3 Department of Geology and Geophysics

3.1 Overview

The purpose of the Department of Geology and Geophysics is to provide, through its faculty for instruction, research, and services, (a) a properly-taught undergraduate curriculum in geology and geophysics, including introduction, core, and advanced courses and laboratories, (b) conduct research and provide graduate-student instruction in scientific areas in which Hawai`i has certain natural advantages by virtue of its geography and existing faculty members, namely Hydrology, Engineering Geology, Marine Geology and Geophysics, Seismology and Solid Earth Geophysics, and Volcanology-Geochemistry-Petrology, and (c) provide public service in the earth and marine sciences at the local, national, Pacific-wide, and world-wide levels.

1. What is the mission of the department? How do the mission and objectives align with the School/College, UH Mānoa, and UH System strategic plans?

The 2011–2015 Draft Strategic Plan for the University of Hawai`i at Mānoa states “As a land, sea, and space grant university, the University of Hawai`i at Mānoa is dedicated not only to academic and research excellence but also to serving with aloha the local, national and international communities around us. Taking as its historic trust the Native Hawaiian values imbedded in the concepts of kuleana, `ohana, and ahupua`a that serve to remind us of our responsibilities to family, community, and the environment, Mānoa’s hallmark is a culture of community engagement that extends far beyond the classroom to bridge theory and practice, fostering creative and critical thinking, and promoting student’s intellectual growth and success as contributing members of society”. The plan also emphasizes that the goals are: a transformative teaching and learning environment; a global, leading research university; an engaged university; and facilitating excellence.
In his booklet “Building on 20 years of excellence and innovation” the Dean of the School of Ocean and Earth Science and Technology (SOEST) states on page 3 that the “four-fold vision of the school is to: Advance understanding of the Ocean, Earth, and Planets; Provide world-class education; Foster a high-tech community; and Promote sustainable use of the environment”.

In laying out the mission statements and goals of the Department of Geology and Geophysics, it can clearly be seen that the department’s mission is an elaboration and extension of the School’s, which in turn expands from the University to the School as appropriate.

2. What is the vision for the next five years? Discuss how planned or pending academic program actions fit within the vision.

With a changing faculty, due to retirements, promotions and appointments the department will continue to ensure excellence in its undergraduate and graduate programs. We will continue to expand the department’s research enterprise with the intent of maintaining our highly ranked status or becoming world leaders in the fields of Coastal Geology, Geochemistry, Marine Geology and Geophysics, and Volcanology. In addition, after many discussions with employers in the local community, the department (through the work of its curriculum committee) is proposing to create a Professional Masters degree (the MGeo degree) that will cater to geoscience related industries, especially locally. This proposed new degree is currently being reviewed by the UHM administration.

3. What is the national/international reputation and/or ranking of the department? What are your areas of program distinction? Please include any program rankings, and the source of ranking (e.g., National Research Council). Is the department satisfied with the level of the ranking?

The Department of Geology and Geophysics is ranked, by US News in 2010, at #34 OF 108 DEPARTMENTS RANKED. Individual specializations are not ranked by this organization but areas of distinction include Geophysics, Coastal Geology and Volcanology. Department faculty continue to improve these rankings through focus on excellence in research, education and outreach. We strive to hire excellent faculty and to make our work known to our peers.

4. Please identify peer programs at other U.S. institutions. How does the general quality of your programs compare with those of other institutions? What data support these comparisons?

From the US News rankings it appears this department is on an equal footing with earth science departments at Oregon State University; Stony Brook University-
SUNY; University of Illinois-Urbana-Champaign; and University of Oregon. It is difficult to make direct comparisons among these departments. However one statistic from University of Hawai‘i, based on surveys of recent graduates, shows that well over 90% of graduates are employed in subject-related work within three months of graduating.

3.1.1 Employment Upon Graduation

From these results, it is very clear that graduates at either Masters or PhD level have had no problems gaining employment, and in a geologically related field.

Even in these hard economic times, it appears that people with graduate degrees in Geology and Geophysics at the University of Hawai‘i are able to get degree related employment. This has also been the case with our undergraduate students, with degree related work available, even here in Hawai‘i (particularly as environmental geologists).

5. In what ways does the department foster a climate of respect for diversity of backgrounds, ideas, and perspectives among the faculty, staff and students? How are academic program decisions made? Is communication regarding campus and college priorities adequate?

The department strives to make its selection of new faculty and graduate students based on the academic merits of the applicant and the best fit into the department, but we are striving to increase our diversity. For instance, our three most recent hires were women (Dulaiova in 2009 and Jahren and Pahnke in 2008; unfortunately Pahnke left the department in 2011) and we hired an Asian-American in 2002 (Apuzen-Ito). Addiitonally, we have just hired a dual-career couple to start in 2014: Bridget and Jasper Konter. We believe that such diversity within the faculty will foster respect for diversity at all levels. A weekly SEMINAR SERIES is in place, allowing faculty and visitors to the department to discuss their views and research, with an underlying code of behavior that a person’s views are to be respected, even if not agreed with.

Academic decisions are made, firstly after hearing the recommendations of the relevant standing committee followed by a faculty consensus or formal votes. For specific topics that require additional discussion, faculty lunches have been held as needed.

Historically department chairs have always forwarded communications from campus authorities to faculty, with a follow up discussion, if necessary, at faculty meetings.
If communications relate to student issues, then either groups of undergraduate or graduate students are consulted through the Geology Club or the Graduate Student organization (both are somewhat informal organizations run by the students).

### 3.2 Research and Faculty

#### 1. Outline research productivity

Over the period 2007 to 2012, G&G faculty members attracted more than $15.6M in new external funding, and published 211 first-authored papers (with an additional 269 co-authored) in peer-reviewed journals or books. We have had 24,811 citations to our work since 2007. Faculty members’ H-indices range from 12-42 for Professors, 6-17 for Associate Professors and 16-19 for Assistant Professors. Details are shown in Table II-1.

#### 2. Describe efforts to generate research

G&G faculty are internationally recognized researchers in geology and geophysical and have been successful in raising extramural funds for supporting this research. Faculty members received 142 grants as PI, valued at $15,644,144, and 44 grants as co-PI, valued at $17,779,182 (note that some of these co-PI grants may be duplicates among collaborating faculty members).

##### a. Grants, fellowships, awards, contracts

The graph at right shows GG funding since 2001. A detailed summary of the grants received for each faculty member is included in the supporting documents to this chapter.

##### b. Explain increases or decreases over past 5 yrs

The large spike in 2006 is due to a single $3.25M grant (to G.Moore) for a 3D seismic cruise. The decline in grant dollars in 2011 and 2012 mostly reflects the retirement of Prof. Fred Duennebier and the resignation of Dr. Katherina Pahnke, both of whom were highly successful in obtaining research funding.

#### 3. What is average research workload?

##### a. What is average instructional and advising/mentoring workload of faculty?

SOEST faculty are expected to spend approximately 40% of their time on teaching duties, 40% on research and 20% on service. G&G faculty generally teach three courses every two years.
All faculty advise/mentor graduate students, with their effort ranging from a few hours to several days per week, depending on the number of students.

4. **To what extent are scholarship/research/creative activity linked to improvement of teaching and learning?**

With such an active research program GG faculty often update the materials taught and methods of teaching in their courses to reflect the current trends in their fields. Dr. C. Fletcher produced an introductory text book as well as a books specifically about local coastal Geology that are used in our classes.

a. **Are library sources sufficient to support research and teaching?**

Library resources are sufficient for teaching. For research, online journals are being used almost exclusively. While most of the important journals are accessible online through the UH library, many subscriptions are too restrictive in terms of the back dates available.

5. **How effectively can department/institute balance expectations of research with teaching/mentoring?**

Most GG faculty are generally successful in obtaining the right balance. They are able to spend the required time to be both successful teachers and successful researchers.

6. **To what extent are adjunct faculty used in teaching? How are they engaged in assessment?**

Adjunct faculty are rarely used for teaching in our Department. All regular faculty members are strongly committed to teaching and we are able to cover all of our current courses with regular faculty. When our MGeo program begins, we will use 1-2 adjunct faculty (drawn from the local Environmental industry) to teach at least one course per semester to give the students exposure to current industrial practice.

7. **Discuss recruitment and retention efforts. How connected to changing needs?**

Since our program review in 2001, GG has made 10 new tenure track faculty appointments (filling prior retirements and resignations), two of which were dual career partner hires. One non tenure-track faculty member (Pahnke) was hired but left UH even though an effort was made to retain her by offering her a tenure-track position. Two other faculty members (S. Roland and E. Hellebrand) were retained by offering a tenure-track position. All applications for tenure and promotion have been successful since 2007.

8. **List faculty awards and recognitions last 5 years**

- Prof. Steven Stanley received the Paleontological Society Medal for the advancement of knowledge in paleontology in 2007. In 2008, he also received the Twenhofel Medal from the Society for Sedimentary Geology (SEPM), for outstanding contributions to sedimentary geology
- Prof. Clint Conrad received a National Science Foundation CAREER Award in 2012
• Prof. Robert Dunn was awarded Fellowship by the Geological Society of America in 2012.

• Prof. Charles Fletcher received the UH Mānoa Chancellor’s Citation for Meritorious Teaching and the U.S. Environmental Protection Agency’s Environmental Achievement Award in Climate Science in 2011.

• Eric Gaidos was an LMK Foundation Fellow at the Pufendorf Institute for Advanced Studies at Lund University, Sweden in 2011.

• Prof. Hope Jahren received the ARCS Honolulu Chapter 2010 Scientist of the Year award; she also received a Fulbright Award in Arctic Science for study in Norway in 2010 and was named Leopold Leadership Fellow by Stanford University’s Woods Institute for the Environment in 2011.

• Professor Brian Popp received a Frolich Fellowship from CSIRO Marine Laboratories, Hobart, Australia in 2011.

• Prof. Scott Rowland received the UH Mānoa Excellence in Teaching award and was awarded Fellowship by the Geological Society of America in 2012.

• Professor John Sinton was appointed as Chairperson, State of Hawai‘i Natural Area Reserves Commission and was awarded Fellowship by the Geological Society of America in 2012.

• Professor Kenneth Rubin was one of the Ridge 2000 Distinguished Lecturers in 2011 and was awarded Fellowship by the Geological Society of America in 2012.

• Prof. Paul Wessel was elected to Fellowship by the American Geophysical Union in 2012.

9. Attach brief cv for each faculty
Included in Appendix 3.1.

3.3 Academic Programs

Guiding WASC Standard: The institution achieves its institutional purposes and attains its educational objectives through the core functions of teaching and learning, scholarship and creative activity, and support for student learning and success. It demonstrates that these core functions are performed effectively and that they support one another in the institution’s efforts to attain educational effectiveness. (Standard II)

3.3.1 Curricula

1. What actions were taken in response to previous program review recommendations? What has transpired in the unit since submission of your one-year progress report following the previous program review?
The program review in 2001 was one year after a major curriculum change from a more flexible and diversified program to a more rigorous, smaller set of core courses and a clearer distinction between the BS and BA degrees. The new curriculum has been successful in that faculty are able to offer the core courses with sufficient frequency and students are more clear on the appropriate sequence of courses to take. GG has since regularly evaluated and updated this curriculum. Some of these changes reflect the addition of new faculty, some reflect changing directions and needs within the earth sciences. Since the low in the number of faculty in 2001, GG has made at least 10 new faculty appointments, allowing for an increase in the depth and breadth and pertinence of subjects taught. Undergraduate courses offered in 2012, but not in 2001, include GG102-Introduction to Global Change; GG106 – Humans and the Environment; GG130-Geological Hazards; GG170- Physical Geology (Honors); GG250 – Scientific Programming; GG406-Natural Disasters: Geoe and the Layman; GG413- Geological Data Analysis; GG421-Geologic Record of Climate Change; GG461- Geospatial Information. Some courses are no longer offered due to retirement of faculty and others are simply irrelevant today.

In addition to new courses, our degree requirements have also been regularly updated.

2. How are disciplines changing, and what research/data support these changes?

There have been various levels of change to the sub-disciplines within Geology and Geophysics. Two clear examples of developing fields are Natural Hazards and Climate Change. Ten years’ ago, no hazards related courses were taught in GG. This year, there are two courses at undergraduate level, as well as one at graduate level. In addition co-curricular courses are taught with the Department of Urban Planning and increased involvement with the Natural Hazards Disaster Preparedness Center. We now offer 100-level and 400-level courses devoted to Climate Change and have incorporated discussion of the causes and consequences of Global Change in all introductory courses (e.g., GG101, 106 and 170). Paleontology was taught before, but is no longer a separate course in part because the demand for graduates with expertise in paleontology has declined. Paleontology is included as a unit in GG200 presently. In its place, we recently started a new program in GeoBiology and have two faculty members that have active GeoBiology research programs (Gaidos and Jahren).

The department continues offering a mainstream Geology curriculum that includes such course as Mineralogy, Igneous and Metamorphic Petrology, Structural Geology, Geochemistry, Field methods, and Sedimentology and Stratigraphy, which are required courses for graduation. These would be common core courses for the majority of departments teaching Geology.
Scientific Programming was introduced as it became obvious that geologists of the future need to be competent in an algorithmic computer language, such as MATLAB, for this field.

3. To what extent are scholarship, research and creative activity linked to the curricula?

Increasingly, the senior undergraduate students are choosing to take GG499 – Undergraduate Thesis as one of their optional courses. This involves performing original research and presentation of the results in the form of a thesis, but in addition, can often involve the student presenting it at international conferences such as the American Geophysical Union's Fall Meeting in San Francisco. The department requires GG410-Undergraduate Seminar (for undergrads) or GG610-Graduate Seminar (for grad students) in which students are taught techniques, gain practice, and demonstrate competence in creating and presenting scientific talks. Our faculty also regularly teach GG711 which are special topic graduate courses that directly draw from current research projects. Graduate theses and dissertations are clearly linked to faculty research areas.

4. In what ways have courses and programs been modified to reflect new knowledge and/or changes in the needs of society?

The two prime examples mentioned above are Natural Hazards and Climate Change. It is very important for the people of Hawaii who live on islands with active volcanoes and urban development under steep and sometimes unstable hillsides and where the very coastlines are being affected by climate change, that this department have active research programs and teaching interests in the areas of Natural Hazards and Climate Change. Another topic that has been incorporated into the curriculum is the issue of the global supply limits on conventional energy resources such as petroleum and coal. Hawaii’s reliance on imported petroleum puts the state at risk to large fluctuations in prices and supply limitations, of which every citizen should be aware.

Another effort GG has made to adapt to societal needs is in proposing to create the Professional Masters in Geoscience (MGeo) program. The MGeo is for students seeking careers in geoscience related industries rather than scientific research. In addition to coursework that emphasizes societally relevant applications, the program will provide practical work experience for students and bolster connections between GG and employers in Hawai‘i as well as in the U.S. mainland. The program will be an efficient path for those with a B.S. in geology and geophysics (including GG B.S. majors) to obtain a Master’s degree because the MGeo can be completed with only one year of study.

5. In what ways have resources been shifted to respond to these changes?

Over the past ten years, the most dramatic change in technology is the use of personal computers. Since we moved into the POST Building in 1998, the department has maintained two computer rooms with state-of-the-art computers and software for students to use in research and preparation of course work. With many of our undergraduates owning their own
laptops, the University provides WiFi throughout the building. The School has also continued to make improvements to its computing facilities.

In 2002, the School began operation of a new research vessel, which has increased the opportunities for all students to take part in ocean-related research and has regularly sponsored research expeditions devoted to student-led projects at sea. These State-funded expeditions have also provided opportunities for departmental instructors to build collaborative training and research cruises for SOEST graduate and undergraduate students. By coordinating requests the benefits of ship time are maximized in terms of collaborative graduate education associated with specific courses, graduate student thesis research, and exposure of undergraduate students in the Geology and Geophysics and Global Environmental Science programs to oceanographic research.

3.3.2 Assessment

6. What are the learning outcomes for each certificate, undergraduate and graduate program? How has the department ensured that its degree and certificate programs remain rigorous and aligned with educational objectives?

Undergraduate Student Learning Outcomes

1. Students can explain the relevance of geology and geophysics to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.

2. Students can apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.

3. Students use the scientific method to define, critically analyze, and solve a problem in earth science.

4. Students can reconstruct clearly and ethically, geological knowledge in both oral presentations and written reports.

5. Students can evaluate, interpret and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines and their context in relationship to other core sciences to explain complex phenomena in geology and geophysics.

During the Spring semester, students are asked to evaluate the degree program with respect to meeting the SLOs that they had been advised of with the start of each course. These responses are then tallied and reported on to the curriculum committee to see if any adjustments need to be made to the learning objectives.

For the M.S.

1. M.S. graduates are proficient in applying technical knowledge of relevant knowledge base, theory, laboratory methods, field methods, computer applications, and the
supporting disciplines (math, physics, chemistry, biology) to help advance the fields of geology and geophysics. *(assessed by performance in coursework)*

2. M.S. graduates are able to (a) construct scientific hypotheses, (b) define and carry out research to evaluate them in a timely manner, (c) analyze and synthesize the results of their research, and (d) derive conclusions that help advance the fields of geology and geophysics. *(Assessed by success in the thesis proposal, semester progress report to M.S. committee, and annual evaluations)*

3. M.S. graduate are able to effectively communicate the findings of their research in writing at a level comparable to that of a scientific journal publication, and defend it orally to the satisfaction of a scientific audience. *(Assessed by success in the thesis proposal, and oral and written defense)*

4. M.S. graduates have acquired the knowledge and skills needed to pursue employment or other activities that contribute to the advancement of the Earth sciences and/or the solution of societal problems. *(Assessed through presentations at professional conferences, publications, the thesis defense, and/or successfully gaining employment in a relevant area.)*

**For the MGeo**

1. MGGeo graduates are proficient in applying technical knowledge of relevant knowledge base, theory, laboratory methods, field methods, computer applications, and the supporting disciplines (math, physics, chemistry, biology) in solving practical problems in geology and geophysics. *(Assessed by performance in coursework)*

2. MGGeo graduates are able to define and successfully complete a project in a timely manner that has practical benefit to industry and/or society. *(Assessed by success in the project proposal, semester progress report to MGGeo committee, and annual evaluations)*

3. MGGeo graduates are able to effectively communicate the findings of their project in a written report as well as in an oral presentation at a professional level as evaluated by scientists and other professionals. *(Assessed by success in the project proposal, and the oral and written reports)*

4. MGGeo graduates have acquired the knowledge and skills needed to pursue employment or other activities that contribute to the advancement of the Earth sciences and/or to the solution of societal problems. *(Assessed through presentations at professional conferences, publications, the thesis defense, and/or successfully gaining employment in a relevant area.)*
conferences, publications, the oral and written reports, and/or successfully gaining employment in a relevant area)

For the PhD

1. Ph.D. graduates are proficient in applying technical knowledge of relevant knowledge base, theory, laboratory methods, field methods, computer applications, and the supporting disciplines (math, physics, chemistry, biology) to advance the fields of geology and geophysics. (Assessed by performance in coursework and the comprehensive examination)

2. Ph.D. graduates are able to comprehensively synthesize, evaluate, and interpret relevant fundamental knowledge in her or his sub-discipline. (Assessed by performance in the comprehensive and Ph.D. qualifying examinations)

3. Ph.D. graduates are able to independently (a) construct scientific hypotheses, (b) design and carry out research to evaluate them in a timely manner, (c) analyze and synthesize the results of their research, and (d) derive conclusions that advance the fields of geology and geophysics. (Assessed through the dissertation proposal, the Ph.D. qualifying examination, semester progress reports to the Ph.D. committee, and annual evaluations)

4. Ph.D. graduates are able to effectively communicate the findings of their research in writing at a level comparable to that of scientific journal publications, and defend it orally to the satisfaction of a scientific audience. (Assessed by success in the dissertation proposal and defense)

5. Ph.D. graduates have acquired the knowledge and skills needed to pursue employment or other activities that contribute to the advancement of the Earth sciences and/or the solution of societal problems. (Assessed through presentations at professional conferences, publications, the dissertation defense, and/or successfully gaining employment in a relevant area.)

6. What indicators and sources of evidence do you use to assess whether students develop core learning abilities and competencies before they graduate? (Please summarize assessment findings.) How have these findings led to modifications in your curricula?

Alongside the undergraduate survey mentioned above, results from certain course work are evaluated to see what progress a student has made. For example, student progress in GG 410 is used in assessing progress in SLO #4; student
work in GG350 and GG250 relates closely to SLO #2. Class work in the core curriculum relates to SLO #5. The faculty work diligently to ensure that not only do the SLOs reflect the core learning abilities and competencies it feels a graduate should have, but that also the curriculum meets the demands of the SLOs and not add an extra workload to faculty and students arbitrarily.

Employment of our graduates has also been used in analyzing the curriculum, and has at times led to modifications. The new development of the MGeo degree has come about from a demand from our Bachelors’ graduates for a Masters’ level qualification more suited to their work environment rather than as a research degree.

8. How would you assess the role general education plays in preparing your undergraduate students for the major(s)? In what areas are students well prepared? Where do you see deficiencies?

Earth science is a truly multi-disciplinary field and requires general education in chemistry, mathematics (calculus and linear algebra), physics and biology. These support subjects are necessary for a student to succeed in the upper division geology courses. Overall, GG undergraduate students are reasonably well prepared in these subject areas, but some struggle in math and physics. In response, GG has created its own math courses such as Geological Data Analysis (GG 413) and GeoMathematics (GG 312). GG312 has also become popular among oceanography and engineering students.

9. To what extent does the faculty regularly engage in discussing effective approaches to assessing teaching and learning within the department?

Effective teaching methods are discussed in faculty meetings, occasionally with an outside expert coming in to explain new techniques. Most faculty are aware of changing trends in teaching strategies and some of our faculty are eager to explore new methods. The use of “clickers”, for example, has greatly enhanced the involvement of GG101 students in their class work. In addition, with the mandate from our Dean to incorporate iPads in our teaching, faculty are beginning to use them to change their teaching methods. Many of the GG courses have a laboratory component that enables those learners who are more “hands-on” types. The growing use of online course content nationally is recognized but has yet to be adopted on a regular basis in GG.

Graduation Rates

10. What factors prohibit students in your major(s) from graduating in 4 years? What data support these assumptions?

The inferred reason that some GG majors take more than 4 years is based on anecdotal evidence. Many of our majors are transfer students who need additional time to fulfill GG as well as UHM requirements. Some of our students must repeat some supporting course work (esp. math and physics), or occasionally their GG courses in order to earn the minimum
required grade of C in these classes. Like most UHM student's, GG majors typically have part-or full-time jobs as well as family responsibilities that limit the time they can dedicate to study.

Scheduling of courses is frequently an issue. Comments by students have suggested that availability of or space in lower division, non-GG courses has been an issue. GG’s undergraduate advisors are committed to helping students plan their coursework appropriately, but sometimes students do not seek or follow the advice given; some students simply declare their major too late to finish in 4 years. A related issue is the introductory science requirements of the College of Arts and Sciences. As more Arts and Science majors have the option to take GG courses to fulfill these credits, more should have the opportunity to gain earlier exposure to GG courses, thus speeding time graduation for those who decide to change majors to GG.

11. How does the department ensure that its programs can be completed within a timely manner? What is the rotation for required courses in your majors?

The department has two undergraduate advisers who are committed to helping the students plan their degree programs efficiently. The department has developed a timetable for required courses that would enable a student to enroll in courses in a natural progression into the subject area and to complete degree requirements within four years. Most courses are taught once a year. In addition, SOEST provides a tutor for our undergraduates to help them with their general education course work.

12. Assess the overall health of your academic programs.

GG has maintained 38-45 undergraduate majors and 45-50 graduate students. GG’s undergraduate program is smaller than those of many programs at UHM, but is healthy when considering the broader U.S. market: the percentage of all UHM students in GG of 0.4% is larger than the geoscience percentage of all U.S. students of 0.15% (i.e., 30,000 graduate and undergraduate geoscience majors in the past decade [AGI, Geoscience Currents, No. 31, 27 April 2010] compared to ~200,000 total U.S. students http://www.census.gov/hhes/school/data/cps/ 2010/tables.html).

The clear advantage is a relatively high faculty-student ratio which allows GG faculty to excel in providing a more personalized and interactive educational experience. Also, if an undergraduate in looking for part time employment, they will usually be able to find it in the GG department, and often within the sub-discipline they are most attracted to. Through this part-time work, many students opt for doing the GG499 senior thesis which in turns helps them if they are intending to go on to graduate study. On completion of their undergraduate degree, especially over the past ten years, nearly all of the Department’s graduates have found either GG related employment or gained entry to graduate study. A few graduating students have intentionally decided to follow other lifestyle options as is common in many programs.
3.4 Students

Guiding WASC Standard: The institution achieves its institutional purposes and attains its educational objectives through the core functions of teaching and learning, scholarship and creative activity, and support for student learning and success. It demonstrates that these core functions are performed effectively and that they support one another in the institution’s efforts to attain educational effectiveness. (Standard II)

Questions for Engagement

1. What is the department’s overall satisfaction with the quality of your current students?

Each year the GG Department has about 10-15 new undergraduate students admitted to our major. Many of our undergraduates come from the West Coast of the mainland, taking advantage of a WASC-related schools discount on fees. The department also has a number of Scandinavian students who come for a semester. The ability of these students covers the full range of mediocre to outstanding. There is no selection process at undergraduate level – if the student wishes to major in GG they can, though in doing so they need to meet the core course requirements to graduate, which in itself may eliminate some contenders. We would prefer to attract a higher caliber of undergraduate students and have established contacts with Kapiolani Community College to try to attract Juniors who show promise of being excellent students.

At the graduate level, the department is able to be much more discriminating in whom we select. For each fall semester, the department receives between 90-100 applications for the Masters and PhD programs combined. The average GPA of these applicants is about 3.45. Graduate students are selected on a mix of criteria: GPA and GRE grades, references, content of undergraduate degree, and finally assessed suitability of a student to work with a particular professor on often a very specific topic. By being so selective, the department has a very high graduation rate amongst those it accepts. The quality of students that apply to this school is reflected in the fact that many of our Graduate applicants are also applying to the top schools in the country (e.g. Stanford, Harvard, MIT) and some choose UHM. Competition for grants has become increasingly competitive over the past ten years, thus the department is pleased that it has been able to maintain the average of offering positions to 10-12 Graduate students each Fall,
with on average 9-10 accepting. There has not been a discernible drop in the number of applications received, but the proportion coming from females and overseas applicants (especially from China) is increasing.

2. *To what extent is the department satisfied with enrollment trends and the number of degrees earned?*

The total number of declared majors has fluctuated moderately but consistently remained between 80 and 100 since 2002. Our undergraduate program has seen an upward trend since 2000: ~30 were enrolled in 2000-2002, compared to ~40 in 2010-2012. The increase in Fall 2002 was two years after the major revision to our undergraduate curriculum. The average annual number of B.S. and B.A. combined graduations is 3.8 since 2005, which is about 80% of the average number of newly declared majors each year over the same time period. GG is moderately satisfied with the trend of increasing undergraduate numbers and ~80% success rate.

GG’s graduate student enrollment increased in 2002, shortly after the arrival of 4 new faculty hires, and has showed a relatively flat trend ever since. The success rate for GG graduate students (M.S. and Ph.D. combined) has been 85-95% since 2005. Enrollment is limited primarily by the number of extramurally funded research projects, thus from that perspective, the graduate student numbers are satisfactory. However, in terms of course instruction, GG is capable of instructing more students and therefore the numbers are unsatisfyingly low. The Professional Masters in Geoscience (MGeo) program is proposed, in part, to take advantage of this capacity and provide more students access to the graduate courses.

3. *Describe briefly how the department markets its programs and recruits students. What percentage of applicants are accepted, and enrolled in your graduate programs?*

The Director of Student Services has in the past coordinated GG’s formal marketing efforts. These activities have primarily involved displays at various events (e.g., Hawaii State Science and Engineering Fair, recruitment events at local high schools, community college recruitment fairs, Fall AGU Meeting). This Director has been promoted to take on SOEST-wide activities, leading to questions about the continued success of GG’s undergraduate recruitment activities. An important tool for national and international recruitment is GG’s and SOEST’s websites, which saw a major renovation about three years ago. Another important recruitment mechanism is the efforts by individual faculty members in contacting colleagues around the world or sending advertisements through various list serves. One effort—which apparently was not successful—involved sending a page-size advertisement to various U.S. physics and engineering departments. GG receives regular inquiries by prospective students, to which interested faculty respond and staff members send a booklet about the program.

The graduate program has received an average of 44 applications each year since 2005. About 15% of these applicants receive offers and about 10% accept these offers. This represents a 66% success rate for recruitment.
4. What financial support is provided?

Undergraduate majors are eligible to compete annually for two fellowships, which provide funds for research projects: William T. Coulbourn Fellowship in Marine Geology and Harold T. Stearns Fellowship. No other financial support is provided by GG to undergraduates. In contrast, all graduate students receive financial support of some kind, and relatively few ever spend even a semester completely unsupported. The department has 5 TA positions (50% salary) funded by the University. The Fred M. Bullard Fellowship is a competitive award that provides stipends for outstanding new recruits or existing graduate students. The J. Watumull Merit Scholarship, the Stearns Fellowship, and Coulbourn Fellowship provide a supplementary level of research funds annually. Occasionally students obtain funds from national fellowships. The major source of funding for essentially all graduate students is research assistantships supported by individual faculty grants, most of which come from NSF. The associated graduate student tuition waivers provide an important advantage for faculty to compete for these grants and recruit the best students.

5. In what ways does the department cultivate a research-oriented culture of inquiry at the undergraduate and graduate levels?

The heavy involvement of GG faculty in research combined with the small student-to-faculty ratio naturally leads to research oriented activities both within and outside of coursework. As discussed previously, undergraduate students seeking part time employment often find this within GG, and this has frequently led to the undergraduate taking the GG399 – Senior Thesis topic. Often students present their findings at a national/international conferences or workshops, with expenses paid by the supervisor. Faculty are also encouraging students to apply to graduate programs, and eagerly supply letters of reference. Again, the vast majority of graduate degrees are based on extramurally funded research projects. In addition to theses and dissertations, GG students present their research (and win awards) in national and international conferences and in peer-reviewed journal publications.

Advising and Mentoring

6. To what extent are instructional faculty engaged in the advising and mentoring of undergraduate students?

At all times, the department has two faculty members with the assigned task of mentoring and advising the declared major undergraduate students. These advisers meet personally with every undergraduate at least once per semester to discuss course selection and academic career goals. Mentoring activities by other faculty occur through class projects, student employment, and GG399-Senior Thesis.

7. Has the department connected the major to co-curricular programs and services, such as development of field settings, service learning, or other similar opportunities for practical engagement? Which co-curricular activities within the college and across campus enhance learning opportunities and development for your students?
Student employment by GG faculty provides outstanding opportunities for students to gain practical work experience. In addition, the department has a long history of offering field trips as part of its course work, as well as a requirement of an extensive field methods course at 300-level. The study of Geology is synonymous with being out in the field, and many faculty include it within their course work. This can range from the GG100 lab course of three hours per week for a semester; a long weekend trip for 100-level students to the Big Island; weekend excursions around Oahu and again more specialized field trips to the other islands. Because these are all done “in-house” the department has not used other co-curricular programs offered elsewhere in the university.

8. How effectively have advising and mentoring helped students to take advantage of and benefit from available educational opportunities and resources within the department and across campus?

Experience suggests that once a student has declared Geology and Geophysics as his/her major, the student takes full advantage of many opportunities offered by the department. Again the small student-to-faculty ratio, employment opportunities, and class activities promote this culture. In addition, the department offers to our majors their own dedicated undergraduate lounge with microwave and soda machine; access to computers and printers 24 hours a day; tutoring in basic science subjects; a social club that organizes many outings each semester; easy access to graduate students.

Governance

9. How does the department define the role of students in departmental decision-making, and how is that role exercised?

The Department has 7 standing committees – personnel, graduate studies, (undergraduate) student, honors and relations, graduate admissions, curriculum and departmental. An undergraduate student is nominated to be a full member of the student, relation and honors, and curriculum committees with full voting rights. Similarly, a graduate student is a full member of the student, curriculum, and departmental committees. These student consult with their constituent groups as part of their service.

10. What are the grievance procedures for students, and how are these communicated to them? How does the department ensure that grievances and complaints are addressed promptly, appropriately and equitably?

At graduate level, grievances are often voiced during annual interviews with individual graduate students with the graduate studies (standing) committee. We note that the student’s adviser is never in attendance at these meetings. Depending on the seriousness of the issue, the
grievance is quickly written up and taken to the Department Chair, who may decide to act him/herself, liaise with a committee or its members or take it further to the Associate Dean of SOEST, who oversees educational issues. If the issue cannot be resolved at this level, then it is taken to the appropriate person at the University level. At undergraduate level, students commonly seek assistance from SOEST’s Director of Student Services, the two undergraduate advisors, and/or the Departmental Chair. In rare cases, assistance is sought from UHM’s Counseling and Student Development Center or the Dean’s office. Again, this is a small department, and students with concerns quickly find someone whom they trust sufficiently to share their concerns with.

11. Please provide any student recognitions over last five years.

2012

• Agatin Abbott Memorial Award: Adonara Mucek
• Fred M. Bullard Fellowship: Emily First, Malin Klawonn, Elise Rumpf, Dana Brodie, Kendra Lynn, Gabrielle Weiss
• J. Watumull Scholarship: Haunani Kane
• Evan Research Fellowship in Oceanography: Alice Colman
• The Manoa Experience Arts Competition Grand Prize, October 2011: http://manoa.hawaii.edu/ovcaa/contest/ & DURRIDGE Company Scholarship 2012- Christine Waters

2011

• Fred M. Bullard Fellowship: Tiffany Anderson, Emily First
• William T. Coulbourn Fellowship: Jacque Kelly
• J. Watumull Scholarship: Myriam Telus
• ARCS Award—Awarded by the Achievement Rewards for College Scientist foundation. Jacque Kelly

G&G Student Awards

J. Watamull Scholarship
Awarded annually to the department’s outstanding graduate student from an endowment from the Watumull Foundation.

Fred M. Bullard Fellowship:
Endowed by Thais Freda Bullard in memory of her father, Fred M. Bullard, a pioneer in the studies of Volcanology and general Geology & Geophysics.

Harold T. Stearns Fellowship
Endowed by longtime department friend for the purpose of supporting student research on geological and geophysical problems in Hawaii and the Pacific Basin.

Abbott Memorial Award
Presented to an outstanding senior, annually, in memory of department faculty Agatin Abbott.

William T. Coulbourn Fellowship
Endowed by friends and family in memory of department alumnus and faculty member William T. Coulbourn.
• G&G Achievement Scholarships—Awarded based on merit service, achievements and outstanding grades of Graduates. Carrie Brugger, Tiffany Anderson
• Fernanado Gabriel Leonida Memorial Scholarship: Michael Chandler
• URC Excellence in Research Award at Master's level: Alice Colman
• Fellowship from the National Science Foundation Graduate Research Fellowship Program: Christine Waters

2010
• Agatin Abbott Memorial Award: Samantha Weaver
• Fred M. Bullard Fellowship: Seung-Sep Kim
• William T. Coulbourn Fellowship: Jacque Kelly
• J. Watumull Scholarship: Bradley Romine
• American Mineralogist Under-graduate Award: Wendy Cockshell
• ARCS Award—Awarded by the Achievement Rewards for College Scientist foundation - Tiffany Anderson
• SOEST Achievement Tuition Scholarships: Awarded based on outstanding Spring 2010 grades of Undergraduates: Samantha Jacob, Joseph Kennedy, Adonara Mucek, Edward Wolzien
• G&G Achievement Scholarships: Awarded based on merit service, achievements and outstanding grades of Graduates: Carrie Brugger

2009
• Agatin Abbott Memorial Award: Maria Janebo
• William T. Coulbourn Fellowship: Jacque Kelly
• Harold T. Stearns Fellowship: Jonathan Weiss and Sarah Yasui
• J. Watumull Scholarship: Michael Chandler
• ARCS Award—Awarded by the Achievement Rewards for College Scientist Foundation. Toby Lee Award in Geology: Thomas Shea
• NSF Graduate Research Fellowship—Three years of funding for Ph.D. dissertation Investigation of the Cooling Mechanics of Complex Lava Flows: Elise Rumpf

2008
• Agatin Abbott Memorial Award: Carolyn Parcheta
• William T. Coulbourn Fellowship: Carrie Plath & Jacque Kelly
• Harold T. Stearns Fellowship: Jacque Kelly & Ashton Flinders
• J. Watumull Scholarship: Meryl McDowell
• ARCS Award—Awarded by the Achievement Rewards for College Scientist foundation.
  Toby Lee Award in Geology: Samuel Hulme

3.5  Staff Support and Facilities

Guiding WASC Standard: The institution sustains its operations and supports the achievement of its educational objectives through its investment in human, physical, fiscal, and information resources and through an appropriate and effective set of organizational and decision-making structures. These key resources and organizational structures promote the achievement of institutional purposes and educational objectives and create a high quality environment for learning. (Standard III)

3.5.1 Questions for Engagement

1. Assess the continuing adequacy of physical and staff resources.

Office space for the four administrative staff is adequate or better, as all offices have only once occupant and are large enough for the necessary furniture. However, two of the three fiscal staff share a small interior office without natural light.

Recently all secretarial staff received new desk top computers, and those without scanners also acquired new scanners. In some areas filing cabinets are old, rusty, beaten up and can be difficult to open. Office seating in some cases is also poor and by today’s ergonomic standards below basic levels.

1a. Identify space and equipment managed by the department that support research and instruction.

Undergraduate and graduate students have access to and regularly use facilities in the Department of Geology and Geophysics for their research as do national and international visitors. In addition, these laboratories are used in many departmental graduate-level courses offered annually.

The Department houses two Stable Isotope Biogeochemistry Laboratories with eight state-of-the-art gas ratio mass spectrometers and two full-time (50% State-funded) laboratory managers and sufficient space for sample preparations.

The Department houses the SOEST Isotope Laboratory, a facility for radiogenic/radioactive isotope geology and non-traditional stable isotope studies. It houses two
thermal ionization mass spectrometers, one state-of-the-art multi-collector inductively coupled plasma mass spectrometer (ICPMS), 24 radioactive counting detectors and a full-time (50% State-funded) laboratory manager. It also includes a dedicated 4 room clean-room facility, a sample preparation space, and a stand-alone wet laboratory to support solution ICPMS sample preparation.

The Electron Microprobe Facility with its state-of-the-art field-emission gun electron microprobe and the X-ray Fluorescence Laboratory are operated together by one full-time State-supported laboratory manager.

The Department also operates a thin-section preparation laboratory that is staffed by a half-time state-funded technician.

An Element2 ICPMS is also among the instrument housed in the department. This instrument is not run as a facility and receives no state support. The lab is operated by faculty with help from half time technical staff (funded extramurally), and is mainly used by graduate students, post-doctoral researchers and faculty from the Departments of Geology and Geophysics and of Oceanography.

The Seismic Reflection Processing and Interpretation Facility has several workstations with commercial seismic processing and interpretation software from Landmark Graphics and Paradigm Geophysical. These computers and software are used by faculty and students for research and teaching.

The Geophysics Computational Facility is a Dell Linux cluster with 176 cpu cores (Intel X5550), each with 3GB RAM. The 22 nodes are connected with Mellanox DDR Infiniband and link to a 20 TB of Raid storage.

2. In what ways does the department support and continue to develop non-academic staff (APT and civil service personnel) in a manner that encourages their effectiveness and actively furthers the mission of the department?

Non-academic staff regularly attend free training sessions offered by the campus as a whole (e.g. introduction to the new KFS; briefings on Retirement funds) but no special on-job trainings are organized or encouraged.

One staff member who acts as the assessment coordinator is encouraged to attend Assessment workshops run by the Assessment office.

3. Is the ratio of APT and civil service staff in relation to faculty sufficient for the department to achieve its mission and goals?

At present there is sufficient administrative and fiscal staff for the department. The professional expertise in student services, however, has declined. Ten years ago the Department had its own Student Services Advisor. But as this person was promoted, extra school-wide duties were added to the job description resulting in a gradual decrease in services to the Department, so
we are now being asked to shoulder many of the Student Services advisor’s duties through use of the administrative staff, with no extra training or renumeration.

The Specialist position (50% G-funded) that was allocated to the Marine Geophysics group for maintenance of seismic software was not returned to the group when the Specialist resigned to take an industry job in 2006. Software maintenance is now added to the faculty workload. Funding for this position is highly desired.

4. Please provide a list of staff awards and recognitions, 2005-2010

None

3.6 Extension and Outreach Activities

Guiding WASC Standard: The institution defines its purposes and establishes educational objectives aligned with its purposes and character. It has a clear and conscious sense of its essential values and character, its distinctive elements, its place in the higher education community, and its relationship to society at large. Through its purposes and educational objectives, the institution dedicates itself to higher learning, the search for truth, and the dissemination of knowledge. The institution functions with integrity and autonomy. (Standard I)

Questions for Engagement

1. Please describe any relationships with organizations/individuals in the community. In what ways do these relationships contribute to the curriculum, student experience, development, faculty research, or budgetary resources in the department?

Education and Outreach: Every two years, SOEST holds a two-day Open House for schools and members of the public. This event involves all academic and research institutes within the School, including the Department of Geology and Geophysics. Since GG is the largest teaching department within the School, all of our classrooms, are used for exhibits and demonstrations, as well as some outside areas that are used for the “messier” or “louder” demonstrations. Over 5000 school students and teachers attend, with our undergraduate and graduate students assisting faculty with exhibits and demonstrations. The purposes are to let the public know how their state and federal dollars are spent, to provide children of all ages exposure to earth science fields and science activities outside of their own classrooms, and to allow students, teachers and parents to meet SOEST/GG faculty, students and staff. The SOEST Open House is a valuable community-building event both between SOEST/GG and the public, but also among students, faculty, and staff within SOEST/GG.
GG faculty often give presentations at schools, community college classes and to media outlets both locally and nationally. Some of the faculty volunteer each year as judges for the Hawaii State Science and Engineering Fair. Other formal outreach and education efforts are funded as part of faculty research programs. NSF for example, is increasingly emphasizing education and outreach. The relations developed and experiences with local organizations enhance the overall experience for GG faculty and students alike.

**Alumni Relations:** Every year the Department publishes a newsletter that is posted on our web site and sent via electronic mail to alumni. This newsletter helps to keep our former students in touch with the Department and it is also a vehicle used by the Department to encourage alumni to make monetary gifts to the department either for a specific use, for general purposes or frequently into the field trip fund for students. Alumni also periodically visit the department and speak to current students about their careers.

**Professional relations:** Some GG faculty collaborate with and/or obtain funding from local companies and agencies such as the US Geological Survey, U.S. Soil and Water Conservation District, Department of Land and Natural Resources, Hawaii Department of Health, Hawaii Department of Transportation, DOI Department of Interior. Besides stimulating research and funding for faculty, these relationships provide practical experience and potential future employment opportunities for graduate students. Additionally, the Macdonald Chair of Volcanology is also the State of Hawaii Volcanologist.

2. Attach copies of newsletters, relevant brochures.

3.7 Concluding Statement

Questions for Engagement

1. *What is your overall assessment of the department? What are the strengths, weaknesses, opportunities and threats? Are you poised to meet these challenges in the future?*

During the strategic planning process, GG self-evaluated both its current situation and scenarios for ideal, probable, and unfortunate futures (see next page). We also considered (largely positive) changes since the last self-assessment, as well as the perceived needs of students and employers in the local marketplace.
Results of self-evaluation by SWOT analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Academic diversity</td>
<td>• Changing face of Earth Sciences</td>
</tr>
<tr>
<td>• Unique geographic/geologic location</td>
<td>• Emerging interdisciplinary research fields</td>
</tr>
<tr>
<td>• External grant funding base</td>
<td>• Land degradation, impending environmental crises, resulting hazards</td>
</tr>
<tr>
<td>• Faculty excellence</td>
<td>• Lack of a state geological survey</td>
</tr>
<tr>
<td>• National leadership in some geologic sub-disciplines</td>
<td>• Unexploited ties to the rest of SOEST</td>
</tr>
<tr>
<td>• Faculty collegiality</td>
<td></td>
</tr>
<tr>
<td>• 50 years of history and tradition of research, teaching, and service excellence</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Limited resources for response to external changes</td>
<td>• Insufficient monetary resources</td>
</tr>
<tr>
<td>• Limited resources for graduate student support</td>
<td>• Political nature of resource allocation at UH</td>
</tr>
<tr>
<td>• Geographic isolation</td>
<td>• Bureaucratic inertia</td>
</tr>
<tr>
<td>• Lack of coverage of some key geologic sub-disciplines</td>
<td>• Unfilled faculty complement</td>
</tr>
<tr>
<td>• Lack of funded technical support</td>
<td></td>
</tr>
<tr>
<td>• Few interdisciplinary research programs</td>
<td></td>
</tr>
<tr>
<td>• Non-overlapping definitions “Geology and Geophysics”</td>
<td></td>
</tr>
<tr>
<td>• Academic preparation of incoming undergraduates</td>
<td></td>
</tr>
<tr>
<td>• Incomplete group cohesion on curricular matters</td>
<td></td>
</tr>
<tr>
<td>• Historical reduction in faculty complement</td>
<td></td>
</tr>
</tbody>
</table>

The strength of any department is its faculty. The Department of Geology and Geophysics (GG) has a highly qualified dedicated faculty, which effectively blends its teaching responsibilities with research activities. Several faculty have been recognized for their achievements by being elected Fellows of national and international geosciences societies (e.g., American Geophysical Union, Geological Society of America, The Geochemical Society, European Association for Geochemistry, etc). The University of Hawaii has two elected members of the very prestigious United States National Academy of Sciences and one is a faculty member in the Department of
Geology and Geophysics (a third member of the US National Academy of Sciences has just been hired by the Department of Oceanography and will begin 2014, see below). GG faculty regularly publish in the top peer-reviewed geosciences journals and many have papers in the World's most prestigious journals (e.g., *Nature*, *Nature Geoscience*, *PNAS*, *Science*, etc). The Geology and Geophysics faculty have been particularly successful in raising money for research (more than $15.6M since 2007), which in turn sponsors graduate student education, post-doctoral training, and employs staff. Several faculty have been recognized by their peers at the University of Hawaii for their teaching ability and have been awarded the Regents' Medal for Excellence in Teaching and/or the Chancellor's Citation for Meritorious Teaching.

The faculty of the Department of Geology and Geophysics are aging. Ten out of twenty-six faculty are age 55 and over and many are within ten years of retirement. The University of Hawaii President has announced an initiative to hire fifty new World-class faculty that are leaders in their field. The first of those faculty, Professor Edward DeLong of the Massachusetts Institute of Technology and a member of the US National Academy of Sciences, will join the Department of Oceanography in 2014. We anticipate that this initiative will in part build upon the strengths of the University of Hawaii and therefore will benefit GG. We anticipate that retirement positions will return to the GG and we anticipate a growth in the number of GG faculty, which will allow us to hire new World-class faculty.

A turnover of faculty and growth requires strong and dedicated leadership at the Departmental level. The position of department chair has been for many years an agreed upon 3-year rotation of a current tenured professor. Many departmental chairs have been strong and effective leaders but some have felt 'coerced' into the position rather than it being a career choice. In addition, with only a 3-year rotation it has been difficult for the department chair to effect change because of the shortness of the tenure and limited funds available for basic support of Department activities. Continued growth of the Department might benefit from a non-rotating department head.

The Department of Geology and Geophysics moved in to its present location in the POST building 14 years ago. At that time, office and classroom space seemed plentiful and laboratories were new and purpose built. In 2012, we now see a squeeze for office space, with more faculty, more postdoctoral researchers and a steady number of graduate students. In addition, on-going maintenance of the building has increasingly become an issue. There have been air-conditioning and electrical problems that present real challenges for many of the temperature-sensitive instruments in POST laboratories. Leadership in the Chancellor's office has promoted more effective communication between facilities management and research faculty in the Department of Geology and Geophysics, which has improved the situation. However, we have one of the lowest indirect cost rates in the United States (36.7%), which is evidence that the University of Hawaii does not support research infrastructure. A much higher level of infrastructure support will be required if the faculty are to maintain their productive level of research and if we are to grow.
The Department of Geology and Geophysics is fortunate to have a vast array of state-of-the-art instruments. Our laboratories are World-class; thanks to the success of the faculty in obtaining equipment support from the National Science Foundation’s Major Research Instrumentation Program we have some of the best and newest instruments available (e.g., several new ThermoFisher isotope gas ratio mass spectrometers, JEOL microprobe, Nu multi-collector inductively coupled plasma mass spectrometer). However, other instruments are old and are in need of constant attention and repair to enable data collection. This aging equipment must be replaced and while highly competitive proposals for this equipment are envisioned, awards will not come unless there is sufficient and appropriate space to house this equipment.

The Department of Geology and Geophysics is lucky to have dedicated, talented and innovative instructors. Teaching methods are constantly evolving. Two challenges that face the faculty are incorporation of distance learning and group learning. Some faculty (e.g., Paul Wessel) have successfully included remote guest lectures by leading experts from around the world. The presentations were delivered via Skype and were recorded and converted to video podcasts. While highly successful, innovation was hindered by the relatively crude technology available to a single faculty member. Innovation in teaching large introductory courses is limited by the traditional design of our lecture rooms. It is simply impossible to facilitate the kinds of hands-on group activities that are so unique to geology in traditional lecture halls where the seats are bolted to the floor.

Although the Department of Geology and Geophysics is relatively small compared to other units on the Manoa campus, we still typically host approximately 80 graduate and undergraduate students. We currently have no educational specialist so student advising, graduation tracking, management of student files, provide confirmation of degree requirements and assessment are affected by the faculty. Given the challenges and the time required of the faculty for teaching, research and service, the everyday needs of our undergraduate and graduate student population would be much better served by a dedicated professional educational specialist.

The Department of Geology and Geophysics is generally poised to meet future challenges if the economy of Hawaii continues to improve. Like many public universities our funding from the State is dependent upon the health of the local economy. However, in Hawaii this may be a more critical future challenge because our economy is driven mainly by tourism, which could be dramatically impacted if the cost of energy drives the price of an airline ticket beyond the reach of a middle class citizen.
Field trips are an essential and integral part of any Geology curriculum. They allow students to experience a spectrum of geologic processes at a range of scales that are difficult to understand from textbooks and lectures alone. Moreover, field trips substantially augment students’ appreciation of the complexity of nature and the ways geologic phenomena interact. Although Hawaii has many excellent exposures of volcanic features, access to other rock types, non-volcanic processes, and geologic structures requires long-distance travel, which is expensive. Our required field methods course (GG305) exploits local field mapping opportunities but includes a one-week trip to southern California that currently costs ~$1000 per student. Even a field trip to a neighbor island requires $150-200 in airfare alone. The Department has been allocating $1000 per field trip to cover the expenses of the instructor (and TA), but students must bear the expenses for their participation. An increasing number of our undergraduates cannot cover these out-of-pocket expenses and are unable to participate on off-island field trips, so these field trips are “optional”. This substantially limits our students’ undergraduate education.

2. What is your assessment of how the department fits within the School/College? What is your assessment of interdisciplinary collaboration and communication across the departments?

Within the School the Department of Geology and Geophysics is an excellent fit, as there are many common interests with other groups within the school. For example, there are close connections with the Hawaii Institute of Geophysics and Planetology (HIGP). Graduate students working with HIGP faculty are enrolled as GG for administrative purposes as well as the synergy in research between GG and HIGP. Faculty within GG have complimentary interests with faculty in Department of Oceanography and the Center of Marine Microbial Oceanography: Research and Education (C-MORE) and many GG faculty are also graduate faculty of Oceanography.

Similarly, at the campus/system level, there are research collaborations with faculty in Astronomy, Chemistry, Geography, Physics, Engineering, Water Resources and Urban and Regional Planning. Recently there has also been strong interaction with faculty at UH-Hilo.

3. Please identify individuals or groups that you recommend the visiting team meet during the campus visit.

- Hope Jahren’s group: New developments in GeoBiology
- Bruce Houghton’s group: Volcanic Hazards, collaborations with social scientists and others across campus
- Craig Glenn/Henrieta Dulaiova/Aly El-Kadi: collaborations across campus and with UH Hilo
- Garrett Ito and Clint Conrad: New developments in Geophysics
- Greg Moore: Chair of Geology and Geophysics
4. Please identify facilities that the team should tour during the visit.

- POST 621: SOEST electron microprobe and XRF (Eric Hellebrand)
- POST 604/630: SOEST Isotope Laboratory (Ken Rubin)
- POST 724/725/726: SOEST Stable Isotope Biogeochemistry Laboratories (Brian Popp)
- POST 732: High-temperature experimental petrology (Julia Hammer)