CCCESD – REVIEW OF DEPARTMENTS – 2015

MEMORIAL UNIVERSITY, Earth Sciences

Students

Total Enrollment	2014-2015	2013-2014
TOTAL UG (2nd-4th year)	189	195
TOTAL GRAD	84* (30% PhD, 70% MSc	85
TOTAL STUDENTS	273	280

*Breakdown by degree:
MSc (Geology): 38
MSc (Geophysics): 21
PhD (Geology): 17
PhD (Geophysics): 8
Of the total 84 graduate students, 32 are female (38% of the total graduate student population).
Of the 25 PhD students, 10 are female (so 40% of the PhD student population).
Of the 59 MSc students, 22 are female (so 37% of the MSc student population).

Faculty Interests and Research

- 25 current faculty members including one University Research Professor and four emeritus professors (including two University Research Professors)
- 1 CRC Tier II Chair; one NSERC-Altius A-IRC; one NSERC-Chevron A-IRC pending with NSERC for final approval
- One CRC Tier II in Seabed Imaging application to be decided in October 2015 (replacement for faculty member who left MUN)
- Two faculty searches recently completed: Applied Seismology; and High-T Geochemistry
- HMDC Chair in Basins Analysis will soon be advertised and will hopefully be matched by RDC and hopefully will become an NSERC A-IRC
- Trying to achieve a steady-state of 30 full time regular faculty members.
- With two positions above and if CRC Chair is funded the total with be 28 current full-time faculty members

External Support for Teaching and Infrastructure

- Looking for renewal of industry funds for field school support for next five years. Last 3.5 years were supported by HMDC

Challenges

- Problems with start-up funds for new faculty given the mandate established by the RDC (the main source of start-up funds for all MUN faculty) – not as bad for ESD as with other departments
- Replacement of aging equipment given CFI and NSERC RTI-1 funding constraints; must rely on industry R&D and E&T from offshore revenue and not a good time for that
- Attracting high quality applicants for faculty positions and especially chairs
- Increase in enrollment straining teaching infrastructure (currently 90 students in 2nd year mineralogy)
- 5-6 retirements looming in next five or so years
- Looking for ways to increase total student numbers in 1st year and 2nd year introductory and service courses

John Hanchar

SAINT MARY'S UNIVERSITY, Geology

As for the last five years or so, enrolment in our Geology Major has remained overly inflated for the capacity of our teaching resources. We have nonetheless not been able to increase our small complement, which has remained at five for the last 30 years. Efforts to secure a lecturer as well as a cross-appointed full-time faculty member with Environmental Science (stable isotope geochemistry, low temperature geochemistry, environmental mineralogy, hydrogeology) have failed thus far, but we still have hope with regards to the latter. On a happier note, we currently have a Tier II Research Chair application in organic geochemistry from Dr. Todd Ventura (University of Illinois) in the CRC pipelines. We will therefore be looking at results from the CRC secretariat with great anticipation in March, as this would generate a substantial boost to our small department. Significant renewal of our microscopy teaching facilities is also in progress, partly to accommodate the increasingly large number of students requiring these resources.

Pierre Jutras

ACADIA UNIVERSITY, Earth and Environmental Science

This year the universities numbers declined somewhat but, like last year, are still near the perceived limit of around 3500 full-time students. The University remains in a deficit funding situation though as tuition increases have been limited and provincial funding has not increased significantly. In 2015-1016 the E&ES Department experienced a decline in first year enrolment but an increase in transfer students, leading to a very slight decrease overall. We still have about 30% more undergraduates than 4 years ago. We presently have about 155 majors split equally between environmental science and geoscience. We currently are supervising 10 graduate students, though graduate courses are considered as overload teaching at Acadia. Our department recently was authorized to convert at

CLT position to tenure track, which will secure some longer term stability. We have also been fortunate in securing some per-course replacements as well. The effects of undergraduate student growth are significant with severe pressure to enlarge classes, reduce sections and limit elective options. A review of our undergraduate Geology and Environmental Geoscience programs and our graduate Geology program was completed in Dec. 2014. The report from the reviewers indicated that long term proactive planning is our biggest challenge and recognized that we have, for a long time, been stretched too thin. The review served to strengthen our position with administration but given our deficit situation, few new resources are anticipated; indeed our operating budget was cut by 10%.

Large enrolments in our service courses (Natural Disasters and Oceanography) continue to enhance our visibility on campus and are important internal (to Acadia) retention tools. Our research programs continue to be vital though accessing both internal and external funding is difficult. Increasingly, we find ourselves partnering with industry to provide graduate student opportunities.

Ian Spooner

UNIVERSITÉ LAVAL, Geology and Geological Engineering

Program	1st year 2014	1st year 2015	Total registered this fall
U Geology	26	24	39
U Geological engineering	34	34	109
M.Sc. Earth Sci. (research)	12	8	25
M.Sc. Env. Tech.	7	3	7
Ph.D. Earth Sci.	6	10	25

Students

- Student enrolment in our departmental programs has been steady.
- A successful undergraduate international field course was held last August on the Islands of Guadeloupe, Antigua and Montserrat.

Faculty and staff

- No significant change from last year with 13 faculty members (of which 1 CRC tier II, 1 NSERC IRC, 2 endowed positions), 14 adjunct professors, and the following permanent staff: 4 professionals, 3 technicians, 2 secretaries.
- Awards to 2 colleagues: Jacques Locat was awarded the R.F. Legget medal the highest award of the Canadian Geotechnical Society. Georges Beaudoin was awarded the Jean Descarreaux award by the Quebec Mineral Exploration Association and also the Prix du Mérite Géoscientifique by the Ordre des Géologues du Québec.

Challenges

- Government budget cuts applied retroactively for 2014-2015, then 5% for 2015-2016 ;
- Aging research equipment (microprobe, SEM). Unsuccessful result to CFI last year.

Research

- Present departmental research activities focus on the following 4 broad domains: Mineral Resources, Ground water, Natural Risks, Geomaterials.
- Start of the *E4M* research center on the Geology and Engineering of Mineral Resources (director Georges Beaudoin): 26 members from 5 departments, 137 graduate students, 6 post-doctoral fellows, 6 research associates and technicians.
- Upcoming start of the "Northern Institute of Quebec", a network of researchers from 3 universities: Laval, McGill, INRS.
- Excellent results for Laval at the 1st competition of the Canada First Research Excellence Fund ("Fonds Apogee") with 98 M$ awarded for the "Northern Sentinel" project.

Marc Constantin

McGILL UNIVERSITY, Earth and Planetary Sciences

Students registered in the Earth and Planetary Sciences Program

Students	Total Enrollment 2015-2016	Total Enrollment 2014-2015	Total Enrollment 2013-2014	Total Enrollment 2012-2013	Total Enrollment 2011-2012
U1	8 (+2)*	14 (+4)*	15 (+6)*	11 (+5)*	14 (+6)*
U2	13 (+4)*	10 (+7)*	11 (+6)*	18 (+3)*	13 (+2)*
U3	13 (+11)*	17 (+7)*	19 (+4)*	12 (+6)*	16 (+6)*
Honours	1	6	8	11	10
Total UG†	34 (+17)*	47 (+18)*	53 (+16)*	52 (+14)*	53 (+14)*
M.Sc.	16	18	18	25	30
Ph.D.	33	33	31	23	25
Total Grads	49	51	49	48	55
Total Students	83 (+17)*	98 (+18)*	102 (+16)*	100 (+16)*	105 (+14)*

† Not including Physics/Geophysics program, ~ 2/year

*Numbers in parentheses are students registered in a declared minor concentration in EPS/Geology/Geochemistry

As can be appreciated from the above table, the student population has decreased slightly this year, mostly for lack of recruitment. The number of

graduate students remains steady, would normally be expected to grow slightly given the number of newly established and incoming young faculty members, but decrease in funding, increases in foreign student fees and stipends limited the number of students that can be accepted into the graduate program. Starting with the 2015-2016 academic year, the minimum disposable income was increased to $18,000 for both M.Sc. and Ph.D. students. This level of funding only applies to students within the prescribed residency of the program.

In 2014/2015, three new faculty members joined the Department of Earth and Planetary Sciences, Prof. James Kirkpatrick in January 2015 as well as Profs. Natalya Gomez and Nicolas Cowan in August 2015. Prof. Kirkpatrick is a structural geologist. He and his students use microstructural observations of deformation structures to investigate the kinematics and mechanics of rock deformation with a focus on faults, topics relevant to earthquake hazard, induced seismicity and hydrocarbon exploration and production. Prof. Gomez, a Canada Research Chair Tier II, is a geophysicist whose research interests focus on geodynamics and sea-level variations in the context of climate change. Prof. Cowan is jointly appointed with the Physics Department and is housed in the new McGill Space Institute. He studies planetary climates on exoplanets, planets that orbit stars other than our Sun, using space telescopes and novel remote sensing methods. On the other hand, Prof. Eric Galbraith left McGill in August 2015 to take on a Full Professorship at the Catalan Institute for Advanced Research (ICREA) in Barcelona, Spain. We are currently recruiting/interviewing for a new tenure-track Assistant Professor in the field of "Global Biogeochemical Cycles" to replace Prof. Galbraith. After this last hiring, our department will be composed of 8 Assistant Professors (2M+5F+?), 4 Associate Professors (3M+1F), 5 Full Professors (4M+1F), 1 Faculty Lecturer (M), 4 Adjuncts (3M+1F) and 2 active Retired/Emeritus Professors (2M).

Since September 2015, the common first year curriculum of the Major and Honours program in Earth Sciences includes a mandatory field methods course called "Geology in the Field" (EPSC-240), offered in the Fall term. To accommodate this course, we have dropped the optical mineralogy course (EPSC-312, Spectroscopy of Minerals) and included microscope work into the Introduction to Mineralogy (EPSC-210) and Introduction to Petrology (EPSC-212) courses.

Our Field School I course changed venue in 2015 after many decades of mapping in Sutton, QC. The sale of the Schweitzer's farm, which was our historic base, meant that costs were going up, and the coincidence of 80+ geo-engineering students from Queens resulted in the area being thoroughly overrun with mapping students, increasing friction with the landowners. Hence, Field School I is now being run out of Las Vegas, with visits to the Valley of Fire state park and the Muddy Mountain Wilderness as well as into California around Barstow, the Rainbow Basin, the Mosaic Canyon, the Mesquite Flat sand dunes and Ubehebe Crater. All this at a fraction of the cost of the previous year in Sutton.

In 2016, we plan to combine our Field School II & III into a single 4-week 6-credit course in the Massif Central of France that will incorporate sedimentology, igneous/volcanic, metamorphic petrology as well as geophysical and geochemical methods.

Over the last year, a number of elective field trips were organized and took place within and outside formal courses, including visits to: Hawaii (Jeff McKenzie and the Earth System Science students), Peru (Willy Trip), the Colorado Mineral Belt (SEG-McGill Chapter), and South Africa (sponsored by Bob Wares). Further trips are planned for the near future, including to: Pacific Northwest (John Stix' Volcanology class), Spain (Galen Halverson's Sediments-to-Sequences class).

Don Baker was the recipient of the 2014 Peacock Medal from Mineralogical Association of Canada (MAC). **Jeffrey McKenzie** was the 2015 recipient of the Canadian Geophysical Union Young Scientist Award. **Volker Moeller** (Ph.D. candidate: Anthony Williams-Jones-Supervisor) won the Best Poster Award at the 6th Annual PDAC-SEG the Student Minerals Colloquium (Ph.D. category). **David Palmer** (M.Sc. '94, Ph.D.'99), President and Chief Executive Officer of Probe Mines Limited, was the recipient of the 2015 Bill Dennis Award for a Canadian mineral discovery or prospecting success.

Don Baker (PI) was awarded a 2.4M$ grant from CFI to upgrade the McGill Microprobe Facility. This includes the purchase of a new microprobe and FEG-SEM. The new instruments should be ordered by January 2016. Renovations and installation are expected to be completed by September 2016. In the meantime, the old microprobe will either be operated from an alternate location on campus or users subsidized to carry out their analyses at another facility. Kim Berlo was awarded a $554k CFI grant to purchase and interface a new LIBS (laser-induced breakdown spectroscopy) to our Thermo-Fisher Scientific iCAP Qc ICP-MS instrument. The LIBS will be ordered before the end of the current calendar year and installed within 3 months. This will be a unique facility in Canada.

As indicated in last year's report, our Petrographic Technician Petrographic was laid off and some of our petrographic equipment is for sale (polishers, jigs and thin-section saw and grinder). Contact the Chair of the department for details.

On May 3-7, 2015 Montreal hosted the joint meeting of the American Geophysical Union (AGU), Canadian Geophysical Union (CGU), Geological Association of Canada (GAC), and the Mineralogical Association of Canada (MAC). Profs. Galen Halverson (Local Treasurer and GAC conference co-president), William Minarik (MAC conference co-president), Jeffrey McKenzie (EGU conference co-president) and Don Baker (AGU representative) served on the local organizing committee for the conference.

Alfonso Mucci

UNIVERSITY OF OTTAWA, Earth & Environmental Sciences

Major restructuring of the faculty departments and programs in the past year resulted in new larger departments; including the Department of Earth and Environmental Sciences (since May 2015). The transfers of faculty positions or cross appointments are under discussion.

The overall enrolment in our undergraduate programs remains relatively stable while the enrolment in our graduate programs increased by >10%.

- 86 majors and honours undergraduate students in the geology programs.
- 148 honours undergraduate students in the environmental science program.
- 4 PDFs, 18 PhD students, and 51 MSc students.

No change in permanent teaching staff (16 in total), one new replacement professor (2 in total) and three new research associates (8 in total).

- Don Cummings, a replacement professor in sedimentary geology (Sept. 2015-July 2016).
- One coming retirement to be fulfilled by the end of 2016.
- One new permanent position in AMS applications expected in the coming year.

No change in our support staff (administration: 3; teaching: 2; research: 12).

- One replacement permanent in the XRD/XRF lab to be fulfilled in the coming months.
- One new permanent technical support staff for the AMS lab expected in the coming year.

Following a major renovation of our existing buildings; teaching, research, and administrative functions of the department are now located in three buildings: Advanced Research Complex (only research), Marion Hall (mainly teaching), and FSS Hall (mainly administration with some research). The ARC building is state-of-the-art with respect to the services, vibration, ventilation and layout for advanced research laboratories. Our labs in ARC occupy more than 2500 m^2 (+ offices, meeting and seminar rooms, etc.). Marion and FSS halls are temporary locations, but the plans for a short-term relocation are unknown.

André Desrochers

CARLETON UNIVERSITY, Earth Sciences

Our undergraduate enrolment underwent a period of steady growth between 2003 and 2014, reaching a maximum of ~ 160 in 2014-15. This year we have ~140 undergraduate students and ~50 minors. In fall 2015 and winter 2016 there are ~ 2000 students registered in service and general interest courses. Graduate enrolment of 50 (i.e. 30 M.Sc. and 20 Ph.D. students) has increased from 36 students of last year. We deliver our programs with 11 full time faculty members, one cross-appointed faculty member, a two-year term Associate Professor and several contract instructors. Dr. Nadine Wittig recently resigned and we are currently advertising for an Assistant or Associate professor in Geochemistry. In the coming year we will be increasing our staff with the addition of a Laboratory Coordinator to look after the laboratory component of first year and engineering geoscience courses. We have recently acquired ~ 4600 ft^2 of new space and have completed the first phase of a two-stage of renovation. The issue of adequate storage for our collections remains unresolved. Our Undergraduate Programs and Department successfully underwent a Quality Assurance review last year. To comply with the recommendations we are in the process of developing course learning outcomes and mapping them back to our program learning outcomes. In addition we are updating our joint program with Geography to bring it into compliance with requirements for professional Geoscience accreditation. The department community is vibrant with regular Thursday seminars rotating between U of O, the GSC and CU; active student societies (e.g. undergrad "GeoSoc", graduate "GraeSoc", joint CU–U of O SEG chapter); joint Ottawa–Carleton Geoscience Centre (OCGC) events (e.g. annual weekend field trip organized by graduate students, fall OCGC lunch, graduate research seminar, lecture series, Advances in Earth Sciences Research Conference or ASERC) conference; informal discipline specific seminars; Fall Department BBQ; Logan Day pig roast and campout weekend; outreach activities (e.g. Geoheritage Day, Teacher Workshops and Seminars, contributions to outreach symposia, visits to schools and visits to our department by school classes). With the University of Ottawa, we will be co-hosting an Alumni and Ottawa-Carleton Geoscience Centre reception at PDAC in March 2016.

In research news:

- Associate Professor Richard Amos and a team of Canadian researchers received a prestigious NSERC award for innovation. The award recognized the team's formation of an academic- industry partnership. Working at the Diavik Diamond Mine, 300 kilometres northeast of Yellowknife in the Northwest Territories, the team develops methods to improve how mining companies manage waste rock.
- Professor George Dix headed a team of researchers in acquiring a $150,000 NSERC grant for a new X-ray diffraction instrument for earth and synthetic materials.
- Scientist-in-Residence Dr. Richard Ernst published his new book, *Large Igneous Provinces*, through Cambridge University Press.
- Adjunct Research Professor Natalia Rybczynski was named one of *Canadian Geographic*'s 100 Greatest Modern Explorers in Canada.
- Professor Claudia Schröder-Adams is producing a documentary that follows the work of Carleton researchers and students in the Arctic., *"Arctic Greenhouse"*.

Sharon Carr

UNIVERSITY OF TORONTO, Earth Sciences

Dr. Qinya Liu joined Earth Sciences in July 2015, moving 50% of her position from Physics as part of the now-finished(?) formation of the Earth Sciences department. In summary, we have grown on the downtown campus from 13.25 FTE faculty in 2010 when the plan was enacted to create a new department, to 19.75 in 2015. This consolidated geophysics to Earth Sciences and brought over scientists from Physical Geography, and prompted us to build/refine programs in Geophysics and Earth and Environmental Systems (the latter created in 2015). There are currently four faculty members at UTMississauga and three at UTScarborough, bringing the campus-wide total to 26.75 within the broader graduate Department of Earth Sciences at U. of T.

In addition to a number of senior faculty receiving major external awards (Sherwood Lollar, Miall, Scott, Eyles, Desloges) it was especially rewarding to see our most recent hire, Prof. Zoltan Zajacz, receive the Waldemar Lindgren Award from the SEG. Zoltan's successful $1.6M CFI award helped bring a new microprobe and LA-ICPMS to the department. We will likely have faculty searches upcoming owing to retirement/departure/new budget opportunities. A challenge always at UofT is guaranteeing replacements, but the Department/ Faculty of Arts and Sciences/University are in much better financial situation than they were 3-5 years ago.

Our undergraduate enrolments seem to have plateaued, with similar numbers over the past two years (~160 students in years 2-4 in our Major/Specialist programs). The biggest growth is in our Geophysics specialist program--e.g., our geophysics field school jumped to 24 students last year, compared to previous years when there might be 1/3 that many. We continue with strong emphasis on field education: aside from regular field camps and local class trips to Niagara gorge, Bancroft, etc. sites, extra field trips/courses this year included Grand Canyon/Death Valley (18 students), China (16), St. Lucia (22), Spain (20). Endowments, budget planning, and subsidies from our Faculty keep our student participation costs for these trips low.

Two primary issues for our undergraduate program include: (1) balancing our program enrolments. Most of our u/g students are in Geology and the growing Geophysics specialist programs. We have to build numbers in environmental programs like our new EES major since we have a large number of faculty members with expertise in environmental fields; (2) We have capacity to build international enrolments. We are behind the target numbers for the University in international admissions. Admittedly though, there has not been much pressure from above on this front.

Our graduate numbers are essentially steady, with a total population of 50 funded students this year. A continuing challenge is recruiting domestic PhD students under heavy competition internationally. We survived a month-long strike by TAs last year without too much rancour among grad students in Earth Sciences.

Russell Pysklywec

BROCK UNIVERSITY, Earth Sciences

The Department of Earth Sciences survived 2014/15's University-wide Program Review that was reported to CCCESD by Francine McCarthy at this time last year. The original purpose of the Review was to identify programs that would be cut as a part of the University budget reduction program. The committee that oversaw the process was initially proposed as an arm of the administration but was given to Senate where it became a kinder, gentler process than had originally been predicted. In the end the Earth Sciences programs survived (only a very few programs across the University did not survive). The review outcomes pointed to reasonable areas for improvement in a document that remains confidential to Senate. Francine tells me that she had been almost certain that we would fall victim to budget cuts but I'm happy to say that her reports of our demise were greatly exaggerated.

We currently have 78 undergraduate majors and 12 MSc students and 9 faculty members (not including Greg Finn who continues to teach two half courses despite the onerous demands of being an Associate Vice President Academic with very broad responsibilities). We also have 1 academic staff member (Senior Laboratory Coordinator), and four non-academic staff including our Administrative Assistant, our Cartography, our Petrographic Lab Technician and our Senior Storekeeper.

Our NSERC grant success rate went up a little this year with Francine managing to regain funding after a hiatus of a few years. A very much deserving renewal of funds that comes when she has more time for her research interests now that her term as Chair has passed. Note that Francine provided her approval for me to give these personal details to her friends and colleagues on CCCESD.

Richard Cheel

McMASTER UNIVERSITY, School of Geography and Earth Sciences

The McMaster School of Geography and Earth Sciences was formed in 1998 as a result of a merger between the former Geology and Geography departments. Our program now includes 3 major streams, Earth Sciences, Environmental Sciences (including Physical Geography) and Social Geography. This report provides data only for the Earth and Environmental Sciences part of our program.

We currently have 13.5 full-time tenure or tenure track research faculty, 2 tenure or tenure track instructional faculty, and 1 term-appointed teaching faculty

in Earth and Environmental Sciences. However, due to retirements and resignations, we will lose 2 of our tenured research faculty this year alone. In addition we had 1 retirement last year and have not yet replaced our structural geologist who resigned in 2011. We have thus will have lost about 30% of our faculty in Earth and Environmental Science in the last few years and we are concerned that unless we are able to replenish our faculty, this trend will present problems in sustaining our program.

We currently have 1 CRC chair in environmental organic chemistry (held by Dr. Slater) as well as the Susan Cunningham Research Chair in Geology (held by Dr. Bhattacharya). The main divisional research areas are in Earth Surface Processes, Geochemistry, and Hydrologic Sciences. Dr. Carolyn Eyles is the Director of the multi-disciplinary Honours Integrated Science Program within the faculty of science. Dr. Bruce Newbold is Director of the School.

In 2014 we had 317 undergraduate majors (69 in Geology, and the remainder in Environmental Science). We also teach about 3300 students in service courses.

We also have 71 Graduate Students (including part time students). Recent data provided by our Dean of Science shows that we are the second highest ranked division in the faculty of science for teaching units per instructor, which reflects our high number of service courses.

Department	Teaching Units per Instructor
Psychology	1127
Geography and Earth Sciences	1020
Chemistry	887
Physics	769
Biology	705
Math	696

In general, our faculty has been very successful in demonstrating sustained research programs, both in terms of scholarly output and research funding. In 2013 Dr. Bhattacharya was hired to enhance the applied geology aspect of the McMaster program and we now have an active AAPG Student Chapter and new courses in Petroleum Systems. However, owing to severe budget constraints in the Faculty of Science, there has been a suspension of hiring and statements made by our Dean and Provost that the faculty of science will shrink in terms of Faculty complement and budget expenditures by about 10%. Although SGES are presently able to offer courses needed for APGO certification, further retirements in the near future may make this very difficult. Our Dean has indicated he may enable a limited number of faculty searches this year, and SGES have requested searches in the areas of Structural Geology and Remote Sensing/Geomatics.

Janok P. Bhattacharya

UNIVERSITY OF WINDSOR, Department of Earth and Environmental Sciences

Overview

- 12 tenured faculty, 2 active professors emeriti, and 4 staff members
- 1 Canada Research Chair in Trophic Ecology (Dr. Aaron Fisk)
- B.Sc. Honours Environmental Science degree (~ 50 majors) and M.Sc. and Ph.D. Earth Science degrees (~ 20 students)
- Predominant contributor to Bachelor of Environmental Studies degree (~ 125 majors)
- ~ $1.2M (2013-14) to $1.4M (2014-15) in research funding from a variety of sources including CRC, NSERC-DG, NSERC-CRD, CIHR, MRI Ontario, Environment Canada, Great Lakes Fisheries Commission, MITACS, Indian Affairs & Northern Development, USGS, World Wildlife Fund, various state, provincial and territorial governments, and various consulting and mining companies
- Academic and research foci include environmental geochemistry and geophysics, hydrothermal mineral deposits, geodynamics, coastal geomorphology, hydrogeology, hydrocarbon reservoirs, trophic ecology, geographic information systems

News

- Pew Fellowship awarded to Dr. Aaron Fisk
- Recent CFI-funded updates to Element and Heavy Isotope Analytical Laboratories (new excimer and femtosecond laser ablation systems, new quadrupole mass spectrometer, upgrades to multi-collector mass spectrometer)
- Recent CFI-funded updates to Environmental Scanning Electron Microscope Laboratory (new solid state detector, new Raman spectrometer with atomic force microscopy)
- Currently undergoing IQAP review process – first external review of new Environmental Science program

Challenges/Opportunities

- Several years of internal realignments (~ 3 %/year) coupled with inflation have resulted in considerable operating budget cuts
- Up to one third of faculty are or will be eligible for retirement over the next 3 to 5 years – anticipate potential difficulties in hiring replacements due to budgetary pressures
- Aging facilities and infrastructure – future of all University of Windsor science buildings currently under review as campus undertakes significant, long term capital works projects

- Faculty renewal will need to match university strategic priorities and provincial differentiation mandate (Great Lakes resource and environmental challenges) – recently awarded Quantitative Hydrologist position under strategic faculty renewal application

Joel Gagnon

LAKEHEAD UNIVERSITY, Department of Geology

In 2015/2017, our enrollment of majors has remained stable with 113 currently enrolled. Sixty-five are enrolled in the HBSc Geology with the others in Environmental Earth Studies, Water Resource Science and the BSc degree. In addition we currently have 12 MSc students in our program down two from last year. High enrolments in our service courses, particularly for Engineering, are straining our resources both in terms of equipment and graduate assistants.

We have six faculty and two active emeritus professors and this year will be hiring three sessionals to cover three courses in order to cover teaching relief provided to offset additional administrative duties. We also have one sessional teaching First Year Geology at our Orillia campus. As in previous years we have two full time lapidary technicians and share an administrative assistant with another department. The department continues to be the hub for the new Centre of Excellence in Sustainable Mining and Exploration (CESME), an initiative that is receiving strong support from senior administration. One of our new faculty was successful with NSERC this year so we now have three faculty and one emeritus professor with NSERC Discovery Grants and our remaining new faculty member is applying once again this year.

Pete Hollings

UNIVERSITY OF MANITOBA – Geological Sciences

1. **Personnel and department direction.**

a. Due to budget cuts we had to layoff one lab manager. The loss of this position has resulted in a shift in duties of other lab managers.

b. One professor retired and we were granted the request to fill his position. We are currently looking for a sedimentologist.

c. Geological Sciences continues collaboration with the Northern Manitoba Mining Academy (NMMA) in Flin Flon. It is offering two first-year correspondence courses at NMMA this term and next term it will provide a face-to-face offering of the first-year lab-based Dynamic Earth course.

d. We received an internal grant of ~$500,000 to upgrade our petrography labs and to purchase a new SEM.

2. **University administration.**

a. Although the U. Manitoba President is attempting to decrease the number of faculties at the university through the process of amalgamating departments, the department of Geological Sciences has managed to stay autonomous. Implications for the Department are not yet fully defined.

b. Budget cuts continue to affect the department. We are expected to plan for a 4% budget cut in 2015-2016 and another 4% in 2016-2017.

c. The resource centered management (RCM) model is being considered by our administration.

3. **Student numbers**. Our overall undergraduate numbers in Geological Sciences continue to increase. In the Honors and Majors programs, our undergraduate enrollment is approximately 140 students (Years 2-4), with many more students on the waiting list or in the General, 3-year program. We have had to increase our cap in lab sessions for courses involving microscopes, field trips, and geophysical equipment.

4. **NSERC.** Disruptions associated with the Discovery Grant program continue, with the 2014-2015 competition. One faculty member received a drastic cut in his discovery grant. There is limited success in CRD applications because of the low commodity prices. Overall, there seems to be limited opportunity to apply for funding.

Mostafa Fayek

UNIVERSITY OF REGINA, Geology

The Department of Geology at the University of Regina welcomes Dr. Tsilavo Raharimahefa as a tenure-track lecturer and Mr. Geoff Reith as a tenure-track lab instructor, both starting July 1, 2015. Dr. Raharimahefa has an expertise in structural geology, tectonics and geophysics; he will teach various courses including metamorphic petrology, geophysics and geomodeling applied to mineral exploration. Mr. Reith has a background in sedimentology and stratigraphy and will teach labs of sedimentology, stratigraphy, petroleum geology and historical geology. With these additions, we now have 9 permanent faculty members and 3 permanent lab instructors.

We continue to offer two undergraduate programs: the Geology program and the Environmental Geoscience program. The latter was converted from a previous Combined Geology and Geography program in 2014. Both programs satisfy all the requirements of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS). In the fall of 2015, the enrolments in Geology programs continue to be high, with 143 undergraduate students claiming as Geology majors (not including transferred and /or Environmental Geoscience students registered in the Department of Geography and Environment Studies). However, there appears to be a decrease in number of first year students this year, and the total enrolment in Geology may decrease next year. Our graduate programs (M.Sc. and Ph.D.) continue to have high enrollments, totaling 20 M.Sc. and 6 Ph.D. students in the fall of 2015. Our department also hosts a historical high number of visiting scholars (8) and visiting Ph.D. students (7) in 2015.

Two of our faculty members currently hold NSERC-DG grants, and most other faculty members have funding from the petroleum and mining industry, provincial and federal governments and through international organizations. We continue to rely on external collaborations or commercial labs for a major part of the analytical work related to research.

The Faculty of Science is searching for a new Dean to start on July 1st, 2016. My term as department head will end on June 30th, 2016; a colleague within the department will be appointed as the new head.

Guoxiang Chi

UNIVERSITY OF SASKATCHEWAN, Geological Sciences

There was no change in the membership of the permanent faculty of the Dept. of Geological Sciences at the University of Saskatchewan in 2014-2015. We have added one two year term position in bio-geochemistry. Our current membership includes 2 Tier 1 Canada Research Chairs, 2 NSERC IRCs and one privately endowed research chair (the Murray Pyke Chair in hard rock geology).There are additionally twelve faculty carrying out research in the broad areas of sedimentology and paleontology (4), geophysics (3), stable-isotopic geochemistry (2) and mineralogy and economic geology (3) with significant overlap between the latter two groups. Another endowed research chair will be awarded on a rotating basis to one of the existing faculty members. Of the 17 faculty, 12 currently hold NSERC Discovery grants. The apparent inconsistency in the new NSERC selection process remains challenging. Funding the ongoing operation of major lab facilities is also a challenge.

There are currently 216 Geology and 14 Geophysics students enrolled over the four years of the undergraduate degree programs. In 2014-2015, 47 Geology students and 5 Geophysics students completed undergraduate degrees. This year, the undergraduate students will be hosting the Western Inter-University Geosciences Conference. Offering field schools remains a challenge given our geographical location and the number of students. Historically, most students work in natural resource industries after graduating but, anecdotally, many are having a hard time finding employment given the current economic conditions.

There are 40 MSc students and 22 PhD students enrolled in the graduate program. There are 2 administrative staff members, 2 academic staff and 3 technical staff members.

Sam Butler

MOUNT ROYAL UNIVERSITY, Earth and Environmental Sciences

In September 2015, our department name was changed to the Department of Earth and Environmental Sciences to reflect our recent merger with the Department of Environmental Sciences. Our department now houses a BSc Geology Major, a BSc Environmental Sciences Major and a Geography Minor Program (no graduate programs).

Enrollment: We will report on enrollment in the 2016 survey.

Faculty and Staff

The Department of Earth and Environmental Sciences at Mount Royal University now has 15.5 tenure and tenure track faculty (6 geology, 5.5 environmental sciences, 4 geography), 1 emeritus professor (geology) and three instructional support technicians. In addition, we have sessional instructors filling the equivalent of 7 full time positions (geology), and 3.5 full time positions (environmental sciences), due in part to the lack of graduate student teaching assistants.

Research foci for these earth and environmental scientists includes: soil & water remediation, soil ecology, ecosystem relations (M. Swallow), surface & ground water contamination, soil & water remediation, hydraulic fracturing (R. St Fort), sedimentology and ichnology (J. Scott), isotope geochemistry & geochronology (J. Pollock), environmental forensics, dendrochemistry, age dating, persistent organic pollutants, surface & ground water contamination, soil & water remediation, hydraulic fracturing (G. O'Sullivan), GIS and spatial cognition (L. Moorman), GIS (P. Macquarrie), depositional environments Burgess shale (P. Johnston), life cycle assessment (I. Dunmade), submarine volcanology and VMS deposits (M. DeWolfe), petroleum geology & Gulf Island water issues (J. Cox), geothermal energy, natural hazard preparedness, & geoscience education (K. Boggs).

Year's highlights

While budget cuts continue to provide challenges, the merger of Earth Sciences and Environmental Sciences has the potential for interesting future synergies. Our fourth geology graduation occurred in June 2015. We have now graduated ~100 BSc Geology majors. Reflecting a significant new focus on undergraduate research, we had five students present at their first international conference in October 2014 (GSA Vancouver) and 11 (of 24 students in 4th year) completed undergraduate research projects. A new high school geology program is being developed for Alberta, spear headed by our department, in collaboration with APEGA, UofC and the Calgary geosciences community.

This past year saw the first graduation from the BSc Environmental Science Major Program (recently transitioned from a 3 year applied degree program). Fourth year environmental sciences and soil science courses were offered for the first time. Funding and approval are now in place for a new collaborative BSc - Environmental Science Major Program with Keyano College (Ft. McMurray).

Years 3 and 4 of the collaborative degree will be distance-delivered with state of the art Cisco Telepresence technology. Additionally, a new dual credit environmental issues course was delivered at Springbank High School in Calgary.

In April, we celebrated the launch of WorldView, a digital Earth technology, funded by $211,000 from TECTERRA. This new type of global grid architecture (L. Moorman) is designed to facilitate the teaching and learning of explicit spatial concepts.

Geoscience outreach has recently become an important focus. Activities include outreach citizen science programs for K-6 students and roving interpretative programs for the general public. One third of the geology students are involved as university student mentors, "roving scientists", and research assistants.

Thanks to significant funding from APEGA, MRU opened a large Cretaceous marine vertebrate exhibit in January. These six large specimen, interwoven through the halls, welcome visitors and students to our science wing.

Challenges

Budget cuts have restricted a planned expansion to the BSc Geology Major Program, which remains at ~25 students per $2^{nd}/3^{rd}/4^{th}$ year.

We lack research space for faculty and/or students. The current storage area for rocks is now full.

Juggling research programs with heavy teaching loads (9 undergraduate contact hours per week per semester) continues to be challenging.

The BSc Geology Major and Environmental Science Major Programs are considering how to implement a new direct entry process from high school for the near future.

Katherine Boggs

UBC OKANAGAN, Earth and Environmental Sciences

Earth & Environmental Sciences together with Physical Geography comprise one of eight administrative units ('Unit 7') in the Irving K. Barber School of Arts and Sciences (IKBSAS). The Unit collectively has 19 faculty with 12 in Earth & Environmental Sciences (5 Professors, 5 Associate Professors, 1 Assistant Professor and 1 Senior Instructor) and 7 in Physical Geography. Two of the EESc faculty are crossed-appointment with Physical Geography and another two with Biology.

Dr Jason Pither, who is cross-appointment with Biology was promoted to Associate Professor with tenure in the summer of 2015.

Unit 7 hired a new external Head (Dr Edward Hornibrook) in August 2015. Hornibrook is returning to Canada after 15 years in the School of Earth Sciences at the University of Bristol in the UK. He will be establishing a new laboratory and research group at UBC Okanagan, specializing in biogeochemistry and stable isotope analysis of atmospheric trace gases.

Earth & Environmental Sciences and Physical Geography until recently shared a single Unit Assistant. In August 2015, the support staff complement of Unit 7 doubled with the hiring Mr Stuart MacKinnon as Undergraduate Laboratory Manager.

There are two faculty on sabbatical in the current academic year: Dr John Greenough is on 12-month study leave and Dr David Scott is on 12-month administrative leave following completion of a 4-year term as Unit 7 Head.

The Department currently delivers two undergraduate degree programmes: Earth & Environmental Sciences (EESc) and Freshwater Sciences (FWSc) although courses taught by EESc faculty commonly are cross-listed with Biology and Geography, contributing to degree programs offered by other Units in IKBSAS. The EESc and FWSc programs both have Honours programs.

Dr Lael Parrott and Dr Kevin Hanna currently are leading a bid to develop a new degree program in Sustainability (SUST). The program is an IKBSAS-wide initiative that will be hosted in Unit 7. It is anticipated that the first cohort of students will be admitted in the fall of 2017.

In early 2015, the department bid unsuccessfully for one of two CRC Tier II positions that became open at UBC-O. There was no net loss of faculty positions to Unit 7 as neither vacated Chair was based in Earth & Environmental Sciences or Physical Geography.

Dr Adam Wei had his NSERC Discovery Grants renewed in 2015. Four faculty in the Earth & Environmental Sciences currently hold NSERC funding.

Four new graduate students (3 M.Sc. and 1 Ph.D.) joined the department in 2015, bringing the total complement of graduate students to 16. The department is looking to increase this number substantially in the next few years as a result of recent hires and recruitment efforts.

The first of two new Fipke Scholarships was awarded to Ph.D. student Sudip Kumar this past summer. A second Fipke Scholar award is available for a high-achieving incoming Ph.D. student in 2016. The awards consist of a person stipend to the student and a research stipend for use of instrumentation in the Fipke Laboratory for Trace Element Research (FiLTER).

It is anticipated that a second technician will be hired in the FiLTER facility in 2016 following restructuring in 2015, which saw Dr. David Arkinstall begin to focus his time primarily on the operation and upkeep of the Tescan Scanning Electron Microscope and newly acquired CAMECA Electron Microprobe equipped with a field emission electron source. The new technician will be responsible for operation of the two ICP mass spectrometers, EXCIMER laser system, and clean lab. The FiLTER facility can be readily accessed by external users and collaborators from academia and industry.

UBC Vancouver is leading a substantial campaign to raise funding to renovate the Oliver Research Station, which is used primarily for teaching undergraduate fieldwork. UBC Okanagan does not currently use the field station, however, we have begun to engage in the initiative and it is anticipated that the EESc program will begin to teach a second year undergraduate field class at the site beginning in 2017 or 2018 at the latest.

The EESc degree program was scheduled for an external review in September 2015, however, that review has been postponed to the fall of 2016. During the past three years our undergraduate student numbers have fluctuated but remained largely stable both in terms of declared Majors and overall FTEs.

Ed Hornibrook

SIMON FRASER UNIVERSITY

We have 17 faculty members consisting of 13 associate and full professors, 2 senior lecturers, 1 lecturer and a limited term lecturer. Two of our faculty are research chairs: Doug Stead, Forest Renewal BC Chair in Resource Geoscience and Geotechnics, and John Clague, CRC Chair in Natural Hazards. Doug was recently renewed for another 5 year term and John will be retiring Spring 2016. We are optimistic that we will advertise next spring for a CRC Chair replacement for John. We also have 18 adjunct faculty. Our faculty expertise is diverse, representing all the major fields in the Earth sciences.

We are currently advertising for an Assistant Professor in the Petrology and Tectonics Group with an expected start of September 2016. This position has been long awaited to help cover a retirement in 2009.

Our majors take one of two streams, Geology or Environmental Geoscience, both of which lead to Professional Registration with the Association of Professional Engineers and Geoscientists of British Columbia. Our enrollments are presently at all-time highs with 35-40 students in our second year courses. We have 57 graduate students in total - 34 MSc and 23 PhD students. We also have 4 visiting research students right now.

Our compliment of office staff remains unchanged with three administrative/clerical staff and two technical staff. We are fortunate to have several new scholarships available to our Earth Science undergraduate students: Clements Earth Sciences Field Trip Grant; Alexis Clague Award; and Edelmayer Undergraduate Award.

The Dean of Science has supported us by providing funding to replace our aging 24 passenger bus with a new and improved version, and added to our number of petrographic microscopes. Our teaching space is currently adequate but may get tight if our student population continues to grow. This past summer we underwent a restructuring of our lab rooms to help better utilize the space for our research and graduate students. Last fall we hosted our first Alumni Reception that coincided with SFU hosting the Geological Society of America annual meeting in Vancouver.

Notable Awards and appointments:

- John Clague -President APEG 2015
- Diana Allen – Robert Farvolden Award: Canadian Geotechnical Society 2015
- Diana Allen – CJ Westerman Memorial Award APEG 2014
- John Clague – GAC J. Willis Ambrose Medal 2012

Brent Ward

UNIV. BRITISH COLUMBIA, Earth, Ocean & Atmospheric Sciences

EOAS is enjoying healthy enrolments and strong research success. We are entering a period of faculty rejuvenation, particularly in geology and geological engineering, but have infrastructure challenges with our field school at Oliver, BC.

Infrastructure

As reported last year, our 3rd year geology camp in Oliver, BC is in critical need of renewal. However, we are questioning whether it is worthwhile to invest the approximately $2m needed for new buildings for a facility that we use only 18 days per year. We are exploring partnerships that would allow better use of the facility.

Undergraduate Education

As of September overall EOAS program enrollment is stable, with 555 undergraduates enrolled in 2014 and 550 enrolled in 2015. Environmental Sciences is now our largest program with 176 students, followed by Geological Engineering with 153 students. Both programs are at their prescribed quotas and not expected to grow. Enrolments in Geology (97), EOS Majors (32), Geophysics (30), and Oceanography (53) have not varied significantly over the last year. However, the viability of our Atmospheric Sciences program, jointly managed by the Geography Department in the Faculty of Arts, is in question with 9 students total and only 4 new students entering in second year. Overall, the total number of students taught in all courses has grown steadily over the last 5 years, and particularly strongly this year, with Term 1 September 2015 enrolment up 7 % over last year to >4300 students. Growth is quite broad across discipline-specific courses as well as first-year and service courses. Consistent with the Flexible Learning strategy at UBC, our distance education courses remain an important component of our offerings, representing about 20% of our total enrolments. We are starting to see growth in our programs coming from international students that have completed Vantage College's one-year program on campus. EOAS involvement in the Vancouver Summer Program, specifically for international students from other universities, has contributed to reversing our budget deficit and will be expanded for 2016. EOAS won two campus-wide Killam Teaching

Awards and Sara Harris, Professor of Teaching, won a prestigious 3M National Teaching Fellowship. The estate of Emeritus Professor Dr. W.R. Danner contributed about $1.1 million towards EOAS through donation of his extensive mineral collection plus $640,000 towards undergraduate awards and bursaries.

Research

Graduate enrolment remains strong at approximately 200 students, evenly split between masters and PhD. Our total research funding remains very strong close to $12M in 2015. EOAS faculty have been recognized with a number of awards, including Roger Francois, a chemical oceanographer, who was appointed a Fellow of the Royal Society of Canada.

Faculty

Between July 2015 and June 2017, seven faculty will retire from EOAS, creating a daunting and exciting challenge to renew the department. Two faculty are associated with our Geological Engineering, four from Geology and one from Environmental/Atmospheric Sciences. We have a search underway for a Geological Engineer and hope to initiate new searches in 2016. In 2015 we have focused on developing a hiring plan that balances the needs of our undergraduate programs with both the desire to maintain traditional strengths and to move into the most exciting research areas.

Staff

We are fortunate to have a very capable and dedicated staff with relatively little turn over in the last 12 months. A traditional machinist retired in February, to be replaced in January 2016 with a mechatronics engineer – a person capable of working with instruments, sensors, data acquisition and who can assist in the design of research equipment. Because we lack the modern CNC equipment now used by most shops, we will collaborate with better-equipped shops in Physics and Chemistry for complex machining.

Budgets

Our budget situation is similar to last year in that we again are projecting a deficit, but hope that we will return to a balanced budget in 2016. The problem lies mostly at the university level and not with profligacy at the department level. According to the university's activity-based budgeting, our growth in undergraduate course enrolment should translate into an increase in department revenue.

Roger Beckie (presented by Mary Lou Bevier)

UNIVERSITY OF VICTORIA, School of Earth and Ocean Sciences

Enrollment

Undergraduate: After regular growth in undergraduate student numbers since 2004, the total number of students registered in courses offered by the School of Earth and Ocean Sciences (SEOS) seems to have plateaued at about 2000, with 1954 this past year, down slightly from 1995 in the previous year. Of current students, 775 are enrolled in first year SEOS courses, 484 in second year, 465 in third year, and 230 in fourth year. A total of 235 students are pursuing BSc degrees in SEOS (declared Major and Honours students in all years). Of these, 159 are pursuing Earth Science degrees, 33 combined SEOS-Geography degrees, 18 combined SEOS-Physics degrees (13 Geophysics, 5 Ocean-Atmosphere Dynamics), 15 combined SEOS-Chemistry degrees, and 10 combined SEOS-Biology degrees. A total of 36 students graduated with SEOS Majors degrees and 12 with Honours. Our Earth Sciences program accounted for 26 of these graduates, while combined programs with other departments accounted for 22. In addition, 16 students graduated in SEOS minors programs (13 in Ocean Sciences, 3 in Earth Sciences). In all cases, the proportions of male to female students are approximately equal.

Staffing our two geological field school courses has been a challenge in past years, and the departure of Stephen Johnston will exacerbate this situation until a suitable replacement can be hired (see below). Nonetheless, these field schools represent highlights in our program for many students. Enrollment in our introductory Field School, taught at the end of second year on Vancouver and the Gulf Islands, remains steady at about 50 students, requiring us to teach two sections (maximum of 30 students/section). Our fourth-year Advanced Field School (average enrollment ~25) alternates between a transect of the B.C./Alberta cordillera and an international location (every third year). This year the field school was held in Cyprus and consisted of a transect of the Troodos ophiolite.

Graduate: Currently, 68 graduate students are enrolled in SEOS (up from 57 last year). This includes 31 MSc, 30 PhD, and 7 visiting graduate students. So far this year, 14 graduate students have completed EOS programs (9 MSc, 5 PhD), and 3 more (2 MSc, 1 PhD) are scheduled to defend their theses before year end. Our graduate-student numbers peaked at just over 80 in 2011. The lower numbers over the past few years are thought to reflect a drop in the number of senior faculty in the School. Over the past four years two of our three geophysicists (Spence and Chapman) retired and one climate scientist (Weaver) has gone on extended political leave. Geophysics and climate studies account for a significant fraction of our graduate student population, and the loss of these professors has resulted in a drop in the overall number graduate students in SEOS.

Program/Course Changes

This year we have moved three courses required for our Ocean Sciences Minor (OSM) program from the summer term to the fall or winter terms to make them more accessible to students outside of the OSM: these courses are EOS 312 Introductory Chemical Oceanography, EOS 313 Introductory Geological Oceanography, and EOS 313 Descriptive Physical Oceanography. Due to a

decrease in the number of SEOS faculty over the past few years, we have been unable to teach some senior elective courses, including Hydrology, Marine Geology, and Acoustical Oceanography. The latter course has now been removed from the calendar, but we are still seeking ways to again offer the first two.

We are currently discussing revising our undergraduate offerings in an effort to provide a full undergraduate program in Ocean and Atmospheric sciences. Such a program would include a dedicated Ocean/Atmosphere field school. It is unclear at this point if we can accommodate such a program given our faculty numbers and a fixed budget.

Faculty/Staff

SEOS currently has 17 tenured/tenure track faculty members, 2 active Professor Emeriti, and 53 adjunct professors. The only change is SEOS faculty in 2015 was a significant one, as SEOS Director Stephen Johnston resigned in September to Chair the Department of Earth and Atmospheric Sciences at the University of Alberta. Stan Dosso is serving as Acting Director until January and a Director Search is currently underway. We are in the early stages of a search for a replacement for Johnston's position with teaching expertise in geologic field schools and related core courses, and research expertise in Earth System Science with a preference for areas such as structural geology, tectonics, marine geology, sedimentology, and/or geochemistry. Over the past year SEOS has been seeking to fill a Canada Research Chair (Tier II) in Earthquake Geophysics, but has been unsuccessful so far as our top two candidates declined, in one case due to another offer (from Harvard) and in the other case due to spousal employment issues. We are currently in the process of re-starting the CRC search. Advertisements for both the replacement geology position and the CRC geophysics position should be out in about a month, and will be sent to members of the CCCESD.

Three office staff remain responsible for all administrative activities in SEOS. We have three senior laboratory instructors, and a single technical staff member (0.8 of a position) who fills the dual roles of ICP-MS Manager and Geochemical Lab Manager. We anticipate the opportunity to hire another technical support staff member in the coming year.

Issues/Challenges

Although our undergraduate student numbers appear to have stabilized, we remain stretched to the limit in teaching our programs, given a reduction in faculty members over the past few years (due to unreplaced retirements and long-term leave). Two geology faculty members taught 'above load' again this past year in order to accommodate all the students. The departure of Stephen Johnston further exacerbates this problem, particularly for field schools, until a suitable replacement is hired. Our student growth has been largely in geology and geophysics. Attracting students into ocean/atmospheric sciences is necessary to balance the department; hence our efforts at crafting an attractive Ocean and Atmosphere undergraduate program.

Stan Dosso