

GG711 - Deep Active Submarine Volcanism Spring 2015

Instructor: Ken Rubin Day, Time: Tu-Th mornings, 1030-1145a POST 613
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Course Content: We will explore various aspects of active volcanism in the deep ocean and its effect on the surrounding environment, focusing on recent eruptions.

Course Format: This is a seminar course where participants read and discuss papers and talk about the latest research. The plan is to meet once per week for an introductory lecture/discussion and then to meet again for a second session to discuss the paper(s) for the week. Initially the instructor will lead the paper discussions but by mid-semester course enrollees will lead the discussions. The format will be conversation and as informal as possible to encourage participation and lots of questions during class. Topics will be illustrated with Specific examples drawn from the literature.

Grading: Grading will be based on class participation and student-led discussions.

Topics: We will discuss all of the following (not necessarily in this exact order):

I. Volcanic products.

- Volcano types, magma types, relationship to tectonic settings
- Forms of deep sea volcanic products, eruption and emplacement mechanisms
- Reconstructing eruptions from sea floor lava morphology, deposit mapping, morphology and geology
- Magma reservoirs and magma chemistry, and magma chamber processes
- Compositional variations within individual eruption deposits

II. Eruptions and Related effects

- Submarine effusive volcanism and pyroclastic activity/explosive volcanism
- Eruption detection and response including seismic detection of eruptions
- Eruption chronologies
- Hydrothermal Processes and response to eruptions, including event plumes
- Eruption effects on sea floor ecology & microbial blooms

III Tectonic settings.

- Ocean ridge volcanism.
- Submarine Hawaiian Volcanism
- Submarine Arc Volcanoes
- Special topics with discussions led by Students

IV. Some Specific eruptions

- N East Pacific Rise 1991-1992 and 2005-2006
- West Mata 2008 - 2012
- Loihi 1997
- NW Rota-1 2004 -2010
- Axial Smt 1998, 2011 and 2015
- others time permitting

GG Student Learning Objectives (SLOs):

GG department has provisionally defined 4 and 5 learning objectives, respectively, for the MS and PhD graduate degree programs, relating to Technical knowledge, the conduct of science, Oral and written skills, and Professional skills. This course directly incorporates content relevant some of these:

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M.S.

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

3. **Communicate geological knowledge** M.S. graduate are able to effectively communicate the findings of their research in writing at a level comparable to that of a scientific journal publication, and defend it orally to the satisfaction of a scientific audience. They are also able to communicate orally about Geology through seminar or conference presentations.

Ph.D.

1. **Technical knowledge.** Ph.D. graduates are proficient in applying technical knowledge of relevant theory, laboratory methods, field methods, computer applications, and the supporting disciplines (math, physics, chemistry, biology) to advance the fields of geology and geophysics.

2. **Expertise in a sub-discipline.** Ph.D. graduates are able to comprehensively synthesize, evaluate, and interpret relevant fundamental knowledge in her or his sub-discipline.

4. **Communicate geological knowledge** Ph.D. graduates are able to effectively communicate the findings of their research in writing at a level comparable to that of scientific journal publications, and defend it orally to the satisfaction of a scientific audience. They are also able to communicate orally about Geology through seminar or conference presentations.