Summary from Tara campaigns reports (PANGAEA)

Focus on biological and environmental details/observations.
Each title is linked to the corresponding PDF (there are some missing).
Chief Scientist's name in square brackets.
Author's notes in curly brackets.

Stations 1-4

North Atlantic Ocean - Lorient, Lisbon and Tanger [Eric Karsenti]

September 2009

{No reports available}

Stations 5-7

Mediterranean Sea - Tanger to Algiers [Stephane Pesant]

September 2009

Three stations including the oligotrophic Alboran Sea Gyre (Station 5), the eutrophic coastal waters (600 m) north of the Gyre (Station 6), and offshore waters near Algiers (Station 7). {No further particular information about biology or environment from report}

Stations 8-10

Mediterranean Sea - Algiers to Barcelona [Christian Sardet]

September 2009

Two stations in 2 gyre areas clearly visible on the Mercator/Coriolis maps (Stations 8, 9), and a third station (which at first was supposed to be "light" but turned out to be "heavy"), was sampled on the way from the Baleares to Barcelona (Station 10) (this day there was a brief thunderstorm). The latter location is a reference open-water site called "D Station" by the Barcelona Marine Institute. Large organisms collected with the different nets: With some differences among stations, they were mainly large and small chaetognaths, heliozoans of many sizes, various embryos and larvae, and many species of copepods. In terms of "gelatinous" organisms, besides different species of moderately abundant jellyfishes (micro to 10 cm) the most prevalent organisms in the nets by far were Muggiaea-siphonophores which look like small rockets.

Stations 12-14

Mediterranean Sea - Nice to Naples [Marc Picheral]

October 2009

{No particular information about biology or environment from report}

Stations 15-23

Mediterranean Sea - Naples, Malta,Tripoli and Dubrovnik [...]

{No reports available}

Stations 24-26

Mediterranean Sea - Dubrovnik to Athens [Fabrice Not]

November 2009

Chlorophyll level was fairly high at the 3 stations.

Stations 27-28

Mediterranean Sea - The EYE of Levantine [among F.D'Ortenzio et al.]

December 2009

{No particular information about biology or environment from report}

Stations 29-30

Mediterranean Sea - ... [...]

{No reports available}

Stations 31-34

The Red Sea [Fabrice Not]

January 2010

Biologically, the Red Sea is divided in two parts. North of Jeddah, characterized by oligotrophic waters, and South of Jeddah by more loaded waters coming through the Bab-el-Mandeb straits. Waters are particularly warm and salty, exhibiting a south-north nutrients load gradient. Considering its geography, the Red Sea is considered as an evaporation basin.

Stations 36-40

Arabian Sea in the North Indian Ocean [Stephane Pesant, Antoine Sciandra]

March 2010

A special attention was given to the Oxygen Minimum Zone (OMZ) which is a recognized particularity of this part of the North Indian Ocean, as it constitutes the major reservoir of anoxic water of the global ocean.

Stations 41-43

North Indian Ocean, Mumbai and Male [Xavier Durrieu de Madron]

March-April 2010

Tropical Indian Ocean, north of the Equateur. The layer of OMZ that still appears in this part of the North Indian Ocean was sampled. It comprises two stations locations in the frontal zones – with cyclonic eddy and filaments – between the Arabian Sea surface waters and the slightly warmer and fresher water originating in the northeastern Indian Ocean and flowing west with the North Equatorial Current.

Stations 44-49

Indian Ocean, Male and St. Brandon (Mauritius) [Xavier Durrieu de Madron]

April 2010

Equatorial and south equatorial Indian Ocean. Open sea stations were carried out in the North Equatorial Current and the Equatorial Current systems (here, two core stations, Stations 45, 47). Coastal shallow stations were carried out in lagoons in the Gan (Maldives, Station 46) and Saint Brandon (Mauritius, Station 49) atolls.

Stations 50-54

South Indian Ocean, between the Islands of Mauritius, Reunion, Madagascar, and Mayotte [Colomban de Vargas]

May 2010

Four open ocean and one lagoon core stations were realized along the cruise track. The open ocean stations (Station 50-53) were located in different water bodies within the complex current system characterizing this poorly known part of the world oceans.

Stations 55-66

Indian Ocean - Madagascar to Cape Town [Gaby Gorsky]

{No reports available}

Stations 67-71

East Southern Atlantic Ocean, Capetown to Ascencion Island [Philippe Koubbi]

September 2010

The Benguela upwelling (Station 67), a meso-scale Agulhas ring (Station 68), the oligotrophic subtropical zone (Station 70), and the Trades - Eastern Tropical Atlantic Province (Station 71). See Villar et al., 2015 (Science).

Stations 72-76

South Atlantic Gyre - Ascension Island to Rio de Janeiro [Jean-Louis Jamet]

October 2010

To study the South Equatorial Current, the Brazil Current and the oligotrophic subtropical zone.

Stations 77-79

West South Atlantic - Rio de Janeiro to Buenos Aires [Nicole Poulton]

November 2010

Station 77 | Short station - Brazilian Coastal Current

Station 78 | Long station - Anticyclonic eddy

Station 79 | Short station - Eddy recirculation

The first two stations were relatively oligotrophic in nature based on physical and biological parameters. Further south into the convergence zone off the coast of Argentina the biomass within the samples increased dramatically (Station 79).

Stations 79b-83

South Atlantic Ocean - Buenos Aires to Ushuaia [Eric Karsenti]

November-December 2010

During the leg Buenos Aires-Ushuaia, we initially decided to choose 6 sampling spots: One on the continental shelf (Station 79b), one in an anticyclonic structure composed of warm water (Station 80), two in mixed cooler water masses (not done), one in the Malvinas current (Station 82). The Malvinas current carries cold water coming from the circumpolar jet. A final station on the continental shelf before sailing across the Le Maire strait (Station 83). The stations actually carried out and the course of TARA are shown on figure 3.

Stations 84-89

Sothern Ocean - Drake Passage and Weddell [Marc Picheral]

January 2011

This leg is the only Antarctic leg of the project. Main objectives: sampling North and South of the Polar front in the Drake canal, sample the Weddell open sea and deep waters, sample close to the ice shelf, sample above the continental shelf in the Weddell sea.

Station 84 | Positioned south of the Polar Front in the Antarctic zone.

Station 85 | Positioned in the deep waters of the Powell basin. It is supposed to sample in the place where the Weddell gyre exhaust waters to the North.

Station 86 | Lowest salinity. The station was the richest of all with a huge amount of diatom biomass, with a 35 m DCM of up to 7 mg/m3 of fluorescence chlorophyll. The CTD showed us that the surface waters were diluted by

melting ice suggesting enrichment by the elements from the ice while the Nitrates were consumed at the surface limiting the production above the nitracline. The UVP profiles revealed that the layers down to 200-300 m were dominated by large diatom chains that aggregated downward in large aggregates. Radiolarians were observed in the complete water column and collected in 500 m nets too. Mean average size increased significantly to the deep.
Station 87 | Placed in the shallow waters on the shelf east of the Peninsula in an ecosystem probably enriched by the bottom sediments. The water column was homogeneous down to this depth and the large diatoms dominated the ecosystem.
Station 88 | Positioned in the Antarctic sound where a deep basin is enclosed. Diatoms also dominated the ecosystem.
Station 89 | Performed north of the Drake passage.

Stations 90-92

South Pacific Ocean - Puerto Montt to Valparaiso [Chris Bowler]

{Reports available but absent in PANGAEA}
Humboldt Current System (HCS, or HC). Cold, low-salinity surface current moving northward that brings subantarctic waters mixed with waters from the south part of the South Pacific Gyre up onto the continental shelf of Chile. The associated wind-driven upwelling nourishes the plankton communities and makes the area off northern Chile and Peru the most productive fishing area in the world (>300g/m2/yr). The area is also of considerable interest for its prominent Oxygen Minimum Zone (OMZ), which is the shallowest OMZ in the world and can be very close to the surface. The OMZ is a characteristic feature of the Equatorial Subsurface Waters (ESSW) which feed the area from the north. (More background in the PDF)
Station 90 | 5 p.m. local time. TSG measurements indicated we were outside the HCS, as both salinity and temperature increased quite suddenly. We made a complete sampling from the surface, as well as a cast down to 100 m. The CTD cast showed a very pronounced DCM at 50 m, that corresponded to the MLD, oxygen maximum, and thermocline, with freshwater in the surface and HC influence in the subsurface water. No OMZ was apparent in this first 100 m of the water column, indicating that the area was not influenced by ESSW. The water column was also characterized by a broad shoulder of chlorophyll fluorescence between 20 and 40 m, and by an oxygen minimum below the DCM that could suggest high respiratory activity due to remineralization of aggregates sinking out of the DCM. The area was dominated by mixed diatom, dinoflagellate and copepod populations. Rhizosolenia, Pseudonitzschia and Cylindrotheca were particularly abundant.
Station 91 | UPW site sampled during the BIOSOPE cruise in 2004. Satellite observations at the site indeed indicated that it was rich in phytoplankton and had cooler temperatures. 10 a.m. local time. Pronounced OMZ at 90 m, indicating that the area was influenced by ESSW. Above this region, we can identify a salinity minimum characteristic of HC water between 25 and 50 m (low salinity), and higher salinities in the surface. The surface was very rich in plankton, especially gelatinous zooplankton, diatoms, and dinoflagellates.
Station 92 | Continental shelf, around 12 nm[1] from the coast with a depth of only 130 m (the previous 2 stations had depths around 4,000 m). The depth profile showed another contrasting
structure. Like Station 91 the site was strongly influenced by an OMZ, this time at 50 m depth. The DCM was closer to the surface, at 15 m, in surface waters that may be derived from HC (low salinity). The site was extremely rich in gelatinous zooplankton and phytoplankton, possibly dominated by a diatom bloom or by a chlorophyte. If a diatom, the dominant species may have been a Thalassionema, present in thick mats of chains in senescing condition. Skeletonema and Detonula were also certainly present in high numbers. Ceratium and Protoperidinium dinoflagellates were also observed.

Stations 93-97

South Pacific Ocean - Valparaiso to Easter Island [Lee Karp-Boss]

{No reports available in PANGAEA, although there should be one}

[1] One nautical mile equals 1,852 m (6,076.1 ft; 1.1508 mi).

Stations 98-102

South Pacific Ocean - Easter Island to Guayaquil [Stephane Pesant]

April 2011

Three contrasting systems were sampled, corresponding to the South Pacific Gyre (Stations 98 and 99), the Sub-Equatorial Waters (Stations 100 & 101) and the Coastal Upwelling Waters (Station 102). These also corresponded to contrasting conditions of plankton diversity as predicted by Mick Follow's model. Unfortunately, due to weather conditions, the Tropical Front Waters were not sampled.

Stations 103-109

South Pacific Ocean - Galapagos [Gaby Gorsky]

May 2011

{No reports available}

Stations 110-113

South Pacific Ocean - Guayaquil to Gambier [Nigel Grimsley]

May-June 2011

Three complete “plan A” stations (stations 110-112) plus a further station within the Mangareva lagoon once we reached Gambier (station 113). This station was necessarily limited to surface water (shallow lagoon).
Two transects, partly investigated previously, were completed. The interest in targeting these transects is that they span a contrasted range of environmental phytoplankton habitats and traverse important large scale oceanic features (see report).
Station 110 | The quantity and diversity of zooplankton revealed this station to lie within the most productive region of the PEQD, and little or no differences were revealed in the levels of zooplankton along the transect. Observations of planktonic species: dinoflagellates (Ceratium), ciliates, diatoms (Chaetoceros, Rhizolenia), Nauplius larvae, copepods...
Station 111 | Mesotrophic
Station 112 | Oligotrophic
We observed progressive diminution of the quantity of zooplankton as we progressed towards the centre of the gyre, while the pattern of diversity changed from many metazoans and crustaceans to a higher proportion of oligotrophy-adapted radiolarians (see image files for examples of species at different stations). A great diversity of colonial radiolaria (Collodaria) dominated the surface waters (Sphaerozoum, Thalassicolla and Collozoum). These colonies host hundreds and even thousands of microalgae (dinoflagellate?) stuck in the gelatinous matrix. This symbiotic association must be a successful strategy to face the poor-nutrient waters. The colony can measure several millimetres long.

Stations 114-121

South Pacific Ocean - Coralton [...]

June-July 2011

{Study on coral reefs ecosystems. No reports available}

Stations 122-125

South Pacific Ocean - Marquesas STEFI experiment [Fabrice Not]

July-August 2011

Characterizing the plume of biological activities observed by satellite chlorophyll images west of the Marquesas Islands. Basically, is iron the trigger for phytoplankton growth and if so where does the iron come from, island

drainage or upwelled water by turbulence created in the wake of the islands? What is the plankton community response (diversity and function) to the trigger? See submitted paper.
Station 122 | High nutrient low chlorophyll waters
Station 123-125 | Within the bloom

Stations 126-130

From South to North Pacific Ocean - Papeete to Honolulu [Xavier Durrieu de Madron]

August-September 2011

Cross of the intertropical and equatorial region around 150°W. It aims at sampling the major oceanic structures delimited by the different eastwardly south and north equatorial currents, the equatorial counter- and the undercurrents. It also surveyed the modifications of planktonic population associated with the N-S gradient in terms of dissolved oxygen in the mesopelagic layer as oxygen was depleted in the northern part of the section. The sampled stations formed a latitudinal transect ranging from 12°S and 12°N, with 3 long stations (at 6°S, equator, and 6° N, Stations 127, 128, 129) and 2 short stations (at 12°S and 12°N, Stations 126, 130). A few additional CTD casts were realized in between stations. The sampling stations were located close to large currents, based on the circulation maps. This was especially true at the equator where the strong shear between the surface drift and the equatorial undercurrent posed some problems to obtain the profiles. However, the section reproduced quite well the known hydrological N-S gradients.

Stations 131-135

North Pacific Ocean - ALOHA & Pacific plastic garbage patch [Isabelle Taupier Letage]

September-October 2011

Four long stations (131-133, 135) + one limited to the surface layer (134).
Station 131 | ALOHA. In oligotrophic conditions. The zooplankton population was clearly dominated by copepods (in nets).
Station 132 | Central part of the Northern Pacific gyre. In oligotrophic conditions. The zooplankton population was clearly dominated by copepods (in nets). High concentrations of plastic debris.
Station 133 | In the “old” cyclonic eddy spawned by the Californian Current
Station 134, 135 | Nearby stations in an upwelling area of the Californian Current. The planned position for station 134 happened finally not to be in an intense upwelling area. While we remained within ~6 nm distance (erratic current, very weak drift), the variability observed on temperature, salinity and chlorophyll was very high. During some time in the morning surface pumping there was a bloom of long diatoms, and all filters for HPLC surface and DCM were (dark) green. Later we entered a very important bloom of salps (large individuals as well as small individuals, colonies).

Stations 136-140

North Pacific Ocean - San Diego to Panama [Gabriele Procaccini]

November-December 2011

To study the Pacific equatorial system sampling in the NEC and the NECC. The area of the San Diego - Panama leg is also characterized by the presence of a shallow OMZ, which extends for almost the whole area covered by the cruise. A few problems made us cut the first proposed station, which was located in a coastal California upwelling cyclone. However, we performed 2 long stations (137 and 138) and 3 short stations (136, 139 and 140).
Station 136 | During the five consecutive days before, when the CTD were performed, we observed a clear evolution in the position of the DCM, the appearance of a second DCM at station 136 and the entrance in the anoxic zone. At station 136, we were in the North fringe of NEC, in the middle of a structure, with low chlorophyll and water coming from the subtropics. Zooplankton nets were full of jelly fishes. Bongo 300 from 500 m was very rich (including fishes and decapods).

Station 137 | Second DCM confirmed, and zero oxygen from 90-100 m to 900 m. Station 137 was in the middle of the NEC. In station 137 we sampled four depths: surface, DCM1, DCM2 and meso. We performed both day and night multinet, from which it was clear the scarcity of organisms in the anoxic zone, although few gelatinous organisms were present. Layers above the anoxic zone were full of a bloom of decapods, that resemble small lobsters (maybe juvenile stages). We collected 'lobsters' with all different types of nets. Due to the conditions of the sea, it was impossible to land on Clipperton.
Station 138 | Adverse weather conditions in the middle of the NECC. Oxygen went down to about 0.5 mg/l at 80 m depth, increased again at 200 m (1 mg/l) and reached zero at about 300 m.
Station 139 | In the middle of a structure with high maximum of chlorophyll ejected from the coast. During the night before the station we passed through very high surface chlorophyll values (about 1 mg/m3). Values were also high at the station, which was dominated by centric diatoms and small copepods. DCM was at 25 m with fluorescence values of 0.5.
Station 140 | The main goal was to collect the biodiversity and compare with the other side of the Panama Channel. There were not particular oceanographic features to characterize. Station 140 was performed on the edge of the slope rising from 1000 m depth. The station presented a DCM at about 25 m and was not particularly rich in zooplankton. The oxygen was at zero at about 200 m depth.
Summary: During the first half of the cruise we passed through an OMZ, where the zero oxygen limit was as shallow as 80 m. In the same area, we detected the presence of two DCMs, one in the shallow oxygenated layer, and the second inside the zero oxygen layer, which has been constantly present along about 400 nm. We think that this is of interest for further data analysis, in order to understand the nature and composition of the deep (no oxygen) DCM. This could reveal the existence of two different autotrophic communities adapted to different environmental conditions.

Stations 141-143

Caribbean Sea & Gulf of Mexico - Panama to Savannah [Emmanuel Boss]

December 2011 - January 2012

Trace the waters of the Western Boundary Current system of the Western North Atlantic as they circulate from the Caribbean Sea to the Gulf Stream. Two long stations (142, 143) and one short station (141). In general, along the approximated 2500 miles of our cruise, the waters got colder and saltier at the surface, while exhibiting overall very low chlorophyll concentrations.
Station 141 | A comparison with the station on the other side of the canal (140) suggests significant differences in all properties measured and, in particular, in oxygen. While anoxia is present in the Pacific side, it is not present in the Caribbean Sea.
In all the stations, temperature, salinity and nitrate are very similar at great depth, suggesting a single source of deep (900-1000 m) waters at all station locations. Changes in absolute values of the UVP are due to changes in gain setting.

Stations 144-145

North Atlantic Ocean - Gulf Stream [Lars Stemmann]

January-February 2012

The Gulf Stream (GS) feeds the widely spread North Atlantic bloom (mainly colonial diatoms) and thus it is of interest to determine if the bloom is ignited by cells belonging to coastal populations that are dispersed offshore by the current or if there is an open ocean diatom community that is living in the surface layer permanently or at depth that is re-entrained into the mixed layer during the late winter mixed layer deepening. Two long stations (144, 145) were performed. In general, along the approximated 1500 miles of our cruise, the waters got colder and saltier at the surface, while exhibiting variable chlorophyll concentrations.
Station 144 | We first targeted on the GS core, in the region downstream of Cape Hatteras where the GS reaches its maximum transport.

Station 145 | The second station was done in the waters resident north of the GS Northern Wall, to be able to have a good contrast with the first station environmental conditions. These waters are influenced by both the GS and the South Westward flowing slope water, fresher and colder. Rough sea conditions prevented us to work in two days period and we had to extend to three days. The drift was important.

Stations 146-147

North Atlantic Ocean - Sargasso Sea [Lee Karp-Boss]

February 2012

Western province of the North Atlantic Subtropical Gyre (NASG). Winter mixing to a depth of ~ 400 m occur almost every year in the northern part of the Sargasso sea; south of Bermuda, mixed layer rarely exceeds 100-150 m. Mesoscale eddies are ubiquitous physical features in the NASG, contributing to large heterogeneity in spatial and temporal distributions of biogeochemical parameters.

Original sampling program: two long stations, one within a cyclonic eddy (station 146) and the other at BATS. Due to bad weather we were not able to sample at BATS. Instead, we conducted a short station (surface only + night multinet) ~ 100 nm northwest of Bermuda (station 147), in an area that was not influenced by mesoscale eddies, to provide a contrast to station 146.

Station 146 | Long station, cyclonic eddy. Deep mixed layer at the surface (upper 200 m) and doming of 'isolines' of physical and chemical properties toward the bottom of the mixed layer in the center of the eddy. Surface chlorophyll concentrations were low, with slightly elevated concentrations at both 'edges' of the eddy compared to its core. Mesopelagic sampling to target the OMZ.

Station 147 | Short station. Location not associated with a clear mesoscale feature. Water temperature at the mixed layer and at any given depth were higher at station 147 compared to station 146. Salinity profile suggests the presence of mode water[2] at station 147 at ~ 220 m, similar to what we observed in CTD profiles from the northern edge of the eddy. Surface chlorophyll concentrations were slightly higher at station 147 compared to station 146.

Stations 148-151

North Atlantic Ocean - Bermuda to Azores [Chris Bowler]

February-March 2012

North Atlantic Subtropical (NAST) gyre, one of the great oligotrophic ocean deserts. There is a transition zone where different water masses converge on the resident Atlantic Central Waters within the heart of the gyre, such as cyclonic Gulf Stream eddies and downwelling anticyclonic eddies of unclear origin. Objectives: sample at (1) BATS, (2) in the transition zone between the eastern and western boundaries of the NAST gyre, and (3) in another area of convergence between the Azores Current and the Subtropical Converge south of the Azores. During this leg, this transition region was rich in eddies of both signs. Cold cyclonic eddies import nutrients up into the euphotic zone, whereas warm anticyclonic eddies carry phytoplankton-rich, nutrient depleted water down below the photic zone.

Station 148 | BATS. Three layered watermass structure, fresh and warm surface waters. No DCM and surface chlorophyll always low (<0.1 mg/l), but MLD was at around 150 m. General lack of phytoplankton, with Rhizaria (forams and radiolarians) being present at a higher proportion than usual, and otherwise a balance of diversity between dinoflagellates, diatoms, and ciliates. Trichodesmium was also observed. Zooplankton catches were also characterized by a low biomass.

Station 149 | Transition zone, western side. Filtration of the surface water revealed that it was quite rich in brown phytoplankton smaller than 20um, and light microscopy observations revealed a diverse but balanced community of diatoms, dinoflagellates, forams, ciliates, tintinnids, and radiolarians, with some haptophytes (Phaeocystis, Scyptosphaera and an unknown coccolithophore) and silicoflagellates (Dictyochophyceae).

Station 150 | Transition zone, eastern side. Part of an interesting anticyclonic eddy with characteristics of NAST-E water, contrasting with the previous stations. It was also localized on the Mid-Atlantic Ridge at 3000 m depth,

[2] A particular type of water mass, which is nearly vertically homogeneous. Its vertical homogeneity is caused by the deep vertical convection in winter.

contrasting with the previous two stations that were at much greater depths. The water column profile was indeed very different. SST had decreased to 18°C, and mode water was no longer evident. Instead we found meso-depth water of a lower temperature that was richer in nitrate. MLD was at around 100 m, and a weak but broad DCM was evident (0.15 mg/m3 between 30 and 60 m). The zooplankton nets were generally rich in fish larvae and juveniles, as well as many copepods (including blue ones). In surface samples there were many small copepods, and the dominant phytoplankter was a dinoflagellate looking like Alexandrium/Goniodoma/Linulodinium, together with Trichodesmium colonies. The DCM was also rich in dinoflagellates, but of a large variety of species, together with other groups of phytoplankton including diatoms and a colonial green alga (Thalospheara).
Station 151 | South of the Azores. Convergence area between the Azores Current and STC. The Secchi disk showed that this site had the most transparent surface water of all our sampling sites. DCM at 80 m. Surface and DCM communities were similar, with a wide variety of dinoflagellates greater than 20 um being the most dominant. Several different genera were observed, including Prorocentrum, Phalacroma, Ornithocercus, Dinophysis, Ceratium, Amphisolenia and Oxytoxum. At the DCM multiple life stages were observed including spores, perhaps signifying the end of a bloom cycle.
The transect data was examined by Ocean Data View (ODV), which confirmed the transition nature of the area examined. In parallel with the decreases in temperature and salinity, we observed general increases in nitrate and oxygen throughout the water column.

Stations 152-154

North Atlantic Ocean - Winter bloom experiment [Eric Karsenti]

March 2012

Topical experiment ABtlanTiK in order to investigate the implications of the deep convection on the adaptation and short-term plasticity of plankton (mainly phytoplankton) metabolic activities, i.e. are they photoacclimated to each depth? Or is mixing overcoming photoacclimation?
Station 152 | ABtlanTiK – Deep convection experiment – phase I «before the wind event»
Station 153 | ABtlanTiK – Deep convection experiment – phase II «after the storm»
Station 154 | Symbolic CTD cast at the location of the first station of the Tara-Oceans expedition

Stations 155-163

North Atlantic Ocean & Start of Arctic section [Lionel Guidi]

May 2013[3] - June 2013

Three very different stations have been sampled.
Station 155 | Area of high productivity, with chains of diatoms.
Station 158 | On the edge of an Anticyclonic eddy, next to the North Atlantic Current (NAC). The station was done in the anticyclonic eddy with chlorophyll ‘a’ values lower than the surrounding waters.
Station 163 | On the edge of a cyclonic eddy, high productivity. Chlorophyll ‘a’ values from the flow through system reached a maximum of 23 mg/m3. From preliminary analysis we think it was a Phaeocystis bloom {confirmed in metaB}.

Stations 167-181

Arctic section - Murmansk to Dudinka [Lee Karp-Boss]

June-July 2013

Barents and Kara seas. Five main stations that included the full sampling program (but not 3 depths in all of them either because they were in shallow water or lacked distinct features such as the chlorophyll max). Our transect across the Barents Sea into the Kara Sea encompassed the water masses characteristics of this area, namely Atlantic water (S ≥ 35, T >2), Arctic water (T < 0; 34.3<S<34.8) and modified Atlantic-Arctic water, so called Barents Sea water (34.7 < S < 35; - 1.5C < T < 2C).

[3] There is a ~1 year gap between Tara Oceans and Tara Polar Circle

- Barents Sea -
Surface chlorophyll concentrations were generally low (< 0.5 mg/m3), and pronounced subsurface chlorophyll maximum was present only in the south west section. In the north eastern section, stratification was weaker and subsurface chlorophyll maximum was smaller in magnitude (or absent). Initial survey of station data suggests post bloom conditions at the time of this leg (low phytoplankton biomass, heterotrophic dominated communities).
Station 168 | Largely represented by dinoflagellates.
Station 175 | A mixture of diatoms (primarily Thalassiosira), Phaeocystis and dinoflagellates. Copepods appeared to be the dominant grazers.
- Kara Sea -
Station 173 | 'Ice' edge station. Northeastern part of the Kara Sea, on a shallow part of the shelf (50 m). Higher diversity of protists, with high abundance of centric (oceanic) and pennate (ice and possibly benthic too) diatoms as well as Phaeocystis. Surface chlorophyll was ~1 mg/m3 and increased toward the bottom; subsurface chlorophyll max was absent. Cells did not look 'healthy' and there were a lot of aggregates suggesting post bloom conditions.
Station 178 | Located near the slope separating the inner and outer shelf of the Kara Sea. This station was characterized by very low biomass of autotrophs and high concentrations of aggregates and appendicularians.
Station 180 | Shallow water (20-40 m) and we supplemented core measurements with higher resolution sampling (from flowthrough) for CDOM, DOC, O18, FCM, FlowCAM, HPLC and nutrients to characterize the signatures of the Yenisei river.

Stations 188-191

Arctic section - Dudinka to Pevek [Pascal Hingamp]

August-September 2013

Three seas mostly above the north shelf of the eurasian continent: the Kara, Laptev and East Siberian seas
Station 188 | 'Ice' edge station. Sharp shallow halocline around 15 m. A clear 4-6 mg/m3 chlorophyll 'a' maximum was observed around 15-20 m during the whole day. Thalassiosira sp., Chaetoceros sp., and another chain forming diatom. Examination of live samples under the macroscope revealed the absence of grazers in both the surface and DCM samples. The concentration of CDOM was the lowest out of the three stations. Analysis on the Accuri indicated the presence of large amounts of particles with similar fluorescent and scattering properties. The abundance of this population was similar throughout the water column.
Station 189 | Nansen Basin. A consistent DCM was observed at around 20-25 m below surface, with a stable peak around 2.5 mg/m3 chlorophyll 'a'. Chaetoceros sp. dominated phytoplankton population. In contrast to the previous station, there were large copepods in both surface and DCM net samples (as seen under the macroscope). CDOM concentration was greater than station 188, however less than at station 191. Sample analysis on the Accuri showed two distinct populations, both of which were at their highest concentration in the DCM.
Station 191 | East Siberian Sea, shallow station. Uniform mixed layer. Abundant Chaetoceros sp. CDOM concentration was slightly higher than at station 189. However, we transited through an area of high CDOM concentration between stations 189 and 191. The Accuri detected a population of fluorescent particles that was near uniform with depth. Examination of net samples under the macroscope revealed abundant small copepods.

Stations 193-196

Arctic section - Pevek to Tuktoyaktuk [Emmanuel Boss]

September 2013

Objectives: Sample the waters of the East Siberian, Chukchi and Beaufort Seas. Sample the Pacific waters coming through the Bering Straits into the Arctic. Sample both near and away from the ice pack.
Station 193 | Shallow station (40 m deep), near Wrangel Island. The water structure: two distinct layers with a DCM in between them.
Station 194 | Near the ice-edge, at 80 m of water near a canyon flowing from the Chukchi plateau into the Arctic basin. This station was characterized by a shallow mixed layer (10 m deep) overlying waters of increasing salinity and density (with a temperature maximum at 25 m). The DCM was located between 35 and 45 m.

Station 196 | Barrow Canyon, 430 m depth. Multiple layers.
As time was running out for our leg, we sailed due East with the intention of doing three more short stations in the Beaufort Sea (with the middle one at the ice edge). We found very different plankton population in the surface waters near the ice (mostly needle like diatoms) vs. the areas far from the ice (dominated by small rounded cells, ciliates, flagellates).

Stations 200-207

Arctic section - Tuktuyaktuk to Disko Bay [Lars Stemmann]

September-October 2013

Areas with relatively high fluorescence at all stations, saline water and a 'large' range of surface temperature. The three SURF layers were sampled in a temperature range of -1.6 to 1.4 and an increasing salinity as we sailed west toward more Atlantic water.
Station 201 | Lancaster Sound during two quiet days of ice forming conditions (very cold SST = -1.5°C, small pancakes forming on sea surface). A DCM was clearly observed at 40-50 m depth. The station was very rich in phytoplankton and zooplankton.
Station 205 | East of the continental shelf off Pond Inlet. SST was -0.5°C and the mixed layer was pronounced down to 40 m depth. No DCM is detected and numerous spikes are observed in the MLD. Overall, this station was very rich in phytoplankton that clogged the 200µm WP2. Zooplankton (copepods, amphipods, chaetognaths and beroe) was very abundant mostly in the deep nets.
Station 206 | Ummannaq fjord, inside the deep basin of the Fjord. The bathymetry was around 700 m deep. The rosette cast in the evening showed a 0-40 m depth MLD with high fluorescence and then a rapid decline. There is no obvious DCM. Over all, the station was not very rich as indicated by the absence of strong clogging of the nets and the use of only two jars for the zooplankton Regent and Bongo nets. Zooplankton was not abundant in the 0-100 m WP2 suggesting deep population.

Stations 208-210

Arctic section - Disko Bay to Quebec [Eric Karsenti]

October 2013

Areas with a range of surface salinity and temperature. The DCM was not sampled because it was absent.
Station 208 | Close to the glacier ice (SST=3°C), no DCM. Flagellates and copepods were found in surface bongo sample.
Station 209 | Continental shelf in the Northward Greenland current. SST was 2.4°C. No clear DCM is detected. Bottom was at about 500 m. This station was rich in small diatoms and relatively high number of phytoplankton. Less copepods than in station 208 were observed.
Station 210 | In the middle of the northern part of the Labrador Sea. Diatoms different from station 209, not as many copepods as in first station.

---End of the expedition---