Weekly Report 3

FS Alkor cruise AL534/2: RiverOceanPlastic

Fahrtleitung: Aaron Beck (GEOMAR)

Cruise progress Week 3: Bay of Biscay to the Wadden Sea

Sea conditions improved enough to continue our transit in the early morning on Monday, 16 March. We arrived at a planned station in the middle of the English Channel on Tuesday morning. Strong currents in the Channel made sampling a challenge, but we completed our usual program (no in situ pumps planned for the remainder of the cruise due to shallow water depths).
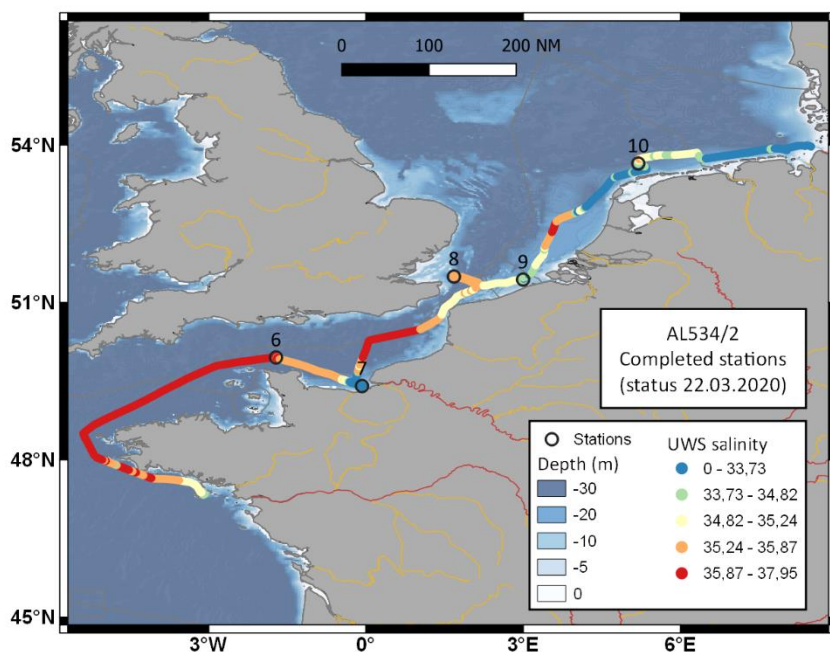

Figure 1. Map of stations completed through week 3. The surface water salinity is shown in colors along the cruise track.

The following morning, we arrived at Le Havre, the outlet of the Seine River (station 7, Fig. 1). This was the most striking river plume we've visited thus far, with salinity as low as 19 PSU. We were able to complete a full sampling program. We observed abundant macroplastic litter floating at this site, and all three of the catamaran trawl deployments collected a number of plastic fragments (Fig. 2). We conducted additional litter spotting surveys during the transit away from station 7.

We arrived at the mouth of the Thames River on the morning of Thursday 19 March, and completed a full sampling program (station 8; Fig. 1). We expected to see litter at this station, but found no obvious visible plastics. The Van Veen grabs and sediment cores revealed abundant benthic macrofauna, including echinoderms, crustaceans, and polychaete worms (Fig. 2).

Station 8 was finished shortly after noon. The weather forecast showed a brief window of favorable weather, so we quickly crossed the channel to Belgian waters. HOTMIC partners at Ghent University

have long-term time series sites near the Scheldt estuary outflow. Visiting at least one of these sites was a priority for AL534/2 so that the cruise could be integrated into a longer temporal context. We took advantage of the good weather, and sampled station 9 into the night. We also found few visible plastics at this station.

Figure 2. (L-R) Macroplastic object passing outside the catamaran trawl opening (station 7), large plastic fragments collected in the catamaran trawl (note also the abundant white plastic foam particles on the sides of the aluminum sampling container; station 7), sandy sediment core near the Thames estuary with hermit crab and brittle star (station 8).

We continued our transit Friday, expecting to arrive at the Ems River in Germany before the weather worsened. A brief window of moderate sea conditions opened as we passed the planned site of station 10, so we turned around and did a full sampling program near the Dutch Wadden Islands. There is no focused river discharge at this site, but sea surface salinity along the cruise track showed a broad minimum. This may reflect northeast-ward transport of discharge from the Rhine/Waal and Maas Rivers near Rotterdam. Station 10 had the highest abundance of plastic debris (Fig. 3) we've encountered thus far on the cruise.

We went into the harbor at Cuxhaven on Saturday morning to wait out high winds overnight. The bongo nets and catamaran trawl are core components of our sampling program, but cannot be deployed in high winds. We plan to leave harbor early this morning to continue our program of sampling the German North Sea rivers.

Figure 3. Meso- and macroplastic objects collected by the catamaran trawl station 7 (upper left panel) and station 10. A diverse array of colors and forms were found, including plastic fragments, fibers, films, and foams. (Photos: A. Peterson)

Table 1. Overview of device deployments and samples collected during Week 3

Device name	Number
CTD/Niskin rosette	5
Van Veen Grab	14
Mini-MUC sediment cores	32
WP3 Net tows (500 µm)	15
Bongo Net tows (300 µm)	15
Catamaran Trawls (300 µm)	13
Underway samples	23
Litter spotting transects	3
Total	*120*

With greetings on behalf of the cruise participants,

Aaron Beck, GEOMAR Helmholtz Centre for Ocean Research Kiel

Cuxhaven, Monday, 23 March 2020