

Warm greetings from METEOR!

First of all, we bring our sincere apologies forgetting to mention in the previous week report another two young participants of *Ristretto e Lungo* cruise from the University of Sofia (Bulgaria). These two ladies are really snowed under with measuring alkalinity and chlorinity from hundreds of pore-water and brine lake samples collected by “greedy” scientists (i.e. us) who want to have everything and at once. How typical ☺! Admit it! ☺

The weather during the most of the week was outstanding: nicely warm; still-mirror-flat sea and blue sky. Our work was continued in the Ionian Basin, where *Ristretto e Lungo* planned “to hit” several ecologically different brine lakes: Medee, Thetis, Kryos, Urania and Discovery (Figure 1).

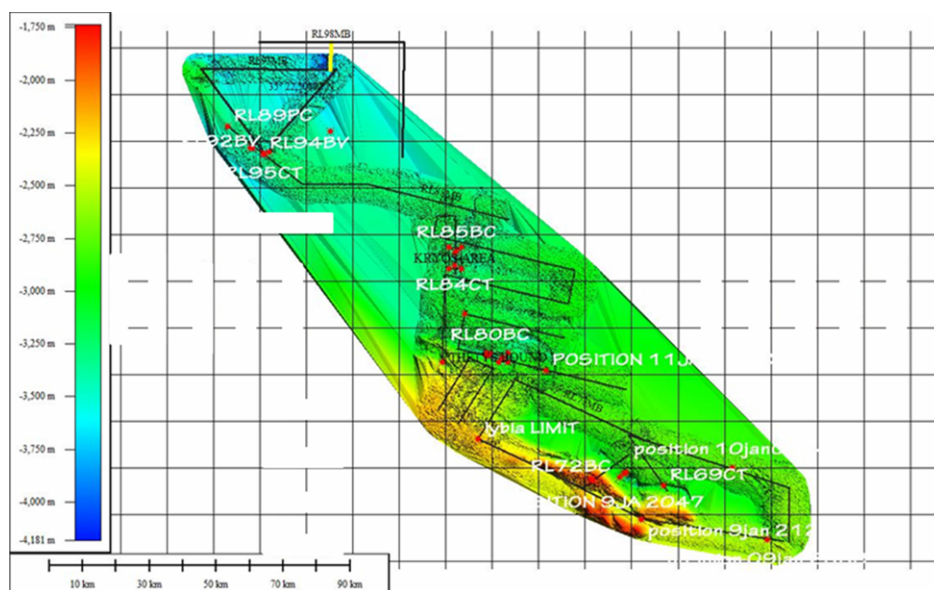


Figure 1. Multibeam mosaic done during the second week of *Ristretto e Lungo* cruise with sampling locations.

Due to the low water activity, extreme saline habitats were always considered as anathema to life or an abode to very few species at best. Recent studies though began to reveal the tremendous diversity of halotolerant microorganisms and eukaryotes, indicating that such habitats foster the evolution of diverse, highly adapted communities. The chemistry of brine systems is also not well understood due to the variety of

environmental factors such as the presence/absence of methane/hydrocarbons, range in alkalinity, sulphide saturation, dissolved inorganic carbon content, etc. Deep sea brines are not just a homogenous saline puddle at the deep sea, which due to density difference have almost no mixing with the overlaid sea water. Brines are very complex, dynamical systems, coupling carbon, sulphur, and other important elemental cycles.

For multiple aspects of scientific research within the divisions of bio(geo)chemistry and (micro)biology it is intriguing to get the picture of what is happening above, below, and within the interface between the brine solution and the sea water. Since we were VERY lucky with the weather, we had a good chance to perform a high resolution sampling of brine/sea water interface using a brine-designed Roseta CTD system. Each CTD station was followed up by box/gravity coring and TV observations exploring an ambience of brine basins. Continuous sub-sampling for gases, pore and brine fluids, mineral precipitates and chemosynthetic fauna, documentation of obtained material, on-board measurements and immediate data processing, an industrial amount of filtrations and labelling experiments kept us in a steady-state hard-working mode ☺. We still have a week ahead!

Conclusively, the second week of *Ristretto e Lungo* brought us additional discoveries. Multibeam surveys revealed a number of so far unknown geological structures that potentially can be mud volcanoes/salt diapirs. Sampling revealed that some brines are very similar to mud volcanoes in origin, i.e. deep generated fluids dissolved in highly saline solutions that were released at the seafloor together with mud and rock clasts from the sedimentary layers below. This type of brines is a kind of strange fusion of a brine lake and a mud volcano.



Figure 2. Authigenic carbonates recovered from the top of a diapiric ridge next to the Medee Brine Basin.

For the first time in the area we found authigenic carbonates in the close vicinity of a brine (Figure 2). Plenty of gypsum crystals with different crystal structure were recovered from brine-floor sediments. Astonishing finding of diverse chemosynthetic organisms confirmed that indeed hypersaline (in some cases alkaline) environments of the Ionian brines are somehow suitable for so far poorly understood life.

We also deployed a sediment trap mooring in the middle of the basin and tried to search for the lost one with video system. Even with a highly professional METEOR staff and NIOZ technicians, unfortunately this exercise was not successful. Nevertheless, it was worth to try since eventually we have got a precise location

of our lost mooring and we obtained four hours of TV-transect through the beach and brine lake learning more about hypersaline habitats and associated sea floor.

Yesterday night the weather turned out to be rough: wind force 8. Our work is stopped for a while. It is not bad though as we have a time for writing the cruise report and just have a short break to catch up.

Certainly, we enjoy METEOR and *Ristretto e Lungo*!

Gert de Lange, Alina Stadnitskaia and the scientific party of *Ristretto e Lungo* M83/3 cruise