

OBSIP Experiment Archive

Year:	2015
Experiment Name:	Crustal Magma Plumbing of the Santorini Volcanic System
Principal Investigator(s):	Emilie Hooft (University of Oregon) Douglas Toomey (University of Oregon)

Experiment Summary: This is a large active source experiment to seismically image the magma plumbing system of an arc volcano throughout the crust and into the upper mantle. We will record the RV Langseth 7,000 cu in air gun array on 93 SP OBS and 26 land stations with an aperture of up to 100 km for 3D tomographic imaging and with sufficiently high density for full waveform inversion.

(Taken from the NSF Abstract Award #[1459794](#)): Santorini is an active arc volcano associated with the Mediterranean subduction zone, which accomodates tectonic convergence between Africa and Europe. Santorini recently experienced geologic unrest and this study will document the current distribution of subsurface magma. Because the volcanic system is semi submerged Santorini is an ideal site for detailed imaging using marine instrumentation. Onshore-only studies cannot achieve broad enough aperture or dense enough coverag to allow mapping of magma throughout the crust.

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Draft plan for transits (yellow lines), offshore short period seismic deployment, and airgun shot profiles.

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Experiment Summary: ...By determining the physical properties of the crust, this international team from the U.S., U.K., and Greece, seek to understand how magma at different depths crystallizes and what that might imply about both a basic research question- how does crust that eventually makes up continents form, and a geohazard question- does the current distribution of magma indicate a likelihood of sustained volcano inflation that might precede a major eruption?

Seismic imaging of the crust at Santorini volcano is designed to constrain the distribution of subseafloor magma and any variation in extent of apparent degree of crystallization with depth. This site is viewed as representative of silicic arc volcanoes worldwide, so results could be representative of other arc volcanoes. Ocean bottom seismometers, and land seismometers will be deployed for a few-week field experiment. Active source signals will be recorded by

Cruises:

11/17/2015 - 12/12/2015:

93 OBSIP short period ocean-bottom seismometers from WHOI and SIO were deployed around the volcanic island of Santorini on board the R/V Langseth. 26 land stations were also deployed concurrently, and all stations recorded shots from the R/V Langseth's airgun.

these instruments as well as by a towed, multi-channel streamer. Tracklines laid out along a north-east trending, 10 x 50 mile swath, with Santorini at the center, will image the lower crustal structure with unprecedented resolution. Data analysis emphasizes complementary seismic approaches: (1) Dense 3D isotropic and anisotropic travel time tomography (2) Full waveform inversion tomography and waveform modeling to obtain higher resolution and more accurate elastic properties and their spatial variability.

Data:

Data from all OBSIP instruments deployed is archived under temporary network code [1E](#) and assembled data set ID #[15-008](#) at the IRIS DMC. Land stations are archived under the temporary network code 3E.

Downloads/Links:

[Experiment Website](#)

[U of Oregon Article](#)