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Experience with a Shallow Water Seismic Pre-Site Survey for combined IODP and ICDP Drilling Campaigns in the Gulf of Naples and Pozzuoli Bay, Tyrrhenian Sea

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The Gulf of Naples receives particular attention due to its proximity to major volcanic features, as the Somma-Vesuvius stratovolcano and the Campi Flegrei Volcanic Fields, both being viewed to bear extreme hazard potential in the highly populated area. Accordingly, a better understanding of the geologic history of the region and its volcanic activity is of high value for predictive approaches.

In January 2008, a dedicated shallow water multichannel seismic survey on R/V URANIA was carried out by the Institute for Coastal Marine Environment in cooperation with the University of Bremen in Pozzuoli Bay as well as in its surroundings to image subseafloor volcanic features as well as the neotectonic framework, as it is documented in Holocene sediments. Furthermore, volcanoclastic events, volcanic edifices, pyroclastic flows and lava flows were identified complicating the stratigraphic interpretation. Major units as the Campanian Ignimbrite and the Neapoltian Yellow Tuff could be traced on regional scales.

Particular focus was put on the nearshore surveys, to connect the onland future ICDP drilling results with the marine deposits and planned IODP drill sites in the vicinity of the survey area. It turned out particularly difficult to collect seismic data in the coastal zone due to intense usage and protected areas.

The equipment used was optimized to collect multichannel seismic data in shallow and very shallow environments. A 50 m long streamer with 48 single hydrophone channels allowed to record undistorted seismic response in waters shallower than 10 meters, and high shot rates – 2 to 4 seconds – provide high coverage and a lateral resolution as good as 1 meter. A modified mini-GI Gun with a reduced volume of only 0.1 L, called micro-GI Gun, generated a frequency spectrum up to 1000 Hz, optimizing also the vertical resolution to less than 1 meter.

Examples will be shown to demonstrate the capability of the equipment for use in amphibic projects, where ICDP and IODP cross the borders of land and sea, and where quality and seismic resolution play a major role to achieve goals of proper site surveys and stratigraphic interpretation.