

## POS 511 Weekly Science Report (01/04/17 to 09/04/17)

Jörg Geldmacher and Scientific Party POS 511

The scientific party moved onboard RV POSEIDON on 31.03.2017 while the ship was in the port of Heraklion (Crete). The day before, the ROV-Team had installed the ROV PHOCA and its control container and the ROV winch onto the back deck with the help of the ship's crew. The last hours in port were spent with the loading of remaining equipment, mobilization of the ROV and a successful harbor test. At 8:30 on 1st of April the ship set sail for our first operation area, the volcanic Christiana Island group (located c. 25 km SW of Santorin).



*Main Christiana Island seen from the back deck of RV POSEIDON on April 2nd (Photo: J. Geldmacher).*

We arrived in our working area in the early evening and first conducted a CTD station (with water sampling) for the calibration of the SB3050 multibeam echosounder. The night, as well as all following nights, was spent with multibeam mapping. On April 2nd two dredge hauls were conducted on the steep southern flank of Christiana Island (from 700 m up to 500 m water depth) but the dredge returned only mud and biogenic carbonate rocks. The Christiana Island group is assumed to represent the oldest volcanic formation in the Santorini area but no age data (and no samples from its submarine base) exist so far. In the afternoon PHOCA (with mounted high resolution camera) was deployed for a first test dive and a short photogrammetric survey on the shallow eastern slope of Christiana. During this survey several pronounced scarps of outcropping pyroclastic layers were discovered in 400 m depth. The next day, April 3rd was therefore spent with stratigraphically controlled sampling of these layers using the manipulator arms of the PHOCA. In total 15 samples of volcanic rocks and compacted calcareous mudstone were successfully recovered from the consolidated

pyroclastics layers. The volcanic samples include rounded, well-preserved pumice clasts (up to 30 cm diameter) suitable for the full range of geochemical and petrological investigations (including Ar/Ar age dating). The following days were alternately spent with ROV surveys, ROV sampling and dredging in the Christiana area and along the steep slopes of the pedestal south of Santorini's main island Thera. Recovered samples are predominantly volcanoclastic rocks, which enclosed fresh (basaltic) lava clasts and silicic pumice. The lack of any continental crust rocks in the recovered samples from the large southern pedestal of Santorini implies that this wide structure was formed by volcanism instead of representing exposed continental basement as previously suggested (addressing this question was one of the objectives of this expedition). If this interpretation can be confirmed by further sampling during the next days, estimates for the extrusive volume of the early volcanic stages of Santorini need to be significantly revised.

Further CTD stations with water sampling were conducted on April 4 and 6. For conducting CTD station 6, which was located in the southern gateway between the caldera and the open Mediterranean, the POSEIDON briefly entered the caldera for the first time during this expedition, providing spectacular views of the steep caldera cliffs towered by picturesque white houses shining in the evening sun.



*Inside the control container of ROV PHOCA: Martin Pieper and Inken Suck are highly concentrated while operating the vehicle.  
Photo: J. Geldmacher*

In the late evening of April 7 all scientific activities were abandoned, because the ship had to follow a request to take part in a coordinated search for a missing sailor from a freight ship. The entire scientific party actively supported the ship's crew in the execution of this task. After 20 hours, scientific operations were resumed.

By Sunday evening we have conducted 4 ROV survey dives, 2 ROV sampling dives, 10 dredge hauls, 3 CTD stations (with water sampling) and executed an extensive multibeam mapping program during the nights. All on board are well and looking forward to the scientific activities in the remaining two weeks.