Cruise report
FRV "Walther Herwig III"
Cruise 404
03.03. – 24.04.2014

Studies on the Occurrence and Frequency of Eggs, Larvae and Adult European Eels in the Sargasso Sea

Chief Scientist: PD Dr. Reinhold Hanel

The 404th cruise of the Walther Herwig took the vessel for the third time since 2011 to the central Sargasso Sea to carry out studies on the distribution and abundance of the early life stages of the European eel (*Anguilla anguilla*). The core study area ranged from 30° - 22°N and 64° - 58°W with stations being sampled along three north-south transects.

The primary objectives of this cruise were the documentation of leptocephalus distributions and abundances with a special focus on European eel larvae and a further delineation of the total spawning area of the species. The study also aimed at gathering more detailed information on the influence of abiotic factors for the eel's choice of potential spawning sites. Together with the results of the 342nd and the 373rd voyage of the FRV "Walther Herwig III" in 2011 and 2014, respectively, as well as the 41st voyage of RV Maria S. Merian (2015), the results of this cruise shall deliver insights into possible changes in leptocephalus assemblages in the Sargasso Sea and to shed light on the influence of varying hydrographic conditions on the presence of early life stages. For this purpose, as in the previous years, all caught leptocephalus larvae were sorted out of the catch, identified, measured and preserved.

In order to study the accompanying fauna in the spawning area of the European eel, a pelagic fishery trawl was deployed. The net was equipped with a multi-closing system that allowed a stratified sampling of the water column, whereby the changes of the nekton community by depth strata was documented. During the entire cruise, hydroacoustic data were recorded. A combination analysis of the hydroacoustic data and pelagic trawl catches shall provide information on nekton abundance, distribution and composition in the study area. As a special aspect, the genetic basis of sensory adaptation of mesopelagic fish will be studied.

A 55 µm Apstein net was deployed to sample mikro- and mesoplankton from the upper water layers. A later analysis of the samples in cooperation with the University of Hamburg will provide information on phytoplankton and POM particles.

Distribution List:

BMEL Ref. 613/614
BLE, Ref. 523
Schiffsführung FFS Walther Herwig III
TI, FI
TI, SF
TI, OF
TI – Präsidialbüro (Michael Welling)
TI-Reiseplanung Forschungsschiffe (Dr. Norbert Rohlf)
Personalrat
MRI, Institutsteil Fisch
Deutscher Fischerei-Verband e.V.
Bundesamt für Seeschifffahrt und Hydrographie
Helmholtz-Zentrum für Ozeanforschung, GEOMAR
Fahrtteilnehmer

The cruise

The Walther Herwig III left Bremerhaven for the Dockyards, Bermuda, on 3 March 2017 with two scientists on board (Dr. Lasse Marohn and Dr. Klaus Wysujack). On 11 March, five artificially matured female European eels (*Anguilla anguilla*) were tagged with Pop-up Satellite Transmitters (PSAT) and released south-west of the Azores. Despite partly unfavorable weather, Bermuda was reached as scheduled on 17 March 2017.

By the evening of 17 March, all 12 members of the scientific crew were onboard and the staffing was complete. On March 18, colleagues of the Bermuda Department of Environmental Protection visited the Walther Herwig III. The voyage to the study area started from the Dockyards at 4 p.m. on 19 March 2017.

The scientific work started when the first station was reached on 21 March 2017. Further work was carried out at stations with a latitudinal spacing distance of 0.5° along north south transects in the core study area. The distance between the transects was 3° longitude (Fig. 1). The basis for the updating of the station planning and the expansion of the transects were satellite photos of ocean surface temperatures and the daily on-site assessment of the hydrographic profile.

At all regular stations plankton sampling was conducted with an IKMT. This took place in the form of double oblique tows, in each case from the surface to 300 m depth. Additionally, at all stations a hydrographic profile was generated (CTD also including oxygen, a transmissometer and Chlorophyll-a measurements) down to 500 m depth. Additional stations at a distance of 0.25° were visited at which a further CTD profile was compiled down to 300 m depth, in order to improve the resolution of the hydrographic data. On three stations on the last transect, the IKMT was tested in combination with a multi-sampler (Hydrobios), enabling stratified plankton sampling in five depths. Ten tows were made during day (N = 7) and night (N = 3) in order to investigate vertical migrations of leptocephalus larvae, focusing on depths down to 300 m, with two tows in depths down to 600 m.

The pelagic trawl net was deployed three times. The multi-sampler made it possible to fish in three defined depths. Trawling took place at night at depths up to 600 m (2x) and 1000 m (1x). The Apstein net (55 µm mesh size) was deployed at a total of 37 stations to sample from a depth of 200 m up to the surface. All plankton samples were preserved in ethanol. On 30 March, a second batch of female eels was tagged with satellite transmitters and released. A detailed station list with all equipment used is provided in the Appendix.

Directly following the IKMT tows during the whole survey, all leptocephalus larvae were sorted out of the catches and identified to the lowest taxon possible, usually genus. Potential *Anguilla* eggs were sorted and preserved for genetic barcoding analysis. All potential *Anguilla* larvae were preserved in ethanol; leptocephali of other taxa were stored frozen by -20°C. Potential *Anguilla* eggs were preserved in Chelex. After the leptocephalus larvae had been removed from IKMT catches, the remaining plankton samples were fixed in ethanol for further studies.

Besides the research aspects listed above, several additional aspects and questions were addressed during the cruise:

- Behaviour of artficially matured eels by tagging with Pop-up Satellite Transmitters (PSAT)
- Gelatinous meso- and macrozooplankton communities
- Larval fish communities
- Sensory organs of mesopelagic fish

- Particulate organic matter (POM)

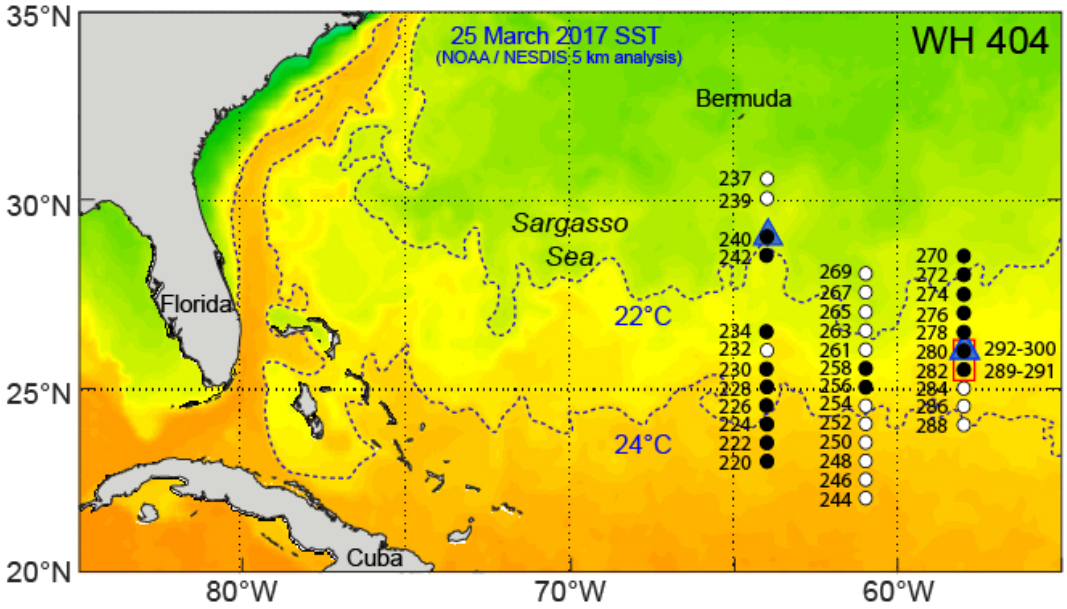

Figure 1. Map of the sampling stations where the IKMT was deployed to collect *Anguilla* leptocephali during the WH404 survey in March and April of 2017. Locations were *Anguilla* leptocephali were collected are filled with black, and stations where they were absent are filled with white. Locations where the large pelagic trawl was fished (Triangles) and where multiple deployments of the IKMT equipped with a muliti-sampler 5 net codend system was deployed at 2 stations (rectangle) that were sampled a second time near the end of the cruise are also shown.

The scientific work was concluded on April 07, 2017, at 1 a.m. On April 10, 2017, the Walther Herwig entered the port of St. George's at 10 a.m. By April 11, 2017, the scientific crewmembers left the ship and the vessel departed for Bremerhaven. The ship anchored in Bremerhaven on April 24, 2017 at 8:30 a.m.

During the 404th cruise of the Walther Herwig III the following station work was carried out:

Isaac Kidd Midwater Trawl (500 µm mesh)	34 tows
IKMT-Multinet (500 µm mesh)	10 tows
CTD Probe	76 tows
Pelagic Fisheries Trawl (Multi-sampler)	3 tows
Apstein Net (55 µm mesh)	37 tows
Eel releases (PSAT tagging)	2

Descriptions of research aspects and first results

IKMT Plankton samples, leptocephalus larvae

A total of 1226 leptocephalus larvae were collected during the WH404 cruise using both the IKMT and the large pelagic trawl. The larvae included about 35 species of 13 families of eel species (Anguilliformes). There were 79 leptocephali that were either clearly *Anguilla* (N = 68) or likely *Anguilla* (N = 11) that ranged in size from 6.4 mm to 40.4 mm (mean ± S.D. = 13.5 ± 5.9 mm). All

larvae were measured on board and identified to the lowest taxon possible. The most abundant species were *Ariosoma balearicum*, N = 303, (Baleares conger, Bandtooth conger) and *Nemichthys scolopaceus*, N = 240 (Slender snipe eel), which together comprised almost half of all the leptocephali. There were eight species of the family Congridae (congers) and six species of the Chlopsidae (false morays) collected and a small number of species of other anguilliform families. Large size congrid leptocephali of the Bristletooth conger *Xenomystax congroides* were the most abundant species captured by the large pelagic trawl (N = 42), with only two being caught by the IKMT. Different samples were photographed (Figs. 2, 3, 4). Identification to the species level of all the *Anguilla* specimens will be made later by genetic analyses carried out at the Institute of Fisheries Ecology.

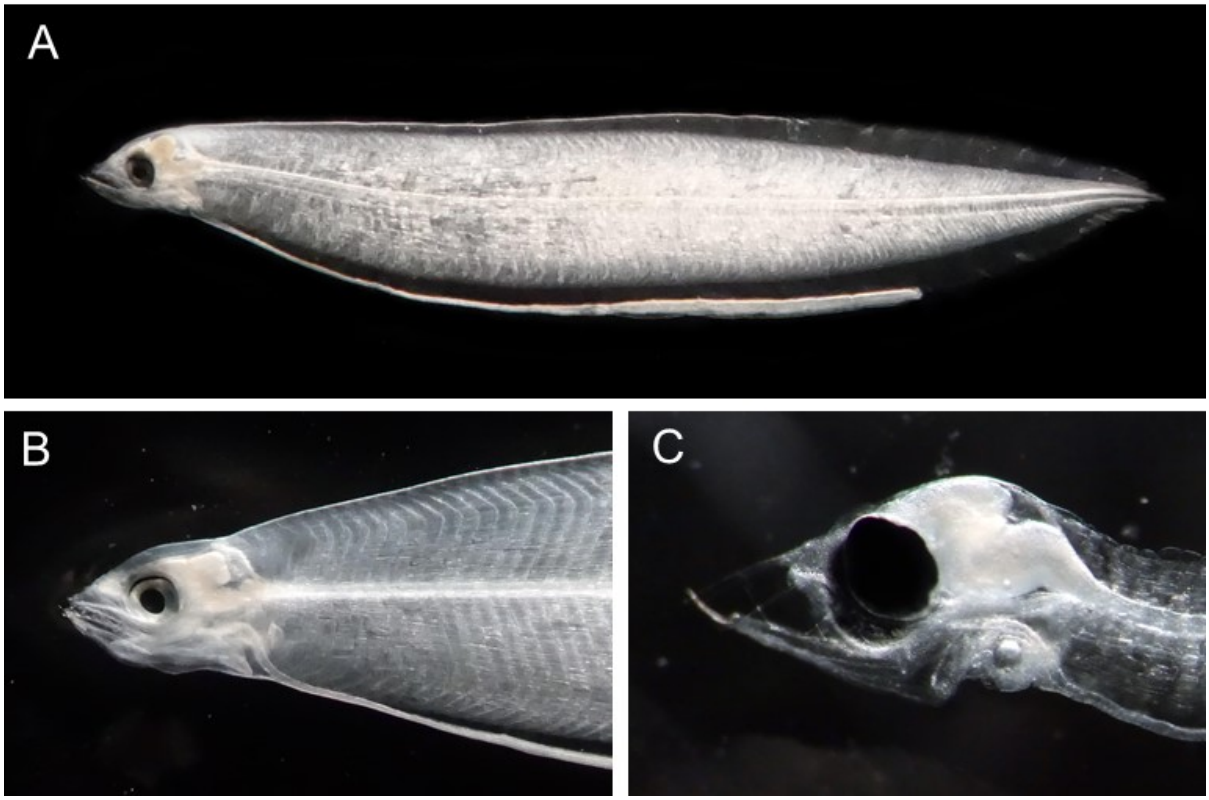

Figure 2. Photographs of *Anguilla* leptocephali collected during the WH404 survey in March and April of 2017 showing a 16.4 mm leptocephalus (A, no. 622), a much larger 40.4 mm leptocephalus (B. no. 184), and a recently hatched 6.4 mm late-stage preleptocephalus/early feeding stage leptocephalus that still has some oil globule material still remaining (C, no. 377). The 40 mm larva would have been spawned late last year (Nov-Dec 2016) based on a recent otolith aging study that included similar sized *Anguilla anguilla* leptocephali (Kuroki et al. 2017).

[Kuroki, M, L. Marohn, K. Wysujack, M. J. Miller, K. Tsukamoto, R. Hanel. 2017. Hatching time and larval growth of Atlantic eels in the Sargasso Sea. Mar Biol 164:in press, DOI:10.1007/s00227-017-3150-9]

Based on the frequency of *A. anguilla* and *A. rostrata* larvae, an abundance comparison will be carried out compared to earlier studies (from the 1980s, the 342nd and 373rd cruise of the WHIII in 2011 and 214, respectively, and the 41st voyage of RV Maria S. Merian in 2015). In addition, the distribution of the *Anguilla* larvae with the prevailing hydrographic conditions will be placed in context.

Catches with the IKMT multi-sampler yielded a total of 223 leptocephalus larvae of 13 families, 9 of which were identified as *Anguilla* and 3 were classified as potential *Anguilla* larvae. The most

abundant families were Congridae (N=64), Serivomeridae (N = 54) and Nemichthidae (N = 35). Though the deployment of the multi-sampler was essentially a test run, provisional results indicated a shift of leptocephalus catches towards shallower depths during night time. The catches from the pelagic trawl nets were frozen at -20° C. Species identification based on morphological characters as well as genetic barcoding and morphometry of the fish will be carried out at the Institute of Fisheries Ecology. Thus, on the one hand, the pelagic fish species community and their depth stratification will be documented. On the other hand, the data will also enable a detailed evaluation of hydroacoustic data.

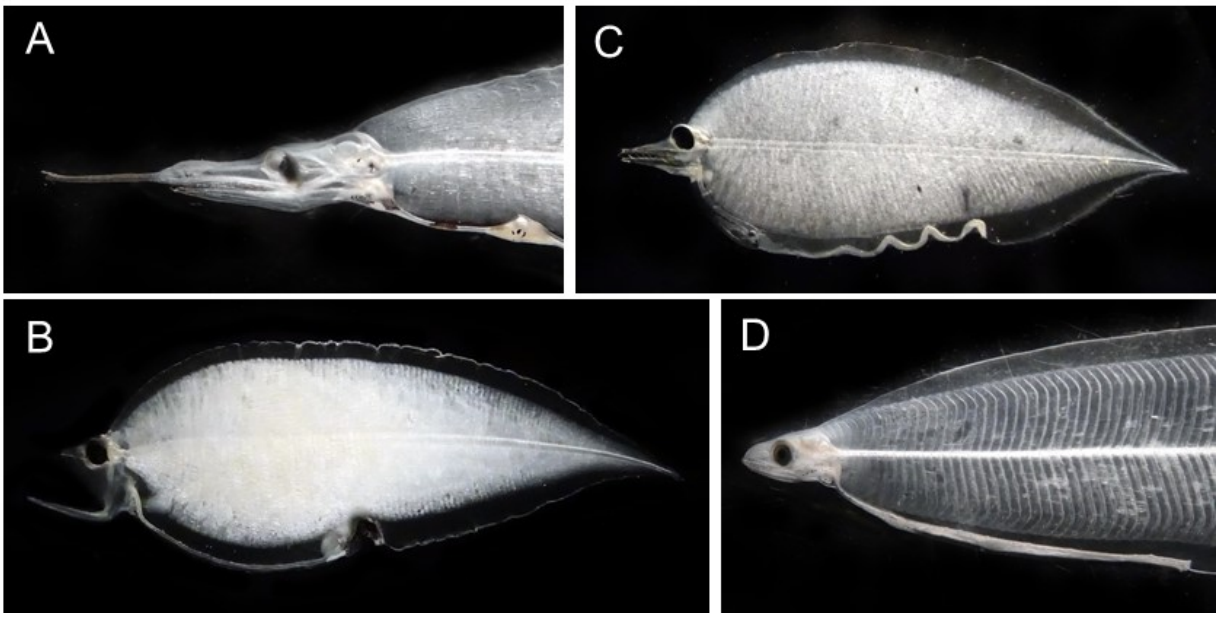

Figure 3. Photographs of various marine eel leptocephali collected during the WH404 survey in March and April of 2017 showing a 51 mm Illyophinae sp. C leptocephalus (A, no. 246), a 25,3 mm *Eurypharynx pelecanoides* leptocephalus (B, no. 906), a 26.2 mm *Cyema atrum* leptocephalus (C, no. 82), and a 53 mm *Kaupichthys hyoproides* leptocephalus (D, no. 185).

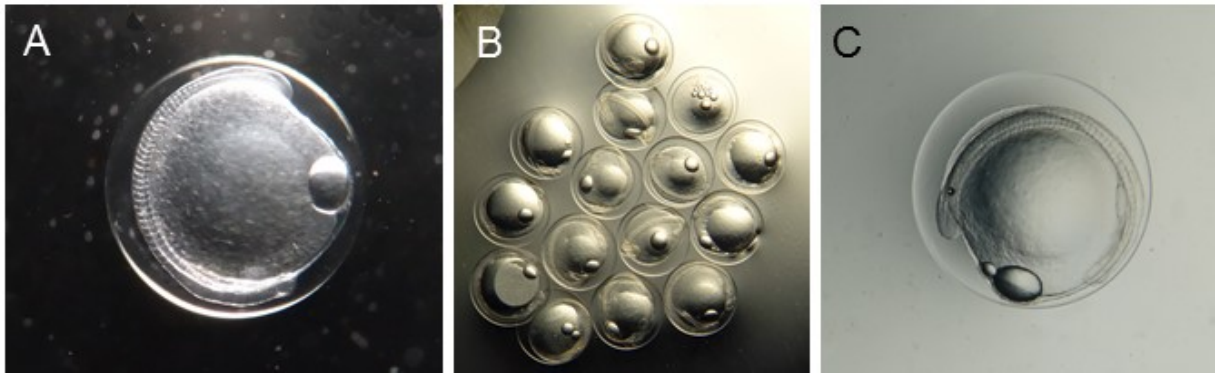

Figure 4. Photographs of a common type of large fish eggs that were collected in most IKMT deployments at the 2 station locations where depth-discrete sampling was conducted using the 5-net multisampling cod-end on the IKMT during the 3rd transect of the WH404 survey [Egg 6 (A), other eggs in the same tow (B), and Egg 8 from a different tow (C)]. Their morphology resembles anguilliform eggs, but are larger with less perivitelline space between the embryo and the egg wall than most anguillid eggs, suggesting they may be the eggs of a mesopelagic eel species. DNA sequencing will be used to identify what type of egg these are.

Satellite tagging of artificially matured eels

Ten artificially matured female European silver eels were tagged with X-Tag-Archival Pop-up-Tags (Microwave Telemetry Inc.) and released at two stations (Station 1: Southwest of the Azores (36°54'N, 30°46'W; 11.03.2017), Station 2: Central Sargasso Sea (25°30'N, 61°00'W; 30.03.2017)).

For a period of up to three months, the satellite tags will store information about water temperature, depth and light conditions, before they pop up to the surface and transmit the archived data. The received data will allow a detailed reconstruction of the individual behavior of eels during their spawning migration and within the spawning area (vertical migration behavior, temperature preference, migration route).

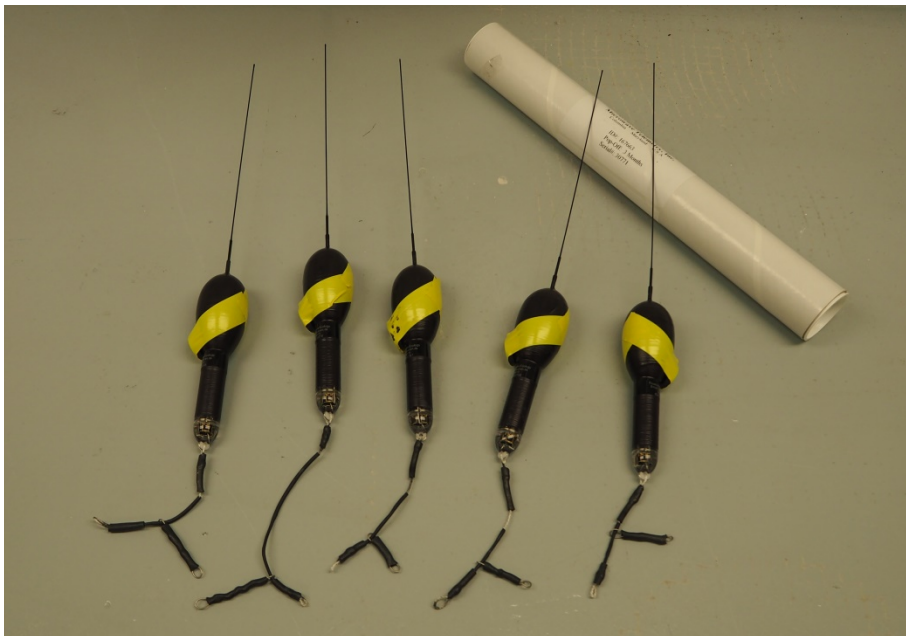

Figure 5. The satellite tags measure 120 mm in length (without antenna) and weigh 40g. (© Lasse Marohn)

Prior to release, the eels were artificially matured during several weeks by intramuscular injections of salmon pituitary extract. This hormone induces gonadal development in eels and leads to fully developed oocytes and spawning within about 20 weeks. The use of matured females for this tagging experiment should increase the likelihood that they show a direct swimming behavior towards the spawning place(s) and seek for their preferred hydrographic spawning conditions.

Information about the spawning behavior of European eels in the wild is very scarce and is usually derived from laboratory experiments. The outcome of this tagging study should provide *in situ* information about the swimming and spawning behavior of female eels in the Sargasso Sea and contribute to the localization of spawning sites and the identification of hydrographic conditions during spawning. The data receipt is expected latest by June 2017.

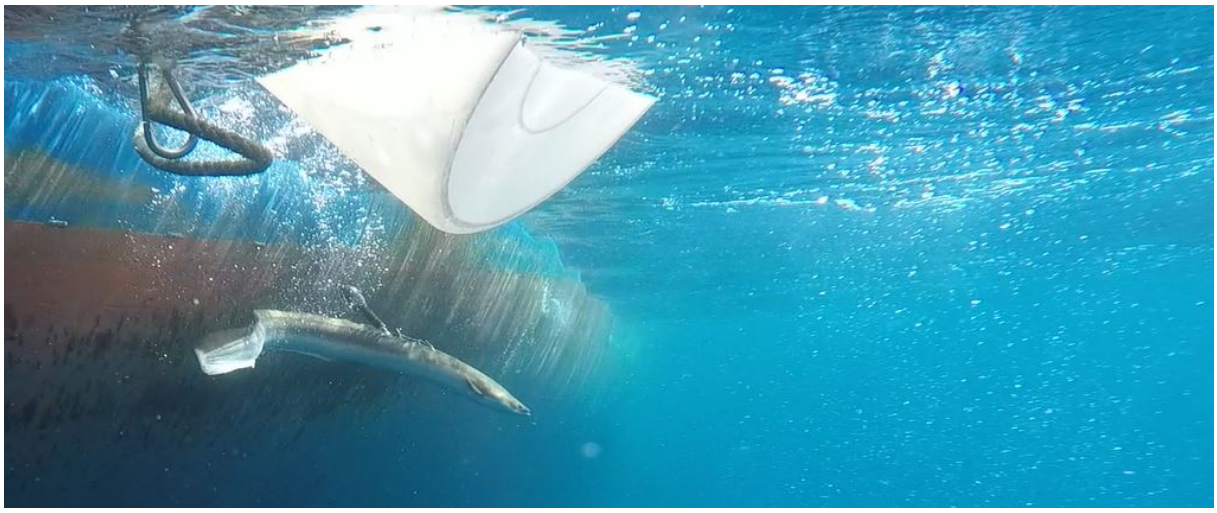

Figure 6. A tagged female eel immediately after release. (© Lasse Marohn)

Gelatinous meso- and macrozooplankton in the central Sargasso Sea

On-board approach

After joint sorting of plankton samples (and separation of all leptocephali), iconic and bigger gelatinous species, i.e. pyrosomes, scypho- and hydromedusae and ctenophores were measured in size (diameter or body length) and wet weight, and separately preserved in 5% borax-buffered formaldehyde. These specimens will be later in the lab re-scaled to generate species-specific shrinkage rates after fixation. More abundant and smaller species, such as siphonophores and doliolids were not considered in this but will be analysed in detail for horizontal mapping of biomasses.

Preliminary results and outlook

A total of 141 gelatinous zooplankton specimens were taken out of the samples and preserved in formalin (Table 1). Among the iconic gelatinous organisms, at least eight different species were identified. Therein, the most abundant order (Siphonophorae) was not selectively collected from the samples since their density was overwhelmingly high. However, a trend of higher abundances of siphonophores at the northern stations and higher densities of doliolids at the southern stations was obvious and has to be evaluated in detail. Two pleustonic hydrozoans, the Portuguese man o' war (*Physalia physalis*) and the sea raft (*Velella velella*) were observed and caught once during the cruise. At the Institute for Fisheries Ecology, the ethanol preserved plankton samples will be divided into halves using a modified Folsom plankton splitter and analysed. Figure 1 shows some of the species caught and photographed before fixation. Further results, including exact quantitative analyses of the distribution patterns within the fronts as well as novel size-weight-relationships of some species (e.g. pyrosomes) will be examined in detail in laboratories in Hamburg and Kerteminde (Denmark).

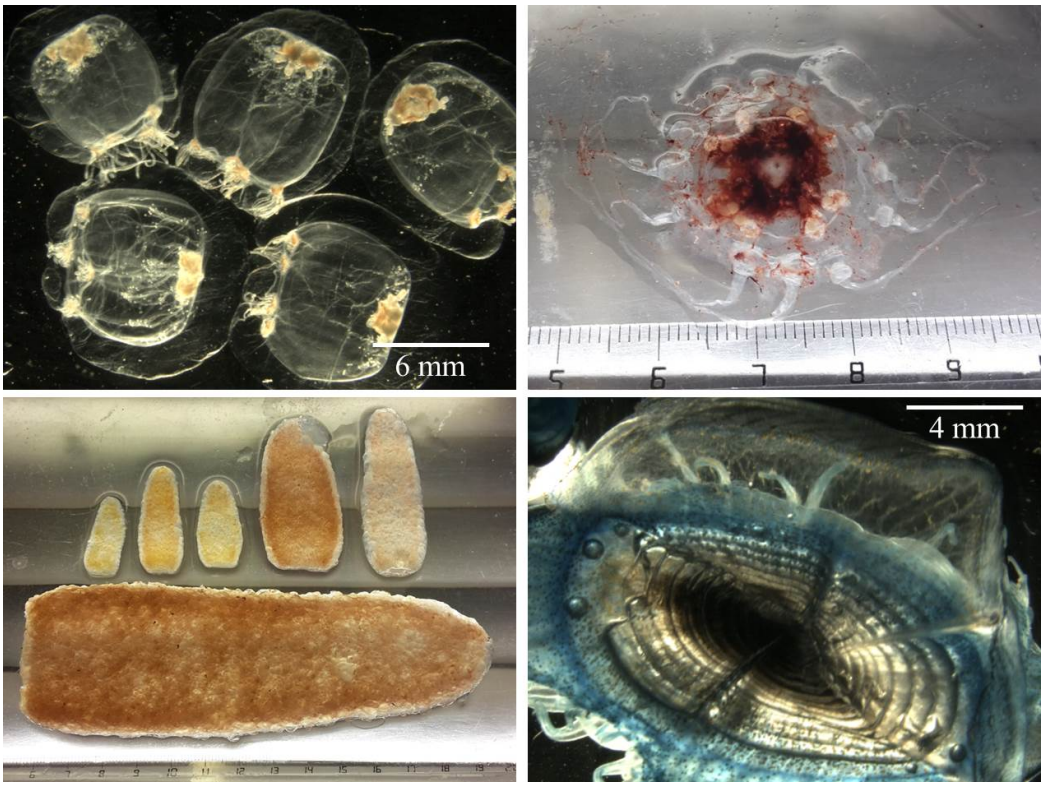

Figure 7. Some characteristic species of gelatinous zooplankton collected in the central Sargasso Sea (© Florian Lüskow), beginning in left upper corner: Transparent hydromedusae and a deep-living coronate jellyfish, various sized pyrosomes, and the pleustonic siphonophore *Velella velella*.

Table 1. Diversity and number of collected iconic gelatinous zooplankter.

Phylum	Class	Order	Number of species	Number
Cnidaria	Hydrozoa	Trachymedusae	2	16
Cnidaria	Hydrozoa	Anthomedusae	1	4
Cnidaria	Scyphozoa	Coronatae	3	11
Ctenophora	Nuda	Beroida	1	1
Chordata	Thaliacea	Pyrosomida	≥ 1	109

Sensory adaptation of the mesopelagic deep-sea fishes

Deep-sea fish inhabit one of the most extreme environments on earth – the tri-dimensional open ocean – in which they need to navigate, find a prey and successfully reproduce. During evolution, the sensory systems, such as vision or olfaction, became crucial elements for the fish survival. It is no wonder, that in deep-sea fishes we can find extreme adaptations to enhance vision in the virtual darkness, such as tubular, telescope or mirror eyes. Within the present research cruise, we performed sampling for the project focused on the deep-sea fishes and their sensory adaptations, particularly on the molecular mechanisms behind the deep-sea fish vision and olfaction.

Most of the deep-sea fishes live in the mesopelagic zone (200 – 1000 m of depth). Some of the species persist permanently at certain depth, while some others perform diel vertical movements to the shallower zone at night and back to the deeper zones during the day. Apart of that, migratory or not, most of the deep-sea fishes live in shallow waters during their larval stage. We aimed to cover both adult and larval stages of migratory and non-migratory deep-sea fish species by deploying different capture methods at different depths.

The sampling for the sensory genomics project was mainly focused on three different categories: 1) larval fish present in the epipelagic zone (0 – 200 m of depth) collected by the IKMT during day and night time, 2) adult mesopelagic fishes performing the diel vertical migration between shallow and deep water levels, collected by the IKMT in the shallow (epipelagic) zone only at night time, and, 3) mesopelagic fishes permanently staying in the deep sea, collected by the large mesopelagic trawl deployed in the depth of 600 – 1000 m. In total, over 200 larvae and 300 adult individuals (Tab. 2) have been sampled for the study of the sensory system adaptations. We specifically sampled eyes and olfactory epithelium for the analysis of the gene expression with the focus on the sensory-receptor genes (i.e. photoreceptors for vision and olfactory receptors for the sense of smell). For most of the individuals, we also preserved the entire body for the subsequent identification (both morphological and genetic screening). Collected samples were fixed in ethanol, RNAlater and para-formaldehyde solutions, or were stored in the deep freezer (-80°C) to preserve the entire specimens.

Following the project plan, we will analyze the collected samples in the molecular genetic laboratory. We will first identify the species (if morphology is not sufficient, we will use the DNA barcoding to compare with the database; we will also use genetic identification for the larvae). We will further sequence transcriptome, i.e. set of the expressed genes represented by the mRNA molecules in the receptor cells of the sensory tissue (retina and olfactory epithelium) to identify which of the receptors are actively used. Subsequently, we will try to interpret the sensory abilities of each species. We will further compare the ability of vision and smell between larvae and adults of the same species. Thanks to the thorough sampling on WHIII (see attached Table), we managed to cover substantial part of the fish diversity, which will presumably allow us to identify the general patterns of the sensory modifications putatively essential for the life in the deep sea.

Table 2. List of teleost fishes sampled in the Sargasso Sea for the sensory genomics study:

species	larval	adults	order	family	(older family)
unidentified		1	Anguilliformes	Nemichthyidae	
Saccopharynx/Eurypharynx sp.		4	Anguilliformes	Saccopharyngidae	
Gonostoma elongatum		11	Stomiatiformes	Gonostomatidae	
Diplophos sp. cf. madeirensis		1	Stomiatiformes	Gonostomatidae	
unidentified		4	Stomiatiformes	Gonostomatidae	
Cyclothone sp.		13	Stomiatiformes	Gonostomatidae	
Pollichthys mauli	1	5	Stomiatiformes	Phosichthyidae	
Vinciguerria sp.		4	Stomiatiformes	Phosichthyidae	
unidentified		1	Stomiatiformes	Phosichthyidae	
Sternoptyx sp.	1	2	Stomiatiformes	Sternoptychidae	
unidentified	3	18	Stomiatiformes	Sternoptychidae	
unidentified		1	Stomiatiformes	Stomiidae	Astronesthidae
Astronesthes indicus		1	Stomiatiformes	Stomiidae	Astronesthidae
Borostomias cf. antarcticus		1	Stomiatiformes	Stomiidae	Astronesthidae
unidentified		4	Stomiatiformes	Stomiidae	Astronesthidae
Chauliodus danae	1	18	Stomiatiformes	Stomiidae	Chauliodontidae
Idiacanthus fasciola	19	17	Stomiatiformes	Stomiidae	Idiacanthidae
unidentified		3	Stomiatiformes	Stomiidae	Malacosteidae
Aristostomias sp.		1	Stomiatiformes	Stomiidae	Malacosteidae
Photostomias		2	Stomiatiformes	Stomiidae	Malacosteidae
Malacosteus niger		3	Stomiatiformes	Stomiidae	Malacosteidae
Eustomias sp. 1		1	Stomiatiformes	Stomiidae	Melanostomidae
Eustomias sp. 2		1	Stomiatiformes	Stomiidae	Melanostomidae
Eustomias sp. 3 - cf. longibarba		1	Stomiatiformes	Stomiidae	Melanostomidae
Eustomias obscurus		1	Stomiatiformes	Stomiidae	Melanostomidae
Eustomias sp. 4		1	Stomiatiformes	Stomiidae	Melanostomidae
Eustomias sp. 5		1	Stomiatiformes	Stomiidae	Melanostomidae
Eustomias sp. 6		5	Stomiatiformes	Stomiidae	Melanostomidae
Grammatostomias flagellibarba		1	Stomiatiformes	Stomiidae	Melanostomidae
Photonectes sp.		1	Stomiatiformes	Stomiidae	Melanostomidae
unidentified		2	Stomiatiformes	Stomiidae	Melanostomidae
Photonectes parvimanus		1	Stomiatiformes	Stomiidae	Melanostomidae
Melanostomias tentaculatus		1	Stomiatiformes	Stomiidae	Melanostomidae
Melanostomias cf. valdiviae		1	Stomiatiformes	Stomiidae	Melanostomidae
Echiostoma barbatum		2	Stomiatiformes	Stomiidae	Melanostomidae
Photonectes sp.		4	Stomiatiformes	Stomiidae	Melanostomidae
Bathophilus cf. digitatus		2	Stomiatiformes	Stomiidae	Melanostomiidae
Bathophilus cf. vaillanti		3	Stomiatiformes	Stomiidae	Melanostomiidae
Bathophilus sp.	2		Stomiatiformes	Stomiidae	Melanostomiidae
unidentified		3	Stomiatiformes	Stomiidae	Stomiidae
unidentified	5		Stomiatiformes	???	
unidentified		1	Argentiniformes	Opisthoproctidae	
unidentified	1	4	Aulopiformes	Evermanellidae	
unidentified	2		Aulopiformes	Notosudidae	
Lestidiops jayakari	2		Aulopiformes	Paralepididae	
unidentified	13	1	Aulopiformes	Paralepididae	
Scopelarchus sp.	28	1	Aulopiformes	Scopelarchidae	
Gigantura sp.		1	Aulopiformes	Giganturidae	
unidentified	12	107	Myctophiformes	Myctophidae	
Nannobrachium wisneri? + atrum		21	Myctophiformes	Myctophidae	
Symbolophorus rufinus	1		Myctophiformes	Myctophidae	
Centrobranchus nigroocellatus	16		Myctophiformes	Myctophidae	
Diaphus mollis	1	3	Myctophiformes	Myctophidae	
Myctophus nitidulum		1	Myctophiformes	Myctophidae	
unidentified	3	1	Gadiformes	Bregmacerotidae	
Anoplogaster cornuta	2	1	Beryciformes	Anoplogasteridae	
Diretmus sp.	3		Beryciformes	Diretmidae	
Scopelogadus sp.		2	Beryciformes	Melamphaidae	
Poromitra crassiceps		2	Beryciformes	Melamphaidae	
Melamphaes		2	Beryciformes	Melamphaidae	
unidentified	5	32	Beryciformes	Melamphaidae	
Bryx sp.	4		Syngnathiformes	Syngnathidae	
unidentified	2		Scombriformes	Scombridae	
unidentified	6		Pleuronectiformes	???	
Paraexocoetus hillianus	1		Beloniformes	Exocoetidae	
unidentified	1		Beloniformes	Exocoetidae	
Antennarius	18		Lophiiformes	Antennariidae	
unidentified	1		Lophiiformes	Ceratoidei	
unidentified	7		Tetraodontiformes	???	
unidentified	5		ex-Perciformes	Bramidae	
Pseudoscopelus altipinnus		3	ex-Perciformes	Chiasmodontidae	
Epigonus pectinifer		3	ex-Perciformes	Epigonidae	
Diplospinus multistriatus	4	1	ex-Perciformes	Gempylidae	
unidentified	9		ex-Perciformes	Gempylidae	
unidentified	7		ex-Perciformes	Labridae	
Scombrolabrax heterolepis		3	ex-Perciformes	Scombrolabracidae	
unidentified	44		unidentified	unidentified	
TOTAL SAMPLED	230	337			

**Stomiidae (formerly recognized families Melanostomidae, Malacosteidae, Idiacanthidae, Stomiidae, Astronesthidae, Chauliodontidae)*

Particulate organic matter (POM)

The overview of POM biochemical composition and its associated microbiome will enable an insight into degradability of organic matter in Sargasso Sea and its availability for the higher trophic levels in the water column. Describing the microplanktonic community in the Sargasso Sea will provide an understanding of primary and secondary production and early life stages of American and European eels in this area.

Along the three transects samples were taken for POM biochemical and microbial communities composition assessment. The data about water column salinity, temperature, chlorophyll and oxygen were screened by CTD-probe, and the water samples were taken at the selected depths by two sets of Niskin bottles (5 L and 1.5 L). Suspended organic matter was separated from the water through multiple filtrations, collected on filters of different pore sizes (5, 1, 0.7, 0.2 µm), and preserved at -80˚C until analyses. Fatty acid analysis (FAME) will be performed by gas chromatography coupled with mass spectroscopy detection, and screening of the microbial communities composition, procariotic as well as eucariotic, will be performed by second generation sequencing techniques. Samples for microbial community's molecular analysis were taken at three depths: 10 m, deep chlorophyll maximum (DCM) and 300 m, while samples for POM chemical analysis were taken at DCM. In addition, samples were taken on every station for microplankton determination with the Apstein net (down to 200 m depth), phytoplankton count and Chlorophyll a measurement (5m and DCM). Microplankton will be counted and identified to group level with «Flowcam VS».

In total 317 samples were taken and stored as follows:

- Fatty acid analysis – **22** Samples
- Eucariotes – **48** Samples
- Particle attached bacteria – **34** Samples
- Free living bacteria - **17** Samples
- Microplankton Apstein – **36** Samples
- Phytoplankton – **72** Samples
- Chlorophyll – **72** Samples
- Leptocephalus gut content – **4** samples, NR. 1147 (*Anguilla anguilla*), 1149 (*Serrivomer beanii*), 1156 (*Anarchias similis*), 1170 (*Chilorhinus suensonii*)

These samples are stored at -80°C.

- Bacterial count, 15 mL formol fixed – **12** samples, stored in the +4˚C

Differences of the POM lipid profiles along the three transects will be compared and linked to the spatial variability of the microbial communities profile within the water column. Microbial analysis of the gut content will be assessed for four samples. Correlation between microplanktonic composition of each station and abundance of leptocephalus larvae will be figured out and described. Combined results are aimed to provide better insight into feeding ecology of leptocephalus larvae.

Participants

01 PD Dr. Reinhold Hanel	17.03. – 11.04. TI-FI (chief scientist)
02 Dr. Klaus Wysujack	03.03. – 11.04. TI-FI
03 Dr. Lasse Marohn	03.03. – 11.04. TI-FI
04 Marko Freese	17.03. – 11.04. TI-FI
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12 Louis Bergemann	17.03. – 11.04. Hamburg University

In the name of the scientific participants, I would like to thank Captain Hans-Otto Janßen and his crew for their support and cooperation throughout the entire trip.

Dr. Reinhold Hanel

Appendix:

List of stations:

Station	Date	Time (UTC)	Lat (°N)	Long (°W)	Gear
n.a.	11.03.2017	13:00	36°54'	30°46'	Eel release
220	21.03.2017	22:01	23°00'	64°00'	CTD 500m
220	21.03.2017	22:45	23°00'	64°00'	Apstein 300m
220	21.03.2017	23:19	23°00'	64°00'	IKMT 300m
221	22.03.2017	02:59	23°15'	64°00'	CTD 300m
222	22.03.2017	04:39	23°30'	64°00'	CTD 500m
222	22.03.2017	05:09	23°30'	64°00'	Apstein 300m
222	22.03.2017	05:42	23°30'	64°00'	IKMT 300m
223	22.03.2017	09:10	23°45'	64°00'	CTD 300m
224	22.03.2017	10:54	24°00'	64°00'	CTD 500m
224	22.03.2017	11:29	24°00'	64°00'	Apstein 300m
224	22.03.2017	13:30	24°00'	64°00'	IKMT 300m
225	22.03.2017	16:53	24°15'	64°00'	CTD 300m
226	22.03.2017	18:29	24°30'	64°00'	CTD 500m
226	22.03.2017	18:55	24°30'	64°00'	Apstein 200m
226	22.03.2017	19:40	24°30'	64°00'	IKMT 300m
227	22.03.2017	23:09	24°45'	64°00'	CTD 300m
228	23.03.2017	00:48	25°00'	64°00'	CTD 500m
228	23.03.2017	01:29	25°00'	64°00'	Apstein 200m
228	23.03.2017	02:26	25°00'	64°00'	IKMT 300m
229	23.03.2017	07:16	25°15'	64°00'	CTD 300m
230	23.03.2017	09:00	25°30'	64°00'	CTD 500m
230	23.03.2017	09:25	25°30'	64°00'	Apstein 200m
230	23.03.2017	10:25	25°30'	64°00'	IKMT 300m
231	23.03.2017	14:03	25°45'	64°00'	CTD 300m
232	23.03.2017	15:44	26°00'	64°00'	CTD 500m
232	23.03.2017	16:12	26°00'	64°00'	Apstein 200m
232	23.03.2017	16:52	26°00'	64°00'	IKMT 300m
233	23.03.2017	20:11	26°15'	64°00'	CTD 300m
234	23.03.2017	21:44	26°30'	64°00'	CTD 500m
234	23.03.2017	22:07	26°30'	64°00'	Apstein 200m
235	24.03.2017	02:27	26°45'	64°00'	CTD 300m
236	24.03.2017	04:23	27°00'	64°00'	CTD 300m
236	24.03.2017	04:48	27°00'	64°00'	Apstein 200m
237	25.03.2017	10:48	30°30'	64°00'	CTD 500m
237	25.03.2017	11:19	30°30'	64°00'	Apstein 200m
237	25.03.2017	12:09	30°30'	64°00'	IKMT 300m
238	25.03.2017	15:53	30°15'	64°00'	CTD 300m
239	25.03.2017	17:28	30°00'	64°00'	CTD 500m
239	25.03.2017	17:52	30°00'	64°00'	Apstein 200m
239	25.03.2017	20:14	30°00'	64°00'	IKMT 300m
240	26.03.2017	05:42	29°00'	64°00'	Pelagic trawl 600m
240	26.03.2017	10:46	29°00'	64°00'	CTD 1000m
240	26.03.2017	11:33	29°00'	64°00'	Apstein 200m
240	26.03.2017	12:17	29°00'	64°00'	IKMT 300m

241	26.03.2017	17:16	28°45'	64°00'	CTD 300m
242	26.03.2017	19:00	28°30'	64°00'	CTD 500m
242	26.03.2017	19:23	28°30'	64°00'	Apstein 200m
242	26.03.2017	20:08	28°30'	64°00'	IKMT 300m
243	27.03.2017	00:38	28°15'	64°00'	CTD 300m
244	28.03.2017	15:33	22°00'	61°00'	CTD 500m
244	28.03.2017	16:43	22°00'	61°00'	Apstein 200m
244	28.03.2017	16:48	22°00'	61°00'	IKMT 300m
245	28.03.2017	21:52	22°15'	61°00'	CTD 300m
246	28.03.2017	23:30	22°30'	61°00'	CTD 500m
246	29.03.2017	00:54	22°30'	61°00'	IKMT 300m
247	29.03.2017	04:56	22°45'	61°00'	CTD 300m
248	29.03.2017	06:33	23°00'	61°00'	CTD 500m
248	29.03.2017	07:03	23°00'	61°00'	IKMT 300m
249	29.03.2017	11:19	23°15'	61°00'	CTD 300m
250	29.03.2017	13:04	23°30'	61°00'	CTD 500m
250	29.03.2017	13:35	23°30'	61°00'	IKMT 300m
250	29.03.2017	16:11	23°30'	61°00'	Apstein 200m
251	29.03.2017	18:05	23°45'	61°00'	CTD 300m
252	29.03.2017	19:45	24°00'	61°00'	CTD 500m
252	29.03.2017	20:07	24°00'	61°00'	Apstein 200m
252	29.03.2017	20:49	24°00'	61°00'	IKMT 300m
253	30.03.2017	01:01	24°15'	61°00'	CTD 300m
254	30.03.2017	02:43	24°30'	61°00'	CTD 500m
254	30.03.2017	03:07	24°30'	61°00'	Apstein 200m
254	30.03.2017	03:42	24°30'	61°00'	IKMT 300m
255	30.03.2017	07:25	24°45'	61°00'	CTD 300m
256	30.03.2017	09:13	25°00'	61°00'	CTD 500m
256	30.03.2017	09:41	25°00'	61°00'	Apstein 200m
256	30.03.2017	10:30	25°00'	61°00'	IKMT 300m
257	30.03.2017	13:54	25°15'	61°00'	CTD 300m
258	30.03.2017	15:39	25°30'	61°00'	CTD 500m
258	30.03.2017	16:05	25°30'	61°00'	Apstein 200m
258	30.03.2017	16:50	25°30'	61°00'	IKMT 300m
259	30.03.2017	19:27	25°30'	61°00'	Eel release
259	30.03.2017	19:49	25°30'	61°00'	CTD 300m
260	30.03.2017	21:35	25°45'	61°00'	CTD 300m
261	30.03.2017	23:17	26°00'	61°00'	CTD 500m
261	31.03.2017	00:28	26°00'	61°00'	IKMT 300m
262	31.03.2017	04:05	26°15'	61°00'	CTD 300m
263	31.03.2017	05:58	26°30'	61°00'	CTD 500m
263	31.03.2017	06:31	26°30'	61°00'	Apstein 200m
263	31.03.2017	07:21	26°30'	61°00'	IKMT 300m
264	31.03.2017	11:09	26°45'	61°00'	CTD 300m
265	31.03.2017	12:55	27°00'	61°00'	CTD 500m
265	31.03.2017	13:25	27°00'	61°00'	Apstein 200m
265	31.03.2017	14:08	27°00'	61°00'	IKMT 300m
266	31.03.2017	17:55	27°15'	61°00'	CTD 300m
267	31.03.2017	20:12	27°30'	61°00'	CTD 500m

267	31.03.2017	20:36	27°30'	61°00'	Apstein 200m
267	31.03.2017	21:16	27°30'	61°00'	IKMT 300m
268	01.04.2017	00:57	27°45'	61°00'	CTD 300m
269	01.04.2017	02:36	28°00'	61°00'	CTD 500m
269	01.04.2017	03:00	28°00'	61°00'	Apstein 200m
269	01.04.2017	03:43	28°00'	61°00'	IKMT 300m
270	01.04.2017	21:59	28°30'	58°00'	CTD 500m
270	01.04.2017	22:23	28°30'	58°00'	Apstein 200m
270	01.04.2017	23:05	28°30'	58°00'	IKMT 300m
271	02.04.2017	02:33	28°15'	58°00'	CTD 300m
272	02.04.2017	04:15	28°00'	58°00'	CTD 500m
272	02.04.2017	04:42	28°00'	58°00'	Apstein 200m
272	02.04.2017	05:24	28°00'	58°00'	IKMT 300m
273	02.04.2017	08:53	27°45'	58°00'	CTD 300m
274	02.04.2017	10:29	27°30'	58°00'	CTD 500m
274	02.04.2017	10:57	27°30'	58°00'	Apstein 200m
274	02.04.2017	11:40	27°30'	58°00'	IKMT 300m
275	02.04.2017	15:04	27°15'	58°00'	CTD 300m
276	02.04.2017	16:37	27°00'	58°00'	CTD 500m
276	02.04.2017	17:01	27°00'	58°00'	Apstein 200m
276	02.04.2017	17:43	27°00'	58°00'	IKMT 300m
277	02.04.2017	21:07	26°45'	58°00'	CTD 300m
278	02.04.2017	22:36	26°30'	58°00'	CTD 500m
278	02.04.2017	23:10	26°30'	58°00'	Apstein 200m
278	02.04.2017	23:52	26°30'	58°00'	IKMT 300m
279	03.04.2017	03:18	26°15'	58°00'	CTD 300m
280	03.04.2017	04:52	26°00'	58°00'	CTD 500m
280	03.04.2017	05:22	26°00'	58°00'	Apstein 200m
280	03.04.2017	06:06	26°00'	58°00'	IKMT 300m
281	03.04.2017	09:45	25°45'	58°00'	CTD 300m
282	03.04.2017	11:17	25°30'	58°00'	CTD 500m
282	03.04.2017	11:46	25°30'	58°00'	Apstein 200m
282	03.04.2017	12:28	25°30'	58°00'	IKMT 300m
283	03.04.2017	16:14	25°15'	58°00'	CTD 300m
284	03.04.2017	17:45	25°00'	58°00'	CTD 500m
284	03.04.2017	18:11	25°00'	58°00'	Apstein 200m
284	03.04.2017	18:50	25°00'	58°00'	IKMT 300m
285	03.04.2017	22:26	24°45'	58°00'	CTD 300m
286	04.04.2017	00:01	24°30'	58°00'	CTD 500m
286	04.04.2017	00:26	24°30'	58°00'	Apstein 200m
286	04.04.2017	01:11	24°30'	58°00'	IKMT 300m
287	04.04.2017	05:42	24°15'	58°00'	CTD 300m
288	04.04.2017	07:20	24°00'	58°00'	CTD 500m
288	04.04.2017	07:46	24°00'	58°00'	Apstein 200m
288	04.04.2017	08:23	24°00'	58°00'	IKMT 300m
289	04.04.2017	21:08	25°30'	58°00'	CTD 500m
289	04.04.2017	23:00	25°30'	58°00'	IKMT-Multinet 300m
290	05.04.2017	03:17	25°30'	58°00'	IKMT-Multinet 300m
291	05.04.2017	09:01	25°30'	58°00'	CTD 500m

291	05.04.2017	09:21	25°30'	58°00'	Apstein 200m
291	05.04.2017	13:41	25°30'	58°00'	IKMT-Multinet 300m
292	05.04.2017	20:47	26°00'	58°00'	CTD 300m
292	05.04.2017	21:25	26°00'	58°00'	Apstein 200m
292	05.04.2017	21:48	26°00'	58°00'	CTD 500m
292	05.04.2017	23:58	26°00'	58°00'	IKMT-Multinet 300m
293	06.04.2017	03:58	26°00'	58°00'	IKMT-Multinet 300m
294	06.04.2017	09:28	26°00'	58°00'	CTD 500m
294	06.04.2017	09:45	26°00'	58°00'	Apstein 200m
294	06.04.2017	11:29	26°00'	58°00'	IKMT-Multinet 300m
295	06.04.2017	15:08	26°00'	58°00'	IKMT-Multinet 300m
296	06.04.2017	19:01	26°00'	58°00'	IKMT-Multinet 300m
297	06.04.2017	22:56	26°00'	58°00'	CTD 500m
297	07.04.2017	00:41	26°00'	58°00'	Pelagic trawl 600m
298	07.04.2017	12:57	26°00'	58°00'	CTD 1000m
298	07.04.2017	13:41	26°00'	58°00'	Apstein 200m
298	07.04.2017	14:56	26°00'	58°00'	IKMT-Multinet 600m
299	07.04.2017	19:08	26°00'	58°00'	IKMT-Multinet 600m
300	07.04.2017	23:18	26°00'	58°00'	Pelagic trawl 1000m