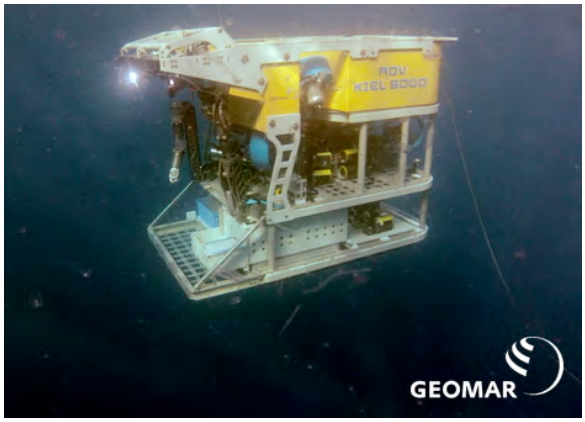
	**SO225** **MANIHIKI II** **Weekly Report No. 4** **(10.12. – 16.12.2012)**	 **R/V SONNE** 06°40,9´S / 162°44,6´W

This week, RV SONNE cruise SO225 did not remain on „the sunny side of the street“ as before. After an unexpected stop-over at Pago Pago on American Samoa at the beginning of the week, we experienced the effects of the tropical cyclone „Evan“, which caused large damage in Apia, the capitol of the Republic of Samoa. Luckily, we were not close enough that „Evan“ could threaten us heavily, but station work was hampered and delayed. During the second half of the week we concentrated on mapping the ocean floor in the central and northern parts of Manihiki Plateau using multi-beam and sediment echosounding techniques. Unfortunately, we remained unlucky during the course of the week. After having left the influence of „Evan“, we realized that the Posidonia antenna mounted below the ship was severely damaged, possibly by floating refuse. Posidonia is necessary for operating and navigating our diving robot ROV Kiel 6000. As we are not able to repair the antenna aboard RV SONNE, we will no longer operate the ROV, but instead will run dredges to recover hard rock from the seafloor. Thanks to the crew of RV SONNE, we managed to change equipment during calm weather conditions on Sunday, December 16. We are very positive that the combined use of both ROV and dredges will allow us to fulfill the petrologicial part of MANIHIKI II.



The remotely operated vehicle ROV KIEL 6000 in the photic layer of the SW Pacific.

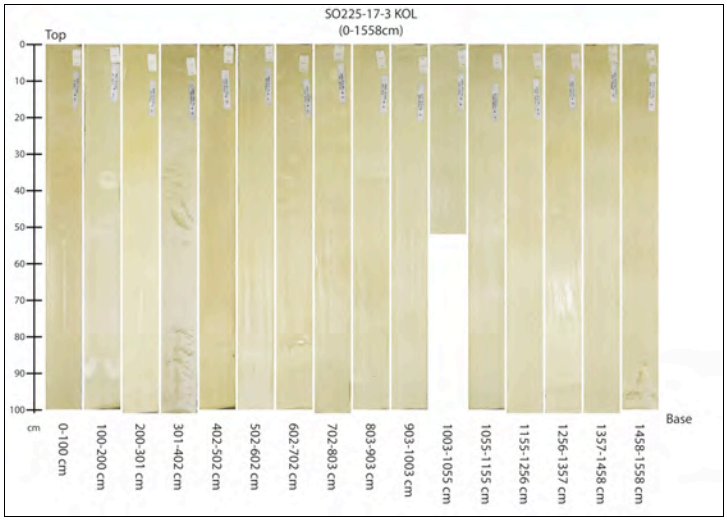
Scientists study rock samples yielded by dredging.

Late Sunday afternoon, the first dredge trail was accomplished at the northern margin of Manihiki Plateau. Based on results from RV SONNE cruise SO193 in 2007, we already know that the basement of Manihiki Plateau is tholeiitic of origin and approximately 123-126 million years old. Since SO225 focuses on the temporal development of the basement at Manihiki Plateau, we intend to considerably broaden the range of samples. The first dredge yielded lava, lithified sediments, and manganese.

During the 4th week of the expedition, the paleoceanographic working group concentrated entirely on laboratory work. The 1 m-core segments meanwhile stored in the cooling room were cut into two halves, one to be archived, the other to be worked on. After the smoothing of the sediment surfaces, the sediment lithology was documented by core photography and visual core description, which allows first insight into the past depositional environment and climatic conditions. These approaches were supported by rapid and continuous core-logging techniques. The magnetic susceptibility measures the amount of magnetizable minerals to quantify the terrigenous portion of the sediment. Color and lightness of the sediment was assessed from other scanning techniques. Both logging approaches help to characterize and classify the sedimentary deposits. Most important result of this week is the correlation of recovered sediment records over wide

distances and the first stratigraphical classification. To yield a first idea of the age of the sediment, the characteristic pattern of our logging data was compared and correlated to dated and already published reference records. From this approach we suggest to conclude that our sedimentary records cover the past ca. 1 million years, allowing us to describe the pronounced Pleistocene climatic variability in the equatorial West Pacific Warmpool area. The preliminary age model will be verified at home by oxygen isotope stratigraphy. The oxygen isotope signal of calcitic microfossils preserved in the sediments varies down-core and will be related to an astronomic timescale, the approach of which is even more accurate than absolute radiometric dating techniques.

Cutting sediment cores during SO225. The light sediments consisting primarily of calcitic microfossils, are cut into cm-slices. Thousands of samples will be brought to the home labs for further analyses.



Photographs of a c. 15.5 m long sediment core recovered out of 3,250 m water depth at the "North Plateau". Foraminiferal sand and ooze dominate the lithology, and carbonate preservation is excellent.

In order to allow for the highest temporal resolution of our paleoceanographic reconstructions, sampling of sediment records was performed at 1 cm-resolution, which is indeed time-consuming and not yet finished considering that c. 110 m of sediment are piled up in our cooling facilities. After arrival in the home labs, various, mostly (isotope)geochemical analyses will be applied to decipher ocean temperature and salinity conditions, the variability of the upper ocean, and its changes in ventilation and stratification on glacial to interglacial timescales.

For the ongoing cruise, we expect further interesting core locations on the "High Plateau" expanding our core transect to the south. Here, sedimentation appears to be much higher than on the "Western Plateaus" and the "North Plateau", as deduced from available sediment-echosounding data. In particular, the geophysical studies performed during SO224 were valuable for the selection of coring sites.

During the night from Thursday, December 12, to Friday, December 13, we celebrated a little party in the GeoLab, as half of the cruise passed already by. All participants send greetings from the Southwest Pacific to everyone at home.

Reinhard Werner