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Using Deep-Sea Scientific Drilling to Enhance Ocean Science Literacy

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Beginning with confirmation of sea floor spreading in Leg 3 of the Deep Sea Drilling Project in 1968, scientific ocean drilling has provided much of the evidence supporting modern understanding of the Earth System, global climate changes, and many other important concepts. But for more than three decades, results of discoveries were published primarily in scientific journals and cruise volumes. On occasion, science journalists would write articles for the general public, but organized educational outreach efforts were rare.

Starting about a decade ago, educators were included in the scientific party aboard the JOIDES Resolution. These "teachers-at-sea" developed formats to translate the technical and scientific activities into language understandable to students, teachers, and the public. Several "Schools of Rock" have enabled groups of teachers and informal science educators to experience what happens aboard the JOIDES Resolution. Over the past few years, educational outreach efforts based on scientific drilling expanded to create a large body of resources that promote Ocean Science Literacy.

Partnerships between scientists and educators have produced a searchable database of inquiry-centered classroom and informal science activities. These are available for free through the JOIDES Resolution website, joidesresolution.org. Activities are aligned with the Ocean Literacy Principles (http://oceanliteracy.wp2.coexploration.org/) and Science Education Standards. In addition to a suite of lessons based on the science behind scientific drilling, participants have developed a range of educational resources that include graphic novels ("Tales of the Resolution" (http://joidesresolution.org/node/263) ; children's books ("Uncovering Earth's Secrets" and "Where the Wild Microbes Grow" http://joidesresolution.org/node/2998); posters, videos, and other materials. Cooper and Kurtz are currently overseeing improvements and revisions to the JR education website pages.

The International Ocean Discovery Program continues to offer annual School of Rock professional development workshops to which educators can apply for participation. During these all-expense paid experiences, they learn about IODP science and develop new activities for their audiences. Cicconi and Passow will describe their experiences during some of these programs.

European teachers have also participated in "teacher-at-sea" programs sponsored by ECORD aboard the JOIDES Resolution. Burgio participated in Expedition 360 from December 2015 to the end of January 2016 (http://joidesresolution.org/node/4253). This cruise focused on the global effort to drill to the Moho through the Southwest Indian Ridge. As they drilled down to the Moho, scientists obtained new discoveries about life in the crust, interactions between water and rocks, and magmatic processes that build the oceanic crust at very slow spreading ridges. The Education Officers team used a panel of strategies to communicate during the efforts during their two months onboard. She used social media and live-streaming to share the last discoveries about the oceanic crust with students all over the world.

Additional materials have been created by teachers and other non-science participants from many countries across the globe. Educational outreach programs associated with scientific ocean drilling provide effective opportunities to enhance Ocean Science Literacy.