SAN FRANCISCO STATE UNIVERSITY

ACADEMIC PROGRAM REVIEW SELF-STUDY, SIXTH CYCLE

DEPARTMENT OF GEOSCIENCES

PROGRAM:

MS in Geosciences

Date:

The enclosed self-study report has been reviewed by the faculty in the instructional unit and is now submitted for external review.

[Signature]

Department Head signature

[Signature]

Date

Dec. 20, 2012

Drafts have been read and deemed ready for external review by:

[Signature]

College Dean signature

[Signature]

Date

13 Mar 13

[Signature]

Associate Vice President Academic Planning and Educational Effectiveness signature

[Signature]

Date

[Signature]

Dean of Graduate Studies signature

[Signature]

Date
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1.0 EXECUTIVE SUMMARY

1.1 Brief history of the program

As of 1989, the Department of Geosciences (Department) was the only department in the College of Science & Engineering (CoSE) that did not have a graduate (MS) program. That year, four new faculty were added to the Department (2 in Geology; 2 in Meteorology), and efforts immediately began to write a proposal to create a graduate program. After several revisions, these efforts were ultimately successful and the program was approved in Spring 1996. The degree was first offered in Fall 1996, when one student enrolled, and the program’s core curriculum was first offered in Fall 1997. During these past 15 years, the MS has matured and grown into a robust, engaging, and effective program, as documented in subsequent sections. By the end of Spring 2012, there were 63 graduates of the MS degree program, including 2 meteorology students who graduated with a MS Special Study degree prior to the start of the Departmental MS program. In September 2012 all graduates were asked to respond to a survey to gauge the level of their satisfaction with the program and to assess the program’s effectiveness (Appendix A). Results indicate a high level of satisfaction with the program.

When first initiated in 1996, the degree was called the MS in Applied Geosciences. Recognizing the need for a small department to limit the scope of subdisciplines offered to students, and recognizing that most of our undergraduate students were obtaining jobs in the environmental industry or in agencies with an environmental focus, we decided to focus on the general area of environmental geosciences, with the aim of training students in fields such as hydrogeology, land-surface processes, neotectonics (active-fault processes), and aspects of physical, synoptic and mesoscale meteorology, including severe weather analysis and prediction. We imagined having a focus on the local San Francisco Bay Area (Bay Area), where our blend of expertise in geology, meteorology, and oceanography uniquely qualified us to address a range of geoscientific problems in a city (San Francisco) where no MS in geosciences had previously existed. A survey of Bay Area geoscience employers and graduates of our undergraduate programs who were working as geoscientists convinced us that the need was great and that graduates of the program would be highly employable.

In our proposal for the new MS program, we requested one new faculty position: in Hydrogeology, a subfield involving studies of water beneath Earth’s surface that is essential to investigations in the general area of Environmental Science. The University complied with our request, once the program had been approved, and in 2001 we hired Matthew LaForce, a hydrogeologist who left the university in 2006 and has since been replaced by Jason Gurdak (starting in 2009). In 2003 we hired Leonard Sklar, whose expertise in geomorphology (surface-water processes) enhanced our ability to offer courses and do research in Environmental Science.

As the number of students grew, and new faculty were hired with specializations in paleo-climate and Himalayan tectonics, our focus shifted and expanded somewhat. In 2007, we decided that the “Applied” modifier was not working well for us, because it
implied a limit to our studies that was not accurate, and because it was difficult for prospective students to find our program because they looked under “g” for geoscience, not “a” for applied. Our proposal to change the name was approved and, since 2010, almost all students have received a degree called simply “MS in Geosciences”. The names of the programs’ core courses (see below) were changed to match the new degree name. Nevertheless, we recognized the need to maintain a restricted focus, so that we could offer students the level of coursework they need to be prepared for employment and/or subsequent graduate education.

From the beginning, we wanted to capitalize on our land-air-sea combination of disciplines to give our students a truly interdisciplinary experience. We had often discussed how we should do more to work together on problems that crossed our various geoscience subdisciplines. With the initiation of the MS program we were able to move this idea forward to make it more of a reality. Many of our students have completed projects that require expertise in at least two of our subdisciplines (geology, meteorology, and oceanography), thus bridging the gap among our disciplines and enabling us to do more interdisciplinary studies.

When the program was initially formed, we decided to create a three-course (9 unit) common core (700-series) that would be taken by all students, regardless of their subdiscipline: Geol/Metr 700 Research Methods in the Applied Geosciences; Geol/Metr 704 Quantitative Methods in the Applied Geosciences; Geol/Metr 708 Seminar in Applied Geosciences Topics. After implementation, we realized some flaws in the structure of the 700-series; we have restructured the sequence several times and now have a 700-series core of courses that works very well to help prepare students do their thesis research and to help them learn about the breadth of the geosciences and think about aspects of the other subdisciplines that could be applicable to their study. Our survey showed a high level of student satisfaction with the 700-series (Appendix A, question 7). Of 32 respondents, 31% rated the core courses as excellent preparation for graduate studies and/or employment, and 38% rated the core courses as very good preparation.

In an effort to boost the oceanography subdiscipline within the Department, and to fill the teaching gap created after Toby Garfield (a physical oceanographer) became Director of the Romberg Tiburon Center (RTC), in 2007 we hired a paleo-climatologist/paleo-oceanographer (Petra Dekens) and in 2008 we hired another physical oceanographer (Tim Janssen). These new faculty expanded the oceanographic research in the Department. Although Tim Janssen left the university at the start of 2012, the Department is currently searching for a new person to fill the position in physical oceanography.

Other units of the University have played important roles in our MS program. Toby Garfield, as Director of the RTC, has helped facilitate stronger connections between the Department and RTC. Tomoko Komada, a faculty member with a joint appointment in the Chemistry Department and RTC, and with a specialization in chemical oceanography, has served as the primary research advisor for two of our MS students, and is on the hiring committee for the position in physical oceanography. Kimberly Tanner, a faculty member in the Biology Department with expertise in science education research, served
as a co-advisor for one MS student who studied student conceptions of weather phenomena across multiple cognitive levels and helped with another student project that included a science education component. Faculty members in the Geography Department with overlapping expertise have contributed to our MS students' research projects and our collaborations with this department have continued to grow. Jerry Davis, in particular, with expertise in geomorphology and GIS (Geographical Information Systems), has been a member of many students' thesis committees. Andrew Oliphant has co-taught and now wholly teaches a course on meteorological and oceanic observing techniques (Metr/Ocen 470; Geol 607). John Monteverdi collaborated with Andrew Oliphant to successfully obtain a NSF Major Research Instrumentation grant (~$700,000) to develop a mobile atmospheric profiling system.

Collaborations outside of the University have also been important for our students and their research. Even without a formal funding process, agencies such as the U.S. Geological Survey (USGS) have provided data, instrumentation, and training that have benefited our students and contributed to the solution of Bay Area problems. These collaborations are described in more detail in Section 10.2 (External Support).

An important aspect of the Department’s MS program is the availability of Graduate Teaching Assistant (GTA) positions, which help students prepare for their future careers by giving them experience preparing course materials and helping students to learn geoscience topics. At least 10 of our 63 graduates are currently in teaching careers at the high school, community college, or university level (Appendix F). At least another 8 of our graduates are currently in PhD programs that may lead to an academic position. We hire our students as GTAs to teach the laboratory component of our introductory geology, oceanography and meteorology courses—typically 10 positions each semester. In addition to teaching experience, these positions help to support MS students who are inadequately funded in our CSU system.

Up until 2010, GTAs did not receive much professional-development support for teaching their laboratory sections, which were courses separate from the lecture component (they still don’t receive much financial support). Materials were outdated or unavailable and GTAs had to work hard to both create materials and teach the labs. In a focus group of present and past GTAs in 2009, they expressed their dissatisfaction with the current situation. As a result, three Geoscience faculty (Grove, Dempsey, Dekens) successfully obtained a grant from the National Science Foundation (NSF) to revise the introductory courses and provide better support to the GTAs teaching the lab. In 2010 the introductory courses were completely revamped to (1) integrate lecture and lab components into a single course (Our Dynamic Earth, Our Dynamic Oceans, Our Dynamic Weather), (2) create new laboratory activities that engage students and help them learn better, (3) create a new computer teaching facility to teach the labs; (4) provide professional development activities to help all instructors (but focusing on GTAs) learn about pedagogical “best practices” and gain support in figuring out how best to run their classes. These innovations have greatly improved the situation for GTAs in the Department, based on formal interviews with them in Spring 2011. The GTAs now have effective teaching materials to use. They also work together with other instructors of
the course, including the instructor for the lecture component, to discuss issues that arise and to make sure the topics are well integrated between the lecture and lab course components. In addition, we have created a one-unit course (Geol/Metr/Ocn 792 Our Dynamic Classroom) that meets each week to discuss teaching pedagogy and provide assistance for specific teaching/learning issues that arise in the students’ classes. Some of the graduate students also benefited by helping to develop and refine the new laboratory materials. For this work they received pay and valuable curriculum-development experience.

The program has now matured into a robust component of the Department. Graduate students are contributing to the teaching mission as GTAs; they are working with faculty to do significant research; and they have elevated the general level of scholarship in the Department. As described in subsequent sections, the number of graduate students has grown to a healthy level, and they are all actively engaged in professional activities that are well preparing them for employment or further graduate studies. This review process, the first since the MS program has achieved a mature level, will help the Department continue to grow and improve the program.

1.2 Brief synopsis of the previous program review recommendations

The Department of Geosciences’ Fifth-cycle Academic Program Review Self-Study Document was completed in July 2004 and the Memorandum of Understanding (MOU) was completed in Fall 2006. The Action Plan in the MOU is summarized below, in terms of the elements that apply to the MS program. In the 2006 MOU the Department was recognized as “in transition from a strongly teaching-based culture to one that emphasizes teaching and research.” The establishment and subsequent growth of the MS in Geosciences program has been an important part of this transition.

Curriculum

1. Assess student-learning outcomes for new (undergraduate) curricula—not applicable to the Sixth Cycle review.
2. “Undertake course-by-course review of paired courses and make the distinction of graduate vs. undergraduate student expectations more explicit in their syllabi.” This has been accomplished and is discussed in Section 2.2 and Appendix B.
3. “The Department will form a broad-based advisory board to periodically review the currency and effectiveness of the programs.” This has been done informally via faculty conversations with employers, but it has not been done formally. However, with our survey in September 2012, we have identified graduates from our MS program who are employed in Geoscience fields and who are interested in serving on an Advisory Board that we intend to create during the next several months.
4. “The Department should adopt an indirect measure of program success by surveying graduating master’s students and their employers.” We did this in September 2012; results are provided in Appendix A and discussed in subsequent sections.
5. A recommendation from our 2004 Self-Study that followed from the MOU of the previous Self-Study and our recognition that the Geosciences fields had become increasingly quantitative, was to “integrate, in a coordinated manner, more basic math, physics, and chemistry principles into the major’s program curriculum.” With the MS program, we have been able to continue the move toward a more quantitative curriculum. We have included a Quantitative Methods course that is required of all MS students and we have hired faculty who have strong skills in math, physics, and chemistry.

Faculty
1. Continue to use portfolios as an assessment tool for undergraduate degree programs—not applicable to the Sixth Cycle review.
2. “The Department should strive to create a careful balance between part-time lecturers and full-time tenure-track faculty and ensure that part-time lecturers are given support to develop as effective educators.” The NSF-funded grant from the Course and Curriculum Improvement (CCLI) program (2010–2102) enabled the Department to offer professional development activities to all Department faculty, but particularly to GTAs and lecturers. We have provided teaching and learning workshops, and a 1-unit graduate course (Our Dynamic Classroom) that all instructors are invited to participate in. Based on formal interviews with lecturers and GTAs, after project implementation, they all feel better supported in their efforts to develop as effective educators. The balance between part-time and tenure-track instructors continues to be a challenge, particularly as the research activity of faculty has increased and the amount of courses they are expected to teach has decreased. This issue will be further explored in a subsequent section.

Students
1. “The Department should organize the co-curricular aspects of the program in a way that differentiates graduate and undergraduate participation. This would include requiring attendance at the Distinguished Speaker Series for graduate students but not for undergraduate students. In addition, the Department should activate the Geology Club for undergraduate students. And it should sponsor at least one social event every year that will bring together potential majors with current majors and faculty in an informal setting.” We have made major strides forward in addressing this recommendation.
   - Distinguishing requirements for graduate and undergraduate students in paired courses (Section 2.2; Appendix B).
   - Attendance at the Distinguished Speaker Series has been made a required part of Geol/Metr/Ocn 700 and 701, two courses that are required of MS students during their first year of studies. As a result of this requirement, many MS students continue to attend during their second year, even though they are not required to. This has had an incredibly positive impact on our Speaker Series, which now occurs every week and is very well attended. Graduate students often meet with the speaker to discuss their research and career opportunities.
The Geology Club has been reactivated to include all students in the Department, not just the geology undergraduates. It is called SMOG (Students of Meteorology, Oceanography, and Geology). The SMOG club has a meeting every week before the Speaker Series. They collect dues and provide pizza for students and faculty who contribute. During this half hour every week, there are abundant opportunities for informal conversations and interactions among everyone in the Department.

2. "The Department should institute an orientation session for entering graduate and undergraduate students." This has been done on a somewhat "ad hoc" basis. We need to formalize this—see recommendations (Section 2.1; Table 2).

Resources

1. "The Department should proceed immediately to reorganize the stockroom and to create a space utilization plan that addresses the long-term needs for offices, storage, labs, and classrooms."
   The Department has made significant progress on this recommendation, with more progress to come during the next several months.
   - With a donation from Doris and David Dawdy, facilitated by Leonard Sklar, the Department took half of the stockroom area and converted it into the "Dawdy Library", which houses David Dawdy's donated professional library and our pre-existing map library, and provides a conference-room-style workspace that accommodates small faculty and student meetings.
   - With the creation of a new field building adjacent to Hensill Hall, we were able to move field equipment out of Thornton Hall and into this building, which is shared with the Biology Department.
   - With a grant from the NSF (to Grove, Dempsey, Dekens in 2010–2012), the Department was able to completely remodel an existing classroom into a computer laboratory that provides a much-improved teaching facility.
   - With Indirect Costs available through Departmental grants, two faculty members (Leech and Dekens) created and implemented a plan to completely remodel an existing laboratory space that was underutilized and convert it into a space for graduate student offices. This room is now a hub of student productivity where students can discuss their research, and GTAs can advise their students and share instructional tips.
   - The Department's current Instructional Support Technician (IST) is retiring at the end of 2012 and the replacement position is currently posted on the University Human Resources web site. We expect to have hired a new technician by the start of the Spring 2013 semester. With this new hire, we will gain tremendous momentum in achieving better organization of the stockroom, field building, and other Departmental space.

Resource support is further discussed in Section 10.0 (Resource Support for the program).
2. “The Department will continue to refine and implement a study that determines the current and long-term Departmental needs for computer labs, technical support, and other technological equipment. From this study, the Department should adopt a long-term strategy for meeting these resource needs.” The Department’s Space and Resources Committee continues to study the existing situation and to suggest improvements. As described in the previous section, there have been many improvements to the Department’s infrastructure. Additional implementations to infrastructure include the following:

- Mary Leech worked with other CoSE departments to write a successful proposal to the NSF that provided funds to purchase a state-of-the-art Scanning Electron Microscope instrument now available for research by all faculty and students within the college.
- Mary Leech is also a member of the CoSE Infrastructure Committee and is helping the college establish a better plan for long-term acquisition and maintenance of technical equipment.
- John Monteverdi collaborated with colleagues in the Geography Department to obtain a NSF major instrumentation grant to develop a mobile atmospheric profiling system.
- With the transition in the Department’s technical staff, we were able to rewrite the position description to include computer support that has not been available within the Department before. We will work with the new technician to improve the support available to Departmental faculty and to better coordinate activities with CoSE staff.
- We now have 4 computer teaching/research labs in the Department. They were created with 4 external grants, 3 from NSF and 1 from NASA. We have adopted an incremental approach to upgrading the labs that has so far been minimally adequate. Each year we use a portion of our equipment allocation to replace the oldest computers, although we are always struggling to keep these systems adequately updated. Dave Dempsey has continued to receive 3 WTU of released time each semester to maintain and upgrade Departmental computers. We expect our new technician to take over part of his responsibilities, starting in 2013.

3. “The Department should make effort to expand the selection of online Geoscience journals available at the University library.” The University library has greatly improved the offering of online Geoscience journals. Many of the major journals are now available online, and any journal articles that are not available can be ordered through our Document Delivery system, without charge.

1.3 Summary of how program meets the standards

Table 2 shows that the program is exceeding the University-wide standards. Details of these standards are discussed in Sections 4.0–5.0.


TABLE 2.

Thumbnail of standards met

<table>
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<th>Indicator</th>
<th>Standard</th>
<th>How standard is met</th>
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<td><strong>3.0 ADMISSION REQUIREMENTS</strong></td>
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<tr>
<td>3.1 Evidence of prior academic standing</td>
<td>3.0 GPA or higher</td>
<td>93% meet standard</td>
<td>19</td>
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<tr>
<td>3.2 Evidence of competent writing</td>
<td>≥ 4.0 GRE Analytical Writing score or SCI 614 (Grad Writing course)</td>
<td>100% meet standard</td>
<td>20</td>
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<tr>
<td>3.3 English prep—non-native speakers</td>
<td>≥ 4.0 GRE or SCI 614 Writing course</td>
<td>100% meet standard</td>
<td>20</td>
</tr>
<tr>
<td><strong>4.0 PROGRAM REQUIREMENTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Number of course offerings</td>
<td>2 grad courses/semester</td>
<td>Average 5/semester</td>
<td>21</td>
</tr>
<tr>
<td>4.2 Frequency of course offerings</td>
<td>At least once/2 years</td>
<td>Once/year</td>
<td>24</td>
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<tr>
<td>4.3 Path to graduation</td>
<td>Published map: can finish in 5 years</td>
<td>90% finish &lt; 3 years</td>
<td>24</td>
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<tr>
<td>4.4 Course distribution on GAP</td>
<td>≥50% grad; ≥30% grad/paired</td>
<td>100% meet standard</td>
<td>25</td>
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<tr>
<td>4.5 Class size</td>
<td>Enroll 8–30; 5–15 for seminars</td>
<td>All but one class</td>
<td>26</td>
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<tr>
<td>4.6 Number of graduates</td>
<td>5/year (average for past 5 years)</td>
<td>Yes</td>
<td>26</td>
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**5.0 FACULTY REQUIREMENTS** | | | |
| 5.1 Number of faculty in program | Minimum of 2 | | 27 |
| 5.2 Number of faculty / concentration | Minimum of 1 | | 29 |

**Program-specific recommendations and standards**

<table>
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<tr>
<th>Recommendations</th>
<th>Standard met?</th>
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<td><strong>6.0 PROGRAM PLANNING PROCESS</strong></td>
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<td><strong>7.0 THE STUDENT EXPERIENCE</strong></td>
<td>Create a more formal orientation for new MS students</td>
<td>36</td>
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<tr>
<td><strong>8.0 THE PROGRAM AND THE COMMUNITY</strong></td>
<td>Send a Departmental newsletter to alumni each year</td>
<td>40</td>
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<td>Create alumni advisory group and plan more alumni activities</td>
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**9.0 THE FACULTY EXPERIENCE**

- Hire positions to increase interdisciplinary/funded research
- Offer more advanced-level courses
- Better coordinate advanced classes with other campuses
- Generate more collaborations at SF State and beyond

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<td>47</td>
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**10.0 RESOURCE SUPPORT FOR THE PROGRAM**

- New science facilities and more technical support
- Provide tuition waivers for Graduate Teaching Assistants
- Generate more internal support from donors
- Fully fund 50% of students

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1.4 Summary of Present Program Review Recommendations

Table 2 shows the program-specific recommendations that arose from the Departmental self-study. The recommendations are also provided in the list below, along with the section within which they are discussed.

- Create a formal orientation for new graduate students, to include teaching workshop for GTAs and field trip within the local area (Section 7.2).
- Send a Departmental newsletter to alumni each year (Section 8.1).
2.0 PROFILE OF THE PROGRAM

2.1 Overview of the program

The MS in Geosciences program is on a growth trajectory since its inception in 1996. The number of students has continued to grow and, as of Spring 2012, there were 63 graduates of the program. The program exceeds the University-wide standards, yet the Department aims to do even better. As anticipated when the program was created, the majority of the program’s graduates go to work for environmental and engineering consulting firms or to teaching positions. In recent years, increasing numbers of the graduates have continued on to PhD programs. The expanding numbers of students and the scope of their interest have led the Department to seek more funding and collaborations, both within the University and beyond.

With the addition, in the past 10 years, of 5 new faculty with increased research expectations, the Department’s ability to fund student research projects has increased. The Department aims to continue this trend and to hire new faculty to replace those who retire during the next 10 years. With the Department’s increasing focus on interdisciplinary studies that integrate our 3 geoscience disciplines, new faculty will be expected to demonstrate a more systems-based approach and to offer rigorous, quantitative research projects and support for the graduate students.

Although there are many financial challenges, the Department has leveraged the resources available in the University and at institutions outside of the University. We expect to continue working with others to improve the infrastructure of the campus and bring it to a level compatible with the quality of the ongoing faculty and student endeavors. The Geosciences Department “in transition from a strongly teaching-based
culture to one that emphasizes teaching and research”, as described in the 2006 MOU for the Fifth-Cycle Academic Program Review, is continuing the transition.

**TABLE 3.**
FTES, FTEF, and SFR for the last five years

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<th>Spring 2008</th>
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<tr>
<td></td>
<td>FTES</td>
<td>FTEF</td>
<td>SFR</td>
<td>FTES</td>
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<tr>
<td>Lower Division</td>
<td>180.3</td>
<td>12</td>
<td>15.03</td>
<td>198.9</td>
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<td>Upper Division</td>
<td>110.6</td>
<td>12</td>
<td>9.22</td>
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<td>Grad Division</td>
<td>7.4</td>
<td>12</td>
<td>0.62</td>
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<td>Total</td>
<td>298.3</td>
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2.2 The program in the context of the academic unit

All Department Programs
In addition to the MS in Geosciences program, the Department currently offers 4 undergraduate degrees and a minor. These programs are listed below, with approximate enrollments.

- MS in Geosciences—26
- BS in Geology—40
- BS in Atmospheric and Oceanic Sciences (with concentrations in Meteorology and Oceanography)—22
- BA degree in Earth Sciences—20
- Minor in Earth Sciences—10

In Spring 2013, the Department will work to consolidate and streamline the undergraduate degree programs. We expect to create undergraduate options that are more interdisciplinary, with a focus on studying the Earth as a system while still providing depth in each geoscience discipline. The degree(s) would have a common core and emphasis choices. This curriculum revision is not expected to have a large effect on the MS program, but it will continue the move toward better integration of our science disciplines.

Table 3 shows FTES (Full-Time Equivalent Student), FTEF (Full-Time Equivalent Faculty) and SFR (Student/Faculty Ratio) for the past 5 years. Lower division FTES is generated primarily by students in our General Education (GE) courses. These courses are taught in larger-sized classrooms, have a higher SFR, and are taught by lecturers, GTAs, and regular Departmental faculty. Many of these courses are where students get attracted to our majors’ programs, and some are gateways to the majors. The Department has 5 long-term lecturers who regularly teach many of our GE courses and who get consistently good evaluations. These courses are also important vehicles for the professional development of graduate assistants (GTAs) who teach many of the labs.

Upper division FTES is generated by GE and majors courses, in about equal amounts. Regular faculty members teach most of the majors’ courses; both regular faculty and lecturers teach the GE courses. Our 300-level courses are those that satisfy students’ Segment III requirement, whereas our 400–600-level courses are required and elective courses for our majors. While the 300-level courses are housed in larger-sized classrooms (40–70 seats), the majors courses are smaller, with typical enrollments of 10–25. The smaller size is essential for the rigorous, field-and-laboratory-based training we provide our students. Most graduate students take at least one of these courses to fulfill their elective requirements. These courses may be strictly undergraduate (up to 6 units allowed on the Advancement To Candidacy—ATC—form), or they may be paired (up to 13 units of paired or strictly undergraduate courses allowed on the ATC).

The MS program generates a small, but important part of total Departmental FTES. These courses are taught by regular faculty members and typically have enrollments of
5–15. Some of the graduate courses are paired with upper-division undergraduate courses, as discussed in the following section.

**Paired Courses**

To be able to offer more elective choices to our students, we have developed some of our upper-division (400-level) undergraduate courses into paired courses that are also available at the graduate (700) level. We have found that paired courses can be beneficial to all students, as long as the different expectations for graduate students are clearly defined. Appendix B provides examples of how faculty in the Department differentiate between the work load and expectations of students in the 400 and 700 levels. Graduate students are typically expected to take a more leadership role in the course by leading class discussion or student groups, to conduct small independent research or pilot projects, to write a literature review for a specific course topic, or to read articles and write summaries that relate course material to their thesis topic.

In the ATC (Advancement To Candidacy) form, students are required to complete 23 of their 30 units at the 700 level. Of these 23 units, at least 17 are graduate level only and 6 may be graduate only or paired. The remaining 7 units (electives) can be either graduate or upper-division undergraduate units.

Most graduates of the program are satisfied with the course offerings (Appendix A—survey results). However, some students, particularly those who go on to PhD programs, feel that the courses were not rigorous enough to prepare them sufficiently well for more advanced studies. The Department has been developing more 700-only courses; in particular we have developed 6 advanced-level courses under the Geol 795 (special topics) category. This enables us to offer more advanced-level courses when there is sufficient student interest; undergraduates can enroll in these courses but only if they are willing to do graduate-level work. These courses provide valuable options to the MS students, in addition to the paired courses.

**Ideal number of students**

Table 4A shows the number of applicants to the program, the number of students that have been accepted, and the number of accepted students that enrolled. The table shows more than the last 5 years, to show how the program has grown over the past 10 years. Admission requirements are discussed in Section 3. We are currently enrolling 7–10 new students per academic year. Table 4B shows the number of students enrolled in the program each year since 1995 (two students completed MS Special Majors in Meteorology prior to the start of the MS in Geosciences program). Table 4B indicates a steady growth in the number of students over the past 15 years. [Note that there are typically about 5 more active students than shown on Table 4B, because there are always some students who have finished their course work but take an extra semester or two to complete their MS thesis.]
Our current number of 25–30 total students, with 7–10 new students each year, is the maximum number the Department can currently handle. Tables 4A and 4B show the growth trajectory of the program. We expect the number of students to grow during the next 10 years, as senior faculty who were hired with lower research expectations retire and new, more research-active faculty that will increase our advising capacity are hired.

**TABLE 4A.**

Number of applicants to the program, students accepted to the program, and students that actually enrolled in the program for the last 5 years

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<th>Number of accepted students that enrolled</th>
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TABLE 4B.
Number of enrolled MS in Geosciences students
(does not include the 5 or more students still in the Department each semester, who have finished their coursework but still need to finish their culminating experience—MS thesis)

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<td>Fall 11</td>
<td>20</td>
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<tr>
<td>Fall 12</td>
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3.0 ADMISSION REQUIREMENTS

3.1 Evidence of prior academic success

During the past five years (Fall 2007–Spring 2012), we are gratified that 46 of the 58 (79%) students admitted into the program decided to enroll (Table 4A). Of the 46 students admitted, 43 (93%) met the minimum 3.0 GPA requirement. The other three students had GPAs very close to the minimum (2.96, 2.94, 2.90) and we requested that they be admitted based on their good GRE scores (with particular emphasis on the Quantitative Reasoning score) and their letters of recommendation. All three of these students produced outstanding MS theses; in fact, two are currently in PhD programs (University of Washington and UC Santa Cruz) and one is employed as a Support Technician/Application Engineer for a company that makes oceanographic instruments.

We therefore do not see any need to change the evaluation process and hope to continue getting exceptions to the 3.0 GPA minimum when other evidence suggests the applicants will be successful in our program.
3.2 Evidence of competent writing

We use the Analytical Writing component of the GRE to assess incoming students' writing abilities (First-level English writing requirement). If students achieve a score of 4.0 or better, we consider them to have adequate writing skills. Of the 46 students who have enrolled during the past five years, 37 of the students (80%) achieved this level. Those students who had a score <4.0 were required to take the SCI 614 (Graduate Writing Skills) course. This course does not count toward students' 30-unit graduate program, but is considered a remedial course. Most of these students have gone on to complete their degree program, or are still in the process of completing their thesis research.

Our Geol/Metr/Ocn 701 course, which is required for all students, is another way for students to improve their writing. In this course they write the proposal for their thesis research; they write numerous drafts and get extensive feedback from the course instructor, their thesis committee members, and their peers in the class. Writing skills are further developed in the 702 course, and in the process of completing and writing the thesis (Geol/Metr/Ocn 897/898). Advisors review numerous drafts of the written thesis, which for most students results in publication in peer-reviewed journals (see further discussion in Section 8.1 and list of student publications in Appendix E).

*We therefore do not see any need for change in our process for evaluating students' writing competency.*

3.3 English preparation of non-native speakers

Only four of the 46 students admitted to the program during the past five years have been non-native speakers. One of the students was a Fulbright Scholar from Poland and had exceptional preparation. She graduated and is now in a PhD program in Florida. The second student was a recent immigrant from Iran who got <4.0 on the Analytical Writing component of the GRE and took the SCI 614 course during her first semester of studies. She completed her degree and is now working at the U.S. Geological Survey. The third student is a legal resident from Palestine who got <4.0 on the Analytical Writing component. She took the SCI 614 course during her first semester and is doing very well in the program. The fourth student is a Turkish citizen with a scholarship from the Turkish Petroleum Corporation; she is currently completing the SCI 614 course.

*Because the number is small, and our program provides extensive one-on-one training, we do not have problems with students who are non-native speakers and do not see any need to change our procedure for these students.*

3.4 Overview of program admissions policy

During the period of Spring 2003–Fall 12 (Table 4A), 0–100% of the applicants each semester were admitted to the program (average=64%). As the program has grown, we have had increasing numbers of applicants, and have become increasingly selective. Of
the 114 students admitted since Spring 2003, 77 (67%) have decided to enroll. Given the relative lack of financial support (e.g., tuition waivers) compared to other universities, this is a reasonable number. Like any department, however, we would like to convince a larger number of the students we admit to attend the University.

*Based on the fact that most students who enroll continue on to graduate from the program, and produce a high quality written thesis, the admissions procedure appears to be working well.*

In the early part of the program’s existence, most students in the program were already living in the San Francisco Bay Area. In recent years, however, students have increasingly been attracted to the program from other parts of the country and the world. Faculty with research grants have been able to provide financial incentives for students to come to SF State and work on their research projects. Unfortunately, tuition waivers have not been available at SF State, even for in-state students. Students’ need to pay for tuition offsets the support we can provide them through grants and employment as GTAs. Other CSU campuses offer tuition waivers to graduate students who are employed as teaching assistants. The lack of tuition waivers on our campus makes it challenging to attract the best students to the Department, because they can get better financial deals elsewhere.

*We want to improve this situation, and attract more students from outside the Bay Area, who choose our program over other research institutions and come to work on funded projects without needing conditional acceptance and additional, prerequisite coursework.*

Another trend has been an increase in the number of students who go on to PhD programs. When creating the program, we anticipated that the majority of students would continue on to a job in teaching or the environmental consulting field. This has largely been the case, as shown in Appendix F. In recent years, however, more students have entered PhD programs.

*Whereas the program, and the course offerings, have worked well for the students who go directly into a job, a new challenge is to figure out how to provide a program that will better prepare students who choose to continue on for more advanced university study.*

### 4.0 PROGRAM REQUIREMENTS

#### 4.1 Number of course offerings

The MS in Geosciences program includes three core courses that are taken by all students. These courses help students prepare for their thesis research and are offered every year (Table 5—700 and 702 in the fall semester and 701 in the spring semester). A summary of the courses is provided below. Our survey of graduated MS students (Appendix A) suggests that these courses are essential elements of the program and valued because they help students prepare for subsequent graduate studies and/or employment.
### TABLE 5. Course Rotation Schedule

Number in cell = census graduate enrollment for course; (# in parenthesis = census undergraduate enrollment; source=SF State Enrollment Analysis: [https://www.sfsu.edu/online/enr_analysis.htm](https://www.sfsu.edu/online/enr_analysis.htm)

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<td></td>
<td></td>
<td></td>
<td>3(3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>G/M/O 756</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>G/M/O 792</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>3</td>
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</tr>
<tr>
<td>Supervisory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>G/M/O 896</td>
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<td>5</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G/M/O 899</td>
<td>6</td>
<td>2</td>
<td>7</td>
<td>9</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Metr 798</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Paired course
**Cross-listed with Chem and Biol (total enrollment >10)
***Converted to GWAR course (undergraduate only)
^New course as of F10 (professional development for GTAs)
#Instructor on sabbatical F11; students given alternative course options

(Note: Course titles available on next page; enrollments are minima because they don’t include CEL or other non-standard situations.)
<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>COURSE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required Courses</strong></td>
<td></td>
</tr>
<tr>
<td>G/M/O 700 (2)</td>
<td>Graduate seminar in Geosciences</td>
</tr>
<tr>
<td>G/M/O 701 (3)</td>
<td>Research methods in Geosciences</td>
</tr>
<tr>
<td>G/M/O 702 (3)</td>
<td>Quantitative methods in Geosciences</td>
</tr>
<tr>
<td><strong>Elective Courses</strong></td>
<td></td>
</tr>
<tr>
<td>Geol 726 (4)</td>
<td>Mineralogy and petrology II</td>
</tr>
<tr>
<td>Geol 741 (4)</td>
<td>Electron microscopy</td>
</tr>
<tr>
<td>Geol 750 (4)</td>
<td>Geomorphology</td>
</tr>
<tr>
<td>Geol 754 (3)</td>
<td>Quaternary climate and soils</td>
</tr>
<tr>
<td>Geol 770 (3)</td>
<td>Neotectonics</td>
</tr>
<tr>
<td>Geol 775 (4)</td>
<td>Hydrogeology</td>
</tr>
<tr>
<td>Geol 776 (3)</td>
<td>Groundwater contamination</td>
</tr>
<tr>
<td>Geol 780 (4)</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>Geol 785 (4)</td>
<td>Ore mineralogy</td>
</tr>
<tr>
<td>Geol 795 (1–3)</td>
<td>Special topics: Global tectonics (3), Hydrogeology expedition (1), Paleoclimatology (1), Rock mechanics in geomorphology (2), Tectonic geomorphology (3), Vadose zone hydrology (3)</td>
</tr>
<tr>
<td>Ocn 710 (3)</td>
<td>Coastal processes</td>
</tr>
<tr>
<td>Ocn 720 (3)</td>
<td>Physical oceanography</td>
</tr>
<tr>
<td>Metr 715 (3)</td>
<td>Remote sensing in the atmosphere and ocean</td>
</tr>
<tr>
<td>Metr 790 (2)</td>
<td>Consulting meteorology and oceanography</td>
</tr>
<tr>
<td>Metr 801 (1)</td>
<td>Weather chart analysis and discussion</td>
</tr>
<tr>
<td>Metr 835 (3)</td>
<td>Analysis and prediction of severe storms</td>
</tr>
<tr>
<td>G/M/O 756</td>
<td>Anthropomorphic climate change</td>
</tr>
<tr>
<td>G/M/O 792</td>
<td>Our dynamic classroom</td>
</tr>
<tr>
<td><strong>Supervisory Courses</strong></td>
<td></td>
</tr>
<tr>
<td>G/M/O 896 (3)</td>
<td>Directed reading</td>
</tr>
<tr>
<td>G/M/O 899 (1–3)</td>
<td>Special study</td>
</tr>
<tr>
<td>Metr 798 (1–3)</td>
<td>Advanced public weather forecasting</td>
</tr>
</tbody>
</table>

The 700-seriers required courses:

- **Geol/Metr/Ocn 700 Graduate Seminar in Geosciences (2 units).** Introduction to the graduate program and research topics in the geosciences. Students are required to attend the Department’s Distinguished Speaker Series, which provides examples of many different research fields. Students observe and evaluate effective oral communication and practice writing with weekly critiques of the Speaker Series. Students develop a plan for attaining specific goals during their graduate work. There are weekly opportunities to network with researchers and professionals, which helps students think about their own thesis research and future careers.

- **Geol/Metr/Ocn 701 Research Methods in Geosciences (3 units).** Students write the proposal for their thesis research. The course helps students think about the
research process, and the steps needed to take a project from initial question to published results. There is a continued focus on improving written and oral presentation skills.

- Geol/Metr/Ocn 702 Quantitative Methods in Geosciences (3 units). Quantitative methods (mainly statistics) that can be applied to geoscientific data. Students take the course in their 3rd semester, when they have data from their own thesis research to analyze.

In addition to the 700-series of required courses, students are required to take 13 units of electives. Elective courses, shown on Table 5, are divided into Geol (geology), Ocn (oceanography), Metr (meteorology); courses that are cross-listed or paired courses are indicated as such. Table 5 indicates that the number of graduate-level courses each semester, including the required 700-series, ranges from four to eight.

The bottom three courses were not included in the numbers above. G/M/O 792 is a course that helps train graduate students who are teaching labs in the Department. G/M/O 896 is Directed Reading. This course works well, particularly when there are 2-4 students working with the same advisor. Directed Reading can be a particularly effective learning tool because students read papers relevant to their research work, discuss them, and write summaries of the research and their analyses. G/M/O 899 is Special Study. It is used when students complete small projects that are “add-ons” to their thesis research. Of the 45 students who enrolled in 899 during the 5-year period (Table 5), 32 were enrolled in only 1 unit of 899, 7 were enrolled in 2 units of 899, and 6 were enrolled in 3 units of 899.

The program more than meets the University requirement to offer at least 2 graduate courses each semester. Nevertheless, we would like to offer more advanced-level courses, because our students, particularly those that go on to PhD programs, are requesting them. This recommendation is further developed in Section 4.5.

4.2 Frequency of course offerings

The only courses that are required for graduation are the 700-series. These courses are offered every year (Table 5). Two–six additional elective courses are offered each semester.

The program more than meets the University standard to offer courses at least once every 2 years. Nevertheless, to satisfy student interest, we would like to offer some of the advanced-level courses more frequently.

4.3 Path to graduation

The Department provides each MS student with a document that outlines program requirements and deadlines (Appendix C). The required courses (700-series) are offered every year and students complete them during their first 3 semesters of study. Elective courses are offered sufficiently often for them to get the 13 units they need to fulfill the
elective requirement. The 6 units of research (G/M/O 897) and 3 units of MS thesis (G/M/O 898) are offered every semester, when students can enroll in these supervisory courses while working on their thesis research with their faculty advisor.

Of the 27 students admitted between Fall 2007 and Fall 2009, 20 have completed their degree and graduated. Times taken by those 20 students to complete the program are provided in the following table.

<table>
<thead>
<tr>
<th>Number of years to graduation</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years</td>
<td>10</td>
</tr>
<tr>
<td>2.5 years</td>
<td>1</td>
</tr>
<tr>
<td>3 years</td>
<td>1</td>
</tr>
<tr>
<td>3.5 years</td>
<td>1</td>
</tr>
<tr>
<td>4 years</td>
<td>1</td>
</tr>
</tbody>
</table>

Eighteen of the 20 students (90%) graduated within 3 years. The student who took 3.5 years was doing research in a topic different than her undergraduate degree and she needed additional preparation to complete her thesis research. The student who took 4 years started a PhD program on the East Coast and this extended somewhat the time it took her to finish.

The 7 students who did not finish were not impeded by the program but by personal factors:
- Severe illness (1 student)
- Change of interest to science education (1 student; got MS at Stanford)
- Decided to pursue career in high-school teaching (1 student)
- Inability to finish thesis for personal reasons (2 students)
- Decided not to pursue MS after one semester (1 student)
- Delayed start of research and now proceeding well (1 student; expected graduation in 2013)

*These data suggest the program provides a path to graduation that enables most students to graduate within 3 years. When they take longer than this, or don’t graduate at all, it is usually because of factors unrelated to the program.*

4.4 Course distribution on Advancement To Candidacy (ACT) form (formerly GAP)

All students in the MS in Geosciences program are required to take 17 units of graduate-level (non-paired) courses—8 units in the 700-series (700, 701, 702) and 9 units of research/thesis (897, 898). Since 17 units = 57% of the graduate program (30 units), every student in the program has met this standard; otherwise, we would not approve the ACT or the Graduation Application. Of the remaining 13 elective units, 6 units (an addition 20%) must be graduate level courses, either exclusively graduate or paired. The remaining 7 units (23% of program units) may be upper-division undergraduate courses.
Since all students meet the University standard, we have no recommendation for change in this area.

4.5 Class size

The courses with only graduate students (G/M/O 700, 701, 702; Geol 756 and 795) typically enroll 6–12 students (Table 5). Only one class (G/M/O 700 in Fall 2011) had less than 5 students. Most of the 700-level courses are run in seminar style.

G/M/O 792 is a seminar-style professional-development course for graduate students who are employed as GTAs. Since initiated, this course has enrolled 2–8 students, but many more attend. Some students don’t enroll because they don’t want to pay for an additional unit (especially out-of-state students and those who are taking it for the second or third time). Other instructors, including regular faculty and lecturers, attend the course but do not enroll.

Paired courses with both graduate and undergraduate students (indicated by * in Table 5), have enrolled a total of 5–24 students. These courses range from having an equal number of graduate and undergraduate students, to having a majority of undergraduate students. Instructors make small changes to the courses, depending on the ratio between the two student populations, to make sure the graduate students are performing at a more advanced level (Appendix B shows distinct expectations in paired courses).

The number of students in graduate courses meets the University standard. The G/M/O 756 and Geol 795 (special topics) courses are the ideal of what we wish to offer to our graduate students—that is, more courses where the graduate students are the majority of the enrolled students. In our survey of graduated MS students (Appendix A), this was their most common suggestion to improve the program.

The Department has moved toward offering more of these non-paired courses. For example, a 6th topic for the Geol 795 (special topics) course was recently approved. We recommend that this trend continue.

4.6 Number of graduates

Table 6 shows the number of students who have graduated from the MS in Geosciences since its inception in Fall 1999 (called Applied Geosciences prior to 2007; first student started in Fall 1998 and graduated Spring 1999). The table shows numbers for all years since the program began to demonstrate how it has grown since its inception. During the past 5 years (Fall 2007–Spring 2012), the program has graduated an average of 7 students, which more than meets the University’s standard of 5 graduates per year.

Seven students per year is an appropriate number of graduates for the current situation in the Department; however, we expect the number to grow because of faculty turnover during the next decade.
TABLE 6A.
Number of program graduates

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Number of Graduates (n=63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995–1996</td>
<td>1</td>
</tr>
<tr>
<td>1998–1999</td>
<td>1</td>
</tr>
<tr>
<td>1999–2000</td>
<td>0</td>
</tr>
<tr>
<td>2000–2001</td>
<td>2</td>
</tr>
<tr>
<td>2001–2002</td>
<td>0</td>
</tr>
<tr>
<td>2002–2003</td>
<td>3</td>
</tr>
<tr>
<td>2003–2004</td>
<td>6</td>
</tr>
<tr>
<td>2004–2005</td>
<td>7</td>
</tr>
<tr>
<td>2005–2006</td>
<td>2</td>
</tr>
<tr>
<td>2006–2007</td>
<td>6</td>
</tr>
<tr>
<td>2007–2008</td>
<td>4</td>
</tr>
<tr>
<td>2008–2009</td>
<td>4</td>
</tr>
<tr>
<td>2009–2010</td>
<td>8</td>
</tr>
<tr>
<td>2010–2011</td>
<td>13</td>
</tr>
<tr>
<td>2011–2012</td>
<td>6</td>
</tr>
<tr>
<td>Five year average (F07–S12)</td>
<td>7</td>
</tr>
</tbody>
</table>

4.7 Overview of program quality and sustainability indicators

The program is relatively new and is continuing to expand and improve. As it has grown, we have been able to offer more courses, and we expect that trend to continue. We have been able to admit most of the students who are qualified for continued studies at the graduate level, and more than two thirds of those admitted are choosing to enter the program. Courses are offered in sufficient quantity and with sufficient enrollments, so that students are not impeded in finishing their studies. In response to student feedback, we intend to continue offering more courses at the exclusively-graduate level, so that students, particularly those who continue on to PhD programs, are better prepared.

5.0 FACULTY REQUIREMENTS

5.1 Number of faculty in graduate program

Table 6B lists the tenured/tenure-track (T/TT) faculty who have been responsible for teaching courses and advising students in the program. Note that 3 of these faculty members have left the Department (Janssen, LaForce, White) and 1 of the faculty members is now in an Emeritus position (Pestrong). The Hydrogeology position (LaForce) was replaced in Fall 2009 with Jason Gurdak. The Department is currently conducting a search to replace the Physical Oceanography position (Janssen). The positions of Pestrong and White have not been replaced, but we hope to replace them during the next several years. Tomoko Komada is a faculty member in the Chemistry Department with a joint position at the Romberg Tiburon Center (RTC); she has taken primary responsibility for advising 2 of our graduate students’ research projects. Toby
Garfield is currently in a 100% administrative position (RTC Director); nevertheless, he has taken responsibility for advising 4 MS student research projects. Of the remaining 10 faculty, all have taken responsibility for teaching graduate-level courses, and 9 have advised at least 1 graduate research project.

The teaching and advising load is thus distributed among the faculty, and there are sufficient faculty to more than meet the University’s standard. But to increase the number of students we can advise, we need more research-active faculty and recommend that we be able to replace the two faculty who have left the Department (one for retirement and one to take a position elsewhere).

**TABLE 6B.**
Faculty involved in MS Program
(Refer to Table 5 for list of program courses)

<table>
<thead>
<tr>
<th>T/T FACULTY</th>
<th>FIELD OF EXPERTISE</th>
<th>COURSES TAUGHT</th>
<th># OF ADVISEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Caskey</td>
<td>Structural geology / active tectonics</td>
<td>Geol 770</td>
<td>6</td>
</tr>
<tr>
<td>Petra Dekens</td>
<td>Paleoceanography / paleoclimatology</td>
<td>G/M/O 700; G/M/O 756; Geol 758*; Geol 795</td>
<td>2</td>
</tr>
<tr>
<td>Dave Dempsey</td>
<td>Meteorology / science education</td>
<td>G/M/O 792</td>
<td>0</td>
</tr>
<tr>
<td>Oswaldo Garcia</td>
<td>Meteorology / air-sea interactions</td>
<td>Metr 715</td>
<td>1</td>
</tr>
<tr>
<td>#Toby Garfield</td>
<td>Physical oceanography / coastal currents</td>
<td>Ocn 720</td>
<td>4</td>
</tr>
<tr>
<td>Karen Grove</td>
<td>Sedimentation and tectonics</td>
<td>G/M/O 701; Geol 754</td>
<td>6</td>
</tr>
<tr>
<td>Jason Gurdak</td>
<td>Hydrogeology / climate impacts on water supply</td>
<td>G/M/O 700; Geol 775; Geol 776; Geol 795</td>
<td>4</td>
</tr>
<tr>
<td>*Tim Janssen</td>
<td>Physical oceanography / coastal processes</td>
<td>Ocn 710; Ocn 720 (formerly Ocn 765)</td>
<td>3</td>
</tr>
<tr>
<td>**Tomoko Komada</td>
<td>Chemical oceanography / organic carbon cycles</td>
<td>(Chem 680 Chemical oceanography)</td>
<td>2</td>
</tr>
<tr>
<td>*Matthew LaForce</td>
<td>Hydrogeology / soils</td>
<td>Geol 775; Geol 776</td>
<td>6</td>
</tr>
<tr>
<td>Mary Leech</td>
<td>Petrology / Himalayan tectonics</td>
<td>Geol 725; Geol 780</td>
<td>4</td>
</tr>
<tr>
<td>John Monteverdi</td>
<td>Meteorology / severe storms</td>
<td>Metr 715, 790, 800, 825, 835.</td>
<td>4</td>
</tr>
<tr>
<td>David Mustart</td>
<td>Petrology / geology lexicon</td>
<td>Geol 785</td>
<td>2</td>
</tr>
<tr>
<td>##Ray Pestrang</td>
<td>Geomorphology / earth and art</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Leonard Sklar</td>
<td>Geomorphology / surface water processes</td>
<td>G/M/O 702; Geol 750; Geol 795</td>
<td>14</td>
</tr>
<tr>
<td>*Lisa White</td>
<td>Paleontology / science education and outreach</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

*Left the university
**Professor in SF State University Department of Chemistry
#Administrative position (100%)
##Emeritus professor
^Revised to undergraduate GWAR course (Geol 458)
Throughout most of the program’s existence, Karen Grove was the Graduate Coordinator. Starting Fall 2011, John Caskey became the Graduate Coordinator, because Grove was on sabbatical in Spring 2012 and starting a term as Department Chair in Fall 2012. The Graduate Coordinator communicates with applicants and the faculty members who would be their potential advisors, facilitates the application and admittance process, and provides academic advice to students before they have chosen an advisor and/or while they are taking prerequisite courses to prepare them for their graduate program. The Department highly values this service and provides the Graduate Coordinator with 2 WTU of released time in the Spring semester, when the work load is greatest (most students are admitted for the fall semester).

5.2 Number of faculty per concentration

There are no formal concentrations in the MS in Geosciences program. In general, students emphasize geology (Caskey, Grove, Gurdak, Leech, Mustart, Sklar), oceanography (Dekens, Garfield, physical oceanographer to start Fall 2013), or meteorology (Dempsey, Garcia, Monteverdi), although student projects have increasingly involved faculty from across our three disciplines and we expect this trend to continue. In particular, we expect to pursue an increasing emphasis on climate and other interdisciplinary studies that combine expertise from all three of our disciplines.

6.0 PROGRAM PLANNING AND QUALITY IMPROVEMENT PROCESS

The program is young (started in Fall 1999) and this is its first comprehensive review. However, we have reviewed aspects of the program along the way and have made appropriate changes. Because the program is small, we are able to deal with issues as they arise and respond appropriately. Below are examples of program assessments that have led to programmatic changes.

(a.) In 2008, we analyzed students’ GRE scores and the degree to which the students had achieved success in the program (i.e., graduated in a timely manner). The table below summarizes the scores of students who completed the GRE after the scoring system was revised to scores out of 800 possible points (previous scores were expressed as %).

<table>
<thead>
<tr>
<th></th>
<th>Verbal score</th>
<th>Quantitative score</th>
<th>Analytical writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>370–740</td>
<td>500–780</td>
<td>3.0–6.0</td>
</tr>
<tr>
<td>Mean (n=25)</td>
<td>580</td>
<td>680</td>
<td>4.4</td>
</tr>
</tbody>
</table>

We examined the correlation between student scores and their graduate school success and concluded that GRE scores are an imperfect predictor of student potential for graduate studies. In general, the Quantitative score was a better predictor than the Verbal score, which reinforced our inclination to weigh that score more heavily. We continue to require the GRE, but look at the scores carefully in light of other evidence (GPA, letters of recommendation, rigor of undergraduate program, etc.).
The GRE analysis also led to a change in the program's writing requirement. Prior to 2008, students met the First-level Writing Requirement by successful completing G/M/O 701 Research Methods (i.e., received grade of A or B). This course emphasizes writing skills as well as research procedures. In response to University concerns that students' proficiency be evaluated prior to entering the program, we changed the requirement to achieving a score of 4.0 or better on the Analytical Writing component of the GRE. Our analysis showed that students with scores <4.0 had gone on to be successful in the program and so we did not wish to deny all of those students entry into the program. Consequently, if other indicators are positive, we have admitted students with scores <4.0 on the condition that they take the SCI 614 (Graduate Writing Skills) course during the first semester of their studies. This change has worked well, based on subsequent success of these students in the program.

(b.) During the first years of the program, we continually evaluated the students' experience in the core courses (700-series). We looked at student evaluations each semester, and also surveyed students when they were graduating, to find out specifically how the courses worked for them (i.e., helped them in their graduate research) and how they could be improved. Based on these responses, we made numerous changes to the courses and their sequence within the program. Based on student evaluations at the end of each semester, and our survey of graduated students (Appendix A), it appears that these courses now meet students' needs.

(c.) One of the most important assessments of the program is the quality of the MS theses that are produced. All students are required to do a comprehensive research project and write a thesis, which can be a standard thesis or a manuscript submitted for publication. The Department has a rigorous procedure that is followed for each student:

(1) The research proposal is thoroughly reviewed by the G/M/O 701 instructor, the student's thesis advisor and two committee members, student peers in the 701 course, and all Department faculty and students when the proposal is presented to the Department as part of the Speaker Series.

(2) The written thesis is extensively reviewed by the student's primary advisor and 2 thesis committee members. Numerous drafts are required and the result is a well-crafted manuscript that is often ready to be submitted for publication. Appendix E lists publications with student authors or co-authors during the past 5 years. The large number of publications demonstrates the high quality of our students' work.

Departmental faculty and students also provide critiques when the research is presented as an oral defense, as part of the Department's Speaker Series.

Student theses are available in the University's library and in the Department of Geosciences. A review of the theses indicates a quality that is uniformly high.

(d.) The other most important assessment of our program is the positions graduates obtain after they complete their studies. This metric is discussed in Section 7.1.
7.0 THE STUDENT EXPERIENCE

Table 7 shows demographic data of students enrolled in the MS program in 2011. These data show a good gender balance, with 63% female students and 37% male students. Looking at all 63 program graduates, the percentages are 45% female and 55% male. These numbers compare favorably with nationwide data; currently, women earn nearly 40% of all geoscience degrees (Status of the Geoscience Workforce 2011, American Geological Institute—AGI).

In terms of ethnicity, MS in Geosciences students are less diverse than SF State graduate students overall, particularly for the male population. This is not surprising, given the national statistics. Despite concerted efforts, in geoscience programs nationwide, less than 10% of geoscience graduates at all degree levels are underrepresented minorities (Status of the Geoscience Workforce 2011, AGI). Compared to other STEM fields, the geosciences confer the lowest percentage of Bachelor’s and Master’s degrees to underrepresented minorities. According to the AGI 2011 Workforce report, less than 7% of Geoscience Bachelor’s degrees are conferred to underrepresented minorities, so our percentages are at least better than the national numbers. Because students must first get a Bachelor’s degree before entering graduate school, the number of applicants from underrepresented minorities will be small until larger numbers of these students complete undergraduate degrees.

**TABLE 7.**
Student demographics (2011)

From SFSU Academic Planning and Development—Ethnicity and Gender Data
https://sites.sfsu.edu/air/acad-inst-research/student/ethnicity

<table>
<thead>
<tr>
<th>Program Student Demographics</th>
<th>SF State Grad Student Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>Native American</td>
<td>0</td>
</tr>
<tr>
<td>African American</td>
<td>1</td>
</tr>
<tr>
<td>Chicano, Mex-Am</td>
<td>1</td>
</tr>
<tr>
<td>Other Latino</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>1</td>
</tr>
<tr>
<td>Filipino</td>
<td>1</td>
</tr>
<tr>
<td>White</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>12</td>
</tr>
</tbody>
</table>
7.1 Assessment of student learning

The programmatic learning objectives (learning outcomes) for the program are the following:

1. Students can access information about previous research that is relevant to their own study, and they can organize that information and incorporate it into their writing (thesis proposal and thesis manuscript).
2. Students can formulate a research question and develop a detailed plan to address their research question.
3. Students can work independently to collect appropriate data and evaluate its quality.
4. Students can use quantitative methods to analyze research data.
5. Students can write clear, well-organized explanations of their research goals, methods, results, and implications.
6. Students can obtain entrance into a doctoral program or find employment in their field of interest.

Table 8 shows how learning outcomes 1–5 are addressed within the curriculum. The first 5 outcomes aim to prepare students to do original research and publish it. The 700-series courses were developed specifically to develop the skills that enable them to meet the learning outcomes. The elective courses are designed to help students acquire content knowledge related to their thesis research. The skills developed during the research process prepare students for their professional career (outcome 6).

**TABLE 8.**
Curriculum Alignment Matrix/Curriculum Map

<table>
<thead>
<tr>
<th>Course</th>
<th>Outcome 1</th>
<th>Outcome 2</th>
<th>Outcome 3</th>
<th>Outcome 4</th>
<th>Outcome 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>G/M/O 700</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>G/M/O 701</td>
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<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>G/M/O 702</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>G/M/O 897</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>G/M/O 898</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

Outcomes 1–5 are introduced in the G/M/O 700 course, which acquaints students with the program and introduces them to the process of geoscientific research, and further developed in the G/M/O 701 and 702 courses, which prepare students to do their thesis research, when they further develop the skills. The process is here explained in more detail; each number corresponds to the learning outcome above.

1. Students are introduced to library tools in G/M/O 700. In G/M/O 701 they gather at least 10 literature references that relate to their thesis research and use these references to write the background section of their thesis proposal. They
learn to use the results of previous investigations to justify the procedure they plan to follow to conduct their own investigation. Students attend the Department’s Speaker Series, where they learn about research done outside SFSU, and they are encouraged to think about how the work presented during those research presentations applies to their own work. As they work on their research (G/M/O 897), they continue to refine their ability to find appropriate references and to integrate information from previous investigations to explain their own results. They also use library tools in many of the content courses they take as electives. This ability should be mastered in the context of the written thesis (G/M/O 898).

2. In G/M/O 700, students are introduced to the process of formulating a research question and developing a plan to address the question. This outcome is especially well developed in the G/M/O 701 course, where students write a proposal for their thesis research. This is a thorough process, where the instructor and research advisor work closely with each student to make sure they have a well-defined question and have explained appropriate methods to address the problem. This outcome is further developed in G/M/O 702, where they work on data from their research project, and in G/M/O 897, where they work on the details of their thesis research. As the project evolves, it is sometimes necessary for students to redefine their research question and to somewhat alter the research plan. This is done in consultation with the faculty advisor and thesis committee. Students also develop this skill by reading journal papers that demonstrate how others have address their research questions. The written thesis (G/M/O 898) is where students are expected to demonstrate mastery of this outcome.

3. In G/M/O 700 students are introduced to the process of collecting and evaluating data. The outcome is developed during the subsequent 700-series courses and during the course of the thesis research, as the student works closely with the faculty advisor, committee members, and other collaborators to learn what data are needed and whether or not they are valuable. In general, students become progressively more independent throughout the research process (897), as they gain confidence in their abilities to make independent judgments. By the time they are writing their thesis (898), students are expected to have mastered the outcome and to be ready for employment or entry into PhD program, where they will be expected to make independent decisions.

4. Students are introduced to quantitative methods in G/M/O 700 and in other content courses they take in the Department. The outcome is developed in G/M/O 701, where students are formulating the methods they will use to address their research question, but especially in G/M/O 702, where they learn about specific quantitative techniques to analyze the data they are collecting as part of their thesis project. The outcome is further developed as they continue to work on their research (897); mastery at the MS level is expected in the context of the written thesis (898).
5. Students are introduced to writing in the geosciences in G/M/O 700. The next 700-series course (G/M/O 701) has a particular focus on helping students to develop their writing skills in the context of writing their research proposal. Writing skills are further developed in G/M/O 702, which has a required report about their use of quantitative methods, and in their elective courses, all of which have a written requirement. During the course of the research (897), writing skills are further developed by the close collaboration between the student and the faculty advisor, who reads multiple thesis drafts and provides extensive feedback, along with thesis committee members. Mastery of geoscientific writing is expected for the MS thesis (898).

Assessment of learning outcomes 1–5 is achieved as follows:

1. The 700-series courses. All 3 courses are required, and students must successfully complete the courses (defined as grade of A or B) before they can advance further in their studies. This process has worked very well, by forcing students to develop their skills as they move through the program. For example, students cannot do their thesis research until they have shown the ability to write a proposal with a well-defined research questions and thorough explanations of the project plan. Appendix G is the cover sheet that accompanies the research proposal, which must be approved by the course instructor, the faculty advisor, and the thesis committee. Students cannot receive a grade for the G/M/O/ 701 course until they have completed the written proposal with signed cover sheet, and presented the proposal orally to the Department as part of the Speaker Series. An analysis of grades in G/M/O 700, 701, and 702 over the past 5 years shows that nearly all students received a grade of “A” (most common) or “A-”, with just a few “B” grades. A few students were unable to complete the requirements of 701 or 702; they received an incomplete grade and finished the requirements in a subsequent semester. Two students were unable to finish their proposal in a subsequent semester and they have left the program.

2. The best assessment of learning outcomes 1–5 is the high quality of the written manuscripts that are produced (MS thesis—G/M/O 898). Most faculty advisors require their students to present their research at a national conference and to produce a written thesis that is ready, or nearly ready, to be submitted to a peer-reviewed journal. This means that the written manuscript must adhere to the requirements of what is expected for professionals in the field, in all aspects. Students are clearly meeting the learning outcomes, as demonstrated by their publishing success. In the last 5 years, nearly all presented their work at a national conference or were co-authors of a presentation (Appendix E). Appendix E also shows the large number of students who are first author (8) or co-author (7) of papers published in peer-reviewed journals. Many more papers are currently in review or nearly ready to be submitted. Publication, which involves a rigorous peer-review process, is the ultimate demonstration of the students’ high-quality work.
Learning outcome 6 is the “capstone” outcome in that, above all, we want our students to go on to have productive careers. Appendix F shows the overwhelming success of the program in achieving outcome 6, which is predicated on the successful completion of outcomes 1–6. Of the 63 graduates of the program, 27 are working as geoscientists for environmental consulting firms or other private companies; 7 are working as geoscientists for government agencies; 13 are working as geoscientists in educational institutions at high school to university levels; and 9 are in geoscience PhD programs at prestigious institutions. Three graduates, after working as geoscientists for ~5 years, transitioned to environmental law (recently passed the bar), “green business” (currently working on a MBA) and business management (Mercedes Benz). Two graduates who were employed in education or consulting took a break to raise their young children; another graduate with young children is teaching yoga and substitute teaching in public school until she can work at a more full-time level. We have lost touch with 3 of the program’s graduates. The success of our graduates in achieving professional employment in the geosciences shows the program has been doing an excellent job of training students, whose generally positive attitudes about the program is reflected in our survey of them (Appendix A).

7.2 Advising

Students are initially advised by the Department’s Graduate Coordinator. During the application process, the Graduate Coordinator helps connect applicants with potential faculty advisors. In general, a student is not admitted unless a Departmental faculty member has agreed to be the student’s research advisor. After a student is admitted to the program, the research advisor becomes the principal advisor. If a student is admitted conditionally, it is the responsibility of the Graduate Coordinator to make sure the conditions have been met. Typical conditions are: must take SCI 614 during first semester of study and/or must take prerequisite courses that do not apply to the courses listed on the ACT (former GAP form). Of the 63 graduates of the program, 11 had undergraduate degrees in a non-geoscience field and had to take a substantial number of undergraduate courses to prepare them for their graduate work. Our experience has shown that these students are highly motivated and get through the program as quickly, or sometimes more quickly, than the students who enter with a geoscience degree. An analysis of the past 5 years shows that, of the 7 students who did not complete their degree, only 1 did not have an undergraduate degree in geoscience. The lack of a geoscience degree is clearly not an impediment and almost all of those students successfully complete the program.

Students also receive advising as part of the 700-series of courses. They are introduced to all components of the program, and the steps they need to follow to complete it, in G/M/O 700 and 701. All requirements are clearly described in a document that is updated every year (Appendix C) and sent to all students via email each semester.

The program courses are offered during the day, when faculty members are readily available to provide advising. Many of our students work, but they do so part time, and have had no problems receiving the advising they need. Many of our students work at a geoscience agency or company that recognizes the need for flexible work schedules.
Students sometimes start to work full time, but only when they are in the final stages of finishing their thesis. This tends to extend the length of time needed to finish, but the students still have access to faculty advising and most still finish their theses. The University’s new policy for continuing enrollment has helped encourage students to finish their theses before starting a full-time job.

_Students’ success in the program (data provided throughout this document) and their positive attitudes (Appendix A) indicate that the quality and quantity of advising is adequate. The only change we propose is to provide a more formal orientation for graduate students before the start of the academic year, when new students are entering the program._

Previously, most of the entering students were living nearby and were already familiar with the University and the region. Now, more students are coming from out of town and they would benefit from a more thorough orientation. We will consider including a field trip to help acquaint newcomers with the local region. The orientation could also include a workshop for new GTAs that would be part of the G/M/O 792 course. GTAs would learn about logistics, University policies, and basics of teaching/learning pedagogy.

### 7.3 Writing proficiency

As indicated above, students’ First Level English Writing proficiency is evaluated by their score on the Analytical Writing component of the GRE, prior to their admission. Once in the program, their writing is again evaluated as part of the G/M/O 701 course, where they write their thesis proposal. Students cannot proceed in the program until they have written a proposal that has been evaluated by at least 4 faculty members (course instructor, faculty advisor, 2 committee members) and by fellow students, and that has been approved by the 4 faculty members.

Students’ Second Level English Writing proficiency is evaluated by their ability to complete a written thesis. As described in Section 7.1, this is a very rigorous requirement. To graduate, each student’s thesis is thoroughly edited and revised by the thesis advisor and 2 committee members. As described in Section 7.1, and shown in Appendix E, students’ writing capability is demonstrated by the quality of their theses and the number of peer-reviewed publications they have produced.

### 7.4 The culminating experience

As explained in the previous sections, all students in the program must complete a research project and write up their results as a thesis that is usually presented at a professional conference and often as a manuscript submitted for publication in a peer-reviewed journal. Appendix E shows the large quantity of publications that have been produced by our students during the past 5 years.
The consistently high quality of the written theses, available in the University library and in the Department office, and the number of publications they have produced, indicates that the culminating experience is rigorous and thorough.

7.5 Overview of program quality indicators

The high quality of the program is indicated by the quality of the MS theses that are produced by every student, the number of students who go on to publish their research results, and by their success in achieving employment after graduation. The ultimate goal of the program is to insure that all graduates are prepared for a professional career. The MS is the preferred degree for most jobs, although students are increasingly choosing to continue on to PhD programs. Of the 63 graduates of the program, 4 have completed a PhD, 8 or 9 are currently in PhD programs, and 1 is doing research at Lamont Observatory in preparation for entering a PhD program next year.

Appendix A provides data from 32 of the 63 graduates’ responses (41%) to questions about the program’s quality. These results sample a higher percentage of graduates who entered a PhD program than the overall percentage, probably because the percentage entering PhD programs has increased in recent years—prior to Summer 2007, only 3 graduates entered PhD programs, whereas 11 have entered PhD program since Summer 2007. Results indicate that 47% rate the rigor of the program as above-average or excellent (question 2). Whereas 35% rate the program’s preparation for additional graduate studies as above-average or excellent (question 3), 50% rate the program’s preparation for employment as above-average or excellent (question 4). This is not surprising, because the program was designed primarily for students who would directly enter employment in the environmental field, broadly defined. As the program has matured, and faculty have been hired who are generating more external funding, more students are choosing to continue on for more advanced degrees.

When asked about the breadth of the program, 48% provided a rating of above-average or excellent (question 1). This reflects the increased diversity of research in the Department, and the increased awareness of multiple disciplines via the Speaker Series and the 700-series of core courses, which were rated as above-average or excellent by 69% of the graduates (question 7). When asked about the elective courses in the program, 12% said they were necessary; 34% said they were very important; and 16% said they were absolutely essential.

Students recognize that the Department is doing the best it can to provide them with an excellent education. When asked about their view of the support they received in the Department; 22% rated the supportive environment as above-average and 75% rated it as excellent (question 5). When asked what they would tell a colleague or potential student about the program (question 10), they had mostly positive responses. Negatives were mainly related to need for more advanced course work and higher levels of funding. These two elements are both included in the Department’s recommendations.
8.0 THE PROGRAM AND THE COMMUNITY

8.1 Professional engagement of students and alumni

Students in the program are completing state-of-the-art geoscience research and they are fully engaged with professional activities in the Department and the community beyond the Department. Specific examples are listed below.

- Most of our students attend professional conferences at regional and national levels and present their research results there (Appendix E).
- Students take particular advantage of the annual Fall Meeting of the American Geophysical Union that meets in San Francisco every December. With ~20,000 attendees, this is the largest international organization for geoscientists. Many students attend the meeting to learn more about developments in the science and to present results of their own research.
- Most of our recent students are publishing their results in peer-reviewed journals (Appendix E).
- While still in school, students get internships with local government agencies, such as the California Water Quality Control Board, USGS, California Geological Survey, and with private industries such as Kennedy Jenks. These internships provide experience with the practice of geoscience in the workplace.
- Students attend job expos such as the AAPG-SEG West Coast Student Expo in southern California where students can present their research and interview with geoscience companies for summer jobs and full-time employment.
- The Department encourages and, when possible, sponsors students to attend regional field trips in the western U.S., such as the Pacific Cell and Rocky Mountain Cell of the Friends of the Pleistocene annual fall field trips. On these scientifically- and socially-engaging trips, students meet alumni from the Department, as well as other students and professionals.
- Graduate students are required to attend the Department’s Speaker Series every week, where they are exposed to a variety of research topics and have the opportunity to talk with speakers about their professional pathways.
- Faculty and students have many collaborators in other departments of the University and with other researchers in the U.S. and in other countries. Examples of these collaborations are listed in Section 10 (Internal and External Support).

Because of the high quality of the students’ research, many have received awards to recognize their work. A partial list for the past 5 years follows.
- Geological Society of America Best Student Poster Award, Cordilleran Section meeting: 2008, 2009.
- Outstanding student presentation award, American Geophysical Union Fall Meeting: 2007, 2008.
- Jane Lewis Fellowship, UC Berkeley for students interested in vadose zone and groundwater research (2012-present).
- Geological Society of America (GSA) Graduate Student Research Grant, 2011.
• G.A. Harris Research Instrumentation Fellowship, sponsored by Decagon Devices, 2011.
• National Center for Airborne Laser Mapping (NSF-funded), Student Seed Grant: 2008.
• 1st Place, Physical and Mathematical Sciences category, SFSU Student Research Competition, 2011.
• SFSU graduate-student representative to CSU-wide research competition, 2008.

After students graduate from the program, the Department maintains contact with alumni. Individual faculty members stay in contact with the students they advised while in the program and, as a result, we have been able to identify current contact information and professional positions (Appendix F) for nearly all of our alumni. Other activities to maintain contacts and engage alumni are listed below.

• In 2011 the Department created a group affiliation for the Geosciences Department on the LinkedIn web site. We have used this site to post information of interest to Department students and alumni.
• Because we maintain an updated list of alumni contact information, we are able to inform them of opportunities, such as employment information of interest to recent graduates.
• In December 2012, we sent to alumni the job announcement for a Instructional Support Technician position in the Department. As a result, some of the alums have applied for the position.
• Faculty and current students maintain contact with alumni at national and regional professional conferences, and at organized field trips in the western U.S.

This is an area where the Department could do much more. The Department has not sent a newsletter to alumni, and no formal events have been organized, for many years. A survey was sent to Department alumni in September 2012 to gauge their interests in alumni affairs. Twenty-five alumni responded; all are interested in having more alumni activities. Fifteen of the respondents (60%) are willing to be part of an alumni council to brainstorm ideas for better involving alumni. When asked what type of alumni involvement would be most valuable, most mentioned networking opportunities, getting news from the Department, and helping current students. Most are interested in helping current students with career advice and help finding internships and jobs.

The program has now reached a mature level, with 63 graduates working in a large variety of geoscience professions (Appendix F). Most of our alumni remain living in the San Francisco Bay Area: they are eager to be more involved with the Department; they want more opportunities to network with each other; and they want to help our current students, based on their own experiences.
We recommend that the Department send a newsletter to alumni once each year and that the Department organize a formal alumni event twice each year, to include the annual Fall Meeting of the American Geophysical Union in San Francisco.

We recommend creating an alumni advisory committee to help plan alumni events and provide curricular and other advice to the Department.

8.2 Civic engagement

"Civic engagement means working to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference. It means promoting the quality of life in a community, through both political and non-political processes" (Civic Responsibility and Higher Education, edited by Thomas Ehrlich, published by Oryx Press, 2000).

Much of the faculty/student research in the Department aims to improve the quality of life for Earth citizens (and in particular, Bay Area residents) by providing better understanding of the natural environment and how it may respond to changes in climate and other factors. Reading the titles of MS students’ theses (Appendix D) shows the variety of studies they do to help improve life on Earth. Many of these studies involve collaborations with local agencies and community groups. Just a few examples are provided below.

- Students and faculty have collaborated with the San Francisco Public Utilities Commission (SFPUC) to better understand the quality and quantity of groundwater that is added to the city’s municipal water supply. Most recently (finished Spring 2012), one of our students studied the effects of low-impact development and climate change on the SF State campus. External funds were obtained to drill wells near Thornton Hall; the new rain garden was also used in the data collection process.
- Students study aspects of environmental contamination; for example, amount of arsenic in Bay Area soils, trace element concentrations introduced into the environment via a local rock type.
- Students have studied stream processes to help salmon restoration processes. One student was funded by the California Regional Water Quality Control Board. He presented his work, which generated a lot of community interest, at a forum in the small town of Pescadero, located south of San Francisco.
- Students have completed studies of river/stream processes with implications for local environmental health, in conjunction with the Department of Water Resources, the Golden Gate National Recreation Area, and CalFed.
- Several students have studied coastal erosion at Ocean Beach, in collaboration with USGS scientists. These investigations have important implications for the western edge of San Francisco, including threats to a water-treatment plant there, and have been widely presented in local newspapers and public forums.
- Many students conduct research in the field of seismic hazards. A current student, for example, has funding from PG&E to study potential earthquake hazard for a
nuclear power plant in southern California. A past student found that the active Serra fault extends northward into San Francisco, the first time this was known. In collaboration with the USGS, several students have studied the San Andreas fault, both onshore and offshore, to better understand how often the fault moves. These studies are often presented at venues open to the public and their scrutiny.

- Meteorology students have studied the frequency and magnitude of severe storms in California. These studies increase awareness of tornadic storms among California residents who don’t know such storms are possible here.
- Graduate students have directed summer projects for local high school students as part of the SF-ROCKS (Reaching Out to Community and Kids with Science in San Francisco) program. They continue to be involved with a new outreach program (METALS) that takes local high school students to national parks in various parts of the country, where they interact with high school students from other states.

8.3 Equity and social justice

The types of student projects described in Section 8.2 aim to bring knowledge about the local environment to all residents. Students and faculty meet with local residents to help them understand their studies, in terms of their implications for water quality, landslide potential, seismic hazard, etc.

Graduate students directed SF-ROCKS projects with high school students from the southeast part of San Francisco, where many people from groups underrepresented in the geosciences live. Student-directed projects aimed at helping the local community, for example, assessing contamination of soil in local playgrounds, assessing water quality in the Herons Head park wetland area. [http://sf-rocks.sfsu.edu/Student_Research.html](http://sf-rocks.sfsu.edu/Student_Research.html).

8.4 Internationalization

MS in Geosciences students are involved in a variety of international efforts, most of which involve research collaborations with scientists in other countries. Examples of internationalization within the program are listed below.

- Students in Jason Gurdak’s Hydrogeology and Water Resources research group have been involved with two international projects about groundwater and climate. The first is a United Nations Educational, Scientific, and Cultural Organization (UNESCO) supported project called Groundwater Resources Assessment under Pressures of Humanity and Climate Change (GRAPHIC), and the second project is Groundwater@Global Palaeoclimate Signals (G@GPS) that is supported by UNESCO, International Geoscience Programme (IGCP), and the International Union for Quaternary Research (INQUA).
- Mary Leech and her students regularly do geologic field research in the Himalayas and Norway and interact with geoscience collaborators there.
- Student travel (Leech advisee) to GKSS Institute, Geesthacht, Germany for professional collaboration in a nanoindentation and EBSD laboratory.
• Faculty (Leech) and students hosted the 25th Himalaya-Karakoram-Tibet workshop at SF State in 2010 (an international workshop with 160 participants from 11 countries that financially supported participants from India, Nepal, Bhutan, and Pakis.

• Faculty (Leech) and students hosted a workshop on the “Future directions for NSF-sponsored geoscience research in the Himalaya/Tibet” at the Romberg Tiburon Center, SF State in 2010 (100 participants from across the U.S. with scientific leaders from China, India, Pakistan, Bhutan, and Nepal).

• Students present their work at conferences that, although located mostly within the U.S., have international attendance. For example, the 2011 Fall American Geophysical meeting included attendees from over 90 countries. Because this meeting is located in San Francisco, many students attend.

• Department has hosted a Fulbright graduate student from Poland, and another international student from Turkey.

• Faculty (Grove and Leech) led a geologic expedition to Chile and Argentina to learn about the geologic evolution of the Andes. Participants included undergraduate and graduate students.

9.0 THE FACULTY EXPERIENCE

9.1 Faculty statistics

Tables 9–12 summarize information about the faculty teaching in the Geosciences Department. As shown on Table 6B, all faculty have been involved with the MS program; almost all have been involved both as research advisors and as instructors for graduate-level courses. Of the 16 faculty listed in Table 6B, one is a professor in the Chemistry Department (Tomoko), one is a full-time administrator (Garfield), and 3 have left the department via retirement or to take a position elsewhere (Janssen, LaForce, Pestrong, White). LaForce’s position has been replaced and a search is currently underway to place Janssen’s position. The positions of Pestrong and White have not been replaced.

We recommend that the Department be able to replace the two positions of two faculty members who have left the University.

Faculty age and rank statistics (Tables 9–10) show a distribution ranging from junior to senior ranks, but with a majority at the senior level, indicting the probability of substantial turnover within the next 10 years. The gender distribution (Table 9) is 27% female and 73% male. Currently, about 40% of PhD degree recipients in the geosciences are female (Status of the Geosciences Workforce 2011, AGI), so we expect to improve the female/male ratio as new faculty are hired. The ethnic distribution (Table 11) is 82% White Non-Latino and 18% Native American or Latino. Unfortunately, <5% of PhD recipients in the geosciences are underrepresented minorities, so the ethnic diversity of the faculty will be very difficult to change.
TABLE 9.
Faculty distribution by Rank and Gender

<table>
<thead>
<tr>
<th>RANK</th>
<th>NUMBER OF FACULTY</th>
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<tbody>
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<td>Professor</td>
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<tr>
<td>Associate Professor</td>
<td>2 male, 1 female</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>1 male, 1 female</td>
</tr>
</tbody>
</table>

TABLE 10.
Faculty Distribution by Age

<table>
<thead>
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<th>AGE</th>
<th>NUMBER OF FACULTY</th>
</tr>
</thead>
<tbody>
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<td>3</td>
</tr>
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</table>

TABLE 11.
Faculty Distribution by Ethnicity

<table>
<thead>
<tr>
<th>ETHNICITY</th>
<th>NUMBER OF FACULTY</th>
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</thead>
<tbody>
<tr>
<td>Native American</td>
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<tr>
<td>Latino</td>
<td>1</td>
</tr>
<tr>
<td>White Non-Latino</td>
<td>9</td>
</tr>
</tbody>
</table>

9.2 Research and professional engagement of the faculty

Of the 11 tenured/tenure-track faculty currently in the department, 4 were hired during the past 10 years (2003–2009: Sklar, Leech, Dekens, Gurdak), with another search currently underway. These 4 faculty, who were hired with reduced teaching loads and higher research expectations, are doing the bulk of the graduate student teaching and advising (Tables 5 and 6B). They all have currently active externally-funded grants to support their research and their students; all have demonstrated grant success even from the highly-competitive National Science Foundation (NSF) programs, including a highly-prestigious CAREER award. They are regularly publishing their research in peer-reviewed journals that are the most prestigious in their field; they every year present talks at local, national and international conferences, and works closely with their students to help them present their research results in written and oral formats.
TABLE 12
Faculty Workload Matrix
(see Table 5 for course titles)

<table>
<thead>
<tr>
<th>Courses</th>
<th>Caskey</th>
<th>Dekens</th>
<th>Gurdak</th>
<th>Leech</th>
<th>Monteverdi</th>
<th>Sklar</th>
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<tr>
<td>*G/M/O 701</td>
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*previously taught by Grove, now Department Chair; 756 to be taught in future by Caskey and/or lecturer
** Rotating topics course; specific choice of topic depends on student demand
***Will be taught every other year by new Physical Oceanographer (to begin Fall 2013)

Faculty hired prior to 2003 continue to be active at some level in the MS program. All teach at least one graduate-level course, and most have advised graduate student research projects (Table 6A and Table 12). Many continue to generate external funding to support graduate students, and all attend professional conferences and maintain professional contacts in their field.

Faculty CVs, with activities during the past 5 years (2007–2012), is provided in Appendix H. Some highlights are provided below. Not included in these lists are the large number of faculty presentations at professional conferences (see Appendix H). Of particular note are the number of presentations and publications that faculty have published with their students (Appendix E).

External Grants in 2007–2012 (not including those that are pending):
- National Science Foundation Grants (Dekens, Dempsey, Grove, Garfield, Leech Monteverdi, Sklar): 12
- U.S. Geologic Survey EDMAP grants to fund student field research (Caskey): 4
- National Earthquake Hazards Reduction Program (Caskey, Grove): 5
- NASA (Sklar): 1
- American Chemical Society, Petroleum Research Fund to fund student research (Dekens): 1

43
California Department of Fish and Game: 3
California Coastal Conservancy: 1
California Bay-Delta Authority (Sklar): 1
California State Water Resources Control Board (Sklar): 1
San Francisco Public Utilities Commission: 1
Nebraska Interrelated Water Management Fund: 2
A variety of equipment grants from various sources (see CVs)
A variety of grants for coastal observation systems (see Garfield CV)
A variety of grants for water projects, mainly from the USGS (see Gurdak CV)

Peer-reviewed Journal Publications in 2007–2012 (not including those in review or the large number of other publications such as maps, workshop proceedings, book chapters, USGS reports—see Appendix H. Note that students are the first author of some papers where faculty are co-authors):

- Nature: 1 co-author
- Nature Climate Change: 1 co-author
- Stratigraphy: 1 co-author
- Geochemistry, Geophysics, and Geosystems: 1 first author
- Paleooceanography: 1 first author
- Journal of Sensors: 1 co-author
- Remote Sensing: 1 co-author
- Journal of Geophysical Research: 10 co-author
- Journal of Acoustical Society of American: 1 co-author
- Tectonophysics: 1 first author
- Groundwater: 1 first author
- Vadose Zone Journal: 1 first author
- Hydrogeology Journal: 1 first author; 2 ao-author
- Environmental Science and Technology: 2 first author
- Water Resources Research: 1 first author; 4 co-author
- Bulletin of American Meteorological Society: 1 co-author
- Journal of Asian Earth Sciences: 1 first author; 1 co-author
- International Geology Review: 1 first author
- Electronic Journal of Severe Storms Meteorology: 1 first author
- Geological Society of America Bulletin: 2 co-author
- Earth Surface Processes and Landforms: 1 first author; 1 co-author
- Gcomorphology: 1 co-author
- International Journal of River Basin Management: 1 co-author
- Journal of Hydraulic Engineering: 2 co-author
- Environmental and Engineering Geosciences: 1 co-author

Faculty honors and other professional activities. A review of faculty CVs (Appendix H) show that they have been recognized outside the University by being elected Fellows (California Academy of Science, Geological Society of America) and officers for professional societies. They are all active members of professional organizations in their subfields. They review manuscripts for journals and proposals for funding agencies, and
serve on editorial boards for professional journals. They are invited to give presentations about their work to universities and institutes at local, national, and international levels. They contribute their service to a wide range of external organizations, and are active in on-campus committees at the Department, College, and University levels. They are involved with outreach activities (on-campus and off-campus) to attract more students to the geosciences and to science careers in general.

9.3 Supervision of culminating experience

In the MS in Geosciences program, the culminating experience for all students is a MS thesis that is based on a research project completed in conjunction with a faculty member. Faculty members have been actively engaged in supervising MS student research (Table 6B. To help offset the large amount of time needed to help students produce their outstanding theses, faculty are provided with 0.5 supervisory (S) units for each student in a supervisory course. These courses are primarily 897 (Research) and 898 (MS thesis). Typically, a faculty member receives a total of 1.5 of S units for each student—two semesters of 897 and one semester of 898. This does not adequately reflect the amount of time devoted to each student, but it does help reduce the teaching load of the research-active faculty. Faculty are also rewarded by the ensuing publications produced with the help of their students (e.g., see number of student co-authored publications during the past 5 years—Appendix E).

9.4 Discipline-specific standards for teaching graduate courses

Graduate-level courses are taught almost exclusively by the tenured and tenure-track faculty in the Department. Standards are maintained by reviewing the syllabi of courses (e.g., paired courses—Appendix B), by reviewing student evaluations for these courses, and by discussing goals and expectations in faculty meetings. Our survey of graduates from the program (Appendix A) indicate a high level of satisfaction with the program and how well it helped prepare them for employment and/or further graduate studies.

Some students, especially those who continue on to PhD programs, express a desire for more advanced-level courses that include rigorous quantitative analyses. We are working toward achieving more advanced-level courses in the following ways:

- Develop more graduate-level-only courses, such as the 795 Special Topics course.
- Coordinate with other geoscience departments, such as San Jose State, to offer courses so that students could commute to the other campus only once per week, with any additional class time met via web conferencing or other remote technique. Our students already take advantage of once-weekly course offerings at Moss Landing Marine Laboratories and at the Romberg Tiburon Center. They also take advantage of the Cross-Registration procedure that enables them to take courses at UC Berkeley for no additional cost.

We recommend that the Department continue to look for ways to expand the number of advanced-level courses we can offer to our students.
We recommend that the Department coordinate advanced-course meeting times with other Bay Area institutions so our students can take advantage of their courses and their students can enroll in our courses.

9.5 Interdisciplinarity

One explicit goal for the MS program, when it was created in the 1990s, was to increase the amount of interdisciplinarity within the Department. Previously, there were two disciplinary “silos” — one in geology and one in meteorology. With the MS program, we have broken down walls between these two disciplines and increased the strength of the oceanography discipline. This has occurred in the following ways:

- All students, regardless of subdiscipline, take the 700 series of 3 courses (700, 701, 702). This provides ample opportunities for students to learn about the other disciplines and to look for ways to incorporate knowledge from them. The courses are taught by faculty from across the 3 disciplines.
- Students are required to attend the Department’s Speaker Series as part of their enrollment in 700 and 701. Speakers in the series span the three disciplines and students are encouraged to consider how each research talk applies to their field. The students also frequently meet with the speaker as part of these courses.
- We have hired faculty doing research that is interdisciplinary and, as a result, have had more thesis committees that include faculty members from across our disciplines. For example, Prof. Gurdak and his students study the effects of climate on groundwater systems, which require expertise in both geology and meteorology. Prof. Dekens and her students study ancient climate using data from oceanic sediments—their investigations require expertise in all 3 of our subdisciplines.
- The MS program has been a vehicle for increased collaborations with colleagues in other Departments. Prof. Komada in the Chemistry Department has expertise in chemical oceanography and has been the primary advisor for 2 MS in Geoscience projects, and served on several other students’ thesis committees. Prof. Davis in the Geography Department, with expertise in surficial processes and GIS, has been an important member of the thesis committees for many of our MS students. Prof. Tanner in the Biology Department provides graduate courses about teaching pedagogy that has been very useful for our students; she has also helped to advise 2 students who did their MS projects in science education research.

We recommend that the Department continue to move toward increasing interdisciplinarity by hiring new faculty who do interdisciplinary studies.

We recommend that all faculty look for ways to collaborate more with others in the Department and in other University departments.
9.6 Overview of faculty quality indicators

The data presented in Sections 9.1–9.5 and in Appendix H indicate a professionally active faculty who are helping their students also become integrated into the professional scientific community.

10.0 RESOURCE SUPPORT FOR THE PROGRAM

10.1 Internal support

Faculty support
Because >50% of the faculty are at the Professor level, considerable turnover is expected within the next 10 years. To sustain the MS in Geosciences program, new faculty are needed who are active in research and can teach advanced courses of interest to the graduate students. The Department is currently able to admit 7–10 students each year.

We recommend that new faculty be hired to replace faculty who have already left the university and who will depart during the next 5-10 years. In particular, we recommend seeking new hires who have interdisciplinary research and who can help to further integrate our 3 geoscience disciplines. With new hires, the number of graduate students admitted can continue to grow.

We recommend that faculty continue to seek collaborations with faculty in other Departments, to build on current collaborations with Chemistry, Biology, Geography, and the Romberg Tiburon Center. These collaborations extend the ability of faculty to advise student projects and expand an interdisciplinary focus.

Clerical and technical staff
The Department has been woefully understaffed, particularly in the area of technical support. This problem will be ameliorated somewhat by the hiring of a new technical support person in 2013. The Department’s Administrative Office Coordinator (AOC) is excellent and does a good job hiring work-study assistants and coordinating most office functions. The CoSE has an excellent staff that helps the Department with a variety of technical and administrative functions. Nevertheless, more staff is needed at the College level to help keep the over-expanding collection of sophisticated instrumentation functioning.

Equipment and supplies
In general, Departmental equipment is inadequate, but it is augmented by resources available in the University and at other institutions (see Section 10.2). At the University level, Department faculty have been involved in two successful efforts to obtain major instruments from the National Science Foundation (NSF).

- Leech (Geosciences), Denetclaw (Biology), Ichimura (Chemistry), Manning (Chemistry), and Teh (Engineering) collaborated on MRI proposal and development of the FE SEM facility in the CoSE.
• Leech and Sklar (Geosciences), Ichimura (Chemistry), and Manning (Chemistry) collaborated on an NSF Instrumentation & Facilities proposal that added equipment to the FE SEM facility and to hire a facility manager. These collaborations and acquisitions are essential for supporting the research of Departmental faculty and students.

Space
The building (Thornton Hall) that houses the Geosciences Department and other science departments is highly inadequate for current research and teaching needs. It was designed for the 1970s when faculty and students were not doing much research, and teaching was done in more formal settings. The current model of integrated faculty/student scholarship, and emphasis on more inquiry-based styles of learning, requires space that is more flexible.

We recommend that the University identify funding sources for new science buildings and ways to provide the technical support that is needed for the level of research being done by our faculty and students.

Faculty financial support
Faculty have taken advantage of internal awards. They have applied for and received Center for Science and Mathematics Education Mini Grants, Faculty International Development Grants, Office of Faculty Affairs and Professional Development travel awards, SFSU Faculty Retirement Association travel grants, and CSU Summer Stipend Awards. The Geosciences Department can only provide ~$300/year for each faculty’s travel expenses, so additional funding at the University level is welcome. Fortunately, the CoSE Dean has worked hard to provide start-up funds for new faculty that are better than at many other CSU campuses. New faculty are also helped by a reduction of their teaching load (to 6 WTU) during the full 6 years of their probationary period.

Student financial support
Students have also taken advantage of internal awards. Numerous small scholarships are available through the CoSE and our students have received a large number of these awards. Notably, during the past 5 years, 3 MS in Geosciences students have received an ARCS scholarship, which provides $10,000 to deserving women graduate students.

At the Department level, graduate students are hired at Graduate Teaching Assistants (GTAs) to teach lab components of introductory geoscience courses. Unfortunately, the payment they receive is only a fraction of the cost of tuition. The CSU allows campuses to fund tuition waivers for GTAs and other campuses are doing this.

We recommend that the University work together with faculty and administrators to figure out a way to offer tuition waivers to the graduate students who are hired as Graduate Teaching Assistants, as allowed by CSU executive order.

Also in the Department, two funds have been made available through the generous support of a Geosciences faculty member (Pestrong Student Award) and an external
donor (Dawdy Student Award). These funds provide small grants (up to $800/semester) to support student research. One complaint of program graduates (survey results in Appendix A) is the lack of sufficient funding to MS students.

*We recommend doing more to raise funds from donors to increase the amount of internal funding available to our students. As part of the increased alumni outreach efforts, we expect to consult with alumni to develop a funding campaign to provide more support to current students.*

10.2 External support

As summarized in Section 9.2, and listed in faculty CVs (Appendix H), faculty have successfully obtained external funding to support their research. These funds not only support research directly, but also provide needed funds to the Department and the College through Indirect Cost Recovery. With expected faculty turnover during the next 5-10 years, the amount of external funding, with support for MS students, is expected to increase.

Currently, the amount of external funding is inadequate for the needs of the students. Although most students find some funding, few are supported with a stipend that is consistent throughout their time in the Department. The lack of tuition waivers available at SF State further adds to the financial burden on our students. Even students that are fully funded must still pay for tuition, which makes our program less attractive than programs elsewhere that offer student packages that include tuition waivers.

*We recommend that faculty work toward a goal of fully supporting at least 50% of the MS students in the Department.*

In addition to support from external grants, faculty have extensive collaborations with scientists at other institutions that help support the research done by students. Examples of these collaborations are provided below.

- Through collaborations with other universities, for example, UC Santa Cruz, UC Davis, UC Berkeley, Stanford University, the University of Arizona, Northern Arizona University, University of Wyoming, Colorado School of Mines, Massachusetts Institute of Technology (MIT), and Moss Landing Marine Labs, students have access to state-of-the-art laboratory facilities not available at SF State. Faculty from these institutions have also served on graduate thesis committees.
- Through collaborations with governmental agencies, for example, U.S. Geological Survey (USGS), NASA-Ames, California Regional Water Quality Control Board, California Department of Water Resources, Calfed, and San Francisco Public Utilities Commission, students get access to publically-available data and analytical facilities. The USGS has been a particularly valuable resource and many USGS scientists have served on our graduate students’ thesis committees. Students have also received partial funding from these government agencies.
- Additional collaborations include companies such as Stillwater Sciences (watershed science).

Students take advantage of other types of external support to fund their research. Some examples are provided below.
- Student travel support for 2 students from the Arizona LaserChron Center, Department of Geosciences, University of Arizona to complete analyses in their LA-ICPMS lab.
- Geological Society of America Graduate Research Grants to at least 8 students.
- Sigma Xi Grants-in-Aid of Research award to 2 students.
- National Science Foundation Graduate Fellowship to 1 student.
- California Desert Research Fund Grants (for research in Death Valley and Mojave Desert) for 6 students.
- NSF MARGINS Distinguished Lectureship Program-sponsored speakers for the Department’s Speaker Series.
- Mineralogical Society of America-sponsored Distinguished Lecturer for the Department’s Speaker Series.

In summary, faculty and students have been proactive in seeking support from both internal and external sources that have ramped up the research level in the Department. This trajectory is expected to continue into the future.
Appendix A.
Survey of MS in Geosciences Graduates—Ranking of Program

Of the 63 graduates of the MS in Geosciences graduates (2002–2012), 51% responded to this survey (32/63). Their responses are provided in the charts below as percentages of those who chose each option.

1. Please rank this aspect of the SFSU MS in Geosciences program: breadth of program.

2. Please rank this aspect of the SFSU MS in Geosciences program: rigor of program.

3. Please rank this aspect of the SFSU MS in Geosciences program: preparation for additional graduate studies.
4. Please rank this aspect of the SFSU MS in Geosciences program: preparation for employment.

5. Please rank this aspect of the SFSU MS in Geosciences program: supportive environment.

6. Please rank the SFSU MS in Geosciences program in terms of overall quality.
7. Please rank the 700 series (700 Graduate Seminar in Geosciences; 701 Research Methods in Geosciences; 702 Quantitative Methods in Geosciences) in terms of how well these courses prepared you for graduate studies and/or employment.

8. How important were the elective courses in your geosciences curriculum?

9. If you are pursuing, or have pursued, additional graduate studies in a geosciences field, what courses or experiences were/are most important to your current work? What area(s), if any, should the Geosciences program add or further develop? [15 of 32 respondents answered this question.]

- I found 701 and 702 to be helpful in different ways. The first course, 701, helped my "scientific writing" and allowed me to be more concise. The second course, 702, was a great background to statistical methods, and I still use much of this today.
- Courses should be separate from and more rigorous than undergraduate. The coursework is not challenging.
- Using math is critical for me right now, and I would suggest the program emphasize that more in the undergraduate and graduate classes. I would also suggest including more computer and programming work for quantitative analysis with large datasets. I am required to do that and I wish I would have gotten more training in programming for geoscience.
• I ended up working in geotechnical engineering. I think that more classes in exploration methods to determine subsurface conditions, hazards assessments for engineering, reading plan drawings and collaborating with engineers, as well as petrology classes would be helpful.

• Geomorphology; Research Methodology

• Most Important: Dynamics and Computer Programming. Further Development: More Dynamics and Computer Programming would have helped me.

• The course work needs serious strengthening. Co-listing classes for grads/undergrads in unacceptable because the course is essentially tailored to the weakest students, and thus becomes an undergrad class. Also the coursework is seriously lacking in quantitative rigor; this doesn’t do the students any favors as they are just unprepared if they go on to get a Ph.D.

• The 700 series was fantastic and was instrumental in helping create a linear path through the masters degree. The research component of the master’s degree was also an important experience that I have carried with me. I think the program needs more classes, and I think the current classes (700 series excluded) need improvement in content and organization.

• The seminar classes and 702 quantitative methods were the most useful. My PhD work would have benefited from more rigorous quantitative classwork and my first journal manuscripts may have been easier if I had gotten more critical review of my writing while pursuing an MS.

• Graduate Level Engineering Geology

• I didn’t get to take one class relevant to my focus, but instead had to take classes just to have credits. This is a crucial criticism I have for the Geoscience MS degree at SFSU. If you are going to have graduate students, you must teach relevant graduate courses. I came into my PhD behind and have had to (and still do) work very hard to stay on par with my fellow graduate students.

• N/A - currently work as an environmental consultant

• I have called on the knowledge I learned in 702 countless times.

• Fieldwork, laboratory research, and writing were most beneficial. More feedback should be given prior to the thesis defense process. Seminars led by professors where students discuss papers relevant to their research may have been helpful.

10. If a colleague or potential student were to ask you about the Geosciences Department at SFSU, what would you tell them?

• That it is a great learning environment since it’s so small. For a MS, I would recommend to check out possible advisors.

• I had an overall great experience with the department. All of the faculty and the students were warm and helpful. I also enjoyed learning about different aspects of Geosciences, including areas that I did not know much about. My first TA appointment was overwhelming, however throughout my time there, the TA’s
were assisted much more and the curriculum was improved in the lab courses. I would recommend this program to anyone.

- Strong department, great faculty, and a supportive environment. I would advise that if they intended to go into the consulting industry, that they collaborate with the engineering department to broaden their skill set.

- Great support to accomplish your goals.

- A good program but focus on a good research advisor and don’t anticipate rigorous coursework.

- I would recommend the program based on the following key points: 1. Location to field areas that provide a variety thesis topics within a relative close proximity to the bay area. 2. Strong learning community - faculty is very supportive, engaged and interested in what you are doing. Support is a key component to completing a thesis which is where most students have a difficult time completing.

- Excellent program. Excellent preparation for a career in the geosciences - in the private sector or in academia.

- I would tell a potential student that if the type of research you are interested is of interest to a faculty member in the department, then it is a good place to be. The department is small enough to provide a lot of attention to graduate students when they need it.

- Great professors, very supportive and enthusiastic.

- I would tell them this was a great program. I highly recommend this program to everyone.

- Great teachers, supportive environment, and good value for the cost of tuition. However, the program is not accommodating for working professionals (i.e., not possible unless they work part-time or have a 100% flexible schedule). Networking opportunities outside of academia are very limited.

- It is a good program provided you know exactly what you want out of it and what you need to do to get it. It is a very friendly department.

- I was able to work part time and to attend school and that I appreciate the flexibility in meeting and enthusiasm of the staff of staff and students in collaborating on projects.

- In short, I tell them how the undergrad program was and is a fantastic program. Concerning the Master’s program in retrospect of completing the degree, I wish that it was more geared at higher learning and not just an extra paper, or other in an undergrad class. All in time.... Thanks

- The program is small but because of this, one on one connections with professors and fellow students are easily made. The professors are engaging and supportive, and courses are interesting and well taught.

- I would recommend it, but advise them to remain self motivated.

- The Geoscience department provides an excellent program emphasizing essential research and communication skills. The professors are not only highly respected researchers in their fields but also passionate educators. I would recommend the program without hesitation.

- There are other universities that may provide broader, more challenging, and comprehensive programs, but Geosci at SFSU provides excellent opportunities for those seeking out alternatives to these other programs.

- Good advisors, poor/non-existent coursework or courses that are basically too
easy.

- Excellent supportive small department! Great diversity of views in both the professors and students.
- Great experience if you have the right advisor.
- The program is generally on par with those offered at other CSUs. My advisor, Leonard Sklar, was exceptional, however, in terms of providing excellent instruction, guidance, grant funding support, and future employment opportunities. The program needs more professors like Leonard who are dedicated to student learning and experiences in the geosciences. An healthy influx of financial support would help improve the program as well (e.g., more elective courses, better equipment, research opps)...!!
- I tell my students and co-workers that SFSU offers an outstanding field component, studies that are in-depth, and a faculty that will go the extra mile to help you succeed. I often recommend SFSU as a choice for undergraduate and Masters level work.
- There are some wonderful faculty there - so depending on who you work with your experience may vary from good to great.
- The instructors are great, the program is good but needs more funding and more 700 series classes.
- I would say it is a close knit, friendly department that is incredibly nurturing, but it is NOT a rigorous program and not a great school if you are continuing on for a PhD. ... but that was my experience.
- The faculty was supportive, I had a great deal of lab experience, a diversity of classes to choose from and it helped me discover my passion for teaching!
- Certainly recommended
- It was a great experience that provided the necessary education and tools to begin my career as a State of California registered Professional Geologist and Certified Hydrogeologist. Specifically, Matt LeForce's Hydrogeology course provided me with the most relevant experience for a career in environmental consulting. The facility was great (with one exception professor; a Harvard Alumnus who would 'mail in' his tedious lectures and who thankfully no longer teaches at SFSU).
- Great program, tight-knit, lots of opportunity, student funding is pretty terrible.
- Graduate students at SFSU can have good or poor experiences based who they have as an advisor. Although good research does happen at SFSU, the Geosciences Department does not have the atmosphere of a serious research institution because few of the grad students are provided financial support (too few faculty can provide stipends for research and TA salaries are not sufficient on their own).
Appendix B.
Expectations for Graduate Students in Paired Courses

GEOL 450/750 Geomorphology (Sklar)
This is a paired course, in which graduate and undergraduate students work together but have somewhat different learning goals and expectations. Graduate students presumably have more experience and advanced skills, and can more easily handle the workload of the undergraduate portion of the course. To provide appropriate graduate-level learning experiences, graduate students will take leadership roles in the concept and landscape groups (including field trip activities), and will conduct a small independent research project and present the results to the class. In addition, problem sets will sometimes have one advanced question required for grad students but optional for undergrads.

Geol 450 Grading (undergrads)
50 Problem sets, reading mini-quizzes, field/lab exercises, in-class activities
5 Class and group participation
20 Concept-Landscape paper
10 Landscape-group presentation
15 Final Exam (comprehensive with emphasis on Landscape-groups presentations)
100 Total points possible

Geol 750 Grading (grads)
40 Problem sets, reading mini-quizzes, field/lab exercises, in-class activities
10 Class and group participation
15 Concept-Landscape paper
10 Landscape-group presentation
10 Final Exam (comprehensive with emphasis on Landscape-groups presentations)
15 Independent mini-research project
100 Total points possible

GEOL 454/754 Quaternary Climate and Soils (Grove)

Course format
Students will have numerous opportunities to demonstrate their learning. Each week students will write summaries of reading assignments and should be prepared to engage in all class discussions. Each student will work together in a group to prepare a research proposal, similar to what would be used to obtain funding from an agency such as the National Science Foundation. Students will be evaluated on their individual contributions and the group will be evaluated on the synthesis of the individual contributions and on the overall quality of the proposal. The proposals will be presented to the class as a mid-term symposium. Additionally, students will submit a report for each weekend field trip. Specific instructions will be provided for the reports and proposal.

Graduate students will be given a more leadership role in the course. They will be the leaders of the proposal groups and they will be expected to collect and analyze some data for a preliminary pilot study, in support of the group proposals. They will also be expected to provide a leadership role on the field trips (more instructions to follow).

GEOL 475/775 Hydrogeology (Gurdak)

Final paper (required for GEOL 775 students only):
Geol 775 students will conduct a "literature review" on a topic in hydrogeology. The purpose of the literature review is to:
- Encourage students to independently gain an in-depth understanding of a specific topic in hydrogeology that is not possible with lectures alone;
- Introduce or reaffirm the importance of a literature review to successful university research;
- Provide another opportunity for students to improve writing skills; and
- Introduce the procedure for submitting papers to a peer-reviewed journal.
Hydrogeology 775 - Requirements for the paper:
1. Papers should consist of about 7 to 10 pages (1.5 line spacing) including the abstract, title page, and "literature cited" section. The paper should include at least 7 articles in the literature cited section.
2. Papers should be submitted in electronic format (Word).
3. The format of the literature review should be similar to that in a topic-review article found in a peer-reviewed journal. I can provide examples if you are unfamiliar with it.
4. Follow the general format and submission requirements of the journal *Ground Water* as though you were submitting your paper for publication (URL provided). a.) A journal-paper style abstract should be included. b.) References should be in the format used by *Ground Water*. c.) The headings and subheadings style of *Ground Water* should be used. In general, your review should include the following sections: Abstract, Introduction, Literature Review (with subheadings as appropriate), Conclusion, and References Cited. Your discussion on the "state of the art" can be incorporated in the literature review section or written into a separate section.
5. You must include a discussion on the state of the art on your topic, as well as suggested areas for future research (and reasons for the recommendations).
6. Grading will be based on technical content, organization, and writing (readability, grammar, spelling, structure, etc.). I will provide tips on scientific writing throughout the semester.

*Suggested Paper Topics (of the many possible—8 possibilities provided)*

**GEOL 476/776 Groundwater Contamination (Gurdak)**

*Course Requirements:*
Grades will be based on class participation, leading the discussions of 2 scientific journal articles (only for GEOL 776 students), lab reports, and completion of a final project.

*Grading GEOL 476 / 776*
Assigned reading and class participation 25% / 5%
Leading discussion of a scientific journal article 0% / 20%
Labs 50% / 50%
Final project 35% / 25%

*Leading Discussions of a Journal Article (776 Students Only):*
GEOL 776 students will lead the class discussion of 2 scientific journal articles during the semester. During the first lab period (Thursday, January 27), 776 students will select papers (see course schedule and iLearn for list) for discussion. Helpful information about leading discussions is posted on iLearn. Grades for leading the discussions will be averaged from professor and anonymous student evaluation forms, which will be made available to each 776 student to use toward improving the 2nd discussion. The purpose of leading the discussions of a scientific journal article is to:
- Expose students to new topics in the field;
- Encourage students to independently gain an in-depth understanding of a specific topic that is not possible with lectures and labs alone; and
- Opportunity for students to develop and practice professional skills, including critical thinking, critical evaluation of published work, effective presentation, oral communication, and leading group discussions.

**GEOL 480/780 Geochemistry (Leech and Gurdak)**

*Grading Policy—GEOL 480 & 780 grading*
Graded in-class problem sets/homework 30%
Midterm exam 30%
Final exam 30%
Participation 10%

Note — 780 students will have additional weekly reading and writing assignments on geochemistry topics related to their MS research. They will read a journal article and write a ~1 page synopsis/synthesis of the paper with specific directions aimed at identifying knowledge gaps that could be a research topic and/or identifying how the paper relates to their thesis research.
**METR 415/815 Remote Sensing of the Atmosphere and the Ocean (Monteverdi and Garcia)**

**Graduate Student Expectations.** The university requires that graduate students taking this course be required a higher level of work product and/or mentoring responsibility. For Lab 1, the students obtaining graduate credit for this course will be required to present the procedures and results for this problem, and will be asked to lead teams of students in joint solution of the question. The quality of the graduate student presentations will be graded by the class (not the solution, of course) as well as by me. As we proceed through my portion of the class, we will continue to use this model, although the group makeup will change for each of the Proctors.

**Grading for those students taking this as Metr 415:**

<table>
<thead>
<tr>
<th>Assignments/Quizzes</th>
<th>Contribution to Overall Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Problems (3 total)</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes (3 total)</td>
<td>30%</td>
</tr>
<tr>
<td>Laboratory Assignments (4 total)</td>
<td>30%</td>
</tr>
<tr>
<td>Inclass Participation</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Grading for those students taking this as Metr 715:**

<table>
<thead>
<tr>
<th>Assignments/Quizzes</th>
<th>Contribution to Overall Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Problems (3 total)</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes (3 total)</td>
<td>20%</td>
</tr>
<tr>
<td>Proctoring Presentations (4 total)</td>
<td>30%</td>
</tr>
<tr>
<td>Laboratory Assignments (4 total)</td>
<td>20%</td>
</tr>
<tr>
<td>Inclass Participation</td>
<td>10%</td>
</tr>
</tbody>
</table>

**METR 535/835 Analysis and Prediction of Severe Storms (Monteverdi)**

**Graduate Student Expectations**

In addition, each graduate student will prepare a version of his or her paper in HTML and will make it accessible to the WWW via the Metr 515/815 Web Site.

Graduate students taking this class will be expected to take a leadership/mentorship role in the group discussions. Each undergraduate student, when possible, will be assigned a graduate student mentor who will serve as resource persona and advisor as the student prepares his or her PowerPoint summary of the article assigned him or her for review.

**Metr/Onn 590/790 Consulting Meteorology and Oceanography (Monteverdi)**

**Graduate Student Expectations**

In addition, each graduate student will prepare a version of his or her final Consulting Report in HTML and will make it accessible to the WWW via the Metr 485/785 Web Site. Graduate students will also present their Consulting Report to the class in PowerPoint presentation format. If possible, I will assign graduate students to act as support for the undergraduate students in the production of their assignments. I will assess Graduate Student Participation on the basis of how well that goes.
Appendix C.

San Francisco State University Department of Geosciences—

Requirements for MS Degree Program in Geosciences

(updated August 2012)

A. Apply to the Graduate Program in Geosciences (see Graduate Studies web site
for application deadlines and procedures, and for downloadable forms:
http://www.sfsu.edu/~gradstdy/).

Courses are scheduled to best accommodate students who begin studies in the Fall
semester; however, students may also be admitted for the Spring semester.

NOTE: If applicants do not have an undergraduate degree in one of the
geosciences, they will be required to take additional coursework that does not
apply toward their graduate requirements.

All students should contact the graduate coordinator and potential faculty advisors
prior to starting the program to establish a proposed plan of study.

B. Summary table of department and university requirements (additional details
about these requirements are provided in separate sections below)

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>WHEN TO DO</th>
<th>2012-13 DATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol/Metr/Ocn 700 (Graduate Seminar)</td>
<td>First semester of study</td>
<td>Fall</td>
</tr>
<tr>
<td>Geol/Metr/Ocn 701 (Research Methods in Geosci.)</td>
<td>Second semester of study</td>
<td>Spring</td>
</tr>
<tr>
<td>Geol/Metr/Ocn 702 (Quant. Methods in Geosci.)</td>
<td>Third semester of study</td>
<td>Fall</td>
</tr>
<tr>
<td>Geol/Metr/Ocn 897 (Research, usually in 2 or 3-unit increments)</td>
<td>After G/M/O 701 (or concurrent if approved by faculty advisor)</td>
<td>Advisor and student arrange meetings</td>
</tr>
<tr>
<td>Advancement To Candidacy (ATC) form</td>
<td>Submitted to Dept (D) &amp; Grad Div (GD) prior to final semester</td>
<td>For Spr 13 grad.: to D—Oct 15 to GD—Nov 1</td>
</tr>
<tr>
<td>Proposal for Culminating Experience form</td>
<td>Submitted to Dept (D) &amp; Grad Div (GD) prior to final semester</td>
<td>Same as for ATC</td>
</tr>
<tr>
<td>Geol/Metr/Ocn 898 (MS thesis)</td>
<td>Last semester—including oral defense &amp; written thesis</td>
<td>Advisor/student arrange meetings</td>
</tr>
<tr>
<td>File application for graduation</td>
<td>Early in semester of graduation</td>
<td>Jan. grad: Sep 20; May grad: Feb 15</td>
</tr>
</tbody>
</table>
C. Written English Proficiency Requirement
   - The First-level Written English Proficiency Requirement is fulfilled by
     obtaining a score of >350 on the Analytical Writing component of the GRE.
     Students who get a score of 350 or less will be required to complete an
     additional course—SCI 614 Graduate Writing Skills.
   - The Second-level Written English Proficiency Requirement is fulfilled by
     satisfactorily completing the written thesis (Geol/Metr/Ocn 898). The
     graduate thesis committee is responsible for insuring that a student has
     demonstrated a high level of writing proficiency in their thesis.

D. Specific information about Geol/Metr/Ocn 700
   - The 700 course is designed to orient students to the graduate program in the
     Geosciences Department.
   - Students also attend the speaker series, discuss current research, and learn
     about important aspects of the research process.

E. Specific information about Geol/Metr/Ocn 701
   - The 701 course is designed to help students prepare for their thesis research
     by writing a detailed thesis proposal.
   - To successfully complete the course, students must:
     1) write a thesis proposal that has been approved by the course instructor and
        the student’s thesis committee;
     2) present the proposal orally to department faculty and students.
   - Cover sheet (obtained from department): the proposal must include a cover
     sheet with signatures of the course instructor and thesis committee members,
     thus demonstrating successful completion of the course requirements.
   - An outcome of the course—student establishes thesis committee:
     1) primary thesis advisor, who must be a faculty member in the Geosciences
        Department;
     2) two additional committee members, one of whom may be a faculty
        member from another SFSU department or from an external agency or
        company. Committee members should have expertise in areas that
        complement the student’s research topic.

F. Specific information about Geol/Metr/Ocn 702
   - The 702 course is designed to help students complete numerical analyses of
     their research data.
   - By taking the class in their third semester, students should have data sets that
     they can use for analysis.

G. Research Units (Geol/Metr/Ocn 897)
   - Students must complete 6 research units. Students enroll in these units
     through the department office. The section number for this course
     corresponds to the faculty member who is the primary thesis advisor.
• Research units are usually taken in 2- or 3-unit increments. To successfully complete these units, students must make satisfactory progress on their research, under supervision of their faculty advisor. If they do not make sufficient progress, they will receive a grade of “RD”, which gives them more time to complete the work.

• Students may begin taking research units after their thesis proposal has been approved (successful completion of Geol/Metr/Ocn 701), or concurrent with G/M/O 701, if approved by thesis advisor.

E. Advancement to Candidacy (ATC) / Proposal for Culminating Experience

• Students must submit the ATC form (obtained from the Graduate Studies website) to the department and Graduate Studies office in the semester preceding registration for the final 6 units of graduate work. The ATC must be approved by the primary faculty advisor and the graduate coordinator in the department, and subsequently by Graduate Studies. The ATC lists all courses to fulfill graduate program (30 units).

• See Graduate Studies website (and table above) for ATC filing deadline.

• Approval of the ATC form advances a student to candidacy for the master’s degree, and to fully classified status if the student was admitted as conditionally classified.

• To change the ATC (or to change a thesis committee member) a student must file a Petition for ATC Substitution or Exception form, including all required signatures, with Graduate Studies.

• Students must also file a Proposal for Culminating Experience Requirement that has been approved by program faculty. This form should be submitted after completing G/M/O 701 (can be submitted together with the ATC).

• Note that students must have a 3.0 (B) average on all ATC courses. Students who do not maintain a 3.0 GPA during their graduate studies will be placed on probation by the university.

F. Human and Animal Subjects Requirements

• Any research that involves human and/or animal subjects requires the approval of the Committee for the Protection of Human Subjects (CPHS) and/or the University Animal Care and Use Committee (UACUC). Approval must be obtained before any research begins that involves these subjects.

• Forms are available from the Office of Research and Sponsored Programs.

• No student is permitted to enroll in the culminating experience course until the research activity has been approved by CPHS or UACUC (if applicable).

• Note that most Geoscience research does not involve human or animal subjects, but if you conduct surveys, this is using human subjects. Almost any type of science education project will require a human subjects review.

G. Graduate thesis (Geol/Metr/Ocn 898) and Oral thesis defense

• This course fulfills the Second-level Written English Proficiency Requirement and the Culminating Experience Requirement of the university.
• Students are not permitted to enroll in this culminating experience course until both the ATC and Proposal for Culminating Experience forms have been approved by Graduate Studies.

• Students must submit, in final format, their approved thesis and Report of Completion of Culminating Experience Requirement form to the department and Graduate Studies (deadline is usually the last day of classes). The thesis must include a cover page that has been signed by all thesis committee members.

  **IMPORTANT NOTE:** Be certain to contact Graduate Studies for thesis format instructions (available online). **Students are advised to take a preliminary draft of the thesis to Graduate Studies prior to the filing deadline, to make sure that all formatting requirements have been followed.**

• As part of the Culminating Experience Requirement (Geol/Metr/Ocn 898), students must present thesis results to the department and answer questions about their research. The defense will be scheduled in consultation with the department chair, graduate coordinator, and thesis committee.

• **Before scheduling the thesis defense, a student must have faculty advisor approval and must have submitted a complete draft of the written thesis to the thesis committee at least five weeks prior to the proposed defense date.** Faculty advisor approval means that the faculty advisor feels that the thesis is near enough to completion and that the results and conclusions are well enough documented and supported to distribute a draft to other committee members for review.

• **Students should allow at least two weeks between the date of their oral defense and the thesis filing deadline to allow time for final revisions based on the thesis committee’s final edits and suggestions, and to allow the faculty advisor time for a final read-through of the thesis.**

• Because the committee must receive a draft five weeks prior to the thesis defense, and because the student should allow at least two weeks between their oral defense and the thesis filing deadline, **students must have an advisor-approved draft to distribute to the committee no later than seven weeks before the thesis filing deadline.**

• Note that, depending on a student’s writing skills, numerous iterations of the thesis draft may be required by the faculty advisor prior to scheduling the oral defense date. Students should therefore be certain to get initial drafts to their faculty advisor early in the semester of their graduation or during the previous semester (see schedule below).

• In addition to submitting a final thesis to Graduate Studies, students must also submit copies to the Geosciences Department and to the thesis committee members. The department requires a bound copy and will pay for the cost.

**H. Applying for graduation**

• Students must file an application to graduate during the semester they plan to graduate. See Graduate Studies web site (and table above) for filing deadline (usually early in the semester).
• Students must file their thesis and a Report of Completion of Culminating Experience Requirement by the last day of instruction.

I. Meeting with the graduate thesis committee
• The student and faculty advisor are responsible for arranging meetings of the student’s thesis committee when needed to address problems that arise or to assess student progress toward research completion.
• Meetings of the thesis committee should be arranged at least once each semester, including the semester when a student’s proposal and oral defense are presented. A final committee meeting will occur after the oral defense.

Note that it is very difficult (probably impossible) to finish the written thesis during a single semester. SEE SCHEDULE BELOW.

J. Schedule to assist student planning for graduation in the desired semester
(Note that this is the schedule students must follow to be certain they will be able to graduate in a particular semester.) Final semester refers to the semester within which a student plans to graduate.

<table>
<thead>
<tr>
<th>DEADLINES</th>
<th>ACTIVITY</th>
<th>FALL 12</th>
<th>SPR 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester prior to final</td>
<td>(1) Submit ATC and Proposal for Culminating Experience form to dept. and Graduate Studies;</td>
<td>Spring 11</td>
<td>Fall 12</td>
</tr>
<tr>
<td>semester</td>
<td>(2) submit thesis intro sections to faculty advisor for review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third week of final</td>
<td>Submit results sections and draft figures (plus rewritten introductory sections) to faculty</td>
<td>Week of</td>
<td>Week of</td>
</tr>
<tr>
<td>semester</td>
<td>advisor for review</td>
<td>Sept 10</td>
<td>Feb 11</td>
</tr>
<tr>
<td>Sixth week of final</td>
<td>Submit discussion/conclusions sections and rewritten previous sections to faculty advisor</td>
<td>Week of</td>
<td>Week of</td>
</tr>
<tr>
<td>semester</td>
<td>for review</td>
<td>Oct 1</td>
<td>Feb 25</td>
</tr>
<tr>
<td>Eighth week of final</td>
<td>(1) With approval of faculty advisor, submit complete draft of thesis to committee members for</td>
<td>Week of</td>
<td>Week of</td>
</tr>
<tr>
<td>semester</td>
<td>review; (2) with committee approval, schedule oral defense in consultation with dept. chair</td>
<td>Oct 15</td>
<td>Mar 11</td>
</tr>
<tr>
<td>(or earlier)</td>
<td>and Graduate coordinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thirteenth week</td>
<td>Present oral defense of thesis—need at least two weeks after defense for: (1) incorporating</td>
<td>Week of</td>
<td>Week of</td>
</tr>
<tr>
<td>of final semester</td>
<td>committee’s final comments; (2) final read-through by advisor; (3) formatting thesis to meet</td>
<td>Nov 26</td>
<td>Apr 22</td>
</tr>
<tr>
<td></td>
<td>Grad Studies requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fifteenth week</td>
<td>Submit written thesis with signed cover page and Report of Completion of Culminating Experience</td>
<td>Due to</td>
<td>Due to Grad</td>
</tr>
<tr>
<td>of final semester</td>
<td>form to Graduate Studies</td>
<td>Grad</td>
<td>Studies May</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Studies Dec.</td>
<td>17 (Aug 16 for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>summer grad)</td>
</tr>
</tbody>
</table>
Appendix D.
MS in Geoscience Theses by Year Completed (n=63)
(faculty advisor in parenthesis)

Spring 2012

Michelle Newcomer, Recharge beneath low impact development and the effects of climate variability (Gurdak)

Brian Stozek, Geophysical evidence for Quaternary deformation within the offshore San Andreas fault system, Northern California (Grove)

Christopher Stumpf, A Comprehensive Survey of Buoyancy and Shear Parameters for California Tornadoes: 1951-2011 (Monteverdi)

Summer–Fall 2011

Eric Donaldson, Geomorphic controls on spatial distributions of cobbles and boulders in stream-channel networks (Sklar)

Dylan Duvergé, Establishing background arsenic in soil of the urbanized San Francisco Bay Region (Gurdak)

Deborah Shulman, Fluid controlled metamorphism of eclogitic pseudotachylite-bearing shear zones, Flakstadey, northern Norway (Leech)

Spring 2011

James Chayka, Quantitative linkages between watershed conditions and mainstem channel characteristics in Lagunitas Creek, northern California (Sklar)

Anita Engelstad, Damping characteristics of wave propagation across the muddy Louisiana shelf (Janssen)

Brent Everett, Pore-scale dual-domain flow and temporal variability in recharge, High Plains Aquifer, USA (Gurdak)

Forrest Horton, Geochronology and zircon geochemistry of greater Himalaya leucogranites in Zanskar, NW India (Leech)

Pariskeh Hosseini, EBSD analysis of partially-eclogitized rocks from the Marun-Keu Complex, Polar Urals, Russia (Leech)

Leah Johnson, Determination of radiocarbon in pore water dissolved organic matter using thermal sulfate reduction (Komada)

Isaac Jones, Wave-driven set-up and surfzone circulation at Ocean Beach, San Francisco, California (Janssen)
Amber Kuss, *Effects of climate variability on recharge in regional aquifers of the United States* (Gurdak)

Sang Pak, *Nonlinear energetics of shoaling gravity waves* (Janssen)

**Summer–Fall 2010**

Leah Feigelson, *Slip rate on the Peninsula San Andreas fault, San Mateo County, California* (Grove)

William Hassett, *Geochemical signature of Himalayan gneiss domes: implications for channel flow* (Leech)

Chelsea Reed, *Upwelling conditions and sea surface temperature off Northern California during early Pliocene* (Dekens)

Dominika Wojcieszek, *Pliocene–Pleistocene climate evolution: was the cooling global?* (Dekens)

**Spring 2010**

Skye Corbett, *A morphodynamic comparison between bedrock and soil-mantle landscapes* (Sklar)

Joshua Goodman, *Post-Middle-Pleistocene tectonic development of the Confidence Hills, Death Valley, California* (Caskey)

Max Hubbard, *Analyses of high-frequency radar data in central San Francisco Bay* (Garfield)

Elizabeth Polito, *Student conceptions of weather phenomena across multiple cognitive levels* (Monteverdi)

**Summer–Fall 2009**

Jill Marshall, *Hillslope rock fragment production: grain size distributions, abundance and climatic influences* (Sklar)

Peter Polito, *Experimental investigation of fluvial incision on Titan by low-velocity sediment impacts* (Sklar)

Jonathon Polly, *Harnessing natural C isotopes to understand organic matter transformations in estuarine sediments* (Komada)

Beth Zygielbaum, *Temperature Effects on Ice Strength Properties: Implications for Erosion Resistance on Titan* (Sklar)

**Spring 2009**

Brian Fuller, *Feedbacks between biotic and abiotic influences on travertine deposition, Fossil Creek, Arizona* (Sklar)
Heather Green, Neotectonic investigation of the southern Death Valley fault zone, southeastern California (Caskey)

Terry McGuire, Stratigraphic investigation of the North Westside Basin of San Francisco and northern San Mateo County (Grove)

**Summer–Fall 2008**

Kristen Wood, Hydrogeologic characterization of the Northern Westside Basin, San Francisco, California (Grove)

**Spring 2008**

Matt Gough, An analysis of HF-radar measured surface currents, Gulf of the Farallones, California (Garfield)

Gina Lee, Geomorphic Expression of Differential Uplift, Point Reyes Peninsula, Marin County, California (Sklar)

Bob Sas, Road failures and related hazards along the Blue Ridge Parkway, North Carolina (Sklar)

**Summer–Fall 2007**

Robert Humphries, Laboratory simulation of gravel augmentation downstream of dams: the effect of hydrographs on sediment pulse dynamics (Sklar)

**Spring 2007**

Jessica Fadde, Temporal and spatial effects of gravel augmentation on rivers: a flume study (Sklar)

Eric (Rick) Ford, Burdell Mountain stratigraphy and implications for long-term slip along the East Bay fault system, California (Caskey)

Jeffrey Hansen, Quantifying reach response to episodic large wave events, Ocean Beach, San Francisco, California (Garfield)

Andrew Matthew, Serpentine soils within the Presidio, California: a return to serpentine prairie land (LaForce/Grove)

**Summer–Fall 2006**

Chris Baldassari, Geochemical analyses and a hydrogeological investigation to identify sources of groundwater contamination at five northern California landfills (La Force)

Glen Leverich, The morphological effect of variable flow discharge on a meandering river model (Sklar)
Spring 2006


Summer–Fall 2005

Mary Snow, *Sediment supply and transport in tidal marsh channels, Suisun Marsh* (Sklar)

Spring 2005

Robert Davies, *Comparison of Mammutthus primigenius and Mammutthus columbi M3 molars* (White)

Joe Farrow, *Lithologic Influence and Experimental Variability in Gravel Abrasion: Implications for Predicting Rates of Downstream Fining of River Bed Sediments* (Sklar)

Chimi Yi, *Depositional and deformational history of the Colma and uppermost Merced and Formations, southwest San Francisco* (Grove)

Summer–Fall 2004

Peter Gorman, *Temporal and Spatial Variability of Hydraulic Conductivity in the Russian River Streambed, Sonoma County, California* (LaForce)

Matthew Horrigan, *The Etymological Dictionary of Geology* (Mustart)

Kasha A. Parker, *Surficial sediment distribution and changes in the central San Francisco Bay* (White)

Anne Marie Scherer, *Geographic information analysis of Quaternary marine terraces, Point Reyes peninsula, California* (Grove)

Spring 2004

Kristin Hepper, *A new cold seep locality in the Mesozoic Great Valley Group, Guenoc Ranch, northern California* (White)


Zita Maligia, *Hydrological reconstruction of extinct thermal spring systems using Hydrobiid snail paleoecology* (White)

Ted Schlaepfer, *Documentation of a Tornadic Supercell in the San Joaquin Valley, California* (Monteverdi)

Megan Simpson, *Background Trace Element Concentrations in the Franciscan Formation San Francisco, California* (LaForce)
Summer–Fall 2003

Charlotte Hedlund, *Hydrogeology and Geochemistry of the Northern Groundwater Basin, San Mateo County, California* (LaForce)

Spring 2003

Erdmann Rogge, *Hydrostratigraphy of the Westside Groundwater Basin, San Francisco and San Mateo Counties, California* (LaForce)

Summer–Fall 2002

Drew Kennedy, *Rapid late Pleistocene uplift and evidence for mid to late Holocene movement on the Serra fault, northern San Francisco Peninsula* (Caskey)

Carolyn Randolph, *Neotectonic investigation of the southern Rodgers Creek fault, Sonoma County, California* (Caskey)

Spring 2001


Summer–Fall 2000

Julie Monet, *Liquefaction susceptibility in the San Francisco South and Hunter’s Point 7.5-minute quadrangle* (Caskey)

Spring 1999

R. David Morris, *Petrology of Franciscan Complex eclogites from Mendocino County, California: a new locality* (Mustart)

Spring 1996

Kathy Pagan, *Detection of polar stratospheric clouds over Antarctica using AVHRR satellite imagery* (Garcia)
Appendix E.
MS in Geosciences Student Publications (2007–2012)
Bold face=MS student co-authors; Underlined=Geoscience Department co-authors

PRESENTATIONS AT CONFERENCES (Abstracts)

2012

Petra S. Dekens; Kathryn Kynett; Dominika E. Wojcieszek, Plio-Pleistocene records from the South East Atlantic reveal changes in the Agulhas leakage, 2012 American Geophysical Union (AGU) Fall Meeting, December 3-7.

Carla Rosa; Rufus D. Catchings; Michael J. Rymer; Karen Grove; Carol S. Prentice, 2012, Near-surface structure of the 1906 main trace of the San Andreas Fault, San Francisco peninsula segment, California, 2012 American Geophysical Union (AGU) Fall Meeting, December 3-7.


Newcomer, Michelle E., Jason J. Gurdak, Climate variability effects on urban recharge beneath low impact development, 2012 American Geophysical Union (AGU) Fall Meeting, December 3-7.

Steele, G.V., Gurdak, J.J., Hobza C., and Lauffenburger, Z.H., 2012, Groundwater movement through the unsaturated zone of the High Plains aquifer in the Central Plate Natural Resources District, Nebraska, Geological Society of America (GSA) annual meeting, Abstracts with Program vol. 44, no. 7, Charlotte, North Carolina, 4-7 November.


Leech, Mary, Deborah J. Shulman, FLUID-CONTROLLED METAMORPHISM OF ECLOGITIC PSEUDOTACHYLITE-BEARING SHEAR ZONES, FLAKSTADØY, NORTHERN NORWAY. 2012 American Geophysical Union (AGU) Fall Meeting, December 3-7.

Jonathan D Beyleer, Leonard S Sklar, Clifford S Riebe, Combining natural experiments in source lithology with laboratory tumbling to quantify sediment resistance to comminution and its role in downstream fining, 2012 American Geophysical Union (AGU) Fall Meeting, December 3-7.

Leonard S Sklar, Jonathan D Beyeler, Geoffrey C Collins, Joseph W Farrow, Leslie Hsu, Kimberly L Litwin, Peter J Polito, Laboratory experiments for defining scaling relations between rock material properties and rock resistance to erosion, 2012 American Geophysical Union (AGU) Fall Meeting, December 3-7.


2011


2010


Wojcieszek, D., Dekens, P. S., 2010. Climate history in the south Atlantic subtropical gyre over the last 4 Ma. 2010 American Geophysical Union Fall Meeting


Stozek, B., and Grove, K., 2010, Geophysical evidence for Quaternary deformation within the offshore San Andreas fault system, Point Reyes Peninsula, California: American Geophysical Union, Fall 2010 meeting, abstract #T33B-2226.


Beyeler, J.D., and L.S. Sklar, 2010, Bedrock resistance to fluvial erosion: the importance of rock tensile strength, crystal grain size and porosity in scaling from the laboratory to the field, Eos Trans. AGU, 91(52), Fall Suppl., Abstract EP41D-0740.


2009


Goodman, Joshua T., and Caskey, S.J., Constraints on the post-middle-Pleistocene tectonic development of the Confidence Hills, southern Death Valley, California, American Geophysical Union, Fall Meeting, 2009, Abstract # T33C-1925.

Reed, C.M., Dekens, P.S., White, L.D., 2009. Sea Surface Temperature and Upwelling Conditions off Northern California Coast During the Early Pliocene. 2009 American Geophysical Union Fall Meeting.


2008

Lackey, Heather Green, and Caskey, S. John, Neotectonic Investigation of the Southern Death Valley Fault Zone, San Bernardino County, California, GSA Abstracts with Programs, Annual GSA Meeting, Houston, TX, 2008.


2007


Fuller, B.M., L.S. Sklar, Z. Compson, K. Adams and J. Marks, 2007, Tracking the vertical growth of travertine dams following restoration of flow to Fossil Creek, Arizona, Biennial Conference on Research on the Colorado Plateau, Flagstaff, Arizona, October

**PEER-REVIEWED PUBLICATIONS**

**In preparation (near submission)**


**In Review**


Horton, F. and Leech, M.L., Geochronology and zircon geochemistry of leucogranites from Zanskar and the Karakoram shear zone, NW India, Lithosphere.


*Leech, M.L.* and Hassett, W.C., in review, Comparing three gneiss domes from the western and eastern Himalaya: The Leo Pargil, Renbu, and Yalashangbo domes, Contributions to Mineralogy and Petrology.
In Press

Published 2012


Published 2011


Published 2010


Published 2009


Published 2008

Appendix F.
Positions of MS in Geosciences graduates (1996–2012)

<table>
<thead>
<tr>
<th>Position type</th>
<th>Specific position</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher education teaching &amp; research / geoscience education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assoc. Prof., Chico State University, CA (PhD)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Asst. Prof., University of Western Australia (PhD)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lecturer, San Francisco State, CA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lecturer, Sonoma State University, CA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Professor/Chair, Eastern Arizona College, AZ</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Professor, Merced College, CA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>High school teacher, Nuevo School, CA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>High school teacher, Notre Dame, Salinas, CA</td>
<td>1</td>
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</tr>
<tr>
<td>Geoscience educator, Lawrence Berkeley, CA (PhD)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lab Manager, CalTech, CA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Staff Scientist, University of Texas, Austin, TX</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Project coord., teacher development UT Austin</td>
<td>1</td>
<td></td>
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<tr>
<td>Research position at Lamont Observatory, NY</td>
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<td></td>
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<tr>
<td>Geologist/geomorphologist—public agency</td>
<td></td>
<td></td>
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<tr>
<td>Desert Research Institute, Reno, NV</td>
<td>1</td>
<td></td>
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<tr>
<td>U.S. Geological Survey, Menlo Park, CA</td>
<td>3</td>
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<tr>
<td>Sonoma Ecology Center, CA</td>
<td>1</td>
<td></td>
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<tr>
<td>Geologist/geomorphologist/geohydrologist/geophysicist/project manager—environmental consulting company</td>
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<tr>
<td>Sanders &amp; Assoc Geotechnical Engineering, CA</td>
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<tr>
<td>HERTZ environmental, CA</td>
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<tr>
<td>Balance Hydrologics, CA</td>
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<tr>
<td>PES Environmental, CA</td>
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<tr>
<td>AGS environmental/geotechnical, CA</td>
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<tr>
<td>TechLaw environmental, CA</td>
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<tr>
<td>Environmental Resources Management (ERM), CA</td>
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<tr>
<td>Stillwater Sc, CA</td>
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<tr>
<td>Erler &amp; Kallnowski Consulting (EKI), CA</td>
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<tr>
<td>Golder Associates, CO and CA</td>
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<tr>
<td>Fugro Consultants, CA and Hong Kong</td>
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<td>Environmental Science Associates (ESA), CA</td>
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<tr>
<td>Whetstone Associates, CO</td>
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<td>MWH water engineering, CO</td>
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<tr>
<td>CH2MH Hill (consulting firm)</td>
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<td>Geometrics, CA</td>
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<td>Geotechnical consultants, Inc (GTC)</td>
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<tr>
<td>Independent geotechnical consultant</td>
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<tr>
<td>Geologist—petroleum company</td>
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<tr>
<td>Chevron, Houston, TX</td>
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<tr>
<td>SAIC at Chevron, CA (environmental applications)</td>
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<tr>
<td>Oceanographer</td>
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<tr>
<td>SonTek/YSI, San Diego, CA (tech support engineer)</td>
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<tr>
<td>CODAR Ocean Sensors, CA (tech support engineer)</td>
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<tr>
<td>Pinnacle Technologies (modeler using Matlab)</td>
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</tr>
<tr>
<td>Meteorologist</td>
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<td></td>
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<tr>
<td>PG&amp;E</td>
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<tr>
<td>NOAA (National Oceanic &amp; Atmospheric Admin)</td>
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<tr>
<td>Bay Area Air Quality Management District</td>
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<tr>
<td>Category</td>
<td>Institution</td>
<td>Count</td>
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<tr>
<td>--------------------</td>
<td>--------------------------------------------------</td>
<td>-------</td>
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<tr>
<td>Student</td>
<td>MBA program—Presidio Business School, CA</td>
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<tr>
<td></td>
<td>PhD program—University of Miami, FL</td>
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<tr>
<td></td>
<td>PhD program—University of South Florida, FL</td>
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<td></td>
<td>PhD program—University of Maine, MA</td>
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<tr>
<td></td>
<td>PhD program—University of Oregon, OR</td>
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<tr>
<td></td>
<td>PhD program—University of Washington, WA</td>
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<tr>
<td></td>
<td>PhD program—University of CA, Santa Barbara, CA</td>
<td>2</td>
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<tr>
<td></td>
<td>PhD program—University of CA, Santa Cruz, CA</td>
<td>1</td>
</tr>
<tr>
<td>Non-geoscience</td>
<td>Attorney—Alexander Community Law, CA</td>
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<tr>
<td></td>
<td>Manager Business Innovation—Mercedes Benz</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Substitute teacher / Yoga instructor / mother</td>
<td>1</td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
APPENDIX G.
Department of Geosciences
San Francisco State University

PROPOSAL FOR MASTER'S RESEARCH AND THESIS (GEOL/METR/OCN 897/898)

1. NAME: __________________________ First ______ Middle ______

2. STUDENT # _______________________

3. THESIS TITLE (ATTACH PROPOSAL: 8–10 pages of text plus figures)

4. REVIEW AND APPROVAL OF WRITTEN MASTER'S THESIS PROPOSAL

THESIS ADVISOR: (Must be Tenured or Tenure-track in the SFSU Department of Geosciences)

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

THESIS COMMITTEE (In addition to Thesis Advisor, choose two geoscientists with expertise relevant to proposed thesis topic; one can be from outside the SFSU Department of Geosciences; third member is optional)

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
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<td>b.</td>
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<tr>
<td>c.</td>
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</tr>
</tbody>
</table>

5. STUDENT HAS SUCCESSFULLY COMPLETED GEOL/METR/OCN 701 REQUIREMENT

Signed:
G/M/O 701 Instructor __________________ Date completed

6. Signed: __________________________ Date

Student Applicant __________________

1. DATE SCHEDULED FOR ORAL DEFENSE OF THESIS PROPOSAL ________ DATE ______

2. ORAL DEFENSE TO DEPARTMENT COMPLETED:

Date ______ G/M/O 701 Instructor or Graduate Coordinator ___________ Thesis Advisor ___________
Appendix H.
Faculty 5-year CVs (2007–2012)

S. JOHN CASKEY

EDUCATION

Ph.D., University of Nevada, Reno, 1996. GPA 4.0. Dissertation: Surface Faulting, Static Stress Changes, and Earthquake Triggering During the 1954 Fairview Peak (M5.7) and Dixie Valley (M6.8) Earthquakes.


B.A. Geology, Humboldt State University, Arcata, California, 1987. Distinction and Honors (Magna Cum Laude).

PROFESSIONAL EXPERIENCE

Associate Professor, San Francisco State University, August 1998–present; Courses taught include Structural Geology, Neotectonics, Earthquakes and the San Andreas fault, Field Methods, Graduate Student Seminar, Physical Geology, and the Geology of California. Earned tenure and promoted from Assistant Professor August 2004.

Assistant Research Professor, Center for Neotectonic Studies, University of Nevada, Reno; NSF and USGS funded geologic and geophysical investigations in the Central Nevada Seismic Belt, 8/97-present.

Instructor, Humboldt State University, Arcata, CA, Summer 2007. Summer Field Geology course for undergraduates, focusing on regional stratigraphy and tectonics of the Basin and Range province.


Teaching Assistant, Four years experience in courses at the University of Nevada, Reno (Summer Field Geology, 1989-1991 and Structural Geology, Fall Semester, 1990) and Humboldt State University (Applied Geophysics, Spring Semester, 1987).


PUBLICATIONS

Peer-reviewed Technical Reports


Published Maps


Workshop Proceedings and Presentations


Presentations of Research at Professional Meetings (Published Abstracts)


Co-authored Published Abstracts


Magary, Katharine L., and Caskey, S. J., Constraints on original elevations of high-level Lake Manly shorelines during recent pluvial cycles, Death Valley, CA, GSA Abstracts with Programs, 42, no. 4., 2010.


Goodman, Joshua T., and Caskey, S. J., Constraints on the post-middle-Pleistocene tectonic development of the Confidence Hills, southern Death Valley, California, American Geophysical Union, Fall Meeting, 2009, Abstract # T33C-1925.

Lackey, Heather Green and Caskey, S. John, Neotectonic Investigation of the Southern Death Valley Fault Zone, San Bernardino County, California, GSA Abstracts with Programs, Annual GSA Meeting, Houston, TX, 2008.

**RESEARCH GRANTS**

U.S. Geological Survey, National Cooperative Geologic Mapping Program (EDMAP), Geologic Mapping and Structural History of the Late Miocene China Ranch Basin, Southern Death Valley Region, Southeastern California, 9/1/12-8/31/13, $17,488.

U.S. Geological Survey, National Cooperative Geologic Mapping Program (EDMAP), Geologic and geomorphic surface mapping along the Southern Death Valley fault zone in the Noble Hills, southeastern California, 7/1/08-6/30/09, $9,721.

National Earthquake Hazards Reduction Program (NEHRP), Theodolite and Total Station measurements on San Francisco Bay region faults, 3/1/10-2/28/15, $245,799.

National Earthquake Hazards Reduction Program (NEHRP), Theodolite and Total Station measurements on San Francisco Bay region faults, 3/1/08-2/28/10, $97,300.

U.S. Geological Survey, National Cooperative Geologic Mapping Program (EDMAP), Geologic and geomorphic surface mapping along the Southern Death Valley fault zone in the Confidence Hills, southeastern California, 7/1/08-6/30/09, $12,611.

National Earthquake Hazards Reduction Program (NEHRP), Theodolite and Total Station measurements on San Francisco Bay region faults, 3/1/07-2/28/08, $40,000.

U.S. Geological Survey, National Cooperative Geologic Mapping Program (EDMAP), Geologic and geomorphic surface mapping along the Southern Death Valley fault zone, southeastern California, 4/1/06-9/30/07, $9,800.

National Earthquake Hazards Reduction Program (NEHRP), Theodolite and Total Station measurements on San Francisco Bay region faults, 3/1/04-2/28/07, $223,694.

National Earthquake Hazards Reduction Program (NEHRP), Investigation of large-magnitude paleoliquefaction-induced lateral spreading, Dixie Valley NV, 6/1/06-11/30/07, $64,968.

**PROFESSIONAL ORGANIZATIONS**

Geological Society of America
Seismological Society of America
American Geophysical Union
Friends of the Pleistocene
Petra S. Dekens

Academic Appointments

2007-present  Assistant Professor, Department of Geosciences  
San Francisco State University
2001-2007  Graduate Student Research Assistant, Department of Ocean Sciences  
University of California, Santa Cruz
2000-2001  Graduate Student Research Assistant, Interdepartmental Graduate Program in Marine  
Sciences, University of California, Santa Barbara

Education

Doctor of Philosophy Ocean Science – August, 2007  
University of California Santa Cruz. Advisor, Dr. A. Christina Ravelo and Dr. Matthew D. McCarthy

Master of Science in Marine Science – August 2001  
University of California Santa Barbara. Advisor, Dr. David Lea

Master of Environmental Science and Management – June 2000  
Donald Bren School of Environmental Science and Management, UC Santa Barbara

Bachelor of Art in Marine Biology – June 1998  
University of California Santa Cruz

Research Grants

- American Chemical Society, Petroleum Research Fund - $50,000. Changes in Productivity along the California margin through the last 5 million years, Dekens, P.S. (sole PI), 9/2010-8/2013
- National Science Foundation, CCLI – Phase 1: exploratory, $175,000. Creating an Academic Community to Foster Curiosity and Discovery in Introductory Geosience Classes, Grove K., Dempsey D., Dekens P.S., 9/2010-8/2012
- CSU Mini Grant Award, $5000, Atmospheric response to warmer coastal oceans during conditions of global warmth, Fall 2009 – Spring 2010
- CSU Mini Grant Award, $4940, Response of the California Current System to Global Warmth, Fall 2008 – Spring 2009

Peer-Reviewed Publications (*Underlined names indicated MS students)


Conference Abstracts (*Underlined names indicate MS students)

Kynett, K.G. Dekens, P.S., 2011. Reconstructing the thermocline in the South Atlantic subtropical gyre over the last 4 Ma. American Geophysical Union Fall Meeting

Rizzo, A.J. Dekens, P.S., 2011. Does G. sacculifer record surface temperatures in the South Atlantic subtropical gyre? American Geophysical Union Fall Meeting

Wojcieszek, D. Dekens, P.S., 2011. Sea surface temperature and salinity in the south Atlantic subtropical gyre over the last 4 Ma. American Geophysical Union Fall Meeting

Dekens, P.S., Ravelo, A.C., Griffith, E.M., 2010 Sea Surface Temperatures in the Indo-Pacific Warm Pool during the Early Pliocene Warm Period. American Geophysical Union Fall Meeting

Wojcieszek, D. Dekens, P.S., 2010. Climate history in the south Atlantic subtropical gyre over the last 4 Ma. American Geophysical Union Fall Meeting

Dekens, P.S., Reed-Sterrett, C., White, L.D., 2010 The California Margin During the early Pliocene Warm Period. International Conference on Paleoceanography


Reed, C.M., Dekens, P.S., White, L.D., 2009. Sea Surface Temperature and Upwelling Conditions off Northern California Coast During the Early Pliocene. American Geophysical Union Fall Meeting

Dekens, P.S., Reed, C., Wojcieszek, D.E., 2009 Response of the California current system to global warmth. Workshop on Pliocene Climate


Searles, Z., Otto-Bleisner, B., Rosenbloom, N. Dekens, P.S., 2008 The Pliocene response to warmer than modern sea surface temperatures in coastal upwelling regions. American Geophysical Union Fall Meeting

Invited Research Presentations

San Francisco State University, Geography Department. September 2010
University of California, Berkeley, Geography Department seminar series, September 2009
San Francisco State University, Romberg Tiburon Center. September 2008
Synergistic Activities and Professional Service

- Reviewer for NSF proposals
- Proposed and co-chaired poster and oral session at the AGU Fall 2010 meeting: The Early Pliocene Warm Period as an Analog for Future Warmth
- Applied for and hosted the SERC Building Strong Departments Workshop, January 2010
- Co-convener for Teaching Introductory Oceanography workshop in June 2013
- Distinguished Speaker Series Coordinator, Dept. of Geosciences, SFSU Fall 2008 to present
- Steering Committee Member and Speaker on Science Panel, Focus the Nation on Climate Change, SFSU, January 2008
- Panel speaker on balancing teaching, research, and service for UC Davis Professional Development Seminar series, April, 2008
- Member of American Geophysical Union, Geological Society of America, and American Meteorological Society

Honors and Awards

- Presidential Award for Professional Development of Probationary Faculty (spring 2012)
- Student Poster Award. The 9th International Conference on Paleoceanography. Sept. 2007
- Columbia University - Lamont Doherty Earth Observatory postdoctoral fellowship, 2007 (declined)
- Myers Trust Grant for graduate students. Spring 2006
- CDELSI Ocean Health and Environmental Change Graduate Student Fellowship, 2005/06
- Center for the Dynamics and Evolution of the Land-Sea Interface Undergraduate and Graduate Student Research Award. Winter 2004
- Ocean Sciences Outstanding Student Award. Spring 2003
DAVE DEMPSEY

EDUCATION:

Ph.D. 1985 University of Washington, Seattle (Atmospheric Science)
(Dissertation title: A One-Level Mesoscale Model for Diagnosing Surface Winds in Coastal and Mountainous Regions.)

B.S. 1978 University of California, Davis (Atmospheric Science, Mathematics)

POSITIONS HELD:

Aug 2000-present
Professor of Meteorology, Dept. of Geosciences, San Francisco State University. Mesoscale numerical model building; UNIX computer lab administration; weather-graphics and WWW Web programming; K-12 teacher preparation curriculum development.

Aug 2006-May '09
Faculty Associate Director, Center for Science and Mathematics Education, College of Science and Engineering, SFSU

Summers 2006-09, 1998 & '99; and Jan-Jul 1997
Visiting Scientist, Mesoscale and Microscale Meteorology (MMM) Division, NCAR, Boulder, CO. Next-generation mesoscale model design, construction and testing. (Jan-July 1997 on sabbatical leave from SFSU.)

Jan-Jul 2005 Visiting Scientist, Developmental Testbed Center (DTC), National Center for Atmospheric Research (NCAR), Boulder, CO. (Sabbatical leave from SFSU.) Analysis and modification of kinetic energy spectra of the WRF-NMM model.

Summer 2004
Visiting Scientist, DTC, NCAR, Boulder, CO. A candidate modification of the vertical coordinate in the WRF-ARW model.

Summers 2001, 02
NASA-ASEE Faculty Fellow, Atmospheric Physics Branch, Earth Sciences Division, NASA-Ames Research Center, Mountain View, CA. Modeling and satellite remote sensing of polar stratospheric clouds.

Aug 95-Aug 00 Associate Professor of Meteorology, Dept. of Geosciences, SFSU. (Tenured Fall, 1995.)

Aug 89-Aug 95 Assistant Professor of Meteorology, Dept. of Geosciences, SFSU.

PUBLISHED ABSTRACTS and CREATIVE ACTIVITIES:


Grove, K., Dempsey, D., and Dekens, P., 2011, Deliberately creating a teaching and learning community to advance graduate student and faculty innovation in introductory Geoscience classes: GSA Abstracts with Programs, v. 43, n. 5.


FUNDED GRANTS:

Spring 2010
NSF-CCLI grant, "Creating an Academic Community to Foster Curiosity and Discovery in Introductory Geoscience Classes." Co-PI with PI K. Grove and Co-PI Petra Dekens (both SFSU Dept. of Geosciences). $175,000 over 2.5 years. Used to develop inquiry-based lab activities for introductory, general education courses in oceanography, geology, and meteorology; build a Mac laptop computer lab; and create a community of instructors for the Department's introductory, GE courses.

Spring 07 Unidata Equipment Grant. $15,785 for one year. Used to buy eight MacBook Pro laptops for student computer lab.

PROFESSIONAL ACTIVITIES and MEMBERSHIPS:

Fall 2011-present
Member, Unidata Policy Committee. (Provide policy guidance to the National Science Foundation's Unidata program; two meetings/year; three-year term.)

Summers 2012, 11, 10, 03, 04
Reviewer, grant proposals submitted to the National Science Foundation's CCLI (Course, Curriculum, and Laboratory Improvement, twice) program, CCEP (Climate Change Education Program, twice), and TUES (Transforming Undergraduate Education in STEM, twice) program.

April 2-11, 2012
Co-convener, on-line workshop: "Communicating Climate Science in the Classroom" (sponsored by the Climate Literacy and Energy Awareness Network [CLEAN]).

May 07-March 10
Member, Unidata IDV Steering Committee. (Provided user input to developers of Unidata's Integrated Data Viewer (geoscience graphics software).)

Member, American Association for the Advancement of Science (AAAS).
Member, American Geophysical Union (AGU).
Member, American Meteorological Society (AMS).

SFSU SERVICE ACTIVITIES:

Fall 2011-present
Chair, General Education (GE) Area B Subcommittee. Review course proposals for certification as Scientific Inquiry and Quantitative Reasoning GE courses.

Fall 2006-present
Chair, Curriculum Committee, Department of Geosciences. Wrote or co-wrote, edited, and won SFSU approval for proposals to revise the B.S. in Geology, B.S. in Atmospheric and Oceanic Sciences, B.A. in Earth Sciences, and Minor in Earth Sciences (Fall 2006).
Spring 1996-present
Manager and System and Network Administrator for first two, then four, Department of Geosciences computer labs. (20% release time.) Labs comprise 39 Mac laptops, 2 Mac servers, and 18 Mac desktops. Manage continuous acquisition of weather data by internet. Wrote and maintain 50,000 lines of UNIX scripts, many for curricular applications of weather graphics software. Created, maintain, and respond to users of the California Regional Weather Server, which provides public access to continuously updated weather maps and images (~20-60,000
unique users and ~200-300,000 meaningful hits per week, on average). Maintain Department of Geosciences links to on-line course home pages.

May 2012 Interviewer, candidates for SFSU Noyce Fellowships for Preservice Secondary Science and Math Teachers.

Fall 2000-2011
Liberal Studies Council (LSC). Serve as representative of the College of Science and Engineering, and as Chair in Spring 2004. (Until the Liberal Studies Program reorganized starting Spring 2012, LSC planned, reviewed, implemented, and evaluated the policies, procedures, and programmatic design of the SFSU Liberal Studies Program.) Formed ad hoc College of Science and Engineering committee to draft learning objectives for the Liberal Studies Area II Core (Life Science, Physical Science, and Mathematics) (Spring 2002). Drafted and won approval for revision of the Area II Emphasis patterns (Fall 2002). Led team that won National Science Foundation grant funding (2002-2004) and created GEOL/METR 309: Investigating Land, Sea, and Air Interactions, an integrated geosciences course to help pre-service K-8 teachers in the Liberal Studies program meet state geosciences subject-matter standards. Motivated the creation by the Departments of Physics and Chemistry of SCI 140: Essential Concepts of Physics and Chemistry, to serve a similar purpose. Served on LSC RTP committee Fall 2008-Spring 2010.

Fall 2006-Spring 2009
Teacher Credential Committee (TCC), San Francisco State University. Served as representative of the Liberal Studies Council. (TCC implements policies of the All-University Teacher Education Committee (AUTEC) relating to teacher credentialing.)

Fall 2005-Spring 2009
Ad hoc College of Science and Engineering and College of Education committee to prepare proposal to create a Center for Science and Mathematics Education (CSME) in the College of Science and Engineering. (Helped write and present the proposal, which was approved with partial funding by SFSU in July 2006.) Interim Co-director of CSME Fall 2006-Summer 2007; Faculty Associate Director Fall 07-Sp 09. Recruited a permanent, full-time director; began revision of single-subject, subject-matter preparation proposal for pre-service teachers of science; began development of proposal to fund education-related activities aimed at corporate donor; etc.
Oswaldo Garcia

Education

Doctor of Philosophy, 1976, Atmospheric Sciences Department, State University of New York at Albany.

Master of Science, 1972, Atmospheric Sciences Department, State University of New York at Albany.


Positions Held Since 2007

August 2007 - Present: Professor of Meteorology, Geosciences Department, San Francisco State University, San Francisco, California.

August 2007 – August 2012: Chair, Department of Geosciences, San Francisco State University, San Francisco, California.

August 2007 – Spring 2010: Faculty Coordinator of Program Review, San Francisco State University, San Francisco, California.

August 2007 – Present: SF State Representative to the University Corporation for Academic Research Academic Affiliate Council

Conference Presentations and Abstracts

Garcia, O. and Kaplan, T, “El uso de datos de sondeo COSMIC para investigaciones sobre la troposfera superior en la region del Caribe” (The use of COSMIC sounding data for researching upper tropospheric conditions in the Caribbean basin” (In Spanish) Abstractos Presentados en el V Congreso de la Sociedad Meteorológica de Cuba, Havana, 2009.

Professional Society Membership: American Meteorological Society

University Service

• Involvement with the 6th Cycle of Academic Program Review.

  -Chaired the Task Force that recommended guidelines for SF State’s 6th cycle of Academic Program Review; consulted with the Academic Senate as it enacted the policy governing this program review cycle; and took primary responsibility for the editing of the handbook that serves as a guideline for this process.

  -As Coordinator of Program Review, served as liaison between the Office of Academic Affairs, College Deans, University departments undergoing program reviews, and their external reviewers.

  -Served as a resource to the Academic Program Review Committee, which drafts the Concluding Action Memorandum that finalizes the program review process at SF State.

• Served during the 2008-2009 Academic Year on the University-wide WASC Steering Committee tasked with developing the SFSU self-study themes for the Capacity and Preparatory Review, an early stage of the SF State accreditation process that culminates in 2013.

• Served in the search committee for the selection of the Vice President for University Advancement, Robert Nava, Spring 2010.

• Served in the Five-Year Performance Review Committee of Linda Buckley, Associate Vice President of Academic Planning and Development Spring 2011
• Chaired the Strategic Issues Committee of the Academic Senate in Fall 2011. Crafted revisions to the Constitution of the Academic Senate of SF State, which were subsequently enacted by the full Senate.

• Served in the committee that proposed establishment of the Heads and Chairs Council in Spring 2012.

• Chaired the Five-Year Performance Review Committee of Sheldon Axler, Dean of the College of Science and Engineering Spring 2012.

Service to the Community and International Activities

• Visited Vanguard University in October 2008 as part of the WASC review team for the final stage its accreditation renewal application and participated in the team’s report and recommendations.

Cuba activities

• Arranged for a team from the National Center for Atmospheric Research to visit the headquarters of the Cuban Institute of Meteorology March 2007, Served as liason between the NCAR team and the Cubans to participate in the COCONet project, a network of ground-based GPS stations throughout the Caribbean that measure the total amount of water vapor in the atmospheric column, which serves as the main energy source of hurricanes.

• Participated in a COCONet planning meeting in Puerto Rico in January 2012 and presented proposal to include Cuba in the network site planning process.

• Currently participating in efforts to install the first COCONet station in Cuban territory.
NEWELL GARFIELD, III

Education:


Professional Employment:

2007-present: Director, Romberg Tiburon Center for Environmental Studies, San Francisco State University, San Francisco, CA
2007-present: Professor of Geosciences (Physical Oceanography), SFSU, San Francisco, CA
2001-2007: Associate Professor of Geosciences, SFSU, San Francisco, CA
2003-2004: Visiting Professor, Moss Landing Marine Laboratories, Moss Landing, CA
1998-2001: Assistant Professor of Geosciences, SFSU, San Francisco, CA
1998-2005: Visiting Professor, Naval Postgraduate School, Monterey, CA
2001-2007: Research Associate, NASA Ames Research Center
1992-1998: Research Assistant Professor, Naval Postgraduate School, Monterey, CA
1989-1992: Adjunct Research Professor, Naval Postgraduate School, Monterey, CA

Awards:
Fellow, California Academy of Sciences, Elected October 2008
SFSU Vice-president's award for research release time, 2001
NASA ASEE Summer Fellowship, 1999 and 2001
Outstanding Instructional Performance Award, Naval Postgraduate School, October 1995
Bonus Performance Awards, Naval Postgraduate School, September 1993 and 1995
Outstanding Student Paper Award, American Geophysical Union 1988 Fall Meeting

Professional Memberships:
American Geophysical Union
The Oceanography Society (Charter Member)
Marine Technology Society
Alliance for Marine Remote Sensing Association (ceased operations in 2006)
Western Association of Marine Laboratories (section of NAML)
Eastern Pacific Oceanographic Conference

Professional Service Activities:
Chair, Board of Trustees, Moss Landing Marine Laboratories 2011-present
Executive Council, Western Association of Marine Laboratories 2010-present
Advisory Council, California Sea Grant 2010-present
Executive Council, Central and Northern Coastal Ocean Observing System (CeNCOOS) 2001-present
Executive Council, CSU Council on Ocean Affairs, Science and Technology (COAST) 2008-present
Fleet Improvement Committee, University National Oceanographic Laboratories (UNOLS) 2003-2009
Chairman, Ocean Sciences Section Meeting Committee, American Geophysical Union 2002-2006

Journal Articles: (* indicates a SF State student author)

Belinda Lipa, Donald Barrick, Sei-Ichi Saitoh, Yoichi Ishikawa, Toshiuki Awaji, John Largier,
Newell Garfield, Japan Tsunami Current Flows Observed by HF Radars on Two Continents. 

Sung Yong Kim, Eric J. Terrill, Bruce D. Cornuelle, Burt Jones, Libe Washburn, Mark A.
Moline, Jeffrey D. Paduan, Newell Garfield, John L. Largier, Greg Crawford, and P. Michael
Kosro, Mapping the U.S. West Coast surface circulation: A multiyear analysis of high-

Hoffman*, Michael D., Newell Garfield, and Roger W. Bland, Frequency synchronization of

Gough*, M. K., N. Garfield, and E. McPhee-Shaw, An analysis of HF radar measured surface
currents to determine tidal, wind-forced, and seasonal circulation in the Gulf of the Farallones,

Research funding:
California Department of Fish Game, Integration of Satellite Imagery with Surface Current Map-
ping Radar in Near Real Time 2004-2007, $250,000
California Department of Fish Game, Integration of Satellite Imagery with Surface Current Map-
ping Radar in Near Real Time: Ocean Imaging 2004-2007, $139,300
California Coastal Conservancy, COCMCP: Coastal Ocean Circulation Monitoring Program for
Central and Northern California 2005-2010 $8,956,434
University of New Hampshire, Delivery and Quality Assurance of Short-term Trajectory Forecasts
from HF Radar Observations 2007-2009, $225,000
NSF FSML, Strategic Plan for the Romberg Tiburon Center 2007-2010, $25,000
Consortium for Ocean Leadership, Sea Lion Bowl 2008-2011, $60,000
University of California, Davis, CeNCOOS Bays 2008-2010, $139,300
California State University, Chancellor's Ocean, Council on Ocean Affairs, Science and Technology
(COAST) 2008-2012, $1,347,924
Monterey Bay Aquarium Research Institute, CeNCOOS: Long-term monitoring of environmental
conditions 2008-2012, $404,700
Rocky Foundation RTC Field Vehicle Acquisition 2009, $50,000
California Department of Fish and Game, HF Radar Network Operations 2009-2010, $25,000
California Coastal Commission, Whale Tail Sea Lion Bowl Diversity Initiative 2010-2012, $25,000
Sonoma State University, CeNCOOS Regional Association monitoring 2011-2013, $474,497
NSF FSML, Improving the Detection, Enumeration and Visualization of Aquatic Microorganisms
at the Romberg Tiburon Center, SFSU 2012-2013, $160,000
University of California San Diego, Sea Grant summer intern support 2012-2013, $10,000
KAREN GROVE

EDUCATION

Ph.D in Geology, 1989  Stanford University, Stanford, CA
B.S. in Geology, 1983  University of Maryland, College Park, MD

PROFESSIONAL EXPERIENCE

Chair, Department of Geosciences, San Francisco State University (8/12–Present)
Fulbright Scholar, Universidad de Chile, Santiago (3/06–7/06)
Professor, Department of Geosciences, San Francisco State University (8/00–Present)
Chair, Department of Geosciences, San Francisco State University (8/98–8/01)
Visiting Scientist, University of California, Santa Barbara, CA (8/97–5/98)
Associate Professor, San Francisco State University (8/95–8/00)
Assistant Professor, San Francisco State University (8/92–8/95)
Visiting Scientist, Moss Landing Marine Laboratories, CA (8/91–8/92)
Lecturer, San Francisco State University (8/89–8/91)
Geologist, Standard Production Co, Anchorage, AK (6/87–9/87)
Teaching Assistant, Stanford University (9/84–6/87; 9/88–12/88)
Associate Instructor, Indiana University Geologic Field Station (5/84–8/84)

AWARDS / HONORS

Chair, Geological Society of America Cordilleran Section, 2009–2010 (Vice Chair in 2008–2009; Past Chair in 2010–2011)
Fulbright Scholar to Chile, March–July 2006
Fellow, California Academy of Sciences, 2001–present
Fellow, Geological Society of America, 1996–present

PROFESSIONAL MEMBERSHIPS

Association for Women Geoscientists
American Geophysical Union
California Academy of Sciences
Fulbright Association
Geological Society of America
National Association of Geoscience Teachers
Northern California Geological Society
Society for Sedimentary Geology, Pacific Section

FUNDED GRANTS

National Science Foundation Course, Curriculum, and Laboratory Improvement Program, DUE 0642390, $175,000, 2010–12, “Creating an academic community to foster curiosity and discovery in introductory geoscience classes” Project Director, co-P.I.s are Petra Dekens and Dave Dempsey.

PEER-REVIEWED PUBLICATIONS  (*=student co-author)

PUBLISHED ABSTRACTS (*=student co-author)


GROVE, K., Dempsey, D., and Dekens, P., 2011, Deliberating creating a teaching and learning community to advance graduate student and faculty innovation in introductory Geoscience classes: GSA Abstracts with Programs, v. 43, n. 5.

Stozek*, B., and GROVE, K., 2010, Geophysical evidence for Quaternary deformation within the offshore San Andreas fault system, Point Reyes Peninsula, California: American Geophysical Union, Fall 2010 meeting, abstract #T33B-2226.


Woodley*, S., and GROVE, K., 2010, Interpreting Pleistocene marine terrace deposits overlying the 82 ka wave-cut platform, Point Reyes Peninsula, Marin County, California: GSA Abstracts with Programs, v. 42, n. 4, p. 64.


GROVE, K., and Ryan, H., 2007, Marine terrace and offshore seismic evidence for spatially and temporarily varying uplift rates adjacent to the San Andreas fault north of San Francisco, California: GSA Abstracts with Programs, v. 39, n. 6, p. 239.

UNIVERSITY COMMITTEES AND SERVICE

Administrative Review Committee for Ann Hallam, Dean, Graduate Studies, Spring 2009.
Workshop leader about "Just-in-time teaching" technique for SFSU’s Center for Teaching and Faculty Development (CRFD), 9 October 2008.
Chair, Review Committee for Carlos Davidson, director of the Environmental Studies program, Fall 2008.
Case Study for CSU Merlot/ELIXR web site, Just-in-time teaching technique, video made by CTFD staff and posted on CSU ELIXR web site, Spring 2008.
Committee member to plan activities for Focus the Nation on Climate Change teach-in at SFSU, 2007–2008; organized student outreach committee; served as event MC.
Chair, University Leave with Pay committee, 2008–2010 (committee member 2006–2010).
Faculty advisor for the Earth Systems Science concentration of interdisciplinary Environmental Studies undergraduate majors program, (1996–present).

OTHER PROFESSIONAL / COMMUNITY SERVICE

External academic program reviewer, Department of Geology, San Jose State University, 14–15 November 2012.


Invited talk, Earth Science Department, City College of San Francisco, “Chile’s magnitude 8.8 Earthquake current and historical perspectives”, 12 Mar 2010.

Chair, Cordilleran Section, Geological Society of America, 2009-2010 (Vice Chair in 2008-2009; Past Chair in 2010-2011).

Invited talk, Department of Geology, San José State University, “Geology of the Andes in Chile and Argentina”, 3 March 2008.

Invited talk, Department of Geology, Sonoma State University, “The Geology of Chile; Perspectives of a 2006 Fulbright Scholar”, 17 April 2007.

Invited talk, Department of Geology, Sacramento State University, “The Geology of Chile; Perspectives of a 2006 Fulbright Scholar”, 20 Mar 2007.

Specialist reviewer, applications for international Fulbright Scholar positions (all geologist applications), Fall 2006, Fall 2007, Fall 2008.
Jason J. Gurdak, Ph.D., P.H.

EDUCATION

Doctor of Philosophy (Ph.D.), Geochemistry, 2006
Department of Geology and Geological Engineering, Colorado School of Mines (CSM), Golden, CO. Dissertation: Advances in spatial and temporal analysis of groundwater vulnerability to nonpoint-source contamination, High Plains aquifer. PhD advisor Dr. John McCray (CSM)

Master of Science (M.S.), Environmental Science and Engineering, 1999
Department of Environmental Science and Engineering, Colorado School of Mines, Golden, CO.

Bachelor of Science (B.S.), Geology, 1998
Department of Geology, Bates College, Lewiston, ME.
Thesis: Geochemical characterization of an arsenic contaminated aquifer, Zimapán, Mexico.

ACADEMIC APPOINTMENTS and PROFESSIONAL EXPERIENCE

2009 to present  Assistant Professor of Geology, Geosciences, San Francisco State University
2009 to present  Associated Faculty, Environmental Studies Program, San Francisco State
2007  Instructor, Colorado School of Mines, Dept. of Env. Science and Engineering
1999 to 2009  Hydrologist, U.S. Geological Survey, Colorado Water Science Center
1999  Environmental Consultant, John Water Consulting, Denver, CO
1997 to 1998  NSF, Research Experience for Undergraduates (REU) fellow, Bates College

PROFESSIONAL CERTIFICATION

Professional Hydrologist (P.H.), Groundwater (cert # 12-HGW-4012): American Institute of Hydrology, 2012

HONORS and AWARDS

- San Francisco State University Retirement Association Travel Grant, 2012, $500.
- California State University (CSU), Water Resources Policy Institute (WRPI) Faculty Research Incentive Award Program, $4,968 for Spring 2012 (release time: 3 W'TUs), Project: Effects of climate variability on groundwater resources of California and the United States

FUNDED and PENDING PROPOSAL and PROJECTS

Principal Investigator (PI) of over $1.2 million and Co-Investigator (Co-I) of over $15.0 million. 5 proposals pending: $6.18 million.

PENDING – Gurdak, J.J. (PI), Ferre, P.A. (Ty) (Co-I), and Maurer, E.P., (Co-I), RUI: Groundwater teleconnections with interannual to multidecadal climate variability, National Science Foundation (NSF), Hydrologic Sciences, $321,865 (3 years).

PENDING – Taniguchi, M. (PI), Gurdak, J.J. (1 of 7 Co-I’s from the Asia-Pacific region. Gurdak is Leading the U.S. Center), Demarcation of environmental governance for human-environmental security in Asia-Pacific region – Nexus of energy, water, and coastal fishery resources. Research Institute for Humanity and Nature (RIHN), Kyoto, Japan. $5.0 million (5 yrs) ($250,000 to Gurdak).

PENDING – Chen, J. (PI), Cendon, D. (Co-I), Gurdak, J.J., (Co-I), Seeboonruang, U. (Co-I), A new groundwater initiative: Global paleoclimate signal from large aquifers (G@GPS) in the Asia-Pacific region,
2013 Annual Regional Call for Research Proposal (ARCP), Asia Pacific Network, $91,750 (2 years), submitted October 16, 2012.

PENDING – Groundwater recharge, Central Platte River Basin, Woodward, D.D. (Co-PI, CPNRD), Gurdak, J.J. (Co-PI), and Steele, G.V. (Co-PI, USGS), Nebraska Environmental Trust grant, $217,200 (3 years).


4. Preparing the San Francisco State University community to understand climate change effects on groundwater resources in San Francisco, Gurdak, J.J. (PI), and Nanus, L., 2010–2011 (1 yr), SFSU Office of Research and Sponsored Programs, FOA 2010-01 Facilitating Research at SFSU (Collaborative Grant), $11,000. Awarded June, 2010.


6. Recharge beneath playas of the High Plains, Gurdak, J.J. (Pl), and Roe, C.D., 2008 (1 yr), Playa Lake Joint Venture 2008 RFP, $15,000.

7. National assessment of groundwater response in selected Principal Aquifers to climate variability on interannual to multidecadal temporal scales, Gurdak, J.J. (Pl), and Hanson, R.T., 2008–2009 (2 yr), U.S. Geological Survey (USGS) Global Change Program 2008 RFP, $30,000 (1 of 15 funded from 284 submitted proposals; open to USGS & Universities).

8. Methods to quantify error propagation and prediction uncertainty for GIS raster processing, Gurdak, J.J. (PI), and Qi, S.L., 2007–2008 (2 yr), USGS Center of Excellence for Geospatial Information Science (CEGIS) 2007 RFP, $134,500 (1 of 7 funded from 77 submitted proposals; open to USGS & Universities).


PEER-REVIEWED PUBLICATIONS (available at: http://online.sfsu.edu/~jgurdak/Publications.html) (Student authors underlined)

**Refereed Journal Publications:**


11. Richard Taylor, Bridget Scanlon, Petra Döll, Matt Rodell, Rens van Beek, Yoshio Wada, Laurent Longuevergne, Marc LeBlanc, James Famiglietti, Mike Edmunds, Leonard Konikow, Timothy R. Green, Jianyao Chen, Makoto Taniguchi, Marc F. P. Bierkens, Alan MacDonald, Yin Fan, Reed M.

In review:

Books and Book Chapters:

In review:

U.S. Geological Survey (USGS) Reports:

OTHER PUBLICATIONS

CONFERENCE ABSTRACTS and PROCEEDING PAPERS
(Students authors underlined)
Steele, G.V., Gurdak, J.J., Hobza C., and Laufenburger, Z.H., 2012, Groundwater movement through the unsaturated zone of the High Plains aquifer in the Central Platte Natural Resources District,
Nebraska, Geological Society of America (GSA) annual meeting, Abstracts with Program vol. 44, no. 7, Charlotte, North Carolina, 4-7 November.

**Newcomer, M., Gurdak, J.J.,** 2012, Quantifying recharge beneath low impact development under current and future climate variability, Groundwater Resources Association of California, 21st Annual Conference, Rohnert Park, CA, October 3-5.


**Gurdak, J.J., Clark, B.R., Hanson, R.T., and Scheiderer, R.M.,** 2008, Groundwater availability responses to
climate variability on interannual to multidecadal timescales, Mississippi Embayment Regional Aquifer System, USA, Eos Trans. American Geophysical Union Fall Meeting Suppl., Abstract H12D-07.


INVITED RESEARCH PRESENTATIONS and GUEST LECTURES

2012 – Groundwater vulnerability to contamination and climate change: Global findings and implications for adaptation in California, Geosyntec, Oakland, CA, April 13

2012 – Vulnerability of groundwater resources to climate change and implications for adaptation, San Francisco State University, Department of Geography, Research Forum, Invited speaker, April 25.

2011 – Effects of climate change on global groundwater resources – Major findings and recommendations, San Francisco State University, Department of Geosciences, Distinguished Speaker Series, Nov. 1.

2011 – Climate variability, recharge rates, and the High Plains aquifer, USA, 1st UNESCO-GRAVIRIC Latin American-Caribbean (LAC) Seminar “Groundwater resources, climate change, and human pressures: Assessment and adaptation in Latin America and the Caribbean, Juan Dolio, Dominican Republic, June 30-July 1 (travel supported).


2009 – Recharge and Chemical Transport and Storage in the Vadose Zone, High Plains aquifer, Nebraska Grout Study Conference, University of Nebraska – Lincoln, Lincoln, NE, October 27-28, 2009


2009 – Beneath the surface of global change—Integrating observations and models to understand groundwater sustainability, Department of Geology, University of South Florida, Tampa, FL, February 6.

PROFESSIONAL and SERVICE ACTIVITIES

Editorships:
Co-editor, Climate change effects on groundwater resources: A global synthesis of findings and recommendations, International Association of Hydrogeologists - International Contributions to Hydrogeology, Taylor & Francis, 414 p.

Professional Society Membership:
American Geophysical Union (AGU)
National Ground Water Association (NGWA)
Geological Society of America (GSA)
International Association of Hydrologic Sciences (IAHS)
International Association of Hydrogeologists (IAH)
Groundwater Resources Association of California (GRA)

Committee Responsibilities and Professional Activities (local, national, and international):
Invited Peer Review Panelist, Seepage Management Plan (SMP), Seepage Management Support processes for the San Joaquin River Restoration Program (SJRRP), implement by CDMS Smith and Bureau of Reclamation, Mid-Pacific Regional Office. August-September, 2012.

Member, Groundwater Quality Committee, American Society of Civil Engineers (ASCE), Environmental & Water Resources Institute (EWRI), 2012 to present: (http://www.asce.org/ewri/CommitteeDetail.aspx?committeeld=000000885082)


Invited Panelist, 6th World Water Forum, Side Event: Groundwater and climate change with a focus on Mediterranean coastal aquifers, Coordinators: UNESCO International Hydrological Programme (IHP), Marseilles, France, March 13, 2012

Invited Speaker, 6th World Water Forum, thematic session 3.3.2: Coping with uncertainties related to climate and global change in water planning and management, Marseilles, France, March 12, 2012


International Coordinator, Groundwater@Global Paleoclimate Signals (G@GPS) Initiative, which is an inclusive group of scientists coordinating paleogroundwater research, and to interpret links between paleoclimate archives and paleogroundwater observations at continental and intercontinental scales.


Invited Reviewer, tenure application, Department of Forestry and Wildland Resources, Humboldt State University, September 2011.


Session Co-Chair/Co-Convener, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA. Session Title: (H08), Water-resource science and strategies for adaptation to climate variability and change, December 13-17, 2010. Our session has 50 abstracts, which is 5 highest of the 72 Hydrology sessions at AGU this year.


Technical Participant, San Francisco Public Utility Commission Urban Watershed Planning Charrette (brainstorming event to advance planning for urban stormwater in San Francisco watersheds), San Francisco State University, November, 13, 2009

Session Co-Chair/Co-Convenor, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.
Session Title: (H12D/H13G), Advanced methods of groundwater resources assessment under the pressures of aridity, humanity, and climate change, December 15, 2008.

Session Co-Chair/Co-Convenor, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.
Session Title: (H14/H11) Climate influences on groundwater recharge, December, 2007.

Judge, outstanding student presentation, AGU Hydrology Division, Fall Meeting, December, 2007.

International Workshop Organizer, Expert Steering Committee meeting, UNESCO-IHP sponsored study: Groundwater resource assessment under the pressure of humanity and climate change, September 18-20, 2007, Estes Park, CO, Workshop included participants from 9 countries.


Newspaper, Book, Radio, and Blog Interviews and Quotes:
2012 – BBC Latin America article “Cambio climático: el agua subterránea será cada vez más vital”
2012 – ClimateWire: The Politics and Business of Climate Change “Climate change may reduce future use of groundwater”, Lacey Johnson, March 12.
2012 – TerraDaily: News about planet Earth, “UN scientists warn of increased groundwater demand due to climate change”, staff writers
2012 – Nigerian Tribune, “Climate change threatens resources”, March 12
2012 – Groundwater Canada, “Professor’s research gains international attention”, March 30
2011 – National Geographic News article “Will tar sands pipeline threaten groundwater?, by Masin Inman (September 19, 2011)
2008 – “Living the Map” by Daniel Seddiqui, about the profession of a Hydrologist.
2008 – The Hokkaido Shimbun Press (1.8 million readers and 7th largest newspaper in Japan) “Japan’s Food Security” by Tokui Hisada.
MARY L. LEECH

EDUCATION
Ph.D. Stanford University, Geological & Environmental Sciences, June 1999
Dissertation title: “Petrotectonic evolution of the Maksyutov Complex, south Ural Mountains, Russia.” Advisor: Gary Ernst
B.S. San José State University, Geology, cum laude May 1994

PROFESSIONAL EXPERIENCE
2011-present Associate Professor, Department of Geosciences, San Francisco State University
2005-2011 Assistant Professor, Department of Geosciences, San Francisco State University
2003-2005 Research Associate, Geological & Environmental Sciences, Stanford University
2002-2005 Lecturer, Department of Geosciences, San Francisco State University
2001-2003 University of California President’s Postdoctoral Fellow, UC Santa Barbara
1999-2001 NSF International Research Fellow, University of London then Stanford University

HONORS AND AWARDS
2001-2003 University of California President’s Postdoctoral Fellowship
1999-2001 National Science Foundation International Research Fellowship
1999 National Science Foundation Earth Sciences postdoctoral fellowship (Declined)
National Science Foundation-NATO postdoctoral fellowship (Declined)
1995-1998 National Science Foundation Minority Graduate Fellowship (Cherokee Nation)

EXTERNAL RESEARCH GRANTS
Electron Microscopy Facility to Increase Geoscience Functionality at San Francisco State University”, PI

2009-2014 NSF CAREER—Tectonics, EAR 0847721, “Petrogenetic affinity of Miocene $507,264
granites to test the mid-crustal channel flow model in the Himalaya”, PI

2010 -2011 NSF Continental Dynamics, EAR 0965796, “Conference Support for the $74,800
25th International Himalaya-Karakoram-Tibet (HKT) Workshop”, PI

2008-2011 NSF — Major Research Instrumentation, CHE 0821619, “Acquisition of a $783,210
FE-SEM to enhance research and student training in Biology, Chemistry, Geosciences, Physics, and Engineering at San Francisco State University”, Co-PI

PUBLICATIONS

$Horton, F. and LEECH, M.L., in review, Geochemistry and zircon geochemistry of leucogranites from
Zanskar and the Karakoram shear zone, NW India, Lithosphere.

$LEECH, M.L. and Shulman, D.J., in review, Fluid-controlled metamorphism of eclogitic
pseudotachylitebearing shear zones, Flakstadøy, northern Norway, Journal of Metamorphic Geology.

Klemperer, S.L., Kennedy, B.M., Sastry, S.R., Makovsky, Y., Harinarayana, T., and LEECH, M.L., in
review, Mantle helium signature implies the Karakoram fault is an active plate boundary, Earth and

LEECH, M.L. and Webb, L.E., in press, Is the HP-UHP Dabie-Sulu orogen a piercing point for offset on the


PUBLISHED ABSTRACTS


Mary L. Leech Curriculum vitae Page 4


INVITED PRESENTATIONS
2012 Department of Geology, University of Vermont
2011 Department of Geosciences, University of Nevada, Las Vegas
2007 Geology Department, San José State University
2006 Himalaya Science Workshop (Dehra Dun, India)
Wadia Institute of Himalayan Geology (Dehra Dun, India)

PROFESSIONAL AFFILIATIONS
Geological Society of America American Geophysical Union
Mineralogical Society of America Sigma Xi
SACNAS (Society for the Advancement of Chicanos and Native Americans in Science)
ACADEMIC SERVICE (EXTRAMURAL)
International workshop co-organizer, 23rd Himalaya-Karakoram-Tibet Workshop in Leh, India (2008), the 25th Himalaya-Karakoram-Tibet Workshop at San Francisco State University (2010, lead organizer), and an NSF-sponsored GEO workshop on "Future directions for NSF-sponsored geoscience research in the Himalaya/Tibet" at the Romberg Tiburon Center (2010).

ACADEMIC SERVICE (INTRAMURAL)
Electron microscopy facility co-director and XRD lab coordinator, Geosciences Department, SFSU, 2005-present. Co-director with Andrew Ichimura (Chemistry) of a new field emission scanning electron microscope with EDS-EBSD, STEM, BSE, and CL detectors, and a transmission electron microscope: EBSD technique development, training users, developing lab protocols, and coordinating hiring of facility management staff. Responsible for training and assisting Geosciences users of the XRD facility.

Infrastructure Committee, College of Science and Engineering, SFSU, 2010-present. Committee addresses issues relating to improving facilities including research instrumentation, computing, staffing, and accounting issues related to ORSP and Fiscal Affairs.

ARCS Site Visit presenter, SFSU, 2009. Featured speaker and site visit participant for the Achievement Rewards for College Scientists (ARCS), Northern California Chapter, to renew the Department of Geosciences and San Francisco State University recipient institution status. Faculty advisor for the first ARCS awardee in the Department of Geosciences at SF State.

Area Coordinator and Judge, Physical and Mathematical Science category, CSU Student Research competition, SFSU, 2008-2009. Sought judges in the College of Science and Engineering, judged written and oral student presentations, ranked and recommended students for advancement to the CSU-wide competition.

MARC (Minority Access to Research Careers) Honors Program Faculty Mentor, SFSU, 2006-present. MARC provides academic support and research experience to prepare participants for entrance into competitive graduate programs and successful completion of a Ph.D. in the sciences.
John P. Monteverdi

CURRENT POSITION: Professor of Meteorology
HONORARY TITLE: Fellow, California Academy of Sciences
OTHER POSITIONS: Member, Board of Directors, Electronic Journal of Severe Storms Meteorology

ACADEMIC BACKGROUND


Ph.D., Geography, December 1977, University of California, Berkeley. Emphases: Synoptic Meteorology and Synoptic Climatology. (54 Quarter Units of Residence completed at Department of Meteorology, San Jose State University).

CERTIFICATIONS

1988. CERTIFIED CONSULTING METEOROLOGIST, AMS.
1972. CANDIDATE OF PHILOSOPHY DEGREE CERTIFICATE, UC Berkeley.
1972. PROFESSIONAL MEMBER, AMS.

PUBLICATIONS (*=student coauthor)

A. Refereed Publications 2000 and Later


B. Conference Presentations/Published Proceedings

Monteverdi, J. P., Umscheid, M. and E. Bookbinder, 2010: Two tornadic thunderstorms in ostensibly weak deep layer shear environments in southeastern Colorado: cyclic supercells of May 25 (Kiowa County) and May 31 (Baca County) 2010 (Poster P10.15). AMS 25th Conference on Severe Local Storms to be held 11-15 October, 2010 in Denver, CO.


GRANTS

2010: as co-Principal Investigator. Principal investigator Andrew Oliphant. NSF Major Research Instrumentation grant (~$700,000) in May, 2010 to develop a mobile atmospheric profiling system (CSU-MAPS)
LEONARD S. SKLAR

EDUCATION

Ph.D. 2003 University of California, Berkeley, Earth and Planetary Science

M.S. 1990 University of California, Berkeley, Civil Engineering
(Water Resources Engineering, River Mechanics, Coastal Processes)

B.Eng. 1989 Cooper Union for the Advancement of Science and Art, NYC, Civil Engineering
(Surface Hydrology and Hydraulic Structures)

B.S. 1989 New York University, Magna Cum Laude, Applied Science
(Earth System Science)

PROFESSIONAL EXPERIENCE

Associate Professor, Department of Geosciences, San Francisco State University, 2009 - present
Assistant Professor, Department of Geosciences, San Francisco State University, 2003 - 2009
Fluvial Geomorphologist/Civil Engineer, Stillwater Sciences, Berkeley, California, 2000-2003.

HONORS AND AWARDS

Honorary Fellow, California Academy of Sciences, elected 2006
George D. Lauderback Award for Distinguished Field Research, U.C. Berkeley, 2000
Teaching Effectiveness Award, U.C. Berkeley, 1995-96
Switzer Environmental Fellowship, 1996-97
Outstanding Graduate Student Instructor, Department of Geology and Geophysics, U.C. Berkeley, 1994-95
Regents Fellowship, U.C. Berkeley, 1989-90
Arthur C. Tuttle Prize for Outstanding Achievement in Applied Science, N.Y.U., 1989
Phi Beta Kappa, 1987, Tau Beta Pi (Engineering Honors), 1988; Pi Mu Epsilon (Mathematics Honors), 1988

RESEARCH GRANTS AND CONTRACTS

National Science Foundation (EAR-0949176), 2010-2013, $311,890. Early career: Upgrade of electron microscopy facility to increase geoscience functionality at San Francisco State University. [CoPIs: Mary Leech, Andrew Ichimura, Bruce Manning, SFSU]

California State Water Resources Control Board (SWRCB-08-067-120), 2009-2011, $25,000. Controls on bed material grain size distributions in Pescadero Creek drainage network.


National Science Foundation (DEB – 0543368), 2006-2011, $150,323. Collaborative Research: Ecosystem consequences of dynamic geomorphology: an experimental approach. [Co-PIs: J.Marks, B.Hungate, NAU]

PEER-REVIEWED PUBLICATIONS (student authors underlined; [citations])

34. Albertson, L.K., B.J. Cardinale and L.S. Sklar (in review) Non-additive species interactions produce synergistic effects on sediment stability in streams, *Proceedings of the Royal Society B: Biological Sciences*.


**PEER-REVIEWED CONFERENCE PAPERS**


CONFERENCE ABSTRACTS AND PROCEEDINGS

2012


2011


2010

Reyeler, J.D., and L.S. Sklar, 2010, Bedrock resistance to fluvial erosion: the importance of rock tensile strength, crystal grain size and porosity in scaling from the laboratory to the field, Eos Trans. AGU, 91(52), Fall Suppl., Abstract EP41D-0740.


Hodge, R., T. Hoey, and L.S. Sklar, 2010, Measuring and modeling grain dynamics in bedrock channels, Seventh Gravel-Bed Rivers Conference, Tadoussac Quebec, September 6-10, 2010


2009


2008


2007


**INVITED SEMINARS AND PRESENTATIONS**

University of Wyoming, Department of Geology and Geophysics, March 2012
University of California, Santa Cruz, Department of Earth and Planetary Sciences, November 2011
University of California, Berkeley, Department of Earth and Planetary Science, September 2011
San Jose State University, Department of Geology, September 2011
European Surface Processes, Keynote, 6th annual meeting, Roscoff, France, July 2009
Teaching Geomorphology in the 21st Century, Colorado State University, July, 2008
Meeting of Young Researchers in Earth Sciences, Tulane University, May, 2008
Northern California Geological Society, May 2008
University of Montana, Department of Geosciences Colloquium, May 2008
Association of Environmental and Engineering Geologists, San Francisco, February 2008

**PROFESSIONAL SOCIETIES**

American Geophysical Union
American Society of Civil Engineers
Association of Engineering Geologists
Council on Undergraduate Research
Geological Society of America
National Association of Geoscience Teachers

**PROFESSIONAL LICENSE**

Licensed Intern Engineer, #039392, New York State.