

CRUISE REPORT



CRUISE: 02030915 (BIOMETORE2)

VESSEL: RV Noruega

CHIEF SCIENTIST: A. Miguel P. Santos

PROJECT: BIOMETORE-Biodiversity in seamounts: the Madeira-Tore and Great Meteor (EEA Grants PT02_Aviso2_0001)

Deliverable D1.2

September 2015

CRUISE REPORT

1 – IDENTIFICATION

- **NAME:** BIOMETORE2
- **NUMBER:** 02030915
- **VESSEL:** RV Noruega
- **DATE:** 03 to 25 September 2015
- **DURATION:** 23 days
- **AREA:** Great Meteor complex seamounts
- **SCOPE:** BIOMETORE Project (EEA Grants - PT02 Programme)
- **COORDINATOR:** Antonina dos Santos
- **CHIEF SCIENTIST:** A. Miguel P. Santos
- **INSTITUTIONS INVOLVED:** IPMA/DivOA; IPMA/DivRP, DOP/IMAR, CCMAR, CIIMAR, ESCS, DGRM

2 –PROJECTS

- **NATIONAL:**
- **INTERNATIONAL:** BIOMETORE Project (EEA Grants PT02_AVISO2_001)

3 – OBJECTIVES

- Characterization of pelagic and benthic ecosystems of the seamounts Atlantis, Irving and Tyro, belonging to the Great Meteor complex.
- Collection of acoustic information for pelagic fish schools detection and bathymetry analysis.
- Collection of information on human activities to assess anthropogenic pressures in these seamounts.

4 – SCIENTIFIC TEAM (Photo in Fig. 1 of Annex I)

1. A. Miguel P. Santos (IPMA/DivOA; Chief Scientist, Oceanography and Plankton)
2. Miguel Caetano (IPMA/DivOA; Chemical Oceanography and Sediments/Benthos)
3. Ana Moreno (IPMA/DivRP; Nekton and Acoustics)
4. João Pastor (IPMA/DivOA; BIOMETORE Grant; Oceanography and Plankton)
5. Catharina Pieper (DOP/IMAR; Oceanography)
6. Teresa Amaro (DOP/IMAR; Oceanography)
7. Miriam Verges (DOP/IMAR; Sea mammals and birds)
8. Rui Pedro Vieira (CCMAR/Univ. Algarve; Nekton and Acoustics)
9. Mafalda Baptista (CIIMAR; Microbiology)
10. Joana Sobreira (ESCS; Reporter)

5 – EQUIPMENT USED

1. CTD SBE19 (S/N 1857)
2. Seapoint Fluorometer
3. Niskin Bottles
4. Plankton nets (Apstein type w/ mouth aperture Ø30 cm/Mesh Size 20 and 55 micra; Bongo Ø60 cm/335 and 335 micra and Bongo Ø90 cm/500 and 750 micra)
5. Fluxometers General Oceanics (BO90E S/N B27296; BO90D S/N B27139; BO60E S/N B25737; BO60D S/N B25313)
6. Isaacs-Kidd Midwater Trawl (IKMT)
7. Pelagic net
8. Smith-McIntyre Grab
9. Multicorer Mark III
10. Echo sounder Simrad EK500

6 – ACTIVITIES

1. **General overview:** The research vessel sailed from Lisbon on September 3, 2015, at 16:00 hours, arriving to Ponta Delgada on September 7, 2015, at 07:00 hours. The scientific staff of IPMA, embarked on the morning of that day, with participants from other institutions boarded at around 15:00 hours. The chief scientist organized a brief meeting with the other members of the scientific team on the organization cruise activities and life on board. After the meeting started the preparation of laboratories for operation during the cruise. The research vessel departed from Ponta Delgada to the Atlantis seamount at 22:00 hours and arrival on September 9, 2015, by 08:00 hours. The first station started at 10:00 hours. The end of the work in Atlantis seamount took place on September 12, 2015 by 07:00 hours. The research vessel sailed to and arrived at REF2 station on September 12, 2015 by 19:33 hours. This station was finished midnight and the arrival at Irving seamount station #4 was at about 05:00 of September 13, 2015. The work end in Irving seamount on September 16, 2015 by 00:10 hours and after about 13 hours steaming arrived at Tyro seamount. Station #3 over Tyro seamount started at September 16, 2015 by 13:30 hours. The end of the work took place on September 19, 2015 by 1:30 pm, having started the journey back to Ponta Delgada, where the ship arrived at 09:00 hours on 20 September 2015. However, the research vessel had to stay anchored off the coast of Ponta Delgada for about 10 hours, because we only had permission to dock at around 22:00 that day. The landing of the scientific staff was also done in Ponta Delgada, during September 20, 2015 and the morning of next day. The research vessel sailed from Ponta Delgada to Lisboa at the end of September 21, 2015 and arrived in the morning of September 25, 2015.
2. **Sampling area:** Atlantis, Irving e Tyro seamounts between the latitudes 31° 51.8' and 34° 13.9' N and longitudes 27° 58.2' and 30° 58.2' W (see Fig. 1 in Annex II and Fig. 2 in Annex III). A total of 28 stations were sampled in a grid of 9 stations over each seamount (see Fig. 2 in Annex III) and at a reference station (*far-field* station; Lat. 32° 40.0' N Long. 28° 49.3' N; Fig. 1 in Annex II). A multicorer station was performed near #IR13 but without success.
3. **Methodologies and data:** Tables 1 and 2 in Annex IV summarize the sampling carried out in each station. Due to a fault in the electromechanical cable it was not possible to use the water sample carousel system (Rosette + CTD SBE911p + sensors for PAR and DO). Thus, it was used a backup CTD (SBE19 S/N 1857 + Seapoint fluorometer) and a Niskin bottle at each level

of depth. The depth levels were reduced to the following seven: 0, 5, 50, 100, 200, 500 and 1000 m. **Vertical profiles of temperature, salinity and Chl-a** were performed using a CTD coupled with a Fluorometer in all stations of Atlantis and Irving seamounts, and in Tyro seamounts stations but without the Fluorometer (no Chl-a information) because it had a malfunction. **Water samples** were made with a Niskin bottle for the determination of Dissolved Oxygen (DO), Nitrous Oxide (N₂O), Total Alkalinity (TA), pH, Salinity (Sal), Total Organic Carbon (TOC), Humic substances (H), Nutrients (N), Totals (T (N+P)), Phytoplankton communities and Microplastics. However, some variables were not determined in all the stations and/or depth levels (see Table 2 in Annex IV). **Plankton vertical hauls** were performed during the day from 200 m to surface with an Apstein type net for **phytoplankton** sampling (20 micra) and **microzooplankton** (55 micra). The hauls of phytoplankton were carried out in some selected stations and the microzooplankton in all oceanographic stations (see Table 1 in Annex IV). **Plankton oblique hauls** were carried out during the night in all stations with Bongo nets (mouth aperture Ø60 cm (BO60) and Ø90 (BO90); see the section “Equipment used” above for mesh sizes) to capture **zooplankton**. In BO60 the right net (BO60D) was mounted in the rim farthest from the vessel and the left net (BO60E) are the closest. In BO90 the right net (BO90D) was mounted in the rim closer to the vessel and the left net (BO90E) in the farthest. The flowmeter serial numbers are:

| Net | Flowmeter S/N |
|--------|---------------|
| BO90 E | B 27296 |
| BO90 D | B 27139 |
| BO60 E | B 25737 |
| BO60 D | B 25313 |

Mesopelagic trawls were carried out during the night in all stations with an Isaacs-Kidd Midwater Trawl (IKMT) at the acoustic-estimated depth of the Deep-Scattering Layer (DSL). In Figure 4 are presented some organisms caught during the cruise, including fish (e.g., hatchetfish, lanternfish and leptocephalus larvae), crustacean, cephalopods and jellyfish (see Annex V).

Pelagic trawls (two) were carried out to catch small pelagic fish, when schools were detected by the ecosounder. Very few pelagic schools were detected and usually they are very deep and near

the bottom. Thus, only two pelagic trawls were done, one in Atlantis seamount #5 and the other in Irving seamount #1 but with very little success. The incidental catch were jellyfish (42), tunicata (58) and euphausiids (4) in the Atlantis, and a jellyfish, several salps, one cephalopod, 3 crustaceans, a snipefish and a juvenile Trichiuridae (largehead hairtail ?) (see Annex VI).

4. **Sediment and benthos sampling** was performed with the **multicorer** in Atlantis seamounts stations AT1 and AT4, and in Irving seamount near #IR13 but without success due to the characteristics of the (hard) bottom and to the winch capacities. A **Smith-McIntyre grab** station took place in Irving seamount #IR5. The sediment was of dirty white colour, coarse size, biogenous origin and odorless. Samples were collected for granulometry, chemical analyses, meiofauna, macrofauna, molecular analyses and microplastics.
5. **Hydroacoustic tracking** was recorded throughout the cruise.
6. **Meteorological measurements** were recorded throughout the cruise.
7. **Sea mammals and seabird watching** was conducted by Miriam Verges during all the cruise.
8. **Vessel watching** was conducted by bridge officers and all the ships sighted were identified and recorded for the evaluation of the anthropogenic pressures on the area. Very few ships were sighted: 2 freighters in Atlantis seamount, 2 freighters and a fishing boat in Irving seamount, and 2 freighters in Tyro seamount.

IPMA Algés, 29 September 2015

A. Miguel Santos

A. Miguel Santos
(Chief Scientist)

ANNEX I - SCIENTIFIC TEAM IN CRUISE BIOMETORE2 (02030915)



Figure 1. From left to right: João Pastor, Joana Sobreira, Teresa Amaro, Miguel Caetano, Miriam Verges, Rui Vieira, Miguel Santos, Catharina Pieper, Ana Moreno e Mafalda Baptista.

ANNEX II: BIOMETORE2 Cruise (02030915) and navigation distances and time

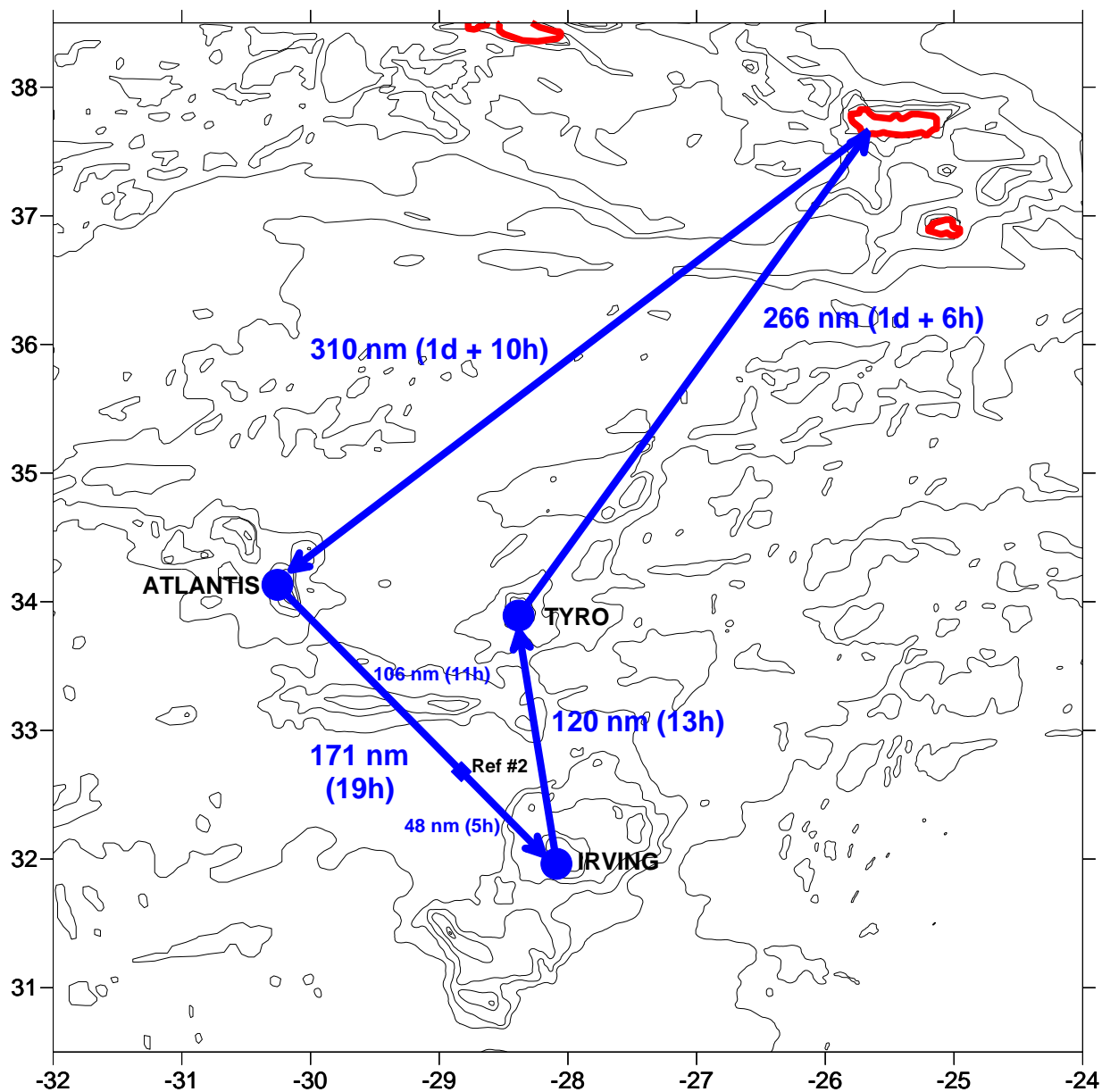


Figure 2. Location of the seamounts (Atlantos, Irving e Tyro) and reference station (Ref #2). In red are the Açores Islands (S. Miguel where the departure harbour of Ponta Delgada is located).

ANNEX III: Seamounts bathymetry and stations

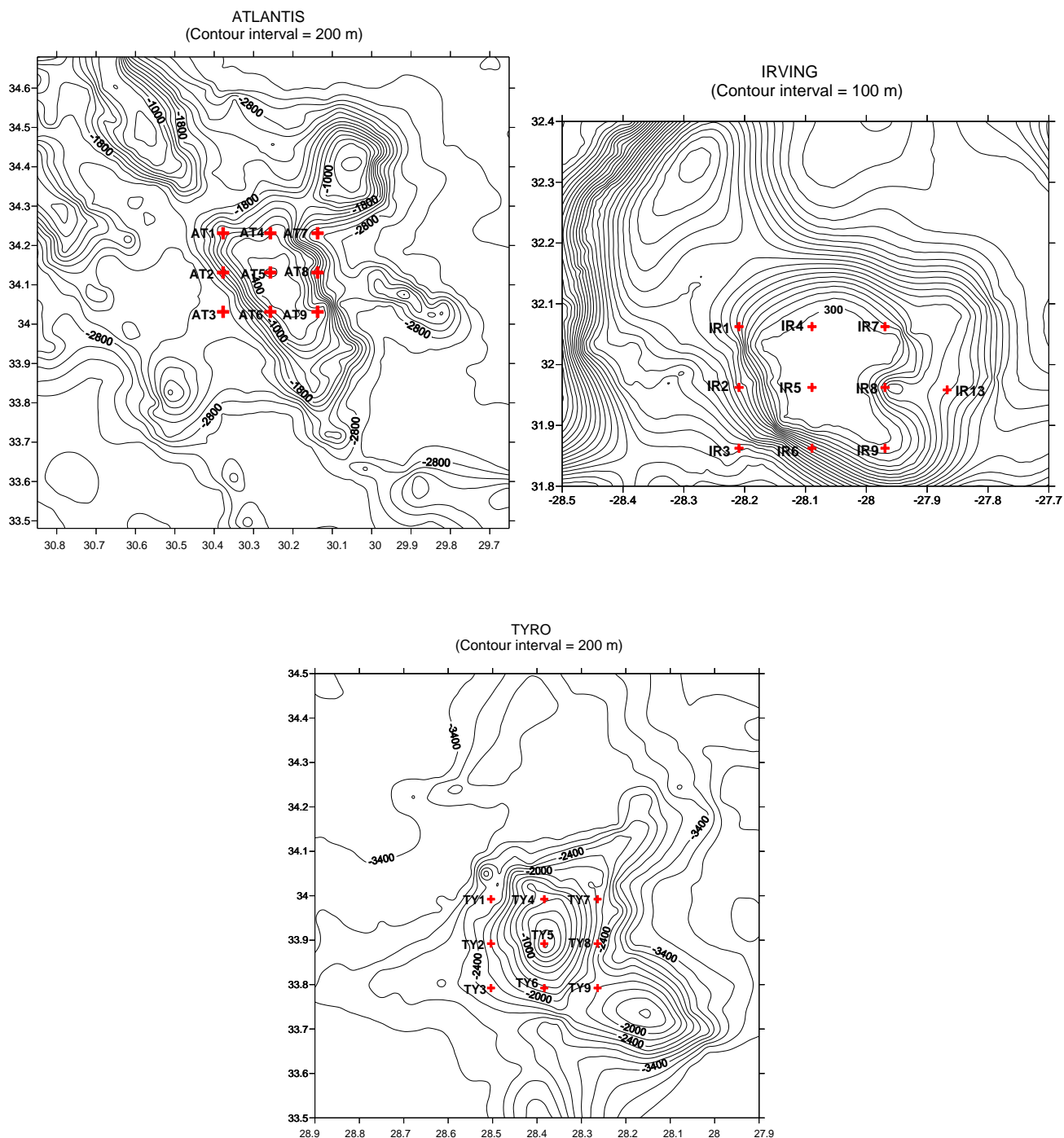


Figure 3. Depth contours (Black lines) and Cruise stations (red +).

ANNEX IV: Table 1 – Sampling performed in each station

| Station | Longitude W | Latitude N | CTD+Fluor | Chemical (Niskin) | Phyto- (Niskin) | Microplastics (Niskin) | WP2_20 | WP2_55 | BO60 | BO60 - Microplastics | BO90 | IKMT | Pelagic_Trawl | Mutli-corer | Grab |
|---------|-------------------------|-------------|-----------|-------------------|-----------------|------------------------|--------|--------|------|----------------------|------|------|---------------|-------------|------|
| AT1 | 30° 22.639' | 34° 13.873' | X | X | - | X | - | X | X | - | X | X | - | X | - |
| AT2 | 30° 22.639' | 34° 07.873' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| AT3 | 30° 22.639' | 34° 01.873' | X | X | - | X | - | X | X | - | X | X* | - | - | - |
| AT4 | 30° 15.439' | 34° 13.873' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| AT5 | 30° 15.439' | 34° 07.873' | X | X | X | X | X | X | X | X | X | X | X | X | - |
| AT6 | 30° 15.439' | 34° 01.873' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| AT7 | 30° 08.239' | 34° 13.873' | X | X | - | X | - | X | X | - | X | X | - | - | - |
| AT8 | 30° 08.239' | 34° 07.873' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| AT9 | 30° 08.239' | 34° 01.873' | X | X | - | X | - | X | X | - | X | X | - | - | - |
| RF2 | 28° 49.310' | 32° 40.000' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| IR1 | 28° 12.559' | 32° 03.747' | X | X | - | X | - | X | X | - | X | X | X | - | - |
| IR2 | 28° 12.559' | 31° 57.747' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| IR3 | 28° 12.559' | 31° 51.747' | X | X | - | X | - | X | X | - | X | X | - | - | - |
| IR4 | 28° 05.359' | 32° 03.747' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| IR5 | 28° 05.359' | 31° 57.747' | X | X | X | X | X | X | X | X | X | X | - | - | X |
| IR6 | 28° 05.359' | 31° 51.747' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| IR7 | 27° 58.159' | 32° 03.747' | X | X | - | X | - | X | X | - | X | X | - | - | - |
| IR8 | 27° 58.159' | 31° 57.747' | X | X | X | X | X | X | X | - | X | X | - | - | - |
| IR9 | 27° 58.159' | 31° 51.747' | X | X | - | X | - | X | X | - | X | X | - | - | - |
| IR13 | 27° 52.090' | 31° 57.322' | - | - | - | - | - | - | - | - | - | - | - | X** | - |
| TY1 | 28° 30.215' | 33° 59.535' | X*** | X | - | X | - | X | X | - | X | X | - | - | - |
| TY2 | 28° 30.215' | 33° 53.535' | X*** | X | X | X | X | X | X | - | X | X | - | - | - |
| TY3 | 28° 30.215' | 33° 47.535' | X*** | X | - | X | - | X | X | - | X | X | - | - | - |
| TY4 | 28° 23.015' | 33° 59.535' | X*** | X | X | X | X | X | X | - | X | X | - | - | - |
| TY5 | 28° 23.015' | 33° 53.535' | X*** | X | X | X | X | X | X | X | X | X | - | - | - |
| TY6 | 28° 23.015' | 33° 47.535' | X*** | X | X | X | X | X | X | - | X | X | - | - | - |
| TY7 | 28° 15.815' | 33° 59.535' | X*** | X | - | X | - | X | X | - | X | X | - | - | - |
| TY8 | 28° 15.815' | 33° 53.535' | X*** | X | X | X | X | X | X | - | X | X | - | - | - |
| TY9 | 28° 15.815' | 33° 47.535' | X*** | X | - | X | - | X | X | - | X | X | - | - | - |
| OBS: | * Net lost | | | | | | | | | | | | | | |
| | ** Near #IR13 | | | | | | | | | | | | | | |
| | *** Without Fluorometer | | | | | | | | | | | | | | |

ANNEX IV (Cont.): Table 2 (1/6) – Sampling performed in each station by depth

| Station | Longitude W | Latitude N | Depth (m) | Depth_Level | DO | N2O | TA | pH | Sal | TOC | H | N | T (N+P) | Phyto- (Niskin) | Microplastics (Niskin) |
|---------|-------------|-------------|-----------|--------------|----|-----|----|----|-----|-----|---|---|---------|-----------------|------------------------|
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 5 | X | X | - | X | X | X | X | X | X | - | X |
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 50 | X | X | X | X | X | X | X | X | X | - | - |
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 100 | X | X | X | X | X | X | X | X | X | - | - |
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 200 | X | X | X | X | X | X | X | X | X | - | X |
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 500 | X | X | - | - | X | X | X | X | X | - | X |
| AT1 | 30° 22.639' | 34° 13.873' | 1200 | 1000 | X | X | - | - | X | X | X | X | X | - | X |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| AT2 | 30° 22.639' | 34° 07.873' | 1500 | 1000 | - | X | - | - | - | X | X | X | X | X | - |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| AT3 | 30° 22.639' | 34° 01.873' | 1300 | 1000 | - | X | - | X | - | X | X | X | X | - | X |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| AT4 | 30° 15.439' | 34° 13.873' | 800 | 750 (Bottom) | - | X | - | - | - | X | X | X | X | X | - |
| AT5 | 30° 15.439' | 34° 07.873' | 292 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| AT5 | 30° 15.439' | 34° 07.873' | 292 | 5 | - | X | - | X | - | X | X | X | X | X | X |
| AT5 | 30° 15.439' | 34° 07.873' | 292 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| AT5 | 30° 15.439' | 34° 07.873' | 292 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| AT5 | 30° 15.439' | 34° 07.873' | 292 | 250 (Bottom) | - | X | X | X | - | X | X | X | X | X | X |
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 0 | X | X | X | X | X | X | X | X | X | X | X |

ANNEX IV (Cont.): Table 2 (2/6) – Sampling performed in each station by depth

| Station | Longitude W | Latitude N | Depth (m) | Depth_Level | DO | N2O | TA | pH | Sal | TOC | H | N | T (N+P) | Phyto- (Niskin) | Microplastics (Niskin) |
|---------|-------------|-------------|-----------|--------------|----|-----|----|----|-----|-----|---|---|---------|-----------------|------------------------|
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| AT6 | 30° 15.439' | 34° 01.873' | 1200 | 1000 | - | X | - | - | - | X | X | X | X | X | - |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| AT7 | 30° 08.239' | 34° 13.873' | 2100 | 1000 | - | X | - | X | - | X | X | X | X | - | X |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| AT8 | 30° 08.239' | 34° 07.873' | 1200 | 1000 | - | X | - | - | - | X | X | X | X | X | - |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| AT9 | 30° 08.239' | 34° 01.873' | 791 | 750 (Bottom) | - | X | - | X | - | X | X | X | X | - | X |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 5 | X | X | - | X | X | X | X | X | X | X | X |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 50 | X | X | X | X | X | X | X | X | X | X | - |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 100 | X | X | X | X | X | X | X | X | X | X | - |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 200 | X | X | X | X | X | X | X | X | X | X | X |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 500 | X | X | - | X | X | X | X | X | X | X | X |
| REF2 | 28° 49.310' | 32° 40.000' | 1150 | 1000 | X | X | - | X | X | X | X | X | X | X | X |

ANNEX IV (Cont.): Table 2 (3/6) – Sampling performed in each station by depth

| Station | Longitude W | Latitude N | Depth (m) | Depth_Level | DO | N2O | TA | pH | Sal | TOC | H | N | T (N+P) | Phyto- (Niskin) | Microplastics (Niskin) |
|---------|-------------|-------------|-----------|---------------|----|-----|----|----|-----|-----|---|---|---------|-----------------|------------------------|
| IR1 | 28° 12.559' | 32° 03.747' | 628 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| IR1 | 28° 12.559' | 32° 03.747' | 628 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| IR1 | 28° 12.559' | 32° 03.747' | 628 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| IR1 | 28° 12.559' | 32° 03.747' | 628 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| IR1 | 28° 12.559' | 32° 03.747' | 628 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| IR1 | 28° 12.559' | 32° 03.747' | 628 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 5 | X | X | - | X | X | X | X | X | X | X | - |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 50 | X | X | X | X | X | X | X | X | X | X | - |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 100 | X | X | X | X | X | X | X | X | X | X | - |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 200 | X | X | X | X | X | X | X | X | X | X | - |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 500 | X | X | - | X | X | X | X | X | X | X | - |
| IR2 | 28° 12.559' | 31° 57.747' | 1050 | 1000 (Bottom) | X | X | - | X | X | X | X | X | X | X | - |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| IR3 | 28° 12.559' | 31° 51.747' | 1934 | 1000 | - | X | - | X | - | X | X | X | X | - | X |
| IR4 | 28° 05.359' | 32° 03.747' | 265 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| IR4 | 28° 05.359' | 32° 03.747' | 265 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| IR4 | 28° 05.359' | 32° 03.747' | 265 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| IR4 | 28° 05.359' | 32° 03.747' | 265 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| IR4 | 28° 05.359' | 32° 03.747' | 265 | 200 (Bottom) | - | X | X | X | - | X | X | X | X | X | - |
| IR5 | 28° 05.359' | 31° 57.747' | 262 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| IR5 | 28° 05.359' | 31° 57.747' | 262 | 5 | - | X | - | X | - | X | X | X | X | X | X |
| IR5 | 28° 05.359' | 31° 57.747' | 262 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| IR5 | 28° 05.359' | 31° 57.747' | 262 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| IR5 | 28° 05.359' | 31° 57.747' | 262 | 200 (Bottom) | - | X | X | X | - | X | X | X | X | X | X |
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 100 | - | X | X | X | - | X | X | X | X | X | - |

ANNEX IV (Cont.): Table 2 (4/6) – Sampling performed in each station by depth

| Station | Longitude W | Latitude N | Depth (m) | Depth_Level | DO | N2O | TA | pH | Sal | TOC | H | N | T (N+P) | Phyto- (Niskin) | Microplastics (Niskin) |
|---------|-------------|-------------|-----------|--------------|----|-----|----|----|-----|-----|---|---|---------|-----------------|------------------------|
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 500 | - | X | - | - | - | X | X | X | X | X | - |
| IR6 | 28° 05.359' | 31° 51.747' | 750 | 705 (Bottom) | - | X | - | - | - | X | X | X | X | X | - |
| IR7 | 27° 58.159' | 32° 03.747' | 273 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| IR7 | 27° 58.159' | 32° 03.747' | 273 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| IR7 | 27° 58.159' | 32° 03.747' | 273 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| IR7 | 27° 58.159' | 32° 03.747' | 273 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| IR7 | 27° 58.159' | 32° 03.747' | 273 | 270 (Bottom) | - | X | X | X | - | X | X | X | X | - | X |
| IR8 | 27° 58.159' | 31° 57.747' | 269 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| IR8 | 27° 58.159' | 31° 57.747' | 269 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| IR8 | 27° 58.159' | 31° 57.747' | 269 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| IR8 | 27° 58.159' | 31° 57.747' | 269 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| IR8 | 27° 58.159' | 31° 57.747' | 269 | 250 (Bottom) | - | X | X | X | - | X | X | X | X | X | - |
| IR9 | 27° 58.159' | 31° 51.747' | 272 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| IR9 | 27° 58.159' | 31° 51.747' | 272 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| IR9 | 27° 58.159' | 31° 51.747' | 272 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| IR9 | 27° 58.159' | 31° 51.747' | 272 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| IR9 | 27° 58.159' | 31° 51.747' | 272 | 250 (Bottom) | - | X | X | X | - | X | X | X | X | - | X |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 200 | - | X | X | X | - | X | X | X | X | - | - |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| TY1 | 28° 30.215' | 33° 59.535' | 1500 | 1000 | - | X | - | X | - | X | X | X | X | - | X |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| TY2 | 28° 30.215' | 33° 53.535' | 2200 | 1000 | - | X | - | X | - | X | X | X | X | X | - |
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 5 | - | X | - | X | - | X | X | X | X | - | X |

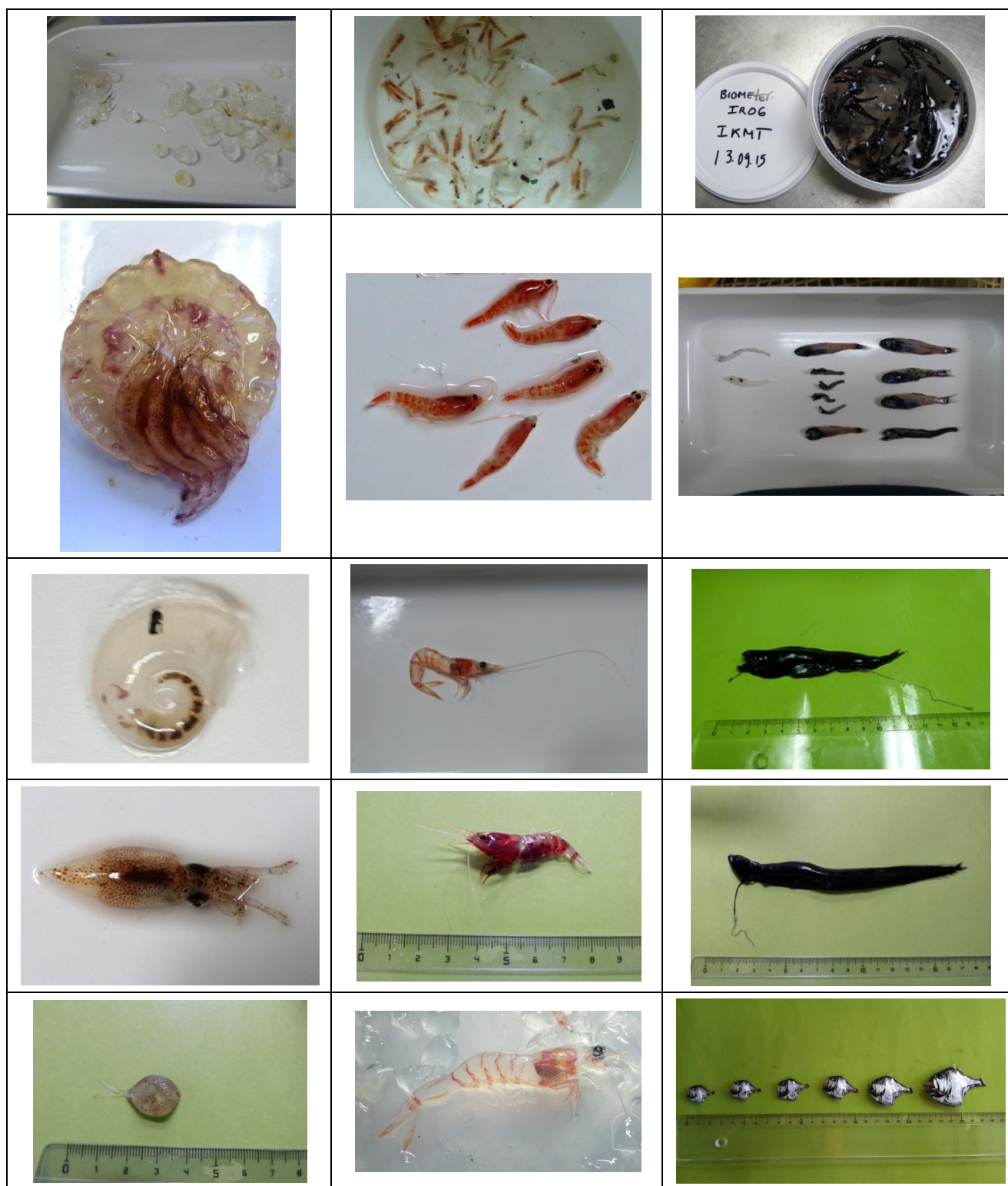
ANNEX IV (Cont.): Table 2 (5/6) – Sampling performed in each station by depth

| Station | Longitude W | Latitude N | Depth (m) | Depth_Level | DO | N2O | TA | pH | Sal | TOC | H | N | T (N+P) | Phyto- (Niskin) | Microplastics (Niskin) |
|---------|-------------|-------------|-----------|---------------|----|-----|----|----|-----|-----|---|---|---------|-----------------|------------------------|
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| TY3 | 28° 30.215' | 33° 47.535' | 2205 | 1000 | - | X | - | X | - | X | X | X | X | - | X |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| TY4 | 28° 23.015' | 33° 59.535' | 1065 | 1000 (Bottom) | - | X | - | X | - | X | X | X | X | X | - |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 5 | - | X | - | X | - | X | X | X | X | X | X |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 200 | - | X | X | X | - | X | X | X | X | X | X |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 500 | - | X | - | X | - | X | X | X | X | X | X |
| TY5 | 28° 23.015' | 33° 53.535' | 1226 | 1000 | - | X | - | X | - | X | X | X | X | X | X |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 0 | X | X | X | X | X | X | X | X | X | X | X |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 5 | X | X | - | X | X | X | X | X | X | X | - |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 50 | X | X | X | X | X | X | X | X | X | X | - |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 100 | X | X | X | X | X | X | X | X | X | X | - |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 200 | X | X | X | X | X | X | X | X | X | X | - |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 500 | X | X | - | X | X | X | X | X | X | X | - |
| TY6 | 28° 23.015' | 33° 47.535' | 2205 | 1000 | X | X | - | X | X | X | X | X | X | X | - |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| TY7 | 28° 15.815' | 33° 59.535' | 2078 | 1000 | - | X | - | X | - | X | X | X | X | - | X |
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 0 | X | X | X | X | X | X | X | X | X | X | X |

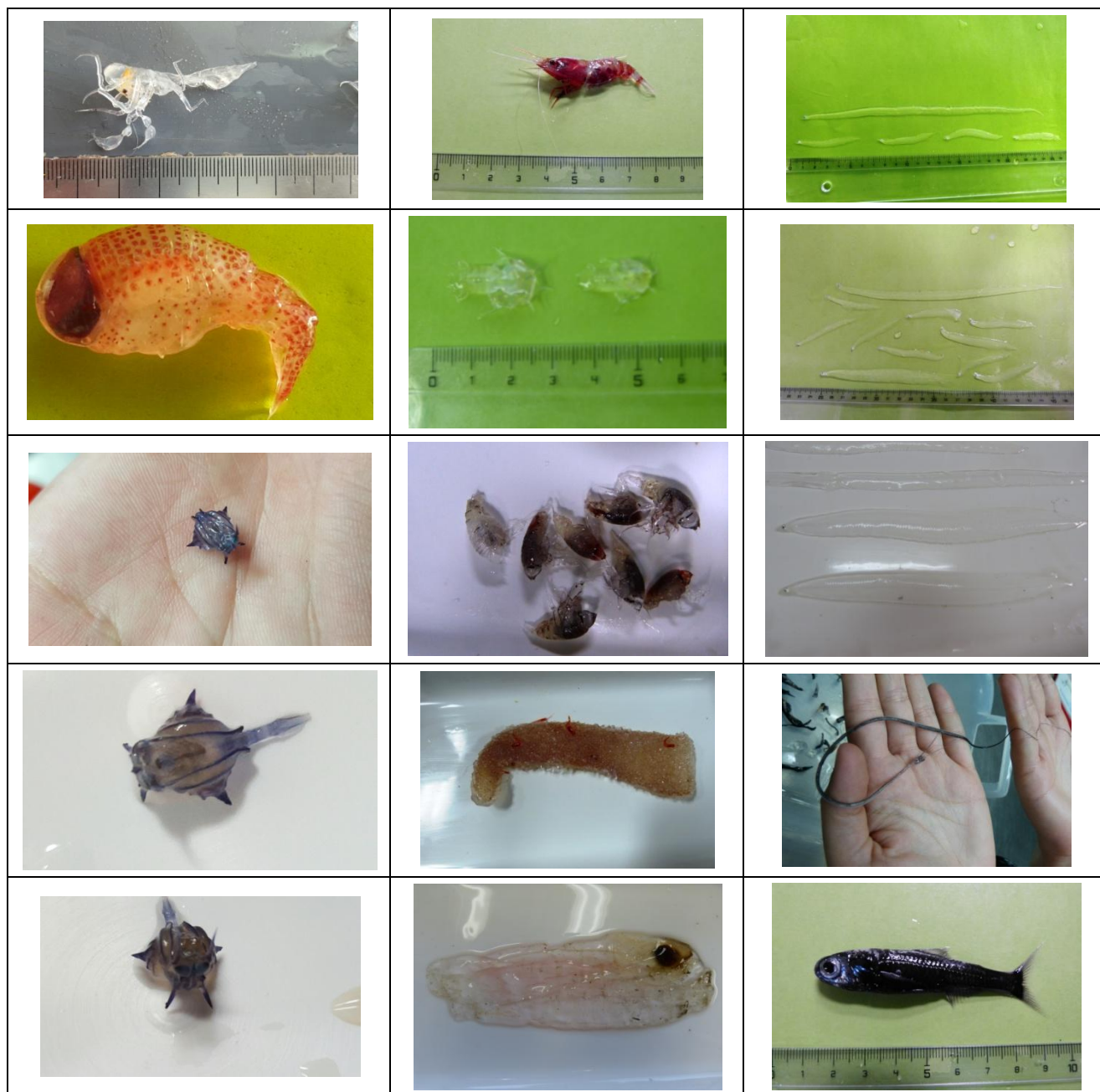
ANNEX IV (Cont.): Table 2 (6/6) – Sampling performed in each station by depth

| Station | Longitude W | Latitude N | Depth (m) | Depth_Level | DO | N2O | TA | pH | Sal | TOC | H | N | T (N+P) | Phyto- (Niskin) | Microplastics (Niskin) |
|---------|-------------|-------------|-----------|-------------|----|-----|----|----|-----|-----|---|---|---------|-----------------|------------------------|
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 5 | - | X | - | X | - | X | X | X | X | X | - |
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 50 | - | X | X | X | - | X | X | X | X | X | - |
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 100 | - | X | X | X | - | X | X | X | X | X | - |
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 200 | - | X | X | X | - | X | X | X | X | X | - |
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 500 | - | X | - | X | - | X | X | X | X | X | - |
| TY8 | 28° 15.815' | 33° 53.535' | 2100 | 1000 | - | X | - | X | - | X | X | X | X | X | - |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 0 | X | X | X | X | X | X | X | X | X | - | X |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 5 | - | X | - | X | - | X | X | X | X | - | X |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 50 | - | X | X | X | - | X | X | X | X | - | - |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 100 | - | X | X | X | - | X | X | X | X | - | - |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 200 | - | X | X | X | - | X | X | X | X | - | X |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 500 | - | X | - | X | - | X | X | X | X | - | X |
| TY9 | 28° 15.815' | 33° 47.535' | 2234 | 1000 | - | X | - | X | - | X | X | X | X | - | X |

ANNEX V: Example of organisms caught with the IKMT



ANNEX V: Example of organisms caught with the IKMT (Cont.)



ANNEX VI: Example of organisms caught with the Pelagic Trawl

