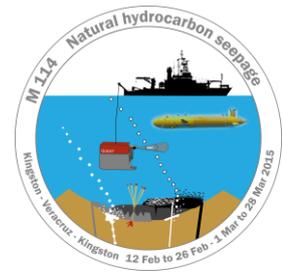


# Expedition METEOR 114

Kingston – Veracruz - Kingston

5th Weekly Report: 9 – 15 March 2015



The fifth week of our expedition was characterized by numerous dive activities with ROV QUEST (Fig. 1), mainly at the asphalt volcanoes which had been mapped in detail by AUV during the first part of the cruise. But before this work could take place, we had to collect an airfreight consignment in Veracruz on Monday, 9 March, which unfortunately did not clear through Mexican customs before METEOR's departure on 1 March. This airfreight was very important for the further progress of our expedition and we could not continue without this equipment. At this opportunity, we were also able to receive some additional chemicals and spare parts for a camera from Florida which had arrived late, as well as some replacement medical supplies for the ship's hospital. The transfer of these materials from a small boat to RV METEOR outside of Veracruz harbor went exactly as scheduled. We would like to thank especially Klaus Bohn and his team in Hamburg, as well as Honorary Consul Mrs. Erika Rempening in Veracruz for their patience and support in facilitating this challenging action in the port.



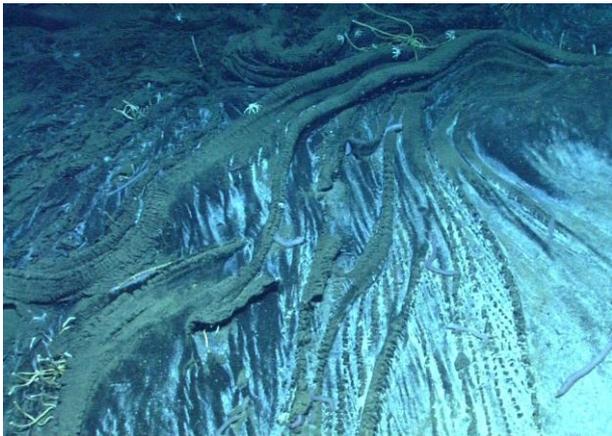
**Fig. 1:** On 13 March ROV QUEST launched under bright blue sky for completion of Dive 356 at Chapopote Asphalt Volcano.



**Fig. 2:** Lava-like asphalt flow that have overflowed an older layer of asphalt. Tubeworms have settled between the two layers.

After this transfer, RV METEOR proceeded northwards on the selected survey tracks, and on Tuesday, 10 March, we dived at Chapopote Asphalt Volcano. Extensive asphalts on the deep sea floor of Campeche Bay were first discovered during a SONNE expedition in 2003 at this same knoll. We named the knoll *Chapopote*, which is the Aztec word for tar or asphalt. In 2006, we were able to investigate the asphalts at Chapopote and their different weathering stages in more detail with RV METEOR and ROV-QUEST. The freshest asphalts (Fig. 2 and 3) were concentrated on the main field at the southeastern crater rim. The most exciting question before the dive was this: How much will the asphalt of the main field at the seafloor have changed during nine years? Reaching the asphalt field with ROV-QUEST again in 2015, we were surprised as we recognized more or less identical asphalt structures in the video records. Three of the markers placed at the seafloor in 2006 were found almost immediately. They showed a displacement of about 20m compared with the old map to our nowadays map, but this is a minor error in 3000m water depth, even though we have accurate underwater navigation. The passage of the ROV across this other-worldly environment was a feast for the eyes as we watched the asphalt structures and their abundant life-forms come into view on the HD camera.

After recording some video transects, the ROV navigated to the so-called “elevator,” which had been deployed early in the morning from the ship. Several sampling containers and measuring instruments, which could not be put on ROV-QUEST, had been transported to the seafloor and thus were available for *in situ*-research work. We then moved to a location discovered in 2006 for intensive sampling of gas bubble emissions, gas hydrate-outcrops, and various chemosynthetic fauna. Our colleague Ian MacDonald, from Florida State University, deployed a video time-lapse camera that was able to monitor a gas bubble flow for three days. Analysis of size and emission rates of the bubbles in HD video will allow a quantification of the bubbling gas volume during this time and will give us important data on the geochemical flow rates. Using our so-called “gas bubble sampler” we also collected the escaping gas bubbles as they rose from the seafloor and brought them back to the surface in the gas-tight pressure tank. In the lab, the chemical composition of the captured gas was measured. The gas samples taken during the cruise so far are thermogenic hydrocarbons. However, this will be further characterized by carbon isotopic analysis back in the laboratory onshore.



**Fig. 3:** Pahoehoe Lava-like asphalt layers covered by white bacteria mats. The pink, eel-like animals are sea cucumbers grazing on the mats.



**Fig 4:** The science party was excited to have large asphalt samples from the seafloor brought up to RV METEOR's Geolab.

The dive on Wednesday, 11 March, at Knoll 2201 investigated the crater area of a different asphalt volcano for the first time. A TV-sled profile performed the night before gave us important hints for the dive. Unlike Chapopote, this asphalt volcano featured many small-scale emissions of viscous oil, which sometimes generated bizarre, whip-like structures attached to the seafloor. These tubes, sometime clustered within patches of tube worms, are coated with a white bio-film and slowly release black oil drops from their upper ends. Investigations of the collected sample material will give us more information about their formation and how they relate to asphalt volcanism.

Unfortunately the bad weather forecast for Wednesday arrived on schedule; so instead of an additional ROV dive, we took several gravity cores at Chapopote. Asphalts and sediments were collected along with liquid oil. The remaining three days of the week we were able to complete daily dives under good weather conditions – the dives brought fascinating insight and familiarized us with the asphalt-associated processes.

Today we dived for the first time on Knoll 2223, which will be named “Tsanyao Yang Knoll” in honor of our dear colleague Prof. Tsanyao Yang of National Taiwan University in Taipei, who had tragically passed away last week.

On Board METEOR, everyone is fine and healthy for the second half of this cruise leg.

Sincerely, on behalf of the cruise participants, Gerhard Bohrmann

Further Info on the cruise: [http://www.marum.de/Logbuch METEOR 114-2.html](http://www.marum.de/Logbuch_METEOR_114-2.html)

RV METEOR, Sunday 15 March 2015