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HOBIT - The new Hamburg Ocean Bottom Tiltmeter: A first deployment at Columbo Seamount (Aegean Sea, Greece)

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Assessing the state of activity of subaerial volcanoes is already quite a difficult task, but assessing the activity of submarine seamounts is even more complicated due to the difficulty of deploying instruments. At land various techniques can be used including seismic networks, deformation studies, gas measurements and others. At sea, these are mainly seismological observations, which are used to assess volcanic activity. However, especially at land deformation studies using INSAR have proven to be very valuable in determining recharge of magmatic systems. We therefore developed a free fall, self leveling ocean bottom tiltmeter mounted in a 17 inch glass sphere to observe deformation on the ocean floor. For measuring tilt signals we use a two component high resolution tiltmeter manufactured by Lipmann Geophysikalische Messgeräte (www.l-gm.de). The instrument has a resolution of about 1 nrad $(0.15\mu^{\circ})$ and a maximum signal of about 0.045 rad (0.5°) can be detected. It is mounted on a levelling stage, which can relevel the instrument between $\pm 5^{\circ}$ down to an accuracy of 0.006°. During the measurement this leveling stage is standing on the bottom of the glass sphere. For releveling purposes the instrument can be pulled up by very thin nylon strings and then is looked to a gimbal system in order to compensate for tilt $> 5^{\circ}$. This releveling procedure is done once every 48 hours. The data is recorded on an 18 bit (at 50 Hz sampling rate) MLS Geolon logger (www.send.de).

In addition to the tiltmeter and a hydrophone for receiving seismic signals, temper-

ature, absolute pressure (paroscientific pressure sensor) to measure possible uplift or subsidence, and orientation (electronic compass mounted to the system) are monitored.

4 HOBIT systems were deployed for ten months (Jun06-Mar07) at Columbo seamount, a submarine volcano north-east of Santorini island, Aegean Sea, Greece, on a 3 km long profile perpendicular to the first principal stress axis σ_1 of the regional stressfield. Three of the instruments operated the whole time, one shut down due to a leak in the power supply leading to a short circuit. First data processing indicates that small regional earthquakes as well as major tectonic earthquakes are properly recorded by the system. Following some regional earthquakes occurring during a seismic swarm we find a small, but permanent deformation associated with the earthquakes. Later during the deployment we also observe slow deformation processes occurring over a period of days. Additionally, subsidence of two stations relative to a third is observed with the absolute pressure gauges.

The implications of these findings as well as the general operational principle of these instruments will be discussed in detail in the presentation.