

RV MARIA S. MERIAN, MSM 79/2

1. weekly report

Mindelo (Capo Verde) – Bahia De Las Minas (Panamá)

06.12. – 18.12.2018



The transit-cruise of the German research vessel MARIA S. MERIAN from Mindelo (Capo Verde) to Bahia de las Minas (Panama) is used, to collect atmospheric reference-data over oceans, to prepare automatically surveyed data on orography and composition of the ocean floor and on ocean currents for data-bases and to deploy oceanic robots (ARGO floats). The research cruise is supported by nine scientists, which assembled for a group picture, as illustrated in Figure 1, prior to their departure in Mindelo.



Figure1. the scientific participants of MSM 79-2. In the back from left to right: Melanie Steffen (HCU), Olaf Tuinder (KNMI), Ulrike Kirchner (MPI-M) and Vinod Kumar (MPI-C). In the front from left to right: Mila Schopenhauer (HCU), Anja Schneeorst (BSH), Dagmar Hainbacher (Uni-HH), Stefan Kinne (MPI-M) and Stephanie Fiedler (MPI-M).

Atmospheric reference data is collected either by small portable instruments (two MAX-DOAS and three sun-photometers) or by already installed instruments (one Ceilometer und two thermal camera systems). All atmospheric instruments are performing as expected. The MAX-DOAS Instruments (of MPI-C and KNMI) sample solar sky radiances to determine atmospheric concentrations of selected atmospheric trace-gases (such as NO₂) and their vertical distributions near the surface. The sun-photometers sample, if not obstructed by clouds, data on aerosol concentration, typical aerosol size and water vapor content. The ceilometer (capturing the cloud bottom altitude via backscattered light of laser impulses) and thermal cloud cameras capture cloud cover, cloud structure and cloud base altitude. Automatically recorded data on ocean floor properties (mapping of orography and soil composition) and of ocean currents of data sampled outside EEZ regions are prepared for submissions into data-bases of the SEABED-2030 initiative and Pangea. Finally, 6 automatic operating robots (so called "ARGO floats") will be deployed. These robots, with a life expectancy of about 3 to 5 years, regularly sample pressure, temperature and salinity down to an ocean depth of 2000m. The goal of the internationally orchestrated ARGO program is a

continuous global survey of upper ocean waters. Currently, Germany contributes with about 150 ARGO floats and their regular replacement. Such an ARGO float is illustrated in Figure 2. Hereby, deployment locations are preferred in regions of low ARGO float density, indicated by red, brown and orange regions (as of November 2018) in Figure 2.

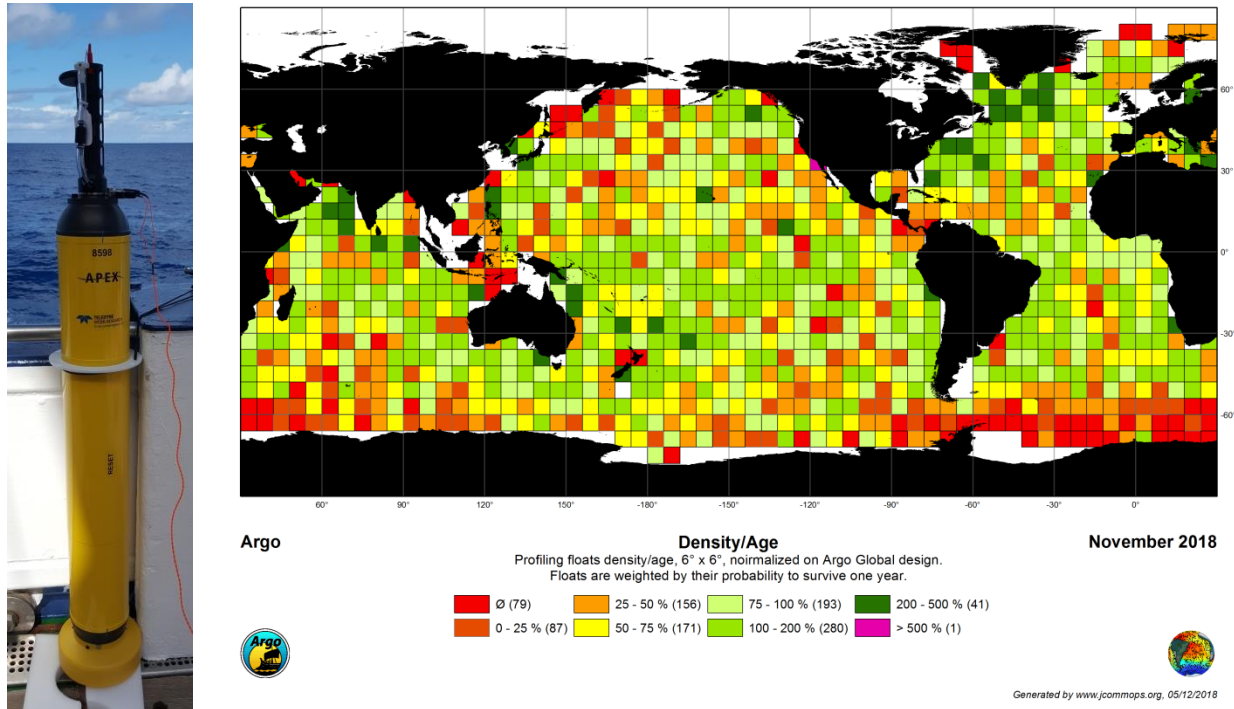


Figure 2: An ARGO float ready for deployment (left) and a regional density map of floats over oceans (right). Especially red colors (but also brown and orange colors) indicate preferred regions for deployments.

Since the float density was relatively low east of the EEZ of Capo Verde, already 3 floats were deployed during the first two days and the deployment of the other 3 floats will follow soon. Unfortunately, there was no time to conduct planned complimentary ocean profiling measurements (with a CTD) at the deployment locations, because the ship is slowed by propulsion issues. The sooner we are back to full speed, the larger the hope for including extra atmospheric experiments, which admittedly will take a couple of extra hours. One of those would be an intercomparison of cloud properties sampled on the ship in the wind approaching cloud observatory the MPI-M at the east coast of Barbados at different distances, to examine cloud structural changes and cloud lifetime in general. Another experiment would be comparisons of ship-borne upward active remote sensing (ceilometer) to those of downward active remote sensing from space (Calipso lidar). This would require following the flight-track of the satellite for at least one hour near the time of the satellite (nighttime) overpass.



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two pictures by Vinod Kumar (MPI-C)