Weekly Report 4

FS Alkor cruise AL534/2: RiverOceanPlastic

Fahrtleitung: Aaron Beck (GEOMAR)

Cruise progress Week 4: Wadden Sea and German rivers

We left Cuxhaven on Monday, 23 March, to arrive on station near Brunsbüttel, Germany, around mid-morning (Station 11; Fig. 1). Although not very far up the Elbe River, the salinity at this location was fully fresh. We were able to complete most of our deployments, but high winds and currents prevented us from deploying the Bongo nets and sediment corer. We found no obvious plastics in the catamaran trawl, but small fish, copepods, and abundant decomposing plant fragments.

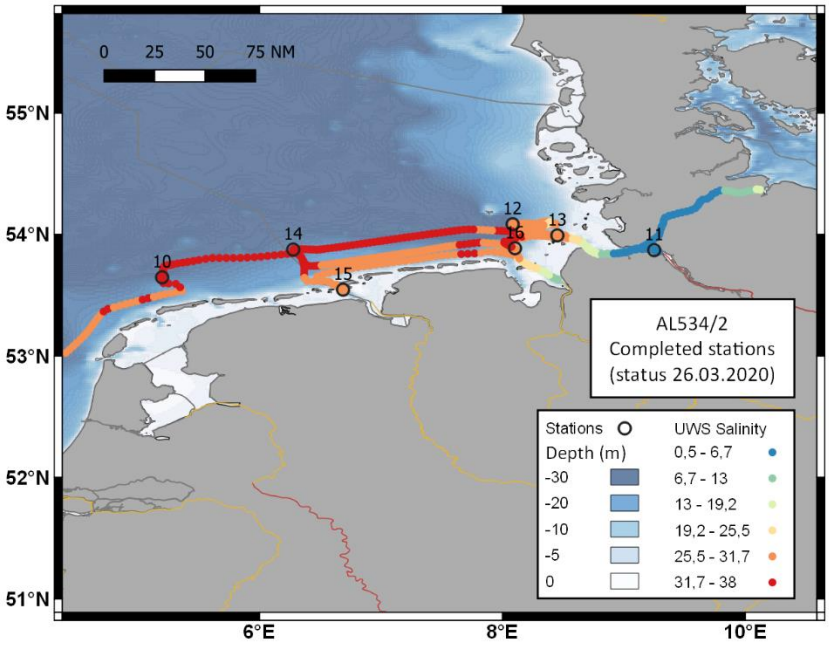

Figure 1. Map of stations completed through week 4. The surface water salinity is shown in colors along the cruise track.

On the morning of the 24th, we started with a station in the comparatively deep water southeast of the island of Helgoland. The sediments at this station were anoxic muds that smelled intensely of sulfides, but had abundant worms. Winds were too high this morning to deploy the catamaran trawl, but we were able to complete the rest of the work. The WP3 net tows showed a surprising diversity and abundance of gelatinous zooplankton.

We immediately transited to the Elbe River mouth to take advantage of high tide. The river plume was evident at the sea surface between the stations, with a marked contrast between the turbid, sediment-laden river water and the clearer water of the North Sea (Fig. 2). Wind and waves were calm, and we were able to complete a full work program at station 13 (Fig. 1).

On Wednesday the 25th, we transited to the Ems River at the border of Germany and the Netherlands. We took advantage of the time before high tide to sample a station farther offshore for gelatinous zooplankton (Station 14; Fig. 1). We only did a CTD cast and WP3 net tows, to investigate if the jellyfish community would be as abundant as we observed off of Helgoland the previous day.

Figure 2. Color difference between the turbid Elbe River plume and the bluer North Sea water.

At midday, we arrived at a station on the Ems River (Station 15). The sampling at this station went smoothly, and we were able to complete a full program of work.

The weather forecast indicated that Thursday and Friday would be our last fair-weather days for sampling. However, with the uncertainty of Corona-virus related closures on land, we were unsure if we would be able to return and unload on the weekend. The science team and ship's crew were willing to push through a midnight sampling to finish our last station so we could arrive in Kiel in time to handle any logistical challenges that might arise.

We arrived at the Weser River estuary around 20:00, and took advantage of the hours before high tide to travel upriver and collect water samples along the salinity gradient from the ship's underway seawater system. We returned to the river mouth at 0:30 on Thursday, and began our final sampling program of the cruise (Station 16). The work under deck lights went perfectly, and we deployed our last gear around 3:00 in the morning. After a few hours of processing the samples we collected, most of the science team was done by sunrise. An abundant jellyfish community meant that the jellyfish group would only finish their sorting and identification by breakfastime, a few hours later.

After traveling through the Kiel Canal (Nord-Ostsee-Kanal), we arrived at the GEOMAR pier in the evening. Colleagues at GEOMAR helped unload the gear on Friday morning and store the hard-won samples in freezers and cold rooms at the institute.

We traveled a long way over the past month, and through some notoriously rough seas. But although we lost a few days of work to bad weather, AL534/2 was an overwhelmingly successful cruise. We completed 16 stations throughout the coastal seas of 7 countries, and brought back an enormous sample set that will give us the first insights into plastic transport from European rivers to the sea.

Table 1. Overview of device deployments and samples collected during Week 4

Device name	Number
CTD/Niskin rosette	6
Van Veen Grab	13
Mini-MUC sediment cores	31
WP3 Net tows (500 µm)	15
Bongo Net tows (300 µm)	12
Catamaran Trawls (300 µm)	12
Underway samples	44
Litter spotting transects	0
Total	*133*

We're grateful to the captain and crew of F/S Alkor for their expertise and support. AL534/2 was truly a team effort, and the success of the cruise is owed to the productive and enjoyable collaboration of everyone on board.

With greetings on behalf of the cruise participants,

Aaron Beck, GEOMAR Helmholtz Centre for Ocean Research Kiel

Kiel, Friday, 27 March 2020