INTERDEPARTMENTAL CORRESPONDENCE

University of Washington
Department of Atmospheric Sciences, Box 351640

Office: 543-4250
Fax: 543-0308

To: Marsha L. Landolt, Dean, The Graduate School

CC: David Hodge, Dean, College of Arts and Sciences

From: James R. Holton, Chair, Atmospheric Sciences

Date: October 18, 1999

Re: Comments on the Report of the Review Committee for the Earth Sciences

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I am writing in response to your request for comments on the report of the committee that conducted the 1999 external review of the four Earth Science units. The report has been made available to our faculty and students and was discussed at our Autumn Quarter faculty meeting October 5, 1999. The comments in this letter are based on that discussion and on informal input by faculty and students.

The members of the Department are, of course, pleased by the generally positive tone of the reviewers' comments, and are very appreciative of the extraordinary time and effort that the members of the committee devoted to reviewing these four diverse units.

Research: We are very pleased that the committee rated the overall quality of our program as "superb". We agree that we will have to "hard work" to remain one of the preeminent departments in Atmospheric Sciences in the world, especially in view of the very limited resources provided by the University of Washington compared with those of a number of our peers.

Undergraduate Education: The report makes several recommendations for improvement in our undergraduate program, but notes that revisions responsive to much of the criticism were already planned by the Department at the time of the review. These improvements have now been approved by the faculty of the Department, and will be implemented during the coming year. The revised curriculum options are outlined in Attachment A. Briefly, the undergraduate major has been broadened to include three alternative tracks. All students will take a set of core courses. Those wishing to satisfy the requirements for forecasting careers in the National Weather Service or the Military will proceed with a "Meteorology" option. Those with career goals in environmental science will take the "Atmosphere and Environment" option, and those interested in oceanic topics will take the "Atmosphere and Ocean" option. We also plan increased efforts to involve

undergraduates in research and internships. Reaction of undergraduates to these changes has been uniformly positive.

We have, as suggested by the committee, consulted with the undergraduates concerning their ideas for improvement of the program. Our introductory course for prospective majors (ATMS 301) is now being taught by our new synoptic meteorology specialist, Assistant Professor Greg Hakim. we hope that he will have great success in attracting students to our undergraduate program. We also have reestablished our annual Autumn reception for undergraduates to provide them with a welcome to the Department. We are attempting to find space to assign as a permanent study lounge for undergraduates. In the interim we have identified a temporary fix for the current and upcoming quarters and hope to soon arrive at a longer term solution.

Graduate Education: The major concern expressed by the review committee centered on the average time to complete a Masters Degree. Our graduate program advisor, Professor Dale Durran, has proposed that a mechanism be put in place that would speed completion of the M. S. thesis through two major changes. The first of these would give the faculty supervisor more responsibility to ensure that an appropriate project is identified early in the student's course of study. The second would limit the scope of the M. S. thesis to a project that can realistically be completed within about 2.5 years of the student's entering the Department. A committee of 3 faculty and 1 graduate student will examine this issue during the present quarter and make recommendations to the faculty.

The second major concern expressed by the Committee was the fragmentation of our graduate program between the JISAO building and the on-campus building. We agree wholeheartedly that this physical separation is undesirable, especially for the graduate students. However, the only way that we could solve this problem at present would be to substantially reduce the size of our graduate student population and the number and scope of our research projects. To do so would clearly be very damaging to the reputation of the Department and to our ability to carry out our mission. With the increasing use of the Departmental and JISAO web sites for posting of research papers, seminar announcements, etc., communication between JISAO and the Atmospheric Sciences Building is indeed improving, and we intend to further utilize these technologies in the future.

Graduate student complaints of limited opportunities to gain teaching experience were cited by the review committee, and by the graduate students in their independent assessment of the Department. This was somewhat of a surprise to us because in the past we have had difficulty in finding graduate students willing to serve as teaching assistants in our service course ATMS 101. We do agree that the

time burden on the TAs in 101 is too heavy since each TA is responsible for teaching 3 sections with a total of nearly 100 students. This is no doubt one source of student reluctance to accept TA offers. we have already identified the TA and quiz section configuration in ATMOS 101 as a hindrance to the education of the undergraduate students taking
this course, and we have developed new curriculum materials that should be used to replace the one-hour quiz section with a two hours laboratory each week. This change would also benefit the graduate student TA's because under the new arrangement each TA would handle 2 laboratory sections with a total of 60 students. This important enhancement of our undergraduate program will require that the college grant us one additional halftime TA position per year. We will be seeking approval from the College of Arts and Sciences to implement these changes, subject to College approval of an additional TA position for the Department.

Another issue raised by the graduate students related to the qualifying exam. We are puzzled that the students complained that they are not well informed about the qualifier since the requirements are clearly stated in our Graduate Program Guide, and many sample exams, with model solutions to problems, are readily available. We have made efforts in the past years to reduce the stress of the examination by allowing the students to bring to the exam a limited number of texts for reference, and by providing students some choice of problems to answer. We do believe, however, that the qualifying examination is an important milestone in a graduate student's career and that it helps to maintain our high standards and reputation. We intend to retain the exam.

Salaries: We agree, of course, with the Committee's comments concerning faculty salaries at the University, and in our Department in particular. The approximate 40% salary gap with our peers is too great to allow us to maintain the top rating of this Department in the next decade. Other universities are exploring raids on our faculty at the present time. This situation requires some sort of drastic action.

Major projects: We agree completely with the committee's sense that "cooperative work or efforts at collaboration on major projects must begin with the faculty". We agree that a steering committee composed of the Chairs, and a representative faculty member from each of the 4 units might play a useful role in fostering collaborative educational efforts. We are willing to cooperate in discussions of a possible 5 year professional M.S. degree in earth science.

We do not, however, agree that such a steering committee should "develop an initiative on a major research topic...". Rather we completely agree with the minority view of Professor Shreve that such a top-down approach is not the way to

foster interdisciplinary involvement. Rather, this should come from groups of faculty members forming collaborations as driven by scientific needs and opportunities. An example of this mode of interaction is the current interdisciplinary work with civil engineering on coupled hydrological/atmospheric modeling. This is a very rapidly expanding effort and includes the PRISM program supported under the University Initiatives Fund. What the steering committee might possibly be able to do (with the aid of the Administration) would be to facilitate faculty participation in initiatives such as this that cross departmental and college boundaries.

We agree with the committee that "Atmospheric Sciences needs to keep its observational capabilities strong." The department is, in fact, grappling with this problem at the present time and expects to be discussing it with the Dean in the near future. It must be kept in mind, however that the department also has considerable strengths in the general areas of global-scale atmospheric circulations, large-scale weather processes, global climate, and climate change. It is obvious that for global-scale problems, observations by a single group are not a viable approach. Unlike the other geophysical sciences, the atmospheric sciences benefit from a huge international network of routine operational observations utilized for weather forecasting and climate monitoring. In addition there are a number of research satellites providing remote sensing observations. Most faculty and students in the Department utilize such data in their research. This work, while not based on instrumentation and observations developed and maintained here, is very much observational in character. In many cases our work combines analyses of observations with hypothesis testing in models. It is also worth noting that a number of groups in the Department actively participate in national and international field programs. Two groups from the Department recently returned from a two month program based in the Tropical Pacific, and several members of the Department are currently participating in the Mesoscale Alpine Experiment in Europe. During the past couple of years members of the Department, including academic faculty, research faculty, and graduate students have participated in polar research programs in both the Arctic and the Antarctic. Furthermore, there is an effort within the department to gather all relevant observational assets from a heterogeneous set of local networks in the Pacific Northwest to create a massive observational data base for regional research and mesoscale modeling. Thus, we by no means are hiding in the "backroom of modelling."

University of Washington
Correspondence
INTERDEPARTMENTAL MAIL

Darrel S. Cowan
Department of Geological Sciences, Box 351310
150 Johnson Hall (206) 543-4033
FAX: 543-3836
e-mail: darrel@u.washington.edu

10 November 1999

TO: Marsha Landolt
Dean and Vice Provost
Graduate School
Box 351230

FROM: Darrel S. Cowan, Acting Chair Darrel S Cowan

RE: Response to the Report of the Review Committee for Earth Sciences

I made copies of the report available to all faculty and to the elected representatives of our graduate students and undergraduate majors. We discussed the report at the faculty meeting of 8 October. I requested comments from all constituents. A few faculty privately spoke to me about parts of the report, and the graduate representatives communicated their constituents' consensus regarding a professional Masters degree.

Our general response is to commend the Committee for acknowledging and affirming the overall strength of the earth-science programs at UW. Some of the specific comments and recommendations made by the report are addressed below.

Strategic Planning and Faculty Hiring

Dean David Hodge of the College of Arts and Sciences has called on all departments to produce strategic plans by June 2000. We have begun planning in Geological Sciences; the faculty have already met in a retreat on October 15, and I have held private conversations with some of my colleagues to obtain their frank views about where the department should aim in the next decade. Some of the points in the report will be specifically addressed in our strategic plan.

The most important part of the plan will speak directly to the issue, emphasized in the report, of how and when to replace the faculty who will retire in the next few years. Seven of our faculty, are over 60 years old. For diverse reasons, some are playing a much diminished role in research and in our graduate program. My singular goal during the next few months is to lead the department to a vision of which subdisciplines it wants to maintain or build into internationally recognized pinnacles of excellence.

Geological Sciences recognizes the need to better serve the women among our undergraduate majors and graduate students by hiring role models who are not only active and well-funded research scholars but also people sensitive to the academic and professional needs of women and minorities. Professor Shreve of the committee noted that the department has in fact tried to do

this, even though the report unfairly implies that we are laggards compared to our brethren in the other earth-science departments in our college.

Facilities

There is little I can add to the emphatic message in the report about the woeful state of our facilities. I echo Mike Brown the Chair of Geophysics, when I say that my own unequivocal preference is for Geological Sciences, Geophysics, and Atmospheric Sciences to remain where we are, on Upper Campus. At least some of my colleagues agree and see little if anything to be gained by uprooting us from our natural home. I do not, however, know what the consensus is among the full faculty.

A major goal is to try to obtain external funding for a new analytical center, built around a new instrument, a multi-collector inductively-coupled-plasma mass spectrometer. Professor Bruce Nelson envisions a facility that is supported by and shared among Geological Sciences, Oceanography, and Atmospheric Sciences. Achieving this goal would certainly foster the closer cooperation that the Committee recommends.

Undergraduate Program

The report recognizes many of the strengths of our program for undergraduate majors. The committee recommends that Geological Sciences do a better job in providing career counseling. We will try to mount seminars or colloquia toward this end each year, and I will contact the undergraduate representatives soon and invite them to take an active role in planning these endeavors. The Committee suggested that we consider hiring a non-academic staff member for advising. We actually had such a staff member until the mid-1990's but concluded that faculty are better able to advise students. The report does not note that in addition to our having a faculty member as undergraduate adviser, we also have a mentoring program in which every major is assigned to a faculty member, whom he or she can contact for independent advice on matters such as career preparation, choice of graduate schools, and which courses to take.

The report is strangely silent on the role that Geological Sciences plays in teaching earth science to non-majors and non-science majors on campus. We have a viable and well-subscribed curriculum comprising 100-, 200-, and 300-level courses; for the past few years, the 100- and 200-level courses alone have generated about 8500 student credit hours annually. One of my goals, which will be addressed in the Strategic Plan, is to re-examine our curriculum for non-majors to see if we can better serve the UW community. I have asked our departmental curriculum committee to do this in collaboration with a committee in the Geophysics Program. The chair of Geophysics and I see teaching non-majors as an obvious area where the two departments can more closely cooperate.

The report suggested that geological-sciences majors be required to take courses in geophysics. I direct you to Professor Shreve's comments on this topic and point out that the report is otherwise silent on the great strides we have made in modernizing our program for majors. I want to note here that we completely revised our curriculum for majors and the requirements for the Bachelors degrees three years ago. Our majors take courses in math, physics, and chemistry outside the department, but just as important, they are required to take courses *in* the department in geochemistry, geomechanics, and geobiology. As far as we know, at least a couple of these required core courses are unique in national undergraduate geological-sciences programs. Together with our completely new, 200-level required courses, they show students how chemistry, physics, and the biological sciences are applicable to a wide range of problems and issues in the earth sciences.

Graduate Program

The Committee's suggestion that we carefully consider a professional Masters program is well taken. This topic has been discussed off and on by our faculty for at least six years. I think that it was originally proposed by Professor Tom Dunne, before he left for another institution. At the time, he envisioned a Masters program in applied geomorphology and hydrogeology. The problem then as now is that such a program, whatever its disciplinary focus, would only involve course work and therefore require teaching at least some courses that are not part of the current curriculum.

The graduate-student representatives report that the graduate students strongly favor such a program. We will consider its nature and feasibility as we discuss our plan, all the while realizing that if adopted, it will bear on faculty hiring. At present, I view such a professional Masters program as a component of our overall graduate program, which is and will remain primarily oriented toward Ph.D.-bound research scholars. Geophysics is attracted to the idea of a professional Masters program in quantitative earth science; here is another natural area where the two department can cooperate to create something innovative and useful to a subset of the graduate population.

The issue of the proper balance of RA and TA support for our graduate students is one that has been discussed for years. We recognize the need to obtain more externally funded RA's but can probably only achieve this goal by continuing to hire new faculty who are actively writing proposals and obtaining grants. We have no intention of slacking off on our teaching to non-majors, however, and will strive to maintain the current level of TA support that we can offer our students. As noted in the report, they value the teaching experience afforded by these TA's.

Co-operation with the Geophysics Program

I note above several areas where the two departments can possibly cooperate more closely: consider a joint professional Masters degree; evaluate the current curricula for non-majors and consider new joint courses; and continue to jointly sponsor colloquia and seminars, perhaps more frequently. I have spoken with Mike Brown, the Chair of Geophysics, about how we can begin to promote these activities. It is my intention that if any faculty hires proposed in our strategic plan are in any way related to or of interest to the Geophysics Program, then faculty from that department will be invited to serve on search committees. We found their contribution to be very helpful in our searches related to the Surface Processes Initiative.

University of Washington Correspondence

INTERDEPARTMENTAL

Geophysics Program Box 351650

Wednesday, November 3, 1999

TO: Marsha Landolt, Dean and Vice Provost
Graduate School

FROM: J. Michael Brown, Chair
Geophysics Program

SUBJECT: Response to the Review Committee report on the Earth Sciences

I have read the report by the Committee for the Review of the Departments of Atmospheric Sciences, Geological Sciences, Geophysics Program, and the School of Oceanography, chaired by Professor Ernest Henley (hereafter CRES). The report was made available to all faculty and students in Geophysics. They were invited to comment to me on any aspect of the report. Several responses have been received.

In general, the report provides a broad overview of all four earth science units and identifies issues that are of concern in these units. It gives a fair assessment of activities and issues within Geophysics. The review committee should be commended for the excellent job in preparation of this document.

Several specific recommendations in the report that have impact on Geophysics are further discussed below.

Earth Science Facilities

CRES endorses the Ocean Facilities Master Plan and suggests that a new Earth Science Building be sited in the southwest campus. This would put the three currently upper campus units in closer proximity to Oceanography and thus could engender their greater collaboration with faculty in Oceanography. However, Geophysics faculty have stronger and very productive ties with science and engineering units on upper campus. This proposed move is not supported by Geophysics.

The deplorable condition of Johnson Hall is emphasized in CRES. The report by the College Council (following the last unit review of Geophysics) also singled out the same issue and stated (April 7, 1992) that "College plans for new construction in the earth sciences address this need and deserve University support." Those plans were for a new Earth Science Building having about a quarter of the space as assignable classrooms. If that had been built, Johnson Hall would have been available for renovation as office space for Math and Applied Math. This outstanding concentration of math and science

units within short walking distance would have provided a world-class scholarly environment.

The impact of the decision to abandon the Earth Science Building continues to plague us. Strategic thinking, necessary to maintain the quality of Geophysics, is hitting a wall of intractability. We do not have the class or lab space to teach new undergraduate courses. It is simply impossible to provide new faculty with start-up laboratories in Geophysics. I can not imagine how we will either recruit or retain quality faculty if no credible solution emerges soon. I strongly recommend that the concept of a new Earth Science Building on upper campus be resurrected.

Retirements

Five Geophysics faculty are 60 or over. Several faculty members, having well-funded and active research programs, are ready to retire now. Other currently active faculty have indicated an intention to wind down their research by not taking on any new graduate students.

We face an immediate crisis. With just 10.4 faculty FTEs in Geophysics, we can not run the unit. With unfilled retirements and fewer faculty, there is inadequate support for either new or continuing students (26 of 32 students have RAs). We will not be able to teach either the current curriculum or an expanding undergraduate set of courses.

Even prior to a full development of a strategic plan, our expectation is that new hires will contribute greatly to the evolving mission. We are aware of the need to develop new strengths that better met missions in the College of Arts and Sciences. Geophysics is undertaking strategic planning this year. However, any change in direction will require adequate faculty strength. Thus, Geophysics needs immediate protection. We must refill positions resulting from retirements. This runs counter to the College policy to delay approval for new searches following retirements. Geophysics has an excellent record in hiring outstanding scientists who are also excellent teachers

Salaries

CRES stresses the serious problem in the Earth Sciences with regard to salaries. I have, in separate memos, documented the Geophysics-related situation. In summary, salaries here at the full professor level lag the official university comparison group in Geophysics by 58%. In addition, while we rank among the top ten Geophysics programs, only a few in the comparison group are at this level of excellence.

Other Strategic Issues

The report notes that enhanced cooperation should be encouraged between Geology and Geophysics. The Chair of Geology and I have met and identified immediate action to be taken. (1) The Graduate Admissions and Curriculum Committees will hold joint meetings this year. (2) Seminar coordination will be improved. (3) a joint committee will consider the reorganization of courses for non-majors. (4) We will also undertake joint considerations of possible new Masters Degrees.

CRES argues that the Earth Science units should be more cognizant of major "Big Science" funding directions. They point to Astrobiology as one recent example.

Geophysics is strongly supporting the Astrobiology UIF and hopes to participate in the filling of a new position in planetary evolution.

In addition, two major national initiatives have significant impact on Geophysics and Geology. We plan to be closely associated with both. Both have developed so quickly that they were not part of the Self-Study Documents prepared nearly a year ago.

(1) The USGS Advanced Seismic Network ($31M) has already gone through congressional budget authorization. This program is designed to address issues of seismic hazards through the updating of regional seismic networks. The Pacific Northwest Seismic Network run in Geophysics will be one of the major recipients of new funding.
(2) The NSF Major Research Facilities Initiative (MRI) EarthScope ($74M) is currently in OMB prior to going to congress next year for anticipated funding in 2001. This is the first "Big Science" initiative in the EAR directorate and significantly changes the environment in the solid earth sciences (currently funded at $101M/year). The single largest project is USArray, which will undertake high-density seismic mapping of the Earth. Geophysics is well positioned to participate and prosper in this new funding environment. In addition, large parts of Geology (tectonics, structure, petrology, and geomorphology) should also see significant new opportunities for research.

New Geophysics Degree

A report of an ad hoc committee in Geophysics (prepared by 6 faculty members during the summer 1999) recommends that Geophysics immediately initiate an effort to launch a new undergraduate major. As a department, we would offer innovative undergraduate science education featuring solid fundamentals in math, physics, and chemistry and upper division courses that are experiential and environmentally focused. At the junior level students would engage in significant field projects that would require acquisition of data, analysis, and interpretation. Examples include setting up a portable seismic array or collecting GPS data on a glacier on Mt Rainier, or working with space or planetary probes. The senior capstone courses would focus on study of material motivated by the observations. Strategic planning in Geophysics is therefore focussed on developing this framework. The degree of participation by other Earth Science Units remains to be determined.

University of Washington Correspondence

INTERDEPARTMENTAL

SCHOOL OF OCEANOGRAPHY
Box 357940

24 November 1999

TO: John T. Slattery, Associate Dean for Academic Programs
The Graduate School
Box 351240

FROM: Bruce W. Frost, Director
School of Oceanography
Box 357940

RE: Reply to the Report of the Review Committee for the Departments of Atmospheric Sciences and Geological Sciences, Geophysics Program and the School of Oceanography

Overview

The review committee's report was distributed to all faculty, staff and students in the school and comments were solicited. Replies were received from 22 faculty, 1 graduate student and 1 former graduate student now a postdoctoral research associate in the school. The large number of responses from the faculty in particular reflects their interest in the review process as a means for objective evaluation and constructive criticism of the school—its strengths and weaknesses—and as a source of specific recommendations for continued improvement of the school.

While the faculty noted the review committee's generally laudatory assessment of the school, they felt that the structure of the review, its broad scope, and the brief time available to the committee did not permit in-depth treatment of specific issues deemed to be of greatest importance to the school. In short, the faculty were dismayed by the cursory examination of the school. Nevertheless, the review committee did make several recommendations specific to the school. The following comments respond briefly to those recommendations and, in addition, touch upon areas of continuing concern to the faculty.

Faculty Issues

The review committee and the letters of all external members of the review committee stressed faculty salary levels as one of the potentially most serious issues for the school. The school faculty did not comment on this, but salary levels have lagged relative to those of our peer institutions and this has strong implications for recruiting and retaining top-quality faculty, for

morale of the faculty, and for continued commitment of faculty to the mission and goals of the school and University. The Dean of the College of Ocean and Fishery Sciences is currently conducting a thorough comparative study of salaries in peer institutions.

A related recommendation of the review committee was to accomplish the conversion of junior faculty appointments (assistant and associate professors) from the present 6-month state supported academic appointments to 9-month appointments. This is extremely important given the present funding environment and increasing pressure for jointly taught courses emphasizing collaborations across campus. At current staffing levels the school is barely able to teach its undergraduate and graduate curriculum, leaving little room for innovative collaborations of the sort envisioned by the review committee.

Education

There was not great enthusiasm for the review committee's recommendation for a 5-year "terminal" MS degree in earth sciences or on the earth and its environment. A compelling rationale was not presented. Perhaps a more effective way to achieve interdisciplinary educational goals in earth sciences is through graduate certificate programs, such as the Astrobiology program and the Global and Environmental Chemistry program (each of which currently involves several school faculty). However, even these programs need to be evaluated for the possibility that excessive course work is being required of the students.

The review committee mentioned favorably the 45 days of R/V *T.G. Thompson* ship time that the state provides for undergraduate and graduate research. Experiential learning in oceanography incurs substantial costs besides ship time, however, and the school needs additional funding to support infrastructure (technical support, equipment, supplies, travel to/from the ship at distant ports) associated with educational use of *Thompson.*

Opportunities for Interdisciplinary Research

The faculty are genuinely interested in ways of developing interdisciplinary research in the earth sciences, but the review committee's recommendations did not appear to strike a chord. Given that interdisciplinary research typically emerges through the visionary leadership and efforts of one or a few energetic individuals, the review committee's recommendation that the Deans of earth sciences units facilitate the hiring of a team with members from two or more earth science units has merit. Such recruitment was successfully accomplished with the hirings of the Earth Surface Processes Initiative. The school faculty see global climate change, including its paleo aspects, as an obvious theme to promote.