**Teaching Multi-University Collaborative Science Classes**

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**EHaz**  
University Exchange Program in Earth Hazards

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**EHaz** is a graduate consortium in Earth Hazards, which links leading graduate programs researching Natural Hazards, especially Volcanoes.

Specialized Graduate programs may be small (several faculty; 10-20 students) on any one campus, but a six university consortium, becomes quite large intellectually, if linkages are strong.

Such linkages can change the atmosphere greatly for students by adding peer group connections and broadening educational efforts.

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**EHaz** links leading graduate programs in Volcanological studies in North America, and an important asset is that Canadian and US students have ready access to field studies and internships at active volcanoes in Mexico, where there are rapidly developing and excellent research capabilities at both Universities and closely associated Volcano Observatories.

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**EHaz** has addressed a common need for advanced graduate courses, which are typically offered sporadically to a small number of students because demand on any one campus is limited and faculty resources are stretched by small classes. Such classes are critically needed by graduate students to get them to the “cutting edge” where scientific discovery is happening and where they need to be if they want funding agencies to bless them. Even if a faculty member does offer such a class, it is quite costly in time to really be at the cutting edge of any topic that isn’t squarely in the research aim of that individual.

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Fig. 4. Probability of pyroclastic flow inundation: left result is with directional weighting calculated; right result is from SAGS with directional weighting guessed.
Important aside: We are not (nor do we aim to be) master teachers, but instead mainly educators committed and absorbed into research and graduate level teaching/mentoring.

- We are always looking for international research linkages and ideal field sites
- We are pressured by staying at the creative edge of research fields
- We seek ways of channelling the efforts (enlisting the help) of everyone we work with (mostly graduate students and post-docs)
- We are strong advocates of student initiated or student driven learning and we use workshop and seminar approaches often

So how can a multi-university consortium work together to deliver advanced graduate classes? We decided to try internet linkages with an ingenious software that was being used by medical doctors to keep up with discoveries in surgical procedures.

**Michigan Tech EHz Course on Volcano Instability (Spring 2007)**

**How the class worked:**

Each week the class focussed on the work of a world expert

Each of the experts provided, pro bono, a narrated powerpoint lecture, and reading material (reprint or preprint in electronic format).

Students absorbed these materials and held discussions on their own campus and then on **Tuesday** in a marratech session without the expert, where a list of questions was agreed on and then communicated to the expert via email.

Finally on **Thursday** we had a 90 minute discussion with the expert, online, using marratech, where we could discuss the questions and any detail.

A graduate assistant on one campus did the website and communications effort.

Each campus administered its own classes, collected tuition, graded, etc.
Students in the class -- 60! Huge for a graduate class

All six EHaz campuses plus three high profile gate crashers (Oregon, Arizona St, UBC)

80% Graduate students and 20% upper level undergraduates

Value of a larger learning group

Small classes are good in some ways, but for grad level classes large numbers are rare but advantageous because they:

Add diversity of experiences (field, experimental, geophysics, geochemistry, remote sensing, etc)

Add peer support for grad students at a critical time which leads to future opportunities

Field Trips have complemented each of our web-based classes

Field trips last two-three weeks

- Calderas (Yellowstone, Long Valley)
- Collapsing mountains (Cascades)
- Mexican Volcanic Belt

Field camping--half to all day hikes, outdoor educational focus
Course Evaluations Highlights

- >90% found the class effective
- Students liked access to experts and the live discussions were especially appreciated
- Excellent readings of current literature
- Getting to know other students--bigger cohort group generated

Suggestions for improving Tuesdays

Successful with students, and we have used student suggestions to change the format of the class, especially to enhance the research discussions and sharpen questions.

This Spring

- Jan-April: Advanced Volcanology Class: Convergent Plate Boundary Volcanism
- May: Field Trip to Mexican Volcanic Belt--Tepic to Orizaba

We expect >100 graduate students to take the class from all over the world
- We will use the “expert of the week” approach

“I enjoyed the setup of the class with a general discussion between universities on Tuesday followed by the more specific questioning and discussion with the speaker on Thursday. One complaint would be the powerpoint presentations were sometimes difficult to follow on my own. At those times I felt I wanted the Thursday speaker to give the lecture with the powerpoint so I knew what and how they were thinking. I do not know how an actual lecture could be incorporated into this class, or if it needs to be. Perhaps if the speakers were aware of this problem and were encouraged to add notes (as some did) or to think of this while putting the presentation together some confusion could be avoided. In addition I really like how this class brings the volcanological community together in addressing some of the important topics, techniques and instrumentation in current and future research.”
**EHaz in the press**

**Multi-university Internet video-conferencing course provides novel approach to student-directed learning**

*Amir Darvish, Rose Stix, Martin Rose, Raman Ram笏, Adam Durant, Mara Cisneros, Hugo Delgado Granados, Guillaume Girard, Ignacio Hernandez, William Rose, Sergio Salinas Sanchez, John Stix*

Connecting graduate students with experts on a given topic is vital in their success but has often been challenging because of logistics, costs, and scheduling. However, advances in remote video-conferencing have allowed students to include such outside expertise effectively. Conducted under the auspices of the Earth Hazards (EHaz) project, the course provided new possibilities, options in the world of learning and teaching, and improved our ability to include many experts. Student and faculty feedback has been positive. The course was a great success and provides a model for similar courses with the long-term goal of providing new opportunities for remote learning.

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**NSF help?**

- New graduate class for all the world’s graduate students in volcanology, plus volcano observatories
- **Volcano Seismology** Spring 2008
- Two professors plus 6 more experts
- Different funding model to pay for the substantial time investment of two professors -- NSF help
- Lab sessions using real data
- Addresses need for research analysis of seismic data which has become ubiquitous but which is inaccessible to most volcanologists
- Is paired with a field course in Ecuador

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**Plans for sustaining multi-university courses**

Experts are generous about giving one session (because of novelty?)

- We have high profile gate crashers
- Tuition collection is separate from the source of instruction
- What about courses which demand many lecture sessions from an expert?
- We have asked NSF to help us in one case.

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**EHaz online:** [www.geo.mtu.edu/EHaz/](http://www.geo.mtu.edu/EHaz/)

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Thank you for listening!
Gracias por su atención!