MEETINGS

Synthesizing Knowledge of Ocean Islands

AGU Chapman Conference on the Galápagos as a Laboratory for the Earth Sciences; Puerto Ayora, Galápagos, Ecuador, 25–30 July 2011

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An inspiration for Darwin's theory of evolution, the Galápagos Islands and surrounding waters are a natural laboratory for a wide range of Earth science topics. The Galápagos are perfectly situated for geophysical and geochemical investigations of deep-Earth processes at a hot spot, and proximity to a spreading center allows exploration of hot spot–ridge interactions. Several highly active volcanoes show rapid deformation facilitating investigation of melt transport paths and volcanic structure. The islands exhibit a range of ages, eruptive styles, and climatic zones that allow analysis of hydrogeologic and geomorphic processes. The Galápagos Islands are a World Heritage Site and are an ideal setting for developing an integrated biological and geological understanding of ocean island evolution.

The Chapman Conference had two goals: (1) set the foundation for a monograph synthesizing work on ocean island magmatism, with a focus on the Galápagos, and (2) plan strategically for future Earth science investigations in the archipelago. Co-sponsored by AGU and the Charles Darwin Foundation, with funding provided by the U.S. National Science Foundation (NSF), the conference was designed to bring together scientists working in the Galápagos and those in other ocean island settings. Seventy-four geoscientists from eight countries engaged in a rich exchange of ideas.

Three conference days included presentations and discussions synthesizing current understanding and pressing questions regarding active, surface, and deep-Earth processes for the Galápagos and global ocean islands. Two days focused on identifying interdisciplinary questions, data requirements, and pathways for developing collaborative and community-based projects. Presentations from the Ecuadorean Instituto Geofísico, Ecuadorean Navy, Charles Darwin Research Station, and NSF gave a sense of current research capabilities, opportunities, and constraints. Field trips to Sierra Negra volcano (Isabela Island) and Santa Cruz Island allowed participants to explore active and historic volcanic features.

Key interdisciplinary questions identified included, How does the hot spot mantle interact with the moving plates and spreading center in space and time? At what depths are magmas generated, and how are they transported through the asthenosphere and lithosphere? How does observed deformation inform researchers about the structure and growth of magmatic systems? How does geologic evolution of ocean islands affect biological evolution?

Conference participants concluded that the Galápagos are a prime location for Earth sciences research because (1) they exist near one end of the global spectrum of ocean island tectonic and climatic settings; (2) previous research has built a strong foundation for future interdisciplinary work; and (3) their internationally celebrated natural heritage makes the islands a high-visibility setting for research. Participants identified significant data sets needed to answer interdisciplinary questions, including high-resolution topography and bathymetry, permanent volcano monitoring, distributed meteorological data, and integrated geophysical-geochemical models of mantle behavior. Strong connections between geoscientists and biologists were emphasized as essential for future work on ocean islands. Further information can be found at http://www.webpages.uidaho.edu/~dgeist/Chapman/Chapman.html.

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Engaging Students in Authentic Climate Research: Raising the Bar for Climate Science Education

Workshop to Define Student Collaborative Climate Research; Silver Spring, Maryland, 17–19 November 2010

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In November 2010 a workshop organized by the Institute for Earth Science Research and Education (http://www.instesre.org) and cosponsored by the U.S. National Science Foundation and NOAA was held for the purpose of defining what it means for (mostly) secondary school students, teachers, and scientists to collaborate in authentic research related to climate and climate change. The workshop was premised on the understanding that (1) the nation must find new ways to build the scientific and technological expertise needed to understand and respond to climate change and (2) there are many opportunities for students, educators, and scientists to collaborate on scientifically and educationally beneficial climate research projects. Considering the many questions raised about the validity of climate research, including projections of future climate, the workshop participants concluded that engaging students in actual research experiences needs to be part of climate science education for the 21st century.

The workshop sought to distinguish between inquiry-based learning and activities that can legitimately be called "research." Informally, this question can be addressed by asking, "If students and teachers follow a project protocol designed in collaboration with scientists, in the prescribed way for an appropriate length of time, when they finish the project will scientists and other potential stakeholders care whether they did it or not?" Only projects that can elicit an answer of "yes" to this question can be characterized as authentic research.

More formally, authentic collaborative climate-related research involves students, teachers, scientists, and other partners working together to identify research questions, acquire and analyze meaningful data, communicate scientifically valid results that will contribute to the understanding of Earth's climate, provide educational benefits to participating students, and create unique professional development opportunities for educators.

Participants agreed that the most important feature of these definitions, which differentiate authentic research from other kinds of active learning experiences, is that authentic climate research with students requires active participation from scientists who care about project results and who will therefore be more likely to provide sustainable support. There are major challenges to implementing such activities. Students, teachers, and scientists have markedly different needs and cultures, all of which need to be taken into account. Teachers, in both preservice and in-service programs, must be given more opportunities to participate in research. School administrations must be willing to take more seriously the role of schools as institutions that include student research as a core part of their mission. Scientists need to be more willing to define collaborative research that will work within the constraints imposed by our formal