



Instructionally Related Activities Report Form

SPONSOR:

DEPARTMENT: BIOLOGY AND GEOLOGY PROGRAM

ACTIVITY TITLE: GLOBAL WARMING: EARTH HAS BEEN HERE BEFORE.

DATE (S) OF ACTIVITY: APRIL 19, 2013

SUPPORTING DOCUMENTATION

Attach:

1) Student evaluations or assessments

Attached (orange forms).

2) A list of attendees complete with each student major and expected graduation date.

The copy that you already have is the most recent list.

3) Images demonstrating student participation (up to 6 images)

This appears to be a requirement developed after the symposium. We did not take any photographs of the symposium.

4) A summary of expenses

Honoraria to the five speakers:

\$1000 to Dr. David J. Bottjer

\$1000 to Dr. James C. Zachos

\$1000 to Dr. Frank A. Corsetti

\$1000 to Dr. Matthew Clapham

\$1500 to Dr. David L. Kidder (The larger honorarium reflects his need to travel from Ohio. All of the other speakers are located in California.)

\$100 to Big Shots, for the Poe Symposium poster

Total expenses: \$5600.

E-mail to the IRA Coordinator at lisa.ayre-smith@csuci.edu within 30 days after the activity.

Thank you for your commitment to engaging our students!!

ANSWER THE FOLLOWING QUESTIONS:

(1) PROVIDE A DESCRIPTION OF THE ACTIVITY;

The activity consisted of a symposium (Poe Symposium) that was held in the Aliso 150 auditorium on the afternoon of Friday, April 19, 2013. Five prominent geoscientists were invited to speak on their ongoing research into episodes in Earth's past, during each of which there was a major, rapid increase in global temperatures. The purpose was to inform the audience that : 1) there have global warming events in Earth's past, some much more severe than the current global warming is expected to be, 2) the past events have been triggered by a variety of mechanisms, some of which are factors in the current warming, 3) study of the past events can help us anticipate how the current warming may develop, and 4) geologists pursue studies of climate change with a wide range of sophisticated techniques. The last is an important subtext because the American public tend to believe that "geology is just about rocks".

The first speaker was Dr. David J. Bottjer (professor and chair, Dept. of Earth Sciences, Univ. of Southern California), whose talk was titled "Exploring Earth's Past History to Help Manage the Future". His talk provided the background needed by a non-geoscience audience in the major global warming events in Earth's past and what processes produced them, including plate tectonics. Many students later told me that this talk greatly helped them understand the following talks.

The second speaker was Dr. James C. Zachos (professor, Earth and Planetary Sciences Dept., Univ. of California-Santa Cruz), whose talk was titled "The Paleocene-Eocene Thermal Maximum". This talk first explained how geochemistry and stable isotope geochemistry indicate the sources and volumes of the carbon released into the atmosphere. Dr. Zachos then applied the technique to the Paleocene-Eocene event, which was triggered at least in part by release of methane from gas clathrates on the continental shelf. Many students found this talk to be the most challenging, due to its geochemical nature, but it sparked good discussions in subsequent class sessions where this critical technique could be further explained.

The third speaker was Dr. Frank A. Corsetti (associate professor, Dept. of Earth Sciences, Univ. of Southern California), whose talk was titled "Ecosystem Reorganization Across the Triassic-Jurassic Transition Associated with Massive CO₂ Rise". The Triassic-Jurassic warming event is attributed to a massive release of volcanic CO₂ during the opening of the Atlantic Ocean. Dr. Corsetti illustrated how field and laboratory study of contemporaneous coral reefs and sponge-rich sedimentary deposits reveal the nature and timing of a warming event. Many students described this as their favorite talk, due to Dr. Corsetti's humor and the fossil-based technique for study of past environments.

The fourth speaker was Dr. Matthew E. Clapham (assistant professor, Earth and Planetary Sciences Dept., Univ. of California-Santa Cruz), whose talk focused on the end-Permian hothouse event. This most severe global warming event of the last 542 million years was triggered by a massive release of volcanic CO₂ and coal methane in Siberia; it resulted in the extinction of 95% of known life of Earth. Dr. Clapham described how his population-based studies of coeval fossil marine invertebrates reveal the resulting changes in ocean chemistry, especially acidification.

The final speaker was Dr. David L. Kidder (associate professor, Dept. of Geological Sciences, Ohio Univ.), whose talk was titled "Large Igneous Provinces and Warm Climates".

Large igneous provinces (LIPs) are huge bodies of volcanic rock that were erupted over a geologically brief interval of time; the Triassic-Jurassic and end-Permian warming events were both triggered by LIP volcanism. Dr. Kidder described the processes of LIP volcanism, especially the relationship between the volume of lava erupted and the volume of CO₂ released from the lava. He then discussed how these volumes compare with the volumes of fossil fuel CO₂ that may be released by a variety of scenarios in the current warming. The discussion following his talk delved even further into the relationships between volcanic CO₂ and climatic states, and what these reveal about the choices we face in dealing with the current warming trend. The students who stayed to the end of the symposium later told me that they found this discussion the richest experience of the afternoon.

(2) HOW DID THE ACTIVITY RELATE TO A COURSE(S) AND/OR LEARNING OBJECTIVES?

The symposium was designed to deepen the audience's understanding of the geologic processes that drive, or may drive, the current global warming trend, as well as the consequences of that trend. Because this issue is a major concern across the spectrum of society, the talks should have sparked discussions in courses of a variety of disciplines after the symposium.

In my own discipline, geology, four courses were running during the Spring 2013 semester: Physical Geology (Geol. 121), Historical Geology (Geol. 122), Foundations of Earth Science (Geol. 300), and Environmental Geology (Geol. 321). A substantial number of students from each of these courses attend the symposium. The latter three courses are particularly concerned with climate and its driving mechanisms, with Historical Geology being especially concerned with the very warming events in Earth's past that the speakers discussed. Physical Geology comes closest to the climate topic through volcanism and chemical weathering, both of which involve atmospheric CO₂. The symposium served to expand on the controls of Earth's climate and the research techniques employed beyond what classtime permits. In my own classes, the symposium triggered a variety of student-initiated discussion.

(3) WHAT DO YOU SEE AS THE STRENGTHS OF THE ACTIVITY?

Among the strengths of the symposium were the following. It provided the audience with an unaccustomed perspective into the climate change issue, that geologic study of past warming events helps us to anticipate how the current event may develop. It helped the audience to understand the geochemical proof that the increased atmospheric CO₂ is derived from organic carbon sources (i.e., fossil fuels). It illustrated just some of the sophisticated research techniques that are used in geology today.

(4) WHAT WOULD YOU SAY ARE/WERE THE ACTIVITY'S WEAKNESSES?

The chief weakness of the symposium arose from talks that were more advanced than the audience's level of expertise. Four of the speakers are into their forties or older and have been teaching for a decade or more, so they have learned how to tailor their talks to their audience. Dr. Clapham, who only recently began his university career, gave a very technical talk that was the most difficult for the audience to follow. I believe that it is an inspiration for CI students,



however, to see a scientist who is only slightly older than them, yet who is already making significant contributions to the science. This weakness of a challenging talk therefore seems to be counterbalanced by the chance to inspire.

(5) HOW WOULD YOU IMPROVE THIS ACTIVITY FOR NEXT TIME?

I prefer to include one or two speakers whose research is particularly field-oriented, so that their talks offer images and stories of their field experiences as well as their scientific insights. Dr. Corsetti was the only such speaker at this symposium. I believe that a second such speaker, such as the volcanologist whom was invited but had other commitments, would have helped.

(6) WHAT DID YOU LEARN FROM THE PROCESS?

I anticipated that the topic of climate change might spark disruptions from protestors in the audience and on campus. Indeed, I know of one prominent person who came to the symposium intending to challenge the science. There were also other members of the audience who raised aggressive questions after the first talk. I designed the symposium to focus on the science, however, not on advocacy for one side of the issue or the other. The speakers were happy to comply. By the end of the second talk, the audience had been diverted from the politics toward the science. Clearly, this is the way to conduct future science symposia on controversial issues.