

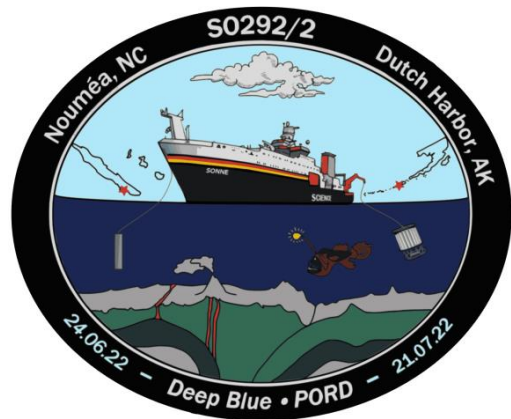
R/V SONNE

Expedition SO292/2

DeepBlue / PORD

24.06.2022 - 21.07.2022

Nouméa (NC) – Dutch Harbor (USA)



4th Weekly report (11. - 17.07.2022)

At the beginning of the week we started the transit, which will terminate with our arrival to Unalaska (Aleutian Islands). During our crossing we did several interesting encounters, both on the surface as well as on the seafloor. By progressively getting into the colder, nutrients-rich waters of the northern Pacific we are increasingly spotting marine mammals, while the ocean seafloor reveals to us through different structures.

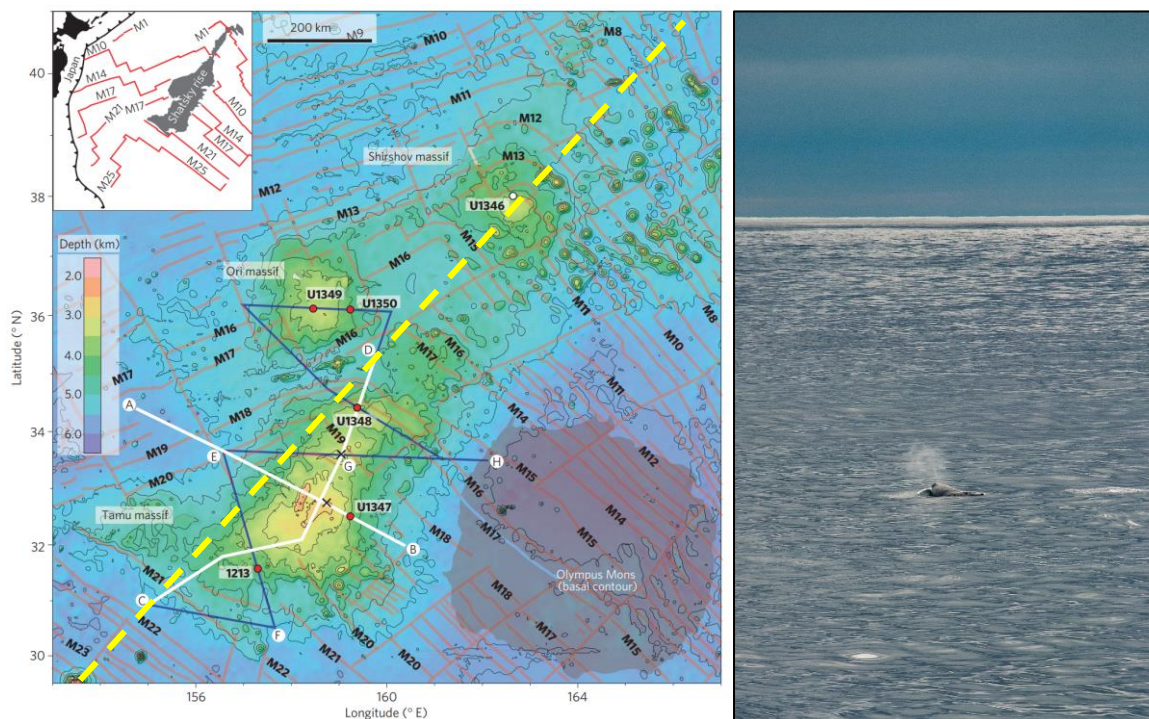


Figure 1: i) Shatsky Rise bathymetry and tectonic map with SO292/2 ship track superimposed (Sager et al., 2013). Grey area (lower right) shows the footprint of Olympus Mons (Mars) at the same scale; ii) whale sighted from the distance (Photo credit: Palash Kumawat)

After crossing the Mariana Trench on Monday, we passed over the Marcus Necker Ridge, a submarine seamount chain subducting under the Philippine Sea plate, partly responsible for the Mariana arc curvature (Miller et al., 2006). We then transited over the Shatsky Rise, a vast LIP which hosted one of the largest volcano of the whole solar system (Sager et al., 2013). Right after we encountered the Emperor Chain, the oldest part of the Hawaiian Seamount Chain, often referred to in the geology textbooks as a clear example of both hotspot volcanism and rapid direction shift in plate motion. Finally, towards the end of the expedition we will pass over the Aleutian Trench, therefore crossing the fourth oceanic trench during our way north, together with the New Britain, Melanesian and Mariana Trenches.

Meanwhile, the work on the samples collected in the working areas is still going on, with the scientists processing the cores and the dredge hauls material. In order to be able to use the samples in future publications, everything has to be thoroughly catalogued and stored adequately, with the corresponding metadata. Preliminary results show that elevated pH (8-9) values are associated with pore waters from freshly erupted muds at the sampling sites and possible depleted mantle ultramafic rocks have been erupted by the mud volcanoes.

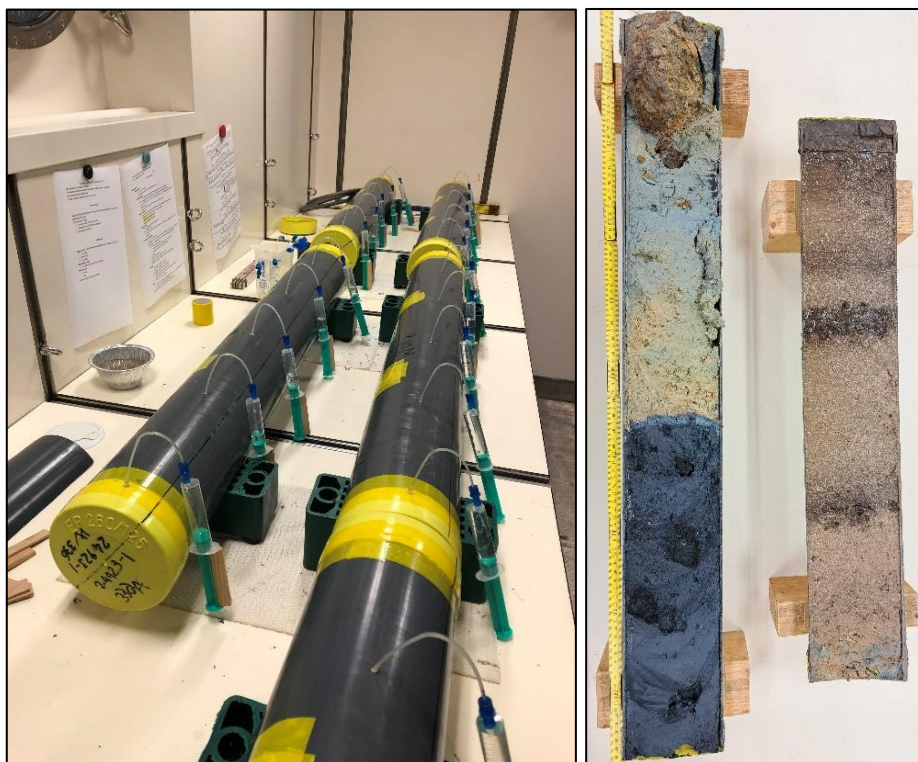


Figure 2: i) rhizon samplers extracting water from a sediment core; and ii) sediment core showing the occurrence of a serpentinite mud flow splitted and ready to be described.

The underway atmospheric measurements did also reveal something unexpected, so far into the Pacific. On July 12, the instruments recorded strongly enhanced Aerosol Optical Depth values (AOD) and also slightly raised fine-mode fractions (FMF). These elevated aerosol properties occurred early in the morning (12.07@20 UTC) at about 31.5° N and 155.5° E. As the ship headed further north the signal slowly faded. At that time a frontal system (with heavy showers) had passed over us and apparently carried on its backside the pollution from East Asia. This pollution advection was confirmed by the NRL forecast model.

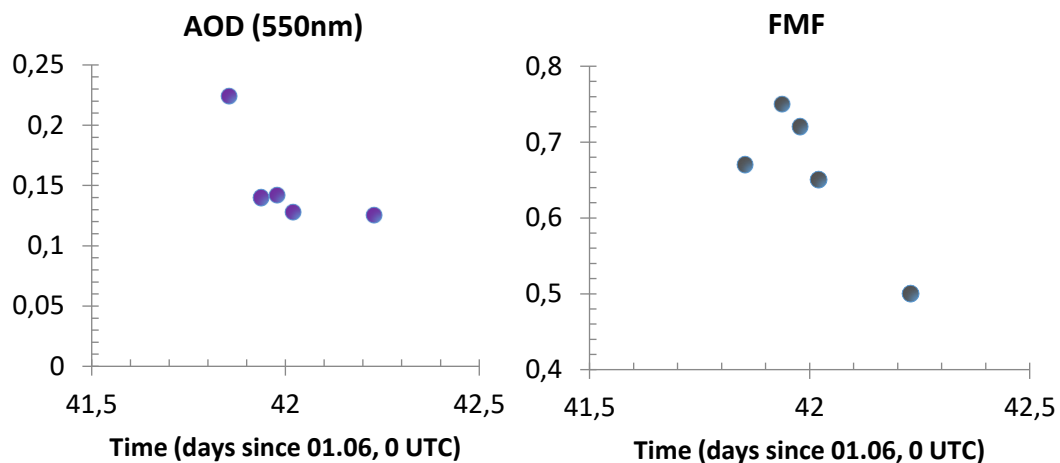


Figure 3. Elevated i) AOD and ii) FMF values towards noon-time

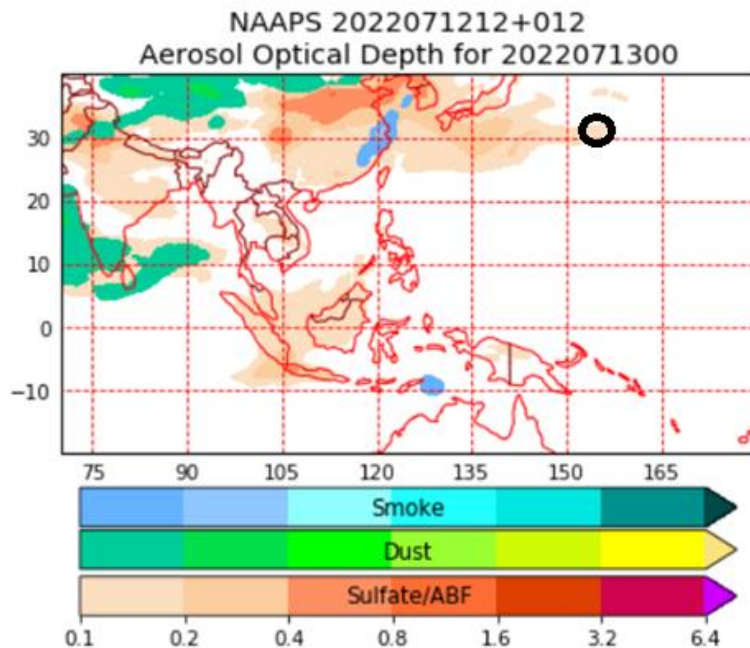


Figure 4. Elevated AOD and FMF at the ship locations (black circle) is consistent with NRL aerosol forecast (https://www.nrlmry.navy.mil/aerosol_web). This forecast for 13.07@0 UTC indicates the transport of Asia pollution ('sulfate'-type) to the ship location.

The SO292/2 expedition is now coming to an end, with RV SONNE entering the Aleutian EEZ (USA) after passing unscathed through the whole northern Pacific. The scientists onboard are still busy with labs cleaning, packing, writing down results, and enjoying the last days onboard, before disembarking on the 21st of July in Dutch Harbor (Unalaska). In conclusion, I would like to express my appreciation to the work of both scientists and crew, which allowed a smooth and successful completion of this research expedition.

*On behalf of the entire SO292/2 Team
Walter Menapace (Chief Scientist)*



University of Innsbruck/ MARUM, University of Bremen