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Volcanism and tectonics in an island-arc rift environment: proposal to drill at Christiana-Santorini-Kolumbo marine volcanic field, Greece

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IODP proposal VolTecArc aims at deep-sea drilling in and around the Christiana-Santorini-Kolumbo (CSK) marine volcanic field to investigate interactions and feedbacks between tectonics and volcanism and how volcanoes interact with their marine environments. The volcanic field lies in a rift system 100 km long and 45 km wide, oblique to the South Aegean volcanic arc, that is one of the most volcanically and seismically active regions of Europe. The volcanoes include three polygenetic and over 20 monogenetic centers that have jointly produced over a hundred explosive eruptions over the last few hundred thousand years. The volcanoes pose important hazards to the Eastern Mediterranean region. Unrest at Santorini caldera in 2011-12 raised awareness of eruption threat at an island archipelago visited by 1.5 million tourists per year.

The results of onland volcanological research, eruption dating, multi-beam sea floor mapping, shallow sediment coring and dredge sampling, combined with a high-quality site-survey database of multichannel seismic profiles and a recent seismic tomography experiment, make deep drilling at the CSK volcanic field very timely. Deep drilling will enable characterization and interpretation of depositional packages visible on seismic images, chemical correlation of Santorini-derived volcanic layers in the rift fills with the dated onshore stratigraphy, and provide a tight chronostratigraphic framework for marine successions. Some objectives of drilling are to: (1) document the history of tectonics, subsidence, sedimentation and volcanism in an arc-rift environment, and how volcanism has evolved spatially and temporally since rift initiation; (2) determine how the genesis and compositions of magmas and their associated volatiles have evolved in time and space over the lifetime of the rift; (3) document the dynamics and environmental impacts of arc eruptions and calderas, including eruption frequencies, magnitudes and rates, the mechanisms of caldera collapse, and the origin of caldera unrest events.

Participants of the 2017 Athens MagellanPlus workshop: 25 additional scientists.