

## **PRESS RELEASE**

### **Marine Exploration Drilling in Santorini-Amorgos (IODP Expedition 398)**

The [International Ocean Exploration Program \(IODP\)](#) is one of the largest international scientific programmes in the world, and has existed in different forms for over fifty years. It involves 22 member countries with financial support from the United States, Japan, China, Australia, Korea, India, Canada and 14 European countries. Its purpose is to study the history of the Earth recorded in sediments and rocks beneath the ocean floor. This is done by deep drilling, and recovering cores of sediment and rock that are then studied in detail by scientists from around the globe. Such sediments and rocks are archives of processes that take place on the ocean floor, in the oceans, and even in the atmosphere. One particularly important feature of the sediments in basins around volcanoes is that they contain long, continuous records of volcanic activity. The IODP uses a number of different drilling ships, but the principal one is the 'JOIDES Resolution', the workhorse of the IODP that tours the oceans of the globe continuously, carrying out different scientific drilling projects.

Following four years of rigorous evaluation, the IODP has now announced the success of a proposal to carry out scientific drilling in the sea around the Christiana-Santorini-Kolumbo Volcanic Complex of Greece. The volcanic complex consists of the extinct Christiana Volcano, Santorini caldera, the Kameni Volcano that last erupted in 1950, and the submarine Kolumbo Volcano that last erupted in 1650. Santorini is an iconic site, both in volcanology and archaeology, owing to the great eruption of the late Bronze Age and its possible impact on Minoan Crete. Moreover, the past volcanic activity of Santorini has been studied in detail by several international science teams over the last few decades, making it one of the best understood volcanoes in the world. However, the marine realm of the volcano has been much less well studied, and this now the target of IODP. The volcanoes, which lie on the Hellenic Island Arc, lie within a large rift where the ocean floor is being pulled apart by deep forces. Each time one of the volcanoes erupts, it showers volcanic pumice and ash, or pours hot pyroclastic flows, into the sea, where they are preserved intercalated in the muds accumulating in the rift basins. Over several million years, thick successions of volcanic deposits and muds have piled up on the sea floor, providing a record of the complete volcanic history of the region. A major aim of the IODP project is to penetrate and recover this record through drilling.

The project was proposed by thirty scientists from universities and research institutions in several European countries, the US and Japan, and is entitled "Volcanism and tectonics in an island arc rift environment: Christiana-Santorini-Kolumbo Volcanic Field". The expedition will be carried out on the 'JOIDES Resolution' over two months in December of 2022 and January of 2023, and will involve drilling at four sites to the northeast and southwest of Santorini, and at two sites within Santorini caldera. At each site outside the caldera, the ship will recover several hundred meters of sediment core from beneath the sea floor in order to obtain a complete volcanic, eruptive, sedimentary record. The ship will be manned by about 30 scientists, 25 technical personnel and 65 crew members. The chief scientists will be Prof. T.H. Druitt (France) and Dr. S. Kutterolf (Germany), and the scientist representing Greece will be Dr. P. Nomikou of the National Kapodistrian University of Athens.

The volcanism associated with subduction at the boundaries of the tectonic plates can greatly affect the life and environment of the surrounding areas. A better understanding of the

volcanoes of island arcs requires the study of processes that lead to volcanic phenomena and their interaction with the marine environment. The Christiana-Santorini-Kolumbo volcanic complex is a unique system for addressing major science questions related to volcanism in the marine environment. Some specific objectives of the scientific drilling will be:

1. To reconstruct the complete volcanic history of the complex over the last few million years;
2. To reconstruct the activity of the underwater faults that delimit the rift basins and how this has correlated with the volcanic activity;
3. To document the genesis, evolution, storage and eruption of the different magmas of the complex;
4. To document the processes, products and possible effects of the Late Bronze Age eruption of Santorini ('Minoan eruption');
5. To study the mechanisms and hazards of possible underwater explosions from Kameni and Kolumbo volcanoes;
6. To document the transition from a continental to a marine environment during the subsidence of the Aegean Sea region;
7. To seek the presence of microbial life deep in the rocks of Santorini caldera, and how it has reacted to repeated volcanic eruptions.

The aims of the drilling are purely scientific; the borehole diameter is very small (about 24 cm), and designed to recover rock and sediment for the employment of different scientific analytical methods. The expedition has no commercial or archaeological purposes. The scientific aim is to better understand what drives volcanic activity and governs eruptions in this region visited by over two million tourists per year in order to better anticipate eruptions and their effects in the future. Drilling inside the caldera will remain shallow (less than 400 m - much less than the magma chamber depth of about 4000 m). The drilling will be carried out in the context of an existing very dense network of seismic profiles that have been scrutinized by geophysicists and IODP experts in detail to avoid intersection with any potential pockets of gas, oil, or magma. Engineers of the JOIDES Resolution have a lot of experience of drilling around volcanoes and of the associated safety issues.

Each IODP campaign with JOIDES Resolution is a major research investment of about 10 million euros. The science will be complemented by an ambitious program of public outreach during the expedition, offering opportunities for young scientists and students to train and participate in international level research and for the public and schools to learn about the scientific findings in real time through social media, online streaming and webinars. It is anticipated that the expedition will attract great interest in Greece and worldwide, and will serve to interest young people and the public in general in the big questions in Earth Sciences and how they are tackled through major international collaborative projects.

[http://iodp.tamu.edu/scienceops/expeditions/hellenic\\_arc\\_volcanic\\_field.html?fbclid=IwAR1MO--VGa7pofEHjLOpyEzePWR-OlVvBquKyR59wY6\\_kay2H2WyTKqf3V0](http://iodp.tamu.edu/scienceops/expeditions/hellenic_arc_volcanic_field.html?fbclid=IwAR1MO--VGa7pofEHjLOpyEzePWR-OlVvBquKyR59wY6_kay2H2WyTKqf3V0)