

April 18, 2014

Dr. Lynn Stauffer  
Dean of the School of Science & Technology  
Sonoma State University

Dear Dean Stauffer,

Please accept the report of my external review of the Geology Department. I had a very enjoyable visit and appreciated the openness and candid observations of all who I met with. I am very pleased to be able to contribute to the ongoing successes of Sonoma State University.

Sincerely,

Russell Shapiro, Ph.D.  
Associate Professor of Geological Sciences  
CSU Chico

cc. Dr. Andrew Rogerson, Provost  
Dr. Elaine Sundberg Associate Vice Provost for Academic Programs  
Dr. Matthew James, Chair Department of Geology

## **External Review of the Geology Department, Sonoma State University**

**Russell Shapiro, Ph.D.**  
**Department of Geological and Environmental Sciences**  
**California State University, Chico**  
**Site Visit: 7-8 April, 2014**

### **Executive Summary**

This external review follows the previous review conducted in 2008. That review recommended a goal of growing to 50 majors, increasing staff as the [then current] four faculty members were stretched too thin to allow time for program development. The 2008 review noted strengths in diverse lower division GE courses offerings and extensive geological field experience, the acknowledged standard in geological education nationwide.

The Department of Geology makes substantial and important contributions to the mission of the School of Science and Technology and the university through increasing the number of majors and graduation rates since the previous external review. The geology faculty members have produced an impressive list of publications and external grants and graduates of the department have gone on to graduate schools as well as the private sector with a high percentage of licensure with the California State Board for Geologists and Geophysicists.

For this review, the current perceived strengths are still the department's national reputation for strong field skills, a well-balanced traditional geology curriculum that is relevant by today's standards, the development of a reputation in computational geology, and the emphasis on student research. Perceived weaknesses include the significant loss in faculty members, lack of elective offerings, and multiple degree offerings in a small department.

This report recommends replacing Dr. Smith's tenure-track position with a geologist who has a strong desire to mentor student research and continue the emphasis on field studies, development of a revised five-year plan that focuses on the strengths of Drs. James and Mookerjee, utilization of part-time faculty in more diverse roles of mentoring students and teaching elective courses, continued evaluation of curriculum in light the impressive increasing number of majors, a plan for continued department contributions to governance and university service, and expanding connections to the private sector for student support and opportunities.

### **Introduction**

This external review is based on a survey of the university and department website, review of department newsletters and previous internal/external review, and a two-day campus visit on April 7 and 8, 2014. During the visit, the reviewer was able to meet one-on-one with each of the three full-time, tenure-track faculty members (Drs. James, Mookerjee, and Smith), the Dean of the School of Science & Technology (Dr. Lynn Stauffer), the Associate Vice Provost for Academic Programs (Dr. Elaine Sundberg) and the Provost (Dr. Andrew Rogerson), as well as several part-time instructors, department staff, and department majors. The reviewer

also visited two classes and toured the facilities on the first floor and basement of Darwin Hall. The reviewer also incorporated comments from two Emeritus faculty and several alumni.

The reviewer has extensive experience with both Sonoma State University and the CSU system in general. He graduated in Geology from Humboldt State University and is an Associate Professor at CSU Chico. He has worked with Emeritus Professor Dr. Tom Anderson over the years and has joined SSU faculty members on a number of geology field trips including twice on the annual course field trip to the Burgess Shale fossil deposits in British Columbia, Canada.

### **Synopsis of Previous External Review**

The Geology Department was last reviewed by Dr. David Bice of The Pennsylvania State University in 2008. At the time, the department was in the midst of rebuilding with the FERP and final retirement of an established core of faculty and the bringing in of two new faculty members to complement two existing faculty members (one of whom has since retired). The primary concern of that review was the building up the number of majors to a critical threshold without degrading the program. Professor Bice recommended a goal of 50 majors given the size of the faculty (four full-time, tenure-track positions). Another concern was that the faculty was too stretched to allow for much time for needed development. The strengths included the diverse offerings of lower division courses and the incorporation of extensive field experience throughout the major. Those strengths continue to the present day. Significant curricular changes since the 2008 external report are the full implementation of the new BA in Earth Science degree and the revision of the existing BS in Geology degree. The recommended recruitment of new majors has more than doubled the number of majors in the department.

### **Overview**

The Department of Geology makes substantial and important contributions to the mission of the School of Science and Technology (SST) overseen by Dean Lynn Stauffer. The faculty members of the Department of Geology are well trained and committed to the goals of the department and to those of Dean Stauffer, SST, and Sonoma State University. Both the number of majors and graduation rates have increased since the previous external review in 2008. The scholarly contributions of the faculty remain high, and includes a component of international education.

Since the last review, the geology faculty members have produced an impressive list of publications and external grants, including two from the National Science Foundation (NSF). Graduates of the department are admitted to graduate schools across the country. Graduates practicing geology have a high percentage of licensure with the California State Board for Geologists and Geophysicists. Alumni of the department are an important part of the workforce in both northern and southern California. In total, the Department of Geology is an integral part of the academic mission of Sonoma State University.

### **Perceived Strengths**

Sonoma State geology has long had a national reputation for strong field skills and the current faculty is maintaining that tradition. The department has a fairly unique curriculum that

melds a five-day field trip to each majors core course that exceeds the offerings of most other four-year programs across the country and sets a high standard. Although the department does not offer a traditional six-week summer field course, the broader community recognizes the skill sets learned by the students on these five-day excursions and the department should be commended for continuing this program. Dr. James and Emeritus Professor Tom Anderson were recognized in 2009 by the Burgess Shale Geoscience Foundation by being invited to organize a field trip for geology faculty across the country in commemoration of the 100<sup>th</sup> anniversary of the discovery of these fossil deposits in 1909 by Smithsonian paleontologist Charles Doolittle Walcott.

The traditional curriculum is well-balanced and includes the outcome goals that are most relevant in today's professional workforce. Recently, the American Geological Institute presented a report on an ad hoc committee analysis on potential accreditation (appended). While that report did not come to conclusion on accreditation per se, there was strong language about the need to address core learning outcomes in a Bachelor of Science degree in Geology. The details are further developed in a set of guidelines from the Geological Society of London. The synopsis is that the core curriculum at Sonoma State is very much in line with the international standard. An anecdotal testament is the successful rate of employment of SSU geology graduates in the private sector following graduation. The reviewer interviewed a graduate who now works in economic geology who felt her training at Sonoma State was sufficient to land a competitive job in the private sector.

The efforts of Dr. Mookerjee are on-track to distinguish Sonoma State as a leader in computational geology. Dr. Mookerjee is on the cutting edge of this expanding field as evidenced by his successful National Science Foundation grants for the EBSD attachment on the scanning electron microscope, and for developing data management of structural geology. The latter is particularly significant as this type of new knowledge organization is being discussed at the highest management levels of NSF, NASA, NIH, and other federal organizations. Dr. Mookerjee's work has the potential to establish Sonoma State as a leader in data management and curation, and should be encouraged.

The emphasis on student research resonates strongly with the majors. During the meeting with the students, the message was clear that the students valued the ability to conduct research with the faculty. The geology students were representative of the diverse and non-traditional base of students at Sonoma State University. (However, it appears that the male/female ratio is not on par with the institution, a situation that is national in geosciences programs.) The students appreciate the small department and feel the student club is thriving and a source of good peer connections and mentoring. The reviewer attended Dr. Mookerjee's weekly "Research Seminar" with majors working under his direction, and there appears to be a positive system of senior-junior research mentoring with the students that both ensures continuity and allows for the development of new, independent projects each year. Several of these student projects have resulted in presentations by students at the annual meetings of the Geological Society of America and the American Geophysical Union.

Despite many competing demands on the daily time, the tenure-track faculty regularly and consistently contribute to faculty governance and to numerous levels of service from the departmental level, to the School of Science and Technology level, and to the University level.

From a scholarly perspective, the SSU geology faculty are actively engaged in their fields nationally and internationally. They publish in respected journals in the field and in their geological subdisciplines. Drs. Mookerjee and Smith have been awarded highly competitive National Science Foundation (NSF) grants in support of their research in structural geology and sedimentary geology, respectively. Dr. James has a contract with Oxford University Press for a book on the 1905-06 Galápagos expedition of the California Academy of Sciences titled, *Collecting Evolution: The Galápagos Expedition that Vindicated Darwin*, due out in late 2014.

### **Perceived Weaknesses**

Additional tenure-track faculty should be hired immediately to maintain the quality of program the students expect. During Spring 2014, there are three tenure-track faculty and five part-time faculty. The part-time faculty teach a combination of GE courses and major core courses. The previous 2008 report noted the challenges of four full-time faculty as they attempted to build the department up to 50 majors. Currently, there are 85 majors (60 in the B.S. Geology, 25 in the B.A. Earth Science) and the faculty is reduced to two with the imminent departure of Dr. Smith to Northern Arizona University. Fortunately, Dean Stauffer and Provost Rogerson understand the emergency nature of replacing the position. However, replacing the position in sedimentary geology still leaves the department without a full-time Mineralogist/Petrologist, a key component of the geology curriculum. The department is fortunate to have an excellent part-time lecturer (Mr. David Bero) to cover the courses at present but the part-time nature of his employment does not open up opportunity for research projects and collaboration with the other faculty, nor is it clear how long Mr. Bero will teach the required courses before retiring. The additional new faculty member would also share the burden of advising and department/university service, advise research students, and likely establish ties with the private sector. Ultimately, the Department of Geology and its students would be best served by having five tenure-track faculty covering 80% of the curriculum and part-time faculty covering 20% of the curriculum.

In discussions with the students, a perceived weakness is the lack of elective course offerings. With two full-time, tenure-track faculty members, one of whom serves as Chair, the situation is exacerbated. The current curriculum provides a solid, classic foundation but the students also need to explore the breadth of earth science. At CSU Chico, we are faced with a similar dilemma and have relied increasingly on part-time faculty with industry or research specialties to teach advanced electives. The SSU geology students I spoke with identified “applied” or “environmental” courses in their wish list, particularly hydrology and engineering geology. The reviewer is not aware if similar courses already exist elsewhere at Sonoma State, although Hydrology is offered by the department each Spring semester and is a crucial course for the water resources degree option in the SSU Department of Environmental Studies and Planning (ENSP).

The multiple offerings of a B.S. in Geology, B.A. in Earth Science, Minor in Geology, Minor in Paleontology, and the Teacher Credential program is perceived on campus as stretching the department too thin. It was difficult to assess the validity of this claim on a short visit. The SSU offerings are not out of line with other departments in the CSU system. The Teacher Credential program in the SSU Geology Department does not attract many majors and does not require any university resources beyond those for the department in general. The minors in Paleontology and Geology likewise do not require resources beyond the normal course offerings.

### **Recommendations for the next Five Years**

Based on the strengths and weakness noted above, this review makes the following recommendations for the next five-year review period:

- 1) The most critical need is to replace Dr. Smith's tenure-track position. The department should place as a hiring priority a geologist who has a strong desire to mentor student research and continue the emphasis on geological field studies.
- 2) The remaining two faculty members should seize the opportunity to develop a five-year plan that is based on their personal strengths so that the new faculty members more clearly build on their successes rather than spread the department in additional directions.
  - a) Based on Dr. Mookerjee's research and current national trends, Sonoma State has an opportunity to be on the cutting-edge of data-based, computation geology. Dr. Mookerjee has already had success with NSF and should be encouraged through internal channels (such as course release or summer stipend) to develop additional external funding. The administration should seriously consider a strategic hire of a data-statistician who has experience with Earth scientists to work synergistically with the department's needs. A national recognition for computational geology would distinguish Sonoma State beyond its already strong field reputation.
  - b) The faculty should clearly identify the boundaries of their expertise and develop creative ways of building collaborations elsewhere in the university or identifying strategic part-time hires for specialty elective courses.. The geology students voiced desire for more interdisciplinary opportunities in research projects and course offerings.
- 3) Utilize the part-time lecturers and staff in more diverse roles.
  - a) Part-time lectures can take on advising roles through WTU credit with the administration. There is a strong desire from the current students to be engaged in research projects with faculty members. There is CSU precedent for part-time faculty to receive one or more WTU for advising, equivalent to the 1/3 WTU currently received by tenure-track faculty per undergraduate research student. This new interaction would not only benefit the students but would enable part-time faculty to build up their own careers while simultaneously expanding the breadth of expertise of the geology department. Similarly, the department technician, Philip Mooney, is an accomplished research geologist with a

strong rapport with the students. Perhaps there is a mechanism to shift some of his time toward mentoring students?

- b) The diverse expertise of the geological community in the Sonoma State service area in the North Bay Area allows the potential to develop new applied and 'professional career' electives. The students were vocal in their desire for courses in environmental monitoring and hydrology (or hydrogeology), in keeping with the frequent employment of department graduates in the fields of engineering geology, hydrology, environmental geology.
- 4) The faculty members need to continue to evaluate the curriculum.
- a) The department should continue to monitor the offerings to see if there is a cost to maintaining several degree options and minors with so few staff. Are the minors a vehicle to bring in more majors or are there other values to the wider SSU campus community?
  - b) The continuation of a strong field program is essential for the department. As universities continue to pull funding, the department needs to keep a very strong front on the programmatic value of field trips. In particular, be wary of minimizing costs by dropping rental vans in lieu of personal vehicles. This change has happened at CSU Chico and it has added many new and negative challenges to conducting successful field trips.
- 5) The department needs to develop a successful strategy for maintaining a department with so few faculty members in regards to governance and university service. Dr. Smith has had a very positive influence in his senior role as Chair of the General Education committee but the release time for that position affected his ability to connect with more students. The students interviewed were very positive on their interactions with Dr. Smith.
- a) The administration suggested the option of merging Geology with another small department to increase the size. However, this artificial construction introduces new negative challenges and needs to be viewed very cautiously. If the existing subdisciplines do not enjoy extensive overlap, there is a strong likelihood of increased tension between faculty members and complications refining curriculum. Successfully merged departments in the CSU, such as SFSU and CSU Fresno, had previous extensive overlap between disciplines. If this is a significant issue for the administration, then the department might consider a fully artificial cooperative to share administrative staff and university service. Any version of merging with another department does not negate the need for new tenure-track faculty in the geological disciplines needed to offer courses for the BS in Geology and the BA in Earth Science.
- 6) The department needs to strengthen its ties to the private sector and bring in new collaborations. Connections with the private sector occur on several different levels and the department has already enjoyed donations of equipment. A recent collaboration with Great Bear Petroleum benefitted both the department and a student employed on the project. It is recommended that the department look to private entities to support a guest speaker series,

supplemental field trips, or sponsoring student research and national conference presentations. These connections could then develop into summer internships while expanding the recognition of Sonoma State in the private sector. The students clearly want more connection to the environmental consulting sector.

- a) The department is in the early planning stages of organizing an Alumni Advisory Board, in keeping with national recommendations from the Heads & Chairs group of the American Geophysical Union (AGU). Dr. James is the 2014 program chair of the AGU Heads & Chairs, to be held in December 2014 in San Francisco at the AGU annual meeting.