CRUISE REPORT 64PE368

CHARLET-4

24 April – 3 May 2013

Ship	**: RV Pelagia**
Cruise Name	**: CHARLET** - Changes in resource limitation and energy transfer
Cruise Number	**: 64PE368**
Cruise Period	**: 24 April – 3 May 2013**
Port of departure	**: Texel, NL**
Port of return	**: Texel, NL**
Responsible Institute	**: Royal Netherlands Institute for Sea Research (NIOZ)** **Landsdiep 4, 1797 SZ 't Horntje, Texel, The Netherlands**
Chief Scientist	**: Dr. C. P.D. Brussaard** **Dept. Biological Oceanography, NIOZ**

Acknowledgements

We like to express special thanks to Captain Pieter Kuijt and the crew of the R/V Pelagia. Furthermore, we thank Sander Asjes for onboard technical assistance, and Sharyn Ossebaar (NIOZ-Nutrient Lab) for nutrient analysis. We thank the NIOZ-Marine Research Facilities (MRF), NIOZ-Marine Technology (MT; Yvo Witte and Marcel Bakker) and NIOZ-Data Management (DMG) for on-shore support. The cruise was supported by the Research Council for Earth and Life Sciences (ALW) with financial aid from the Netherlands Organisation for Scientific Research (NWO).

CONTENT

Project abstract

- CHARLET -
Primary Production in the North Sea:
CHAnges in Resource Limitation and Energy Transfer

Primary production by phytoplankton provides the basis of marine food webs and is strongly determined by nutrient and light availability. Measures against eutrophication have mainly led to a reduction in phosphorus inputs into coastal seas like the North Sea, whereas nitrogen and silica loadings were much less reduced. This has resulted in major changes in the relative availability of different nutrients, and there is currently substantial disagreement whether phytoplankton growth in coastal waters is limited by nitrogen, phosphorus, or light. Furthermore, resource-mediated changes in the cellular composition of phytoplankton will have major implications for their nutritional quality for zooplankton, with effects that may cascade throughout the entire aquatic food web.

In this project, we will determine the limiting factors for phytoplankton growth in the North Sea, and how these limiting factors affect the food quality and species composition of the phytoplankton. We use novel approaches to assess in-situ resource limitation using stable isotope labeling, and implement the results of these studies in competition models describing phytoplankton growth in the North Sea. Furthermore, we investigate how the transfer of primary production to the classical zooplankton-based food web versus the viral loop is affected by shifts in the phytoplankton community and their food quality.

As part of the Dutch ZKO (Sea, Coast and Ocean) competitive funding program we will investigate how changes in resource limitation affect phytoplankton communities, and consequently energy transfer, in the North Sea. The project runs for 4 years (2011-2015).

The project combines mathematical models, laboratory studies and field work during cruises with the R/V Pelagia in two contrasting areas of the North Sea: the productive coastal area with relatively high nutrient inputs from rivers and the central North Sea with much reduced nutrient levels especially during summer. The project involves 4 cruise in the North Sea during spring and summer, of which the current one is the forth and last cruise. The proposed work will offer key insights into the impact of changes in resource limitation on the carrying capacity of the North Sea.

Project Introduction and Objectives

Phytoplankton fix large amounts of CO_2 and account for almost half of the total primary production on Earth. These photosynthetic microorganisms make up the base of the marine food web and provide more than 99% of the organic matter used by marine food webs (Fig. 1). Phytoplankton production sets upper limits to both the overall activity of the pelagic food web and the quantity of organic carbon exported downwards. The nature and activity of the phytoplankton community are strongly influenced by physical and chemical factors that determine their light and nutrient availability. Phytoplankton losses by viral infection-induced death, grazing and sinking, however, restrain primary production and are thus equally important for ocean ecosystem productivity. These controlling processes influence the cycling of energy and biogeochemically relevant elements each very differently, directly affecting the production/respiration ratio of the ocean and the efficiency of the biological pump. As nicely formulated by Kirchman (1999), "how phytoplankton die largely determines how other marine organisms live". Phytoplankton biomass that sinks from the euphotic zone has a strong impact on carbon sequestration in the oceans, whereas grazed algae are channelled to higher trophic levels. Viral lysis directly affects the standing stock of dissolved organic carbon which forces the food web towards a more regenerative pathway.

The carrying capacity of ecosystems can be defined as the number of organisms or biomass at a given trophic level (e.g. primary producers, herbivores, carnivores) that can be sustained by the environment. Nitrogen availability is often thought to be the main limiting factor for primary production in the sea. However, management measures against eutrophication have mainly led to reduction in phosphorus (P) concentrations, whereas nitrogen (N) inputs were much less reduced or remained at similar levels (Turner et al 2003). This has induced major shifts in the N:P:Si ratios of coastal seas such as the North Sea and may have resulted in a shift from N limitation to P limitation. Surprisingly, long-term studies on phytoplankton biomass in the North Sea indicate an increase in phytoplankton biomass since the 1990s, especially in coastal areas, which appear to be related to an improved light climate. As phytoplankton play a central role in marine food webs, identification of the limiting resource for phytoplankton growth (N, P or light) is essential for our understanding of the North Sea ecosystem.

It is well-known that changes in nutrient and light availability affect both the biochemical composition and species composition of phytoplankton. Resource-mediated changes in phytoplankton stoichiometry have major implications for their nutritional quality for zooplankton, with effects on nutrient and energy transfer that may cascade throughout the entire aquatic food web. Moreover, a substantial fraction of phytoplankton production is not transferred to the classical food web, but regenerated within the microbial loop as viral infections are an important loss term for phytoplankton. Changes in resource limitation of the North Sea are thus likely to affect the phytoplankton species composition and their biochemical composition, which in turn may strongly determine whether primary production is either utilized by zooplankton and transferred to higher trophic levels or is lost in the viral loop.

In this project, we determine the limiting factors for phytoplankton growth in the North Sea and how changes in limiting resources affect the cellular composition, ecological stoichiometry and species composition of the plankton community. Based on recent developments in stable isotope labeling and analysis, it is now possible to study the biosynthesis of all major cellular compounds in organisms. We use these new methods to study in-situ nutrient and light limitation, and how this affects phytoplankton and zooplankton stoichiometry in the North Sea. In addition, we will develop competition models and perform competition experiments to establish how changes in resource limitation of the North Sea affect phytoplankton community composition. Furthermore, we investigate to what extent changes in phytoplankton species composition and their nutritional quality (cellular composition) will affect trophic transfer efficiency of nutrients and energy to zooplankton grazing versus viral lysis. For instance, viruses are P-rich compared to zooplankton, such that reduced P contents in phytoplankton might result in shifts from virus attacks to more intense zooplankton grazing. We will study these processes in two contrasting areas of the North Sea: the coastal area with generally higher nutrient concentration due to direct inputs from rivers and the central North Sea with much reduced nutrient levels especially during summer.

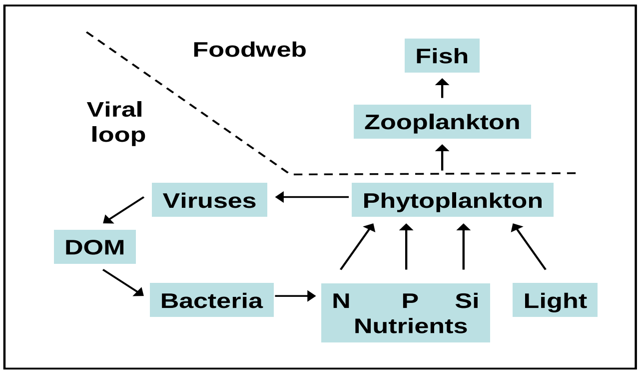


Fig 1. Integration of processes studied in this project. We will investigate how changes in resource availability affect the biochemical composition and species composition of the phytoplankton, and the subsequent transfer of phytoplankton production to the classic food web and the viral loop.

Within the CHARLET project the **following hypotheses are formulated**:

i. The first hypothesis that will be tested is that changes in nutrient and light (co-)limitation lead to predictable changes in the stoichiometry of North Sea phytoplankton species. We will exploit these relationships to study which resources limit phytoplankton growth, during different times of the year and at different locations in the North Sea.
ii. The second hypothesis is that changes in resource limitation have a major impact on the phytoplankton species composition of the North Sea. Some of these shifts in species composition will be straightforward to predict. For instance, it seems likely that poor competitors for phosphorus will disappear under severe phosphorus limitation. However, other changes in species composition will be more difficult to predict, because of the high dimensionality of the plankton community. In particular, we hypothesize that phytoplankton competition for three limiting resources (nitrogen, phosphorus, and light) may lead to multiple alternative stable states in community composition, through the formation of coalitions among the competing species.
iii. The third hypothesis implies that changes in phytoplankton stoichiometry have major consequences for the structure and functioning of the food web and therefore for the carrying capacity of the North Sea. Changes in phytoplankton stoichiometry will be traced into the cellular composition of zooplankton.
iv. The fourth main hypothesis predicts that changes in phytoplankton stoichiometry, due to alterations in resource limitation, will directly and indirectly affect grazing and viral mediated mortality rates, thereby impacting ecosystem functioning and carrying capacity. The requirements for viral production are P-controlled, and thus a change from N to P limitation of phytoplankton growth will promote the relative importance of zooplankton grazing as dominant loss factor.

v. The last hypothesis states that viral activity will modify the cellular composition of their phytoplankton host, which will subsequently affect the nutritional value of the host for grazers as well as the biogeochemical fluxes of C, N and P upon cell lysis.

The above mentioned hypotheses translate into the **following main objectives of the CHARLET** project:

1. To study the effect of resource limitation on the physiology and biochemical composition of representative phytoplankton and zooplankton species from the North Sea in laboratory cultures. We will implement a novel technique using stable isotopes to identify resource limitation in phytoplankton, first in the lab and then in the North Sea (NIOZ-YE).
2. To investigate how changes in nitrogen, phosphorus and light limitation affect phytoplankton competition and community structure (UvA).
3. To examine how changes in resource limitation and the biochemical composition of the phytoplankton affect the transfer of primary production to zooplankton grazing versus the viral loop (NIOZ-TX).
4. To determine phytoplankton abundance, physiology, composition, and primary production in the nutrient-limited central North Sea and the more eutrophic Dutch coastal waters. (NIOZ/UvA).

The main participants in the project are:

- Netherlands Institute of Sea Research – Yerseke (NIOZ-YE): Dr. Eric Boschker, PhD-student Julia Grosse.
- University of Amsterdam (UvA): Prof. Jef Huisman, PhD-student Amanda Burson.
- Netherlands Institute of Sea Research – Texel (NIOZ-TX): Dr. Corina Brussaard, PhD-student Paul O’Connor.

The CHARLET-4 cruise 2013

We studied during April-May the biology of plankton (with a major focus on phytoplankton) in the North Sea, along a transect from coastal waters to central North Sea water. This cruise was undertaken as part of larger integrated study with the main merit of assessing the production, composition and losses of phytoplankton in order to determine the limiting factors for phytoplankton growth in the North Sea and study how these limiting factors affect the food quality and species composition of the phytoplankton. This is the first of four cruises, during spring and summer. The cruise track is shown in Figure 2. Station details in Table 1 and the participant and crew list in Table 2.

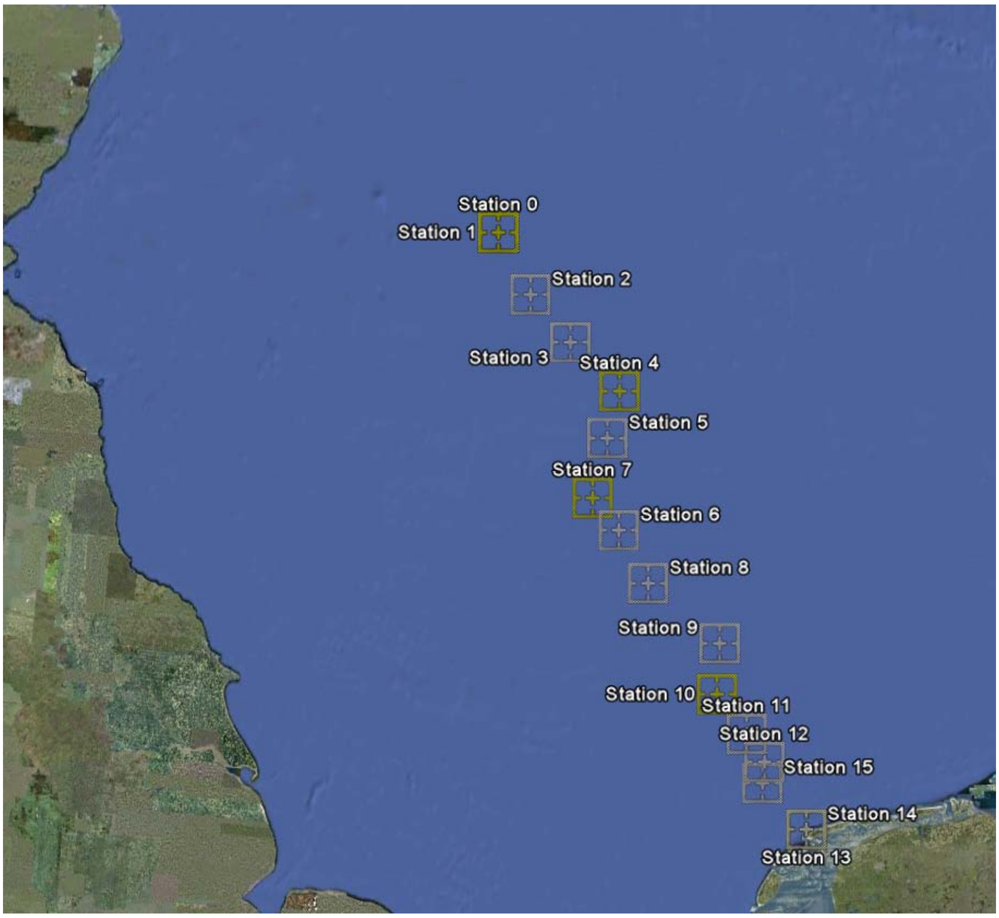


Fig. 2. Cruise track CHARLET-1, summer 2011. This cruise was longer in duration. During the present CHARLET-4 cruise, April-May 2013, we have sampled from south to north stations 13, 11, 10, 8, 7, 4, 2, and 1 (alike CHARLET-2).

Table 1. Station details CHARLET–4, 64PE368 cruise with R/V Pelagia.

Date	***Time (UTC) (+2h)***	***Latitude (deg. min.milli)***	***Longitude (deg. min.milli)***	***Device name***	***Station-cast***
24/04/2013	19:45:25	N 53° 24' 6.934''	E 5° 8' 39.494''	CTD	13-1
24/04/2013	20:04:11	N 53° 24' 9.634''	E 5° 8' 44.372''	Vertical Net 200	13-2
24/04/2013	20:08:58	N 53° 24' 8.957''	E 5° 8' 42.95''	Vertical Net 200	13-3
24/04/2013	20:13:04	N 53° 24' 8.41''	E 5° 8' 42.756''	Vertical Net 200	13-4
25/04/2013	4:04:54	N 53° 24' 7.384''	E 5° 8' 41.096''	CTD	13-5
25/04/2013	4:46:14	N 53° 24' 7.564''	E 5° 8' 40.646''	CTD	13-6
25/04/2013	6:23:02	N 53° 24' 6.426''	E 5° 8' 41.143''	CTD	13-7
25/04/2013	6:58:00	N 53° 24' 7.034''	E 5° 8' 41.903''	CTD	13-8
25/04/2013	8:08:26	N 53° 24' 8.006''	E 5° 8' 39.498''	Vertical Net 200	13-9
25/04/2013	8:13:53	N 53° 24' 8.827''	E 5° 8' 41.456''	Vertical Net 200	13-10
25/04/2013	8:16:32	N 53° 24' 9.292''	E 5° 8' 38.947''	Vertical Net 200	13-11
25/04/2013	8:19:08	N 53° 24' 8.795''	E 5° 8' 36.035''	Vertical Net 200	13-12
25/04/2013	11:10:35	N 53° 24' 7.463''	E 5° 8' 40.682''	RAMSES underwater light	13-13
25/04/2013	12:00:01	N 53° 24' 7.585''	E 5° 8' 39.991''	CTD	13-14
25/04/2013	18:58:58	N 53° 55' 13.224''	E 4° 36' 2.927''	CTD	11-1
25/04/2013	19:58:40	N 53° 55' 11.95''	E 4° 36' 7.168''	Vertical Net 200	11-2
25/04/2013	20:04:55	N 53° 55' 11.748''	E 4° 36' 6.79''	Vertical Net 200	11-3
25/04/2013	20:10:59	N 53° 55' 13.062''	E 4° 36' 5.627''	Vertical Net 200	11-4
26/04/2013	4:01:35	N 53° 55' 11.24''	E 4° 36' 0.59''	CTD	11-5
26/04/2013	6:04:09	N 53° 55' 11.888''	E 4° 35' 59.179''	CTD	11-6
26/04/2013	8:06:35	N 53° 55' 10.661''	E 4° 36' 3.582''	Vertical Net 200	11-7
26/04/2013	8:13:24	N 53° 55' 10.988''	E 4° 36' 7.744''	Vertical Net 200	11-8
26/04/2013	8:19:05	N 53° 55' 12.526''	E 4° 36' 9.875''	Vertical Net 200	11-9
26/04/2013	8:24:49	N 53° 55' 11.136''	E 4° 36' 8.892''	Vertical Net 200	11-10
26/04/2013	11:10:48	N 53° 55' 11.219''	E 4° 36' 2.142''	RAMSES underwater light	11-11
26/04/2013	12:07:14	N 53° 55' 11.665''	E 4° 36' 1.181''	CTD	11-12
26/04/2013	19:15:25	N 54° 7' 45.62''	E 4° 19' 44.281''	CTD	10-1
26/04/2013	19:52:25	N 54° 7' 48.594''	E 4° 20' 3.75''	Vertical Net 200	10-2
26/04/2013	20:01:07	N 54° 7' 47.87''	E 4° 20' 2.234''	Vertical Net 200	10-3
26/04/2013	20:08:50	N 54° 7' 46.2''	E 4° 19' 59.452''	Vertical Net 200	10-4
27/04/2013	4:00:44	N 54° 7' 47.734''	E 4° 19' 48.047''	CTD	10-5
27/04/2013	4:43:23	N 54° 7' 47.86''	E 4° 19' 48.77''	CTD	10-6
27/04/2013	6:04:00	N 54° 7' 47.917''	E 4° 19' 47.262''	CTD	10-7
27/04/2013	7:05:32	N 54° 7' 48.752''	E 4° 19' 48.742''	CTD	10-8
27/04/2013	8:07:35	N 54° 7' 48.486''	E 4° 19' 48.299''	Vertical Net 200	10-9
27/04/2013	8:15:51	N 54° 7' 47.698''	E 4° 19' 48.929''	Vertical Net 200	10-10
27/04/2013	8:24:29	N 54° 7' 48.389''	E 4° 19' 48.835''	Vertical Net 200	10-11
27/04/2013	8:31:40	N 54° 7' 48.745''	E 4° 19' 47.878''	Vertical Net 200	10-12

27/04/2013	11:11:51	N 54° 7' 48.569''	E 4° 19' 50.999''	RAMSES underwater light	10-13
27/04/2013	12:01:03	N 54° 7' 47.762''	E 4° 19' 49.267''	CTD	10-14
27/04/2013	12:52:39	N 54° 7' 48.094''	E 4° 19' 48.731''	Boxcore d=300	10-15
27/04/2013	19:03:04	N 54° 43' 10.128''	E 3° 40' 47.237''	CTD	8-1
27/04/2013	20:00:29	N 54° 43' 9.757''	E 3° 40' 47.446''	Vertical Net 200	8-2
27/04/2013	20:04:22	N 54° 43' 9.732''	E 3° 40' 54.059''	Vertical Net 200	8-3
27/04/2013	20:22:38	N 54° 43' 7.496''	E 3° 40' 48.292''	Vertical Net 200	8-4
27/04/2013	20:25:28	N 54° 43' 9.563''	E 3° 40' 48.713''	Vertical Net 200	8-5
27/04/2013	20:29:01	N 54° 43' 10.7''	E 3° 40' 50.614''	Vertical Net 200	8-6
28/04/2013	4:01:17	N 54° 43' 11.993''	E 3° 40' 48.914''	CTD	8-7
28/04/2013	6:02:40	N 54° 43' 13.141''	E 3° 40' 50.959''	CTD	8-8
28/04/2013	8:05:22	N 54° 43' 12.551''	E 3° 40' 56.557''	Vertical Net 200	8-9
28/04/2013	8:09:16	N 54° 43' 11.611''	E 3° 40' 57.079''	Vertical Net 200	8-10
28/04/2013	8:13:15	N 54° 43' 9.548''	E 3° 40' 56.683''	Vertical Net 200	8-11
28/04/2013	8:18:01	N 54° 43' 5.873''	E 3° 41' 4.862''	Vertical Net 200	8-12
28/04/2013	11:07:00	N 54° 43' 10.286''	E 3° 40' 24.542''	RAMSES underwater light	8-13
28/04/2013	11:34:45	N 54° 43' 27.581''	E 3° 41' 4.232''	RAMSES underwater light	8-14
28/04/2013	12:03:52	N 54° 43' 12.738''	E 3° 40' 50.153''	CTD	8-15
28/04/2013	19:01:03	N 55° 10' 13.552''	E 3° 9' 3.55''	CTD	7-1
28/04/2013	20:03:43	N 55° 10' 25.835''	E 3° 9' 21.553''	Vertical Net 200	7-2
28/04/2013	20:10:36	N 55° 10' 28.286''	E 3° 9' 45.702''	Vertical Net 200	7-3
28/04/2013	20:17:33	N 55° 10' 30.929''	E 3° 9' 50.756''	Vertical Net 200	7-4
29/04/2013	4:01:53	N 55° 10' 11.878''	E 3° 8' 59.726''	CTD	7-5
29/04/2013	4:42:28	N 55° 10' 12.54''	E 3° 9' 0.083''	CTD	7-6
29/04/2013	6:01:08	N 55° 10' 11.24''	E 3° 9' 0.745''	CTD	7-7
29/04/2013	7:15:11	N 55° 10' 9.538''	E 3° 9' 3.391''	CTD	7-8
29/04/2013	8:08:45	N 55° 10' 11.701''	E 3° 9' 3.607''	Vertical Net 200	7-9
29/04/2013	8:14:18	N 55° 10' 10.261''	E 3° 9' 8.982''	Vertical Net 200	7-10
29/04/2013	8:19:07	N 55° 10' 9.466''	E 3° 9' 16.387''	Vertical Net 200	7-11
29/04/2013	8:24:26	N 55° 10' 7.702''	E 3° 9' 22.644''	Vertical Net 200	7-12
29/04/2013	11:10:39	N 55° 10' 9.48''	E 3° 8' 58.07''	RAMSES underwater light	7-13
29/04/2013	11:37:15	N 55° 10' 10.805''	E 3° 9' 1.048''	CTD	7-14
29/04/2013	19:00:14	N 55° 44' 25.224''	E 3° 22' 51.398''	CTD	4-1
29/04/2013	20:07:26	N 55° 44' 22.812''	E 3° 22' 49.066''	Vertical Net 200	4-2
29/04/2013	20:15:04	N 55° 44' 24.569''	E 3° 22' 57.889''	Vertical Net 200	4-3
29/04/2013	20:22:43	N 55° 44' 22.837''	E 3° 22' 55.513''	Vertical Net 200	4-4
30/04/2013	3:59:04	N 55° 44' 24.144''	E 3° 22' 48.54''	CTD	4-5
30/04/2013	6:03:31	N 55° 44' 23.629''	E 3° 22' 48.23''	CTD	4-6
30/04/2013	8:03:06	N 55° 44' 23.618''	E 3° 22' 45.185''	Vertical Net 200	4-7
30/04/2013	8:12:44	N 55° 44' 25.469''	E 3° 22' 50.002''	Vertical Net 200	4-8
30/04/2013	8:22:31	N 55° 44' 25.829''	E 3° 22' 54.912''	Vertical Net 200	4-9

30/04/2013	8:31:44	N 55° 44' 26.588''	E 3° 22' 52.712''	Vertical Net 200	4-10
30/04/2013	11:01:56	N 55° 44' 23.554''	E 3° 22' 55.906''	RAMSES underwater light	4-11
30/04/2013	11:37:58	N 55° 44' 23.071''	E 3° 22' 52.766''	CTD	4-12
30/04/2013	19:38:29	N 56° 34' 49.188''	E 2° 10' 12.846''	CTD	1-1
30/04/2013	20:29:19	N 56° 34' 49.332''	E 2° 10' 20.248''	Vertical Net 200	1-2
30/04/2013	20:43:39	N 56° 34' 56.287''	E 2° 10' 26.551''	Vertical Net 200	1-3
01/05/2013	3:59:35	N 56° 34' 48.475''	E 2° 10' 12.238''	CTD	1-4
01/05/2013	4:39:52	N 56° 34' 48.22''	E 2° 10' 13.318''	CTD	1-5
01/05/2013	5:58:34	N 56° 34' 48.457''	E 2° 10' 12.007''	CTD	1-6
01/05/2013	6:59:31	N 56° 34' 51.308''	E 2° 10' 8.746''	CTD	1-7
01/05/2013	8:06:52	N 56° 34' 48.691''	E 2° 10' 11.114''	Vertical Net 200	1-8
01/05/2013	8:19:26	N 56° 34' 49.915''	E 2° 10' 12.713''	Vertical Net 200	1-9
01/05/2013	11:08:53	N 56° 34' 50.138''	E 2° 10' 16.763''	RAMSES underwater light	1-10
01/05/2013	12:06:49	N 56° 34' 49.339''	E 2° 10' 12.511''	CTD	1-11
01/05/2013	18:58:33	N 56° 14' 59.532''	E 2° 30' 0.13''	CTD	2-1
01/05/2013	20:17:13	N 56° 14' 56.497''	E 2° 30' 3.794''	Vertical Net 200	2-2
01/05/2013	20:32:24	N 56° 14' 55.118''	E 2° 29' 50.575''	Vertical Net 200	2-3
01/05/2013	20:43:43	N 56° 14' 54.521''	E 2° 29' 39.53''	Vertical Net 200	2-4
02/05/2013	3:57:44	N 56° 14' 59.737''	E 2° 30' 0.094''	CTD	2-5
02/05/2013	6:00:51	N 56° 14' 59.579''	E 2° 30' 0.274''	CTD	2-6
02/05/2013	8:05:03	N 56° 14' 59.737''	E 2° 29' 59.219''	Vertical Net 200	2-7
02/05/2013	8:16:09	N 56° 14' 58.783''	E 2° 29' 58.405''	Vertical Net 200	2-8
02/05/2013	8:27:02	N 56° 15' 0.414''	E 2° 30' 0.403''	Vertical Net 200	2-9
02/05/2013	8:36:46	N 56° 14' 58.999''	E 2° 30' 0.032''	Vertical Net 200	2-10
02/05/2013	11:08:29	N 56° 15' 3.197''	E 2° 30' 1.692''	RAMSES underwater light	2-11
02/05/2013	12:03:38	N 56° 15' 1.793''	E 2° 29' 56.886''	CTD	2-12

Table 2. R/V Pelagia Cruise CHARLET-4 Participants and Crew listing.

PARTICIPANTS LIST	In alphabetic order
Name	**Institute/University**
Corina Brussaard	NIOZ-TX, Chief Scientist
Larissa Akil	UvA
Sander Asjes	NIOZ-TX
Eric Boschker	NIOZ-YE
Amanda Burson	UvA
Richard Doggen	NIOZ-TX
Sander Fokkes	NIOZ-TX
Julia Grosse	NIOZ-YE
Haico van Heuzen	NIOZ-TX
Kirsten Kooijman	NIOZ-TX
Anna Noordeloos	NIOZ-TX
Paul O'Connor	NIOZ-TX
Sharyn Ossebaar	NIOZ-TX
Maayke Stomp	UvA
Tom Vaes	UvA

CREW LIST	
John Ellen	Master
Bert Puijman	Ch. Officer
Jaap Seepma	Ch. Engineer
Alle Fockema	2nd Officer
Inno Meijer	2nd Engineer
Iwan den Breejen	Cook
Cor Stevens	Bosun
Roel vd Heide	AB
Jose Vitoria	AB
Martin de Vries	AB
Lukas Riesthuis	Steward-O/S

Water samples were taken using the Sea-Bird SBE 32 sampler carousel, NIOZ hexagon frame, equipped with 24 Niskin type water samplers of 12 liters each, internal springs, and the Sea-Bird SBE11+ deckunit with NMEA navigational input. PC running Seasave 7.21d. The following underwater sensors were used: Sea-Bird SBE911+ pumped underwater unit with single temperature sensor, single conductivity sensor, SBE43 dissolved oxygen sensor, Chelsea Technology Aquatracka III fluorometer, Wetlabs C-star 25 cm transmissometer and bottom sensing altimeter.
The underwater light spectrum was studied using a RAMSES instrument (see for more detail furtheron in cruise report). Furthermore, a vertical net was used to collect the larger sized mesozooplankton (>200 µm mesh size).
Besides direct sampling of the upper water column and short-termed (max 24 h) on-board incubation, on-deck incubations using 5 L bottles were conducted for up to 5 days. Additionally, optical measurements were obtained and the ship's continuous Aquaflow system from a depth of 3 m (detecting temperature, salinity, optical back scatter, and fluorescence) was and will be used for validation, adaptation and testing new satellite products for Chlorophyll and primary production retrieval.

In total 8 locations were sampled (stations), during which 40 CTD casts, 9 Ramses profiles and 55 vertical net hawls have been performed. Only some of measurements could be analysed on board (e.g. macronutrients, direct counts of phytoplankton, physical and optical variables). Numerous samples were stored for later analysis at the home laboratories.

Detailed description of the different scientific activities can be found in the following section.

Scientific activities (per variable):

Nutrient measurements

- Sharyn Ossebaar –

Summary
Nutrients were analysed in a thermo-stated lab container equipped with a QuAAtro Continuous Flow Analyser, measuring approximately 485 samples during the cruise. Measurements were made simultaneously on four channels for Phosphate, Ammonium, Nitrite, and Nitrate with Nitrite together. All measurements were calibrated with standards diluted in low nutrient seawater (LNSW) in the salinity range of the North Sea stations.

Equipment and methods

Sampling and Measuring

Sample seawater was obtained from the CTD rosette sampler from all depths required and from incubation experiments. All CTD samples were collected in 125ml polypropylene bottles. The bottles were rinsed three times with the seawater before being fully filled. In the lab container the nutrient samples were filtered over a 0.2µm Acrodisc filter into 5ml polyethylene vials, (also known as 'ponyvials') rinsing three times, and stored in the dark at 4°C until analysis. Prior to analysis, all samples were brought to lab temperature of 21.2°C in about one to two hours and then covered with parafilm to avoid gas exchange and evaporation before being placed in the auto-sampler. All analyses were done within 18 hours on the auto-analyzer, a SEAL QuAAtro autoanalyzer using a sample rate of 60 samples per hour. The QuAAtro uses an LED instead of a lamp as a light source to avoid the noise effect of the movements of the ship on the light source and therefore on the baseline. Calibration standards were diluted from stock solutions of the different nutrients in 0.2µm filtered low nutrient seawater (LNSW) and were freshly prepared every day. The LNSW is surface seawater depleted of most nutrients; it is also used as baseline water for the analysis between the samples. Each run of the system had a correlation coefficient of at least 0.9999 for 10 calibration points, but typical 1.0000 for linear chemistry. The samples were measured from the lowest to the highest concentration in order to keep carry-over effects as small as possible, i.e. from surface to deep waters. Concentrations were recorded in 'µmol per liter' (µM/L) at the container temperature of 21.2°C. During every run a daily freshly diluted mixed nutrient standard, containing silicate, phosphate and nitrate (a so-called nutrient cocktail), was measured in triplicate. The cocktail was used as a guide to monitor the performance of the analyzer.

Analytical Methods

The colorimetric methods used are as follows:

Ortho-Phosphate (PO_4) reacts with ammonium molybdate at pH 1.0, and potassium antimonyltartrate is used as an inhibitor. The yellow phosphate-molybdenum complex is reduced by ascorbic acid and measured at 880 nm (Riley & Murphy, 1962).

Ammonium (NH_4) reacts with phenol and sodiumhypochlorite at pH 10.5 to form an indo-phenolblue complex. Citrate is used as a buffer and complexant for calcium and magnesium at this pH. The color is measured at 630 nm. Koroleff, 1969 and optimized by W. Helder and R. de Vries, 1979.

Nitrate plus nitrite (NO_3+NO_2) is mixed with an imidazol buffer at pH 7.5 and reduced by a copperized cadmium column to nitrite. The nitrite is diazotated with sulphanylamide and naphtylethylene-diamine to a pink colored complex and measured at 550 nm. Nitrate is calculated by subtracting the nitrite value of the nitrite channel from the 'NO3+NO2' value. (Grasshoff et al, 1983)
Nitrite (NO_2) is diazotated with sulphanylamide and naphtylethylene-diamine to a pink colored complex and measured at 550 nm. (Grasshoff et al, 1983)
Silicate (Si) reacts with ammonium molybdate to a yellow complex, after reduction with ascorbic acid; the obtained blue silica-molybdenum complex is measured at 800 nm. Oxalic acid is added to prevent formation of the blue phosphate-molybdenum (Strickland & Parsons, 1968). Silicate will be performed in the nutrient laboratory of the NIOZ after the cruise.

Calibration and Standards. Nutrient primary stock standards were prepared at the NIOZ.
Phosphate: by weighing Potassium dihydrogen phosphate into a calibrated volumetric PP flask to make 1mM PO_4. Nitrate: weighing Potassium nitrate into a calibrated volumetric PP flask set to make 10mM NO_3. Nitrite: weighing Sodium nitrite into a calibrated volumetric PP flask set to make 0.5mM NO_2. Silicate: by weighing Na_2SiF_6 into a calibrated volumetric PP flask to make 19.80mM Si.
All standards were stored at room temperature in a 100% humidified box. The calibration standards were prepared daily by diluting the separate stock standards, using three electronic pipettes, into four 100ml PP volumetric flasks (calibrated at the NIOZ) filled with low nutrient sea water LNSW. The blank values of the LNSW were measured onboard and added to the calibration values to get the absolute nutrient values. Our standards are regularly monitored by participating in inter-calibration exercises from ICES and Quasimeme and even more recently from the RMNS exercise organised by Michio Aoyama from MRI, Japan.

Statistics of the analysis during this cruise:
The standard deviation of 10 3rd level calibrant samples measured in one run:

	Stdev	Average Value (µM/L)
PO4:	0.004 µM/L	0.714
NH4:	0.074 µM/L	3.59
NO3 + NO2:	0.032 µM/L	15.73
NO2:	0.006 µM/L	0.766

The standard deviation of the NIOZ Cocktail (1008) diluted 250 times measured between different runs:

	Stdev	Average Value (µM/L)	N
PO4:	0.009 µM/L	0.909	36 (Diluted 250 times)
NO3 +NO2:	0.045 µM/L	13.83	36 (Diluted 250 times)

The standard deviation of the deepest sample duplicate measured between two different runs:

	Stdev	N duplicates
PO4:	0.017 µM/L	40
NH4:	0.021 µM/L	40
NO3 +NO2:	0.040 µM/L	40
NO2:	0.003 µM/L	40

Method Detection Limits. The method detection limit was calculated during the cruise using the standard deviation of ten samples containing 2% of the highest standard used for the calibration curve and multiplied with the student's value for n=10, thus being 2.81. (M.D.L = Std Dev of 10 samples x 2.81)

	M.D.L. (µM/L)	Used measuring range µM/L:
PO4	0.011	1.01
NH4	0.032	5.10
NO3+NO2	0.006	21.03
NO2	0.003	1.02

Data Quality & Remarks. By using the NIOZ in-house Lab Cocktail reference (Cocktail-1008) it is possible to monitor the performance of the QuAAtro and its analysis. It is suggested that through diluting the in-house cocktail by means of an electronic pipette and a calibrated flask, a small error of maximum 0.15% is introduced.

References

Grasshoff, K. et al. (1983). Methods of seawater analysis. Verlag Chemie GmbH, Weinheim. 419 pp

Strickland, J.D.H. and Parsons, T.R., 1968. A pracitcal handbook of seawater analysis. first edition, Fisheries Research Board of Canada, Bulletin. No 167, 1968. p.65.

Murphy, J. & Riley, J.P., 1962. A modified single solution method for the determination of phosphate in natural waters. Analytica chim. Acta 27, 31-36

Koroleff, 1969 and optimized by W. Helder and R. de Vries, 1979. An automatic phenol-hypochlorite method for the determination of ammonia in sea- and brackish waters. Neth. J. Sea Research 13(1): 154-160.

Flow cytometric abundances of phytoplankton, bacteria and viruses

- Anna Noordeloos, Haico van Heuzen, Paul O'Connor -

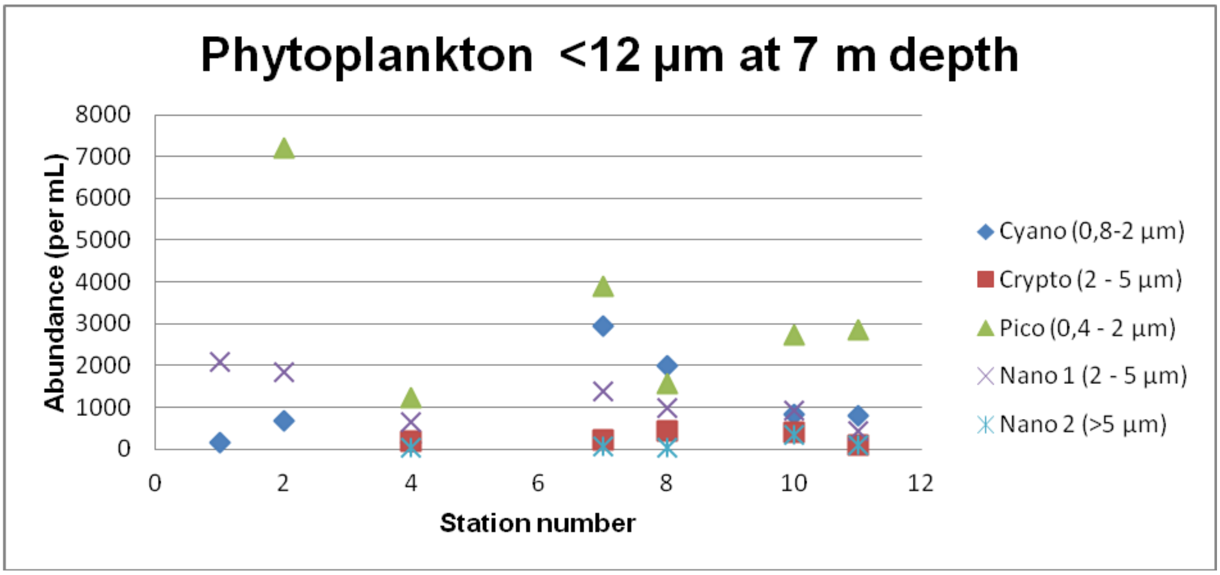
For all stations and each depth, samples were taken for phytoplankton, bacteria and viruses.
Samples for bacterial and viral abundances were fixed with glutaraldehyde solution (25% EM-grade; final concentration of 0.5%) for 15-30 min at 4ºC, after which the samples were flash frozen and stored at -80ºC. Fixed samples will be analyzed in the home laboratory (NIOZ-Texel) upon completion of the cruise.

Phytoplankton samples were measured fresh using flow cytometry. The basic instrument applied for single-cell analysis of the phytoplankton community was a bench top flow cytometer, Becton Dickinson FACSCalibur. The instrument is equipped with a 15mW Argon laser (488 nm excitation), which has an emission in the green, orange, and red. In addition, forward and side (90º) light scatter are collected. The fresh phytoplankton populations were discriminated using red chlorophyll auto fluorescence and scatter. Species/group composition was characterized based on the cellular bio-optical properties, including forward- and side scatter and chlorophyll fluorescence, of the algal cells. The natural community was size-fractionated using 12, 10, 8, 5, 3, 2, 1, 0.8, 0.6 and 0.4 µm pore-size PC-filters of small (<10 mL) sample volumes.

Pulse-amplitude-modulated measurement (PAM) of Photosystem II (PSII) chlorophyll fluorescence is a universal technique in eco-physiology of algae. The maximum efficiency of dark-adapted PSII (Fv/Fm) was measured for all stations and depths on nearly all casts. The photosynthetic capacity of the phytoplankton community present was determined. For all stations, the phytoplankton were healthy (0.6-0.7 r.u.) except for station 7 the 2 PM CTD (0.3-0.5 r.u.).

Table and figure. Preliminary flow cytometric data of algal abundance of different clusters for stations at 7 m depth. The shown data are from the 8 AM CTD.

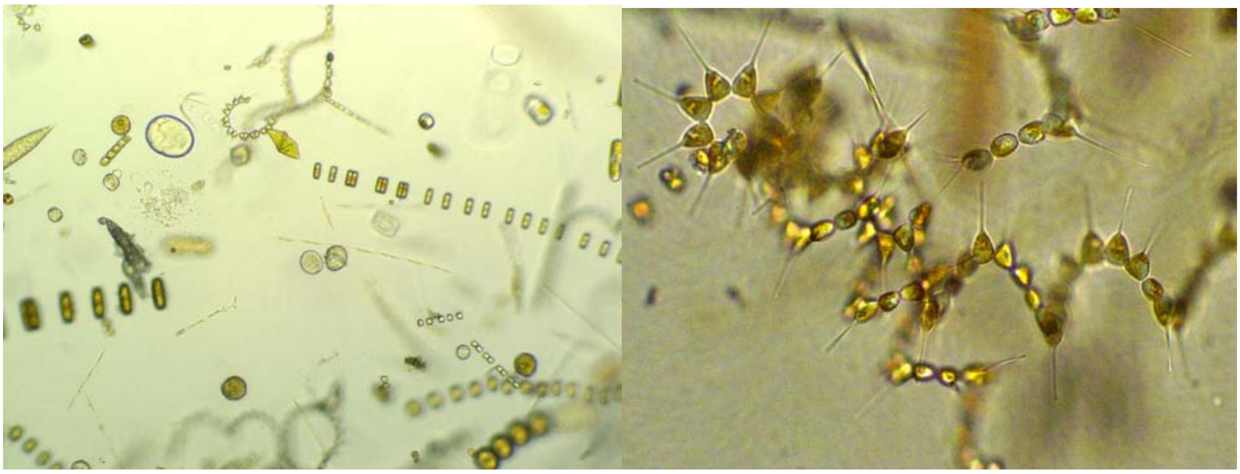
Station	Cyano's (0,8-2 µm)	Crypto's (2 - 5 µm)	Pico's (0,4 - 2 µm)	Nano's1 (2 - 5 µm)	Nano's2 (>5 µm)
1	153			2080	
2	673		7215	1845	
4	143	195	1234	650	26
7	2931	210	3898	1382	54
8	1994	446	1563	974	45
10	814	390	2721	915	325

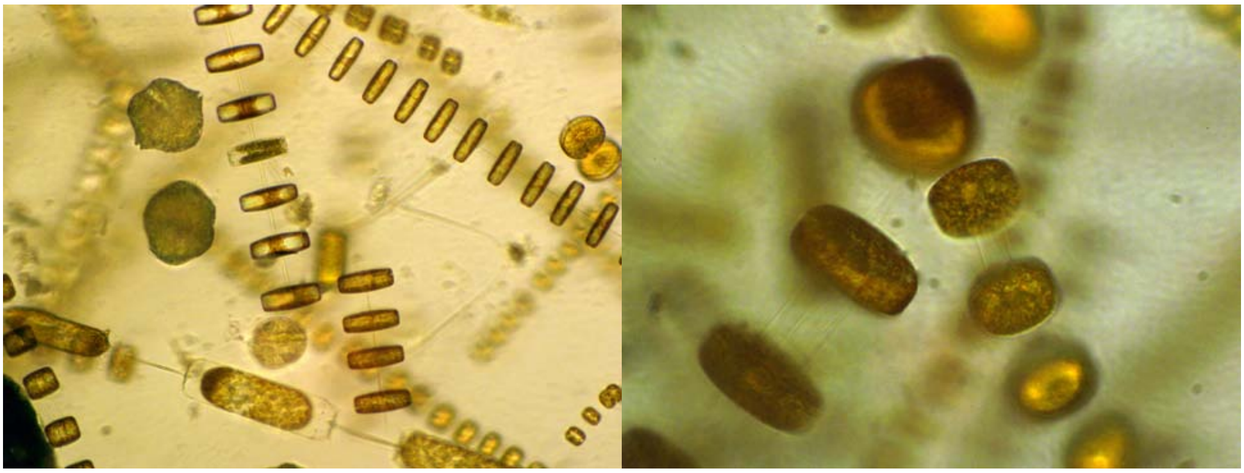


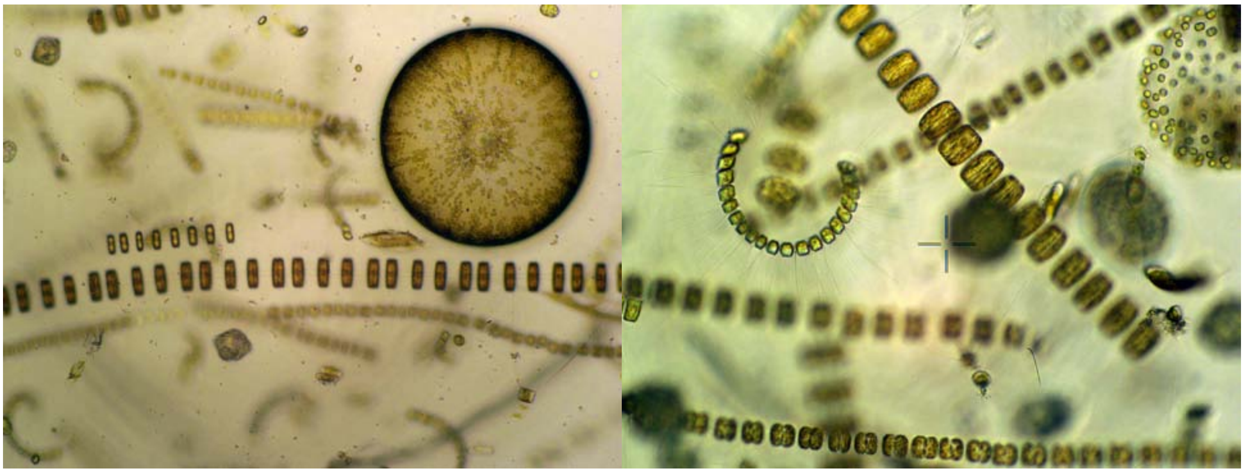
<u>Phytoplankton light microscopy on-board</u>

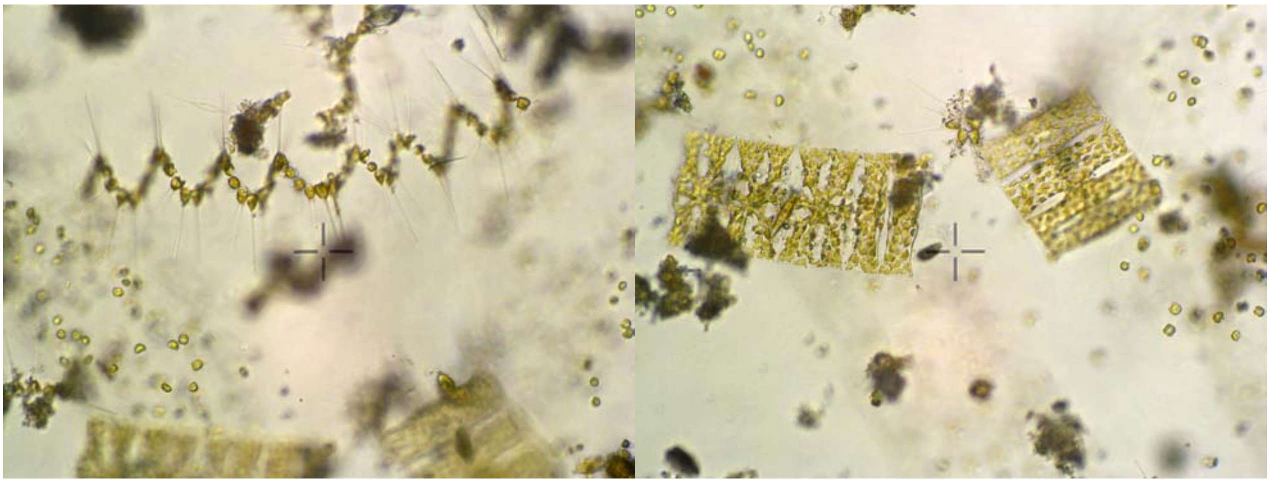
- Corina Brussaard, Sander Asjes (photos) –

At most stations a concentrate of the 7 m sample was prepared of >15 µm phytoplankton for qualitative light microscopy analysis. Below a compilation of photos of main phytoplankton species at stations 8, 10, 11 and 13. Stations 7 and 4 showed little larger-sized phytoplankton and relatively many heterotrophic organisms. Station 1 and 2 were dominated by *Phaeocystis pouchetii* colonies.


Station 8


Station 10


Station 11



Station 13

Bioassays, high resolution sampling, 77K nutrient fluorescence, algal community

- Amanda Burson, Larissa Akil, Maayke Stomp, Tom Vaes –

Bioassays: Nutrient addition bioassay experiment for 84 hours in ambient surface water flow through incubation chambers. T=0 and source water from station 13, 10, 7, and 1 at 7 m depth. Investigations are to determine if, via significant stimulation of growth, phytoplankton communities are nutrient or light limited in the North Sea (see figure).

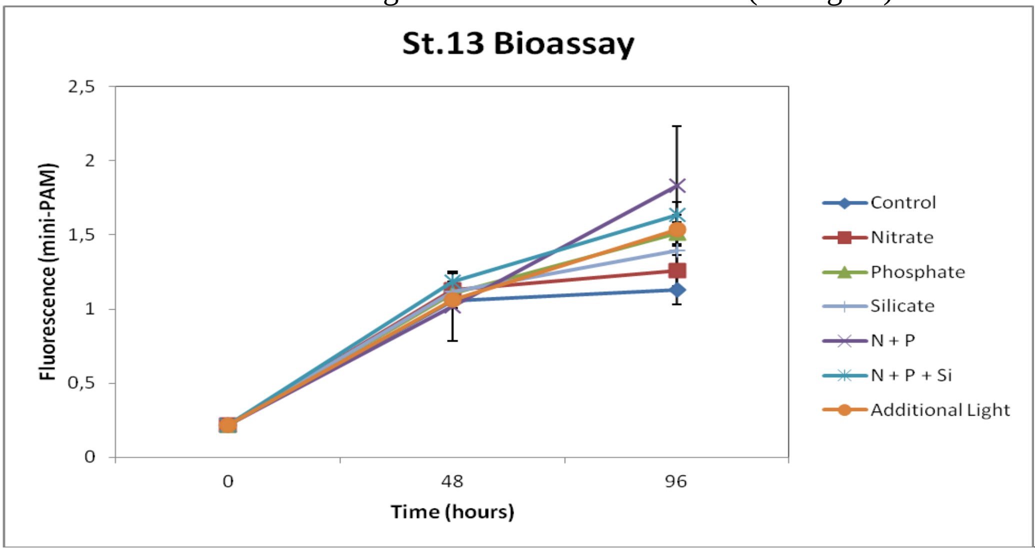


Figure. Fluorescence measurements per treatment from St.13 bioassay measured via mini-PAM.

Treatments as follows:

Treatment	Bottle #	NO3	PO4	Si	Light
Control (Whole)	1-4	None	None	None	=10 % ambient
Control (<20 um)	5-8	None	None	None	=10 % ambient
+N (Whole)	9-12	80 uM	None	None	=10 % ambient
+N (<20 um)	13-16	80 uM	None	None	=10 % ambient
+P (Whole)	17-20	None	5 uM	None	=10 % ambient
+P (<20 um)	21-24	None	5 uM	None	=10 % ambient
+N+P (Whole)	25-28	80 uM	5 uM	None	=10 % ambient
+N+P (<20 um)	29-32	80 uM	5 uM	None	=10 % ambient
+N+P+Si (Whole)	33-36	80 uM	5 uM	80 uM	=10 % ambient
+N+P+Si (<20 um)	27-40	80 uM	5 uM	80 uM	=10 % ambient
High light (Whole)	41-44	None	None	None	=15 % ambient
High light (<20 um)	45-48	None	None	None	=15 % ambient
+Si (Whole)	49-52	None	None	80 uM	=10 % ambient
+Si (<20 um)	53-56	None	None	80 uM	=10 % ambient

T=0 - Parameters measured/collected for are as follows:

Parameter	Volume	Replicates	Storage
Chlorophyll *a*	500 mL filtered	2 each size fraction	-20 C
Particulate organic carbon and nitrogen	500 mL filtered	2 each size fraction	-20 C
Particulate organic phosphorus	500 mL filtered	2 each size fraction	-20 C
Lugol's iodine preservation	50 mL	1 each size fraction	Room temp dark
Flow cytometry phytoplankton	5 mL	4 each size fraction	-80 C
Fluoresence of chla filters using PAM	NA	2 each size fraction	NA

T=48 - Parameters measured/collected for are as follows:

Parameter	Volume	Replicates	Storage
Chlorophyll *a*	100 mL filtered	1 per bottle	-20 C
Fluoresence of chla filters using PAM	NA	1 per bottle	NA

T=F - Parameters measured/collected for are as follows:

Parameter	Volume	Replicates	Storage
Chlorophyll *a*	250 mL filtered	1 per bottle	-20 C
Dissolved inorganic nutrients (0.22 membrane filtered)	20 mL	1 per bottle	-20 C
Particulate organic carbon and nitrogen	500 mL filtered	1 per bottle	-20 C
Particulate organic phosphorus	500 mL filtered	1 per bottle	-20 C
Lugol's iodine preservation	15 mL	1 per bottle	Room temp dark
Flow cytometry phytoplankton	5 mL	2 per bottle	-80 C
Flow cytometry virus	1.2 mL	1 per treatment	-80 C
Fluoresence of chla filters using PAM	NA	1 per bottle	NA

<u>High Resolution Sampling:</u> Water (10 L) was collected from all stations (13, 11, 10, 8, 7, 4, 2, 1) at 2 pm. Water was collected from 2m, 7m, 10m then every 5 m to a maximum of 55m. Water was split into two size fractions, whole and less than 20 then processed as follows:

Parameter	Volume	Replicates	Storage
Chlorophyll *a*	250 mL filtered	1 per depth per size fraction	-20 C
Particulate organic carbon and nitrogen	500 mL filtered	1 per depth per size fraction	-20 C
Particulate organic phosphorus	500 mL filtered	1 per depth per size fraction	-20 C
Lugol's iodine preservation	15 mL	1 per depth per size fraction	Room temp dark
Flow cytometry phytoplankton	5 mL	2 per depth per size fraction	-80 C
Fluoresence of chla	NA	1 per depth	NA

filters using PAM		per size fraction	

77K nutrient fluorescence: Filtration for nutrient induced fluorescence shifts of PSI-low temp fluoresence were performed from stations 13, 11, 10, 8, 7, 4, 2, and 1 from 7 m depth. 230 milliliters of sample were incubated with the following treatments:

Bottle	Treatment
1-3	Control
4-6	Phosphate (5 uM)
7-9	Nitrate (80 uM)
10-12	Silicate (80 uM

75 milliliters of sample water was filtered onto GF/C, 25 mm at t=0, 12, 24 and 48 hours then carefully placed into 2 mL cryo vials so the filters do not fold. Vial is frozen in liquid nitrogen and stored at -80 C. Frozen samples will then be measured using the spectrofluorimeter located at the UvA.

Inoculum collection: At all stations water was collected for inoculums for future experiments at UvA. Water was bubbled for 30 min using CO_2 then placed in cold containers during transect.

Utilization of the underwater light color by phytoplankton

- Maayke Stomp, Tom Vaes–

Underwater light spectra: At each station, the incident solar spectrum and depth profiles of the underwater light spectrum were measured with two RAMSES-ACC-VIS spectroradiometers (TriOS,Oldenburg, Germany), one measuring downward irradiation, and the other upward radiation. One of the probes was equipped with a pressure and inclination sensor. A weight was attached to minimize the inclination.

Light absorption: The underwater light spectrum of aquatic ecosystems depends on light absorption by pure water as well as by other components, including dissolved organic matter (known as ‘gilvin’ in the optics literature), inanimate particulate organic matter (known as ‘tripton’), and phytoplankton. In order to quantify light absorption of each of the components in the Norts Sea, light absorption at each station (4 depths) was measured with two methods: the A-sphere (Hobi-labs) and Filterpad Method.

A-Sphere, The A-sphere (figure on the left side) is an integrating sphere with high diffuse reflectivity that overpowers the scattering by suspended solids in the liquid, and also increases the absorption path length, thereby increasing the instrument sensitivity and accuracy. Hence, the instrument is capable of measuring light absorption of diluted water samples with great accuracy.

First the sphere is filled with pure seawater, followed by the measurement of a light absorption spectrum (Spectrum 1: Total light absorption). Next, the light absorption by the filtrate (GF/F) is measured (spectrum 2: light absorption by gilvin). The difference between the two absorption spectra (spectrum 1 – spectrum 2), gives the light absorption spectrum by particulate matter (spectrum 3: absorption by phytoplankton + tripton). Note that with this method, the light absorption of phytoplankton cannot be distinguished from other particulate matter. Therefor we will analyse the filters with the filterpad method to obtain the specific light absorption of the phytoplankton.

Filterpad method. With the filterpad method, light absorption is measured on loaded filters. Water samples were filtered with Whatman (GF/F) glass fiber filters, flash frozen and stored at -80°C. Absorption spectra on the loaded filters will be measured with the filterpad method (Yentsch 1972; Cleveland & Weidemann 1993), using the spectrophotometer with a 150-mm integrating sphere (Cary 100). First, the absorption spectrum on loaded filters will be measured, representing the absorption spectrum of total particulate matter. Next, photosynthetic pigments will be bleached with boiling ethanol, and the absorption spectrum of the bleached filter will be measured (representing tripton). The absorption spectrum of phytoplankton will be obtained by subtracting the absorption spectrum of tripton from the absorption spectrum of total particulate matter.

Pigment analyses. Photosynthetic pigment composition of the phytoplankton community will be determined by HPLC (chlorophylls and carotenoids). In addition, the phycobilipigments (phycocyanin and phycoerythrin) will be extracted and quantified based on repeated freezing and thawing cycles Bennett and Bogorad (1973), Bryant et al. (1979), and Tandeau de Marsac and Houmard (1988).

Allocation of recently fixed carbon into different biochemical components

- Julia Grosse and Eric Boschker –

Main project 1: Allocation of recently fixed carbon into different biochemical components (lipids, amino acids, carbohydrates, DNA/RNA).

In order to characterize the carbon allocation in the different phytoplankton communities we labeled surface water (7m) with 13C- bicarbonate and incubated the water in flow through incubators under in-situ conditions. Overall, 4 stations (13,10,7,1) were sampled. Initial samples were taken for suspended particulate matter, fatty acids, amino acids, carbohydrates, DNA/RNA, DIC and pigment composition. All samples will be taken to the NIOZ-Yerseke for analysis of 13C incorporation into total biomass and biochemical compounds.

Effect of different light intensities: One set of surface water was taken to investigate the effect of different light intensities on carbon fixation into the different macromolecules. The following light intensities were tested: 50%, 25%, 15% and 3-6%. Samples were terminated after 15 hours (end of light period) and after 24 hours. Simultaneously, measurements of the maximum photosynthetic quantum yields were taken with a FRRF (fast repetition rate fluorometer). This provides a measure of the maximum photosynthetic quantum yields.

Effect of nutrient additions: A second set of surface water was incubated after the addition of nitrate (+N), phosphate (+P) and nitrate, phosphate and silicate (+N+P+Si) to the incubations. This experiment aims to investigate short-term changes in biochemical compound composition in phytoplankton. At stations 13,10,7,1 one time point was sampled after 24h. Stations 13 and 7 had an additional time point sampled after 72h. The same samples were taken as described under section

Main Project 2: Incorporation of phytoplankton amino acids and fatty acids into zooplankton.

This set of samples aimed to characterize the transfer of essential fatty acids and amino acids between trophic levels. We took zooplankton samples from net-tows at stations 13, 11, 10, 8, 7, 4, 2 and 1 and will compare results of fatty acid and amino acid composition between phytoplankton and zooplankton. Analysis will take place at NIOZ-Yerseke.

Secondary Project: Nitrate and ammonium uptake rates:
Surface water (7m) from stations 13,10,7 and 1 was incubated with stable isotope 15N-labeled nitrate or ammonium. These experiments aim to characterize the water masses at the different stations with regards to nitrogen limitation. Analysis will take place at NIOZ-Yerseke.

Phytoplankton community structure

- Kirsten Kooijman –

Phytoplankton species composition was determined by obtaining samples for pigment composition from different depths at every station. After analysis by HPLC, Chlorophyll a will be used as an indicator for algal biomass (to be correlated to the fluorescence data from the CTD). Furthermore, specific marker pigments can reveal the presence of certain species. Using the CHEMTAX program, the contribution of these species to the total population can be estimated. In addition, pigment composition gives information on the photoacclimation status of algae (i.e if they are acclimated to high or low light). At all stations all depths were sampled. Analysis will be performed in the home laboratory (NIOZ-Texel).

Phytoplankton viral lysis and microzooplankton grazing rates

- Paul O'Connor –

Using the adapted dilution method by Baudoux et al. (2005), microzooplankton grazing and virally induced mortality can be estimated simultanously. The principle is that the removal of predators (grazers and viruses) by dilution allows the algal cells to increase in standing stock over the measured 24 h period. The difference in algal concentration over the period; therefore, provides an estimate of algal growth rate. Plotting the growth rate against the dilution, the slope of the linear regression represents the loss rat. Depending on the type of diluent (either grazer-free or grazer and virus-free) the microzooplankton grazing rate and the viral lysis rate can be obtained. From the difference between the two dilutions series the actual virally mediated algal mortality rate can be calculated (*see Figure below*).

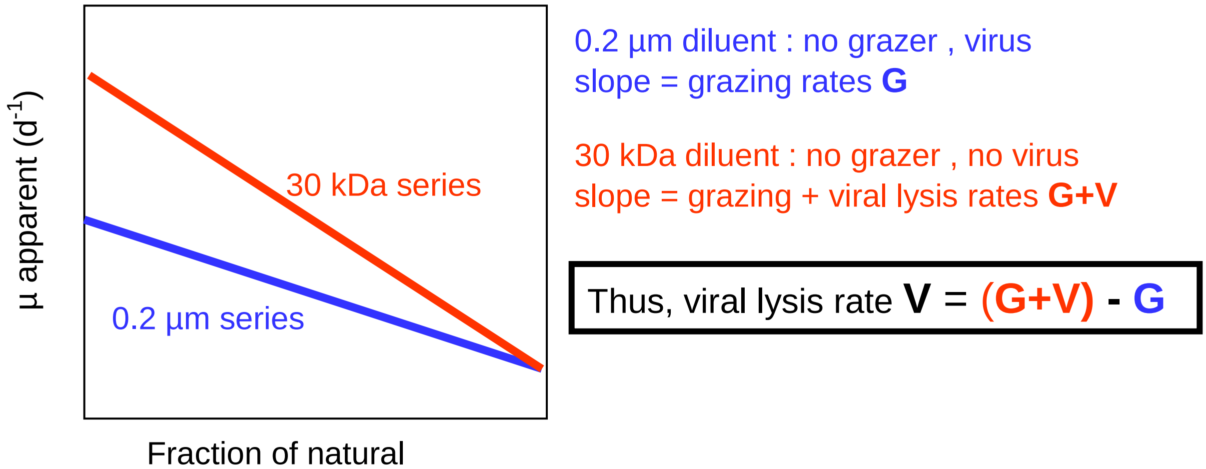


Figure: Dilution method principle.

All stations were carefully sampled at 7 m in the morning (because of the synchronicity of phytoplankton cell division and potential diel effects on viral infection processes) with the sample bottles protected against the light. Samples were gravity filtered through a 0.45 µm filter (Sartopore-2, 300) to create the grazer-free fraction and passed through a 30 kDa tangential flow filtration system (Sartorious Vivaflow 200) to create the virus-free diluent (*see Figure below*). A series of dilutions were prepared to measure 24 h loss rates of the phytoplankton. Using 1 L polycarbonate incubation bottles, natural water (reverse sieved through 200 µm mesh-size) was very gently (siphoned) added to the 0.45 µm and 30 kDa filtrate to create parallel dilution series of 100, 70, 40 and 20% of the total volume (all dilutions in triplicate). Subsamples for algal abundance were taken at T=0 and T=24h and the phytoplankton measured fresh using a bench top flow cytometer (Becton Dickinson FACSCalibur) equipped with a 15mW Argon laser (488nm excitation). Bottles were placed randomly on a slow turning wheel in an on-deck incubator at *in situ* temperature and irradiance (using variable numbers of screens). Specific phytoplankton groups were discriminated by differences in side scatter and red/orange fluorescence. Flow rates of the flow cytometer were calibrated daily to maintain quality control.

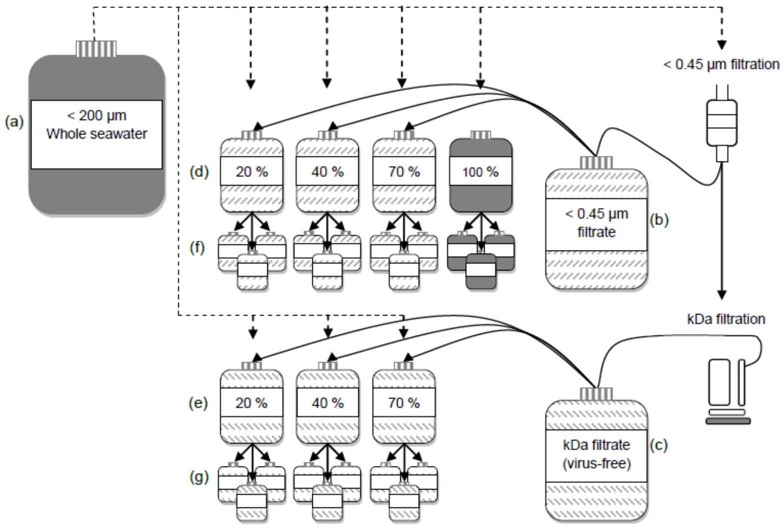


Figure. Experimental design of the modified dilution approach.

Phytoplankton sinking rates

- Haico van Heuzen and Paul O'Connor -

The sinking rates of phytoplankton were determined for the morning (8 AM) and the afternoon (2 PM) CTD samples at the stations over the course of the cruise. Sinking rates were permitted by the use of specially designed ship-board SETCOL devices, wherein a settling column is held in a 2-dimensional gimbal apparatus which eliminates the turbulence induced by the ship's roll. Duplicate columns were gently filled with a homogeneous seawater sample and allowed to settle undisturbed for a set period of time under *in-situ* light and temperature conditions. A control consisting of a 1 L clear plastic Nalgene bottle was also filled and incubated under in-situ conditions for the duration of settlement. The settling time for the 8 AM sampling was 3 hours and the 2 PM sampling had a settling time of 1.5 hour. Subsamples of 3.5 mL were fixed and taken for the flow cytometric analysis at start and end of the incubation. The remaining volume was filtered onto a GF/F filter, flash frozen and stored at -80°C for HPLC analysis back in the NIOZ-Texel home lab.

Grazing experiments using fluorescently labelled prey

- Richard Doggen –

A different approach of determining the grazing rates of bacteria, cyanobacteria and algae (10 µm cell diameter) by heterotrophic nanoflagellates (HNF) and microzooplankton was investigated using green fluorescently labeled prey (method Sherr & Sherr using the green fluorescent stain DTAF). The dye did not fade incubated for 24 h under in situ conditions and the prey did not decay.

Fluorescently labeled prey was gently combined with whole water in 1 L incubations at <5 % of the natural concentration. Grazing was determined by monitoring the concentration of labeled prey at the start of the experiment and after a incubation at in situ temperature and light. The analysis was completed by preparation of filters at the start of the experiment and after 24 h, to be counted using epifluorescence microscopy (organisms will be distinguished based on their green fluorescence). The experiments were conducted at 1 depth (7m) for the fluorescently labelled bacteria (FLB), cyanobacteria (FLC) and algae (FLA). Filters are stored at -20ºC until further analysis at the home laboratory (NIOZ-Texel).
Additionally, samples for the abundance of HNF and microzooplankton community structure and abundance were taken and fixed. Glutaraldhyde fixed (1% final using 10% working fixative stock) and DAPI-stained HNF were filtered through 0.2 µm filter and stored for at -20ºC. Samples for microzooplankton (using brown glass bottles) were fixed with Lugol and stored in the dark at 4ºC until further analysis.

Mesozooplankton secondary production and biomass

- Kirsten Kooijman -

At each station samples were taken to measure the grazing rate of the mesozooplankton by means of the gut clearance rate (Baars & Oosterhuis, NJSR 1985). Plankton samples were collected using a WP-2 net equipped with 200 µm mesh size plankton net. Net hauls were usually done in the morning at daylight and in the evening at dusk. The catch was divided in 5 equal portions and each portion was added to approximately 1 L GF/F-filtered seawater (0.7 µm nominal pore size). The bottles were incubated at *in situ* seawater temperature and zooplankton from the bottles was collected at discrete time intervals (0, 10, 20, 30 and 60 minutes respectively), filtered using 200 µm mesh filter and frozen at -80ºC for later chlorophyll a (phaeophytine) gut contents and biomass analysis at the lab. From the rate of gut contents loss with time and the initial gut content, the grazing (ingestion) rate can be calculated.
At the same times, zooplankton samples for total biomass and taxonomy were taken with the same WP 2 net as described above. The samples were preserved in 4% formaldehyde.
Preceding the net catch, water samples were taken for pigment analysis at discrete depths and filtered using a GF/F filter. The filters were preserved in a -80 C freezer.

Determination of lytic / lysogenic viral infection of prokaryotes

- Sander Fokkes and Paul O’Connor -

In order to estimate the production of both lytic and lysogenic viruses, seawater samples were taken along a transect of the North sea at 7 m at all stations and at 25m depth for all but 2 stations (station 13 and 11).
Rates of lytic viral infection were determined according to the method of Winget et al. (2005). Briefly, the sample was washed with virus-free sample generated by tangential flow ultrafiltration (30 kDa Vivaflow-200 cartridge) and incubated in triplicate in 50 mL Greiner tubesat *in situ* temperature in the dark for up to 24 hours. This way further infection of the

bacteria was prevented and the production of newly released viruses monitored at regular time intervals (every 3 hours) for flow cytometric analysis (Brussaard 2004). Rates of lysogenic infection were determined by addition of Mitomycin C (1 µg/mL final concentration) to initiate the lytic phase of any lysogenic viruses currently infecting the bacterial population. A 0.2 µm filtered treatment was prepared to monitor for viral loss due to the experimental set-up. Results from this experiment will be available following flow cytometric analysis of the samples back at NIOZ-Texel.

APPENDIXES

Appendix I. Logbook ship's scientific activities CHARLET-4 cruise 2013

Appendix II. Instruments configuration file CHARLET-4 cruise 2013

Appendix III. Onboard database CHARLET-4 cruise 2013

Appendix IV. Masterfile CHARLET-4 cruise 2013

Date	Time (UTC)	Latitude	Longitude	Device name	Station-cast
	(+2h)	(deg. min.milli)	(deg. min.milli)		
24/04/2013	19:45:25	N 53° 24' 6.934''	E 5° 8' 39.494''	CTD	13-1
24/04/2013	20:04:11	N 53° 24' 9.634''	E 5° 8' 44.372''	Vertical Net 200	13-2
24/04/2013	20:08:58	N 53° 24' 8.957''	E 5° 8' 42.95''	Vertical Net 200	13-3
24/04/2013	20:13:04	N 53° 24' 8.41''	E 5° 8' 42.756''	Vertical Net 200	13-4
25/04/2013	4:04:54	N 53° 24' 7.384''	E 5° 8' 41.096''	CTD	13-5
25/04/2013	4:46:14	N 53° 24' 7.564''	E 5° 8' 40.646''	CTD	13-6
25/04/2013	6:23:02	N 53° 24' 6.426''	E 5° 8' 41.143''	CTD	13-7
25/04/2013	6:58:00	N 53° 24' 7.034''	E 5° 8' 41.903''	CTD	13-8
25/04/2013	8:08:26	N 53° 24' 8.006''	E 5° 8' 39.498''	Vertical Net 200	13-9
25/04/2013	8:13:53	N 53° 24' 8.827''	E 5° 8' 41.456''	Vertical Net 200	13-10
25/04/2013	8:16:32	N 53° 24' 9.292''	E 5° 8' 38.947''	Vertical Net 200	13-11
25/04/2013	8:19:08	N 53° 24' 8.795''	E 5° 8' 36.035''	Vertical Net 200	13-12
25/04/2013	11:10:35	N 53° 24' 7.463''	E 5° 8' 40.682''	RAMSES underwater light sensors	13-13
25/04/2013	12:00:01	N 53° 24' 7.585''	E 5° 8' 39.991''	CTD	13-14
25/04/2013	18:58:58	N 53° 55' 13.224''	E 4° 36' 2.927''	CTD	11-1
25/04/2013	19:58:40	N 53° 55' 11.95''	E 4° 36' 7.168''	Vertical Net 200	11-2
25/04/2013	20:04:55	N 53° 55' 11.748''	E 4° 36' 6.79''	Vertical Net 200	11-3
25/04/2013	20:10:59	N 53° 55' 13.062''	E 4° 36' 5.627''	Vertical Net 200	11-4
26/04/2013	4:01:35	N 53° 55' 11.24''	E 4° 36' 0.59''	CTD	11-5
26/04/2013	6:04:09	N 53° 55' 11.888''	E 4° 35' 59.179''	CTD	11-6
26/04/2013	8:06:35	N 53° 55' 10.661''	E 4° 36' 3.582''	Vertical Net 200	11-7
26/04/2013	8:13:24	N 53° 55' 10.988''	E 4° 36' 7.744''	Vertical Net 200	11-8
26/04/2013	8:19:05	N 53° 55' 12.526''	E 4° 36' 9.875''	Vertical Net 200	11-9
26/04/2013	8:24:49	N 53° 55' 11.136''	E 4° 36' 8.892''	Vertical Net 200	11-10
26/04/2013	11:10:48	N 53° 55' 11.219''	E 4° 36' 2.142''	RAMSES underwater light sensors	11-11
26/04/2013	12:07:14	N 53° 55' 11.665''	E 4° 36' 1.181''	CTD	11-12
26/04/2013	19:15:25	N 54° 7' 45.62''	E 4° 19' 44.281''	CTD	10-1
26/04/2013	19:52:25	N 54° 7' 48.594''	E 4° 20' 3.75''	Vertical Net 200	10-2
26/04/2013	20:01:07	N 54° 7' 47.87''	E 4° 20' 2.234''	Vertical Net 200	10-3
26/04/2013	20:08:50	N 54° 7' 46.2''	E 4° 19' 59.452''	Vertical Net 200	10-4
27/04/2013	4:00:44	N 54° 7' 47.734''	E 4° 19' 48.047''	CTD	10-5
27/04/2013	4:43:23	N 54° 7' 47.86''	E 4° 19' 48.77''	CTD	10-6
27/04/2013	6:04:00	N 54° 7' 47.917''	E 4° 19' 47.262''	CTD	10-7
27/04/2013	7:05:32	N 54° 7' 48.752''	E 4° 19' 48.742''	CTD	10-8
27/04/2013	8:07:35	N 54° 7' 48.486''	E 4° 19' 48.299''	Vertical Net 200	10-9
27/04/2013	8:15:51	N 54° 7' 47.698''	E 4° 19' 48.929''	Vertical Net 200	10-10
27/04/2013	8:24:29	N 54° 7' 48.389''	E 4° 19' 48.835''	Vertical Net 200	10-11
27/04/2013	8:31:40	N 54° 7' 48.745''	E 4° 19' 47.878''	Vertical Net 200	10-12
27/04/2013	11:11:51	N 54° 7' 48.569''	E 4° 19' 50.999''	RAMSES underwater light sensors	10-13
27/04/2013	12:01:03	N 54° 7' 47.762''	E 4° 19' 49.267''	CTD	10-14
27/04/2013	12:52:39	N 54° 7' 48.094''	E 4° 19' 48.731''	Boxcore d=300	10-15
27/04/2013	19:03:04	N 54° 43' 10.128''	E 3° 40' 47.237''	CTD	8-1
27/04/2013	20:00:29	N 54° 43' 9.757''	E 3° 40' 47.446''	Vertical Net 200	8-2
27/04/2013	20:04:22	N 54° 43' 9.732''	E 3° 40' 54.059''	Vertical Net 200	8-3
27/04/2013	20:22:38	N 54° 43' 7.496''	E 3° 40' 48.292''	Vertical Net 200	8-4
27/04/2013	20:25:28	N 54° 43' 9.563''	E 3° 40' 48.713''	Vertical Net 200	8-5
27/04/2013	20:29:01	N 54° 43' 10.7''	E 3° 40' 50.614''	Vertical Net 200	8-6
28/04/2013	4:01:17	N 54° 43' 11.993''	E 3° 40' 48.914''	CTD	8-7
28/04/2013	6:02:40	N 54° 43' 13.141''	E 3° 40' 50.959''	CTD	8-8
28/04/2013	8:05:22	N 54° 43' 12.551''	E 3° 40' 56.557''	Vertical Net 200	8-9
28/04/2013	8:09:16	N 54° 43' 11.611''	E 3° 40' 57.079''	Vertical Net 200	8-10
28/04/2013	8:13:15	N 54° 43' 9.548''	E 3° 40' 56.683''	Vertical Net 200	8-11
28/04/2013	8:18:01	N 54° 43' 5.873''	E 3° 41' 4.862''	Vertical Net 200	8-12
28/04/2013	11:07:00	N 54° 43' 10.286''	E 3° 40' 24.542''	RAMSES underwater light sensors	8-13
28/04/2013	11:34:45	N 54° 43' 27.581''	E 3° 41' 4.232''	RAMSES underwater light sensors	8-14
28/04/2013	12:03:52	N 54° 43' 12.738''	E 3° 40' 50.153''	CTD	8-15
28/04/2013	19:01:03	N 55° 10' 13.552''	E 3° 9' 3.55''	CTD	7-1
28/04/2013	20:03:43	N 55° 10' 25.835''	E 3° 9' 21.553''	Vertical Net 200	7-2
28/04/2013	20:10:36	N 55° 10' 28.286''	E 3° 9' 45.702''	Vertical Net 200	7-3
28/04/2013	20:17:33	N 55° 10' 30.929''	E 3° 9' 50.756''	Vertical Net 200	7-4
29/04/2013	4:01:53	N 55° 10' 11.878''	E 3° 8' 59.726''	CTD	7-5

29/04/2013	4:42:28	N 55° 10' 12.54''	E 3° 9' 0.083''	CTD	7-6
29/04/2013	6:01:08	N 55° 10' 11.24''	E 3° 9' 0.745''	CTD	7-7
29/04/2013	7:15:11	N 55° 10' 9.538''	E 3° 9' 3.391''	CTD	7-8
29/04/2013	8:08:45	N 55° 10' 11.701''	E 3° 9' 3.607''	Vertical Net 200	7-9
29/04/2013	8:14:18	N 55° 10' 10.261''	E 3° 9' 8.982''	Vertical Net 200	7-10
29/04/2013	8:19:07	N 55° 10' 9.466''	E 3° 9' 16.387''	Vertical Net 200	7-11
29/04/2013	8:24:26	N 55° 10' 7.702''	E 3° 9' 22.644''	Vertical Net 200	7-12
29/04/2013	11:10:39	N 55° 10' 9.48''	E 3° 8' 58.07''	RAMSES underwater light sensors	7-13
29/04/2013	11:37:15	N 55° 10' 10.805''	E 3° 9' 1.048''	CTD	7-14
29/04/2013	19:00:14	N 55° 44' 25.224''	E 3° 22' 51.398''	CTD	4-1
29/04/2013	20:07:26	N 55° 44' 22.812''	E 3° 22' 49.066''	Vertical Net 200	4-2
29/04/2013	20:15:04	N 55° 44' 24.569''	E 3° 22' 57.889''	Vertical Net 200	4-3
29/04/2013	20:22:43	N 55° 44' 22.837''	E 3° 22' 55.513''	Vertical Net 200	4-4
30/04/2013	3:59:04	N 55° 44' 24.144''	E 3° 22' 48.54''	CTD	4-5
30/04/2013	6:03:31	N 55° 44' 23.629''	E 3° 22' 48.23''	CTD	4-6
30/04/2013	8:03:06	N 55° 44' 23.618''	E 3° 22' 45.185''	Vertical Net 200	4-7
30/04/2013	8:12:44	N 55° 44' 25.469''	E 3° 22' 50.002''	Vertical Net 200	4-8
30/04/2013	8:22:31	N 55° 44' 25.829''	E 3° 22' 54.912''	Vertical Net 200	4-9
30/04/2013	8:31:44	N 55° 44' 26.588''	E 3° 22' 52.712''	Vertical Net 200	4-10
30/04/2013	11:01:56	N 55° 44' 23.554''	E 3° 22' 55.906''	RAMSES underwater light sensors	4-11
30/04/2013	11:37:58	N 55° 44' 23.071''	E 3° 22' 52.766''	CTD	4-12
30/04/2013	19:38:29	N 56° 34' 49.188''	E 2° 10' 12.846''	CTD	1-1
30/04/2013	20:29:19	N 56° 34' 49.332''	E 2° 10' 20.248''	Vertical Net 200	1-2
30/04/2013	20:43:39	N 56° 34' 56.287''	E 2° 10' 26.551''	Vertical Net 200	1-3
01/05/2013	3:59:35	N 56° 34' 48.475''	E 2° 10' 12.238''	CTD	1-4
01/05/2013	4:39:52	N 56° 34' 48.22''	E 2° 10' 13.318''	CTD	1-5
01/05/2013	5:58:34	N 56° 34' 48.457''	E 2° 10' 12.007''	CTD	1-6
01/05/2013	6:59:31	N 56° 34' 51.308''	E 2° 10' 8.746''	CTD	1-7
01/05/2013	8:06:52	N 56° 34' 48.691''	E 2° 10' 11.114''	Vertical Net 200	1-8
01/05/2013	8:19:26	N 56° 34' 49.915''	E 2° 10' 12.713''	Vertical Net 200	1-9
01/05/2013	11:08:53	N 56° 34' 50.138''	E 2° 10' 16.763''	RAMSES underwater light sensors	1-10
01/05/2013	12:06:49	N 56° 34' 49.339''	E 2° 10' 12.511''	CTD	1-11
01/05/2013	18:58:33	N 56° 14' 59.532''	E 2° 30' 0.13''	CTD	2-1
01/05/2013	20:17:13	N 56° 14' 56.497''	E 2° 30' 3.794''	Vertical Net 200	2-2
01/05/2013	20:32:24	N 56° 14' 55.118''	E 2° 29' 50.575''	Vertical Net 200	2-3
01/05/2013	20:43:43	N 56° 14' 54.521''	E 2° 29' 39.53''	Vertical Net 200	2-4
02/05/2013	3:57:44	N 56° 14' 59.737''	E 2° 30' 0.094''	CTD	2-5
02/05/2013	6:00:51	N 56° 14' 59.579''	E 2° 30' 0.274''	CTD	2-6
02/05/2013	8:05:03	N 56° 14' 59.737''	E 2° 29' 59.219''	Vertical Net 200	2-7
02/05/2013	8:16:09	N 56° 14' 58.783''	E 2° 29' 58.405''	Vertical Net 200	2-8
02/05/2013	8:27:02	N 56° 15' 0.414''	E 2° 30' 0.403''	Vertical Net 200	2-9
02/05/2013	8:36:46	N 56° 14' 58.999''	E 2° 30' 0.032''	Vertical Net 200	2-10
02/05/2013	11:08:29	N 56° 15' 3.197''	E 2° 30' 1.692''	RAMSES underwater light sensors	2-11
02/05/2013	12:03:38	N 56° 15' 1.793''	E 2° 29' 56.886''	CTD	2-12

Date	Time (UTC) (+2h)	Latitude (deg. min.milli)	Longitude (deg. min.milli)	Device name	Station-cast
24/04/2013	19:45:25	N 53° 24' 6.934''	E 5° 8' 39.494''	CTD	13-1
25/04/2013	4:04:54	N 53° 24' 7.384''	E 5° 8' 41.096''	CTD	13-5
25/04/2013	4:46:14	N 53° 24' 7.564''	E 5° 8' 40.646''	CTD	13-6
25/04/2013	6:23:02	N 53° 24' 6.426''	E 5° 8' 41.143''	CTD	13-7
25/04/2013	6:58:00	N 53° 24' 7.034''	E 5° 8' 41.903''	CTD	13-8
25/04/2013	12:00:01	N 53° 24' 7.585''	E 5° 8' 39.991''	CTD	13-14
25/04/2013	18:58:58	N 53° 55' 13.224''	E 4° 36' 2.927''	CTD	11-1
26/04/2013	4:01:35	N 53° 55' 11.24''	E 4° 36' 0.59''	CTD	11-5
26/04/2013	6:04:09	N 53° 55' 11.888''	E 4° 35' 59.179''	CTD	11-6
26/04/2013	12:07:14	N 53° 55' 11.665''	E 4° 36' 1.181''	CTD	11-12
26/04/2013	19:15:25	N 54° 7' 45.62''	E 4° 19' 44.281''	CTD	10-1
27/04/2013	4:00:44	N 54° 7' 47.734''	E 4° 19' 48.047''	CTD	10-5
27/04/2013	4:43:23	N 54° 7' 47.86''	E 4° 19' 48.77''	CTD	10-6
27/04/2013	6:04:00	N 54° 7' 47.917''	E 4° 19' 47.262''	CTD	10-7
27/04/2013	7:05:32	N 54° 7' 48.752''	E 4° 19' 48.742''	CTD	10-8
27/04/2013	12:01:03	N 54° 7' 47.762''	E 4° 19' 49.267''	CTD	10-14
27/04/2013	19:03:04	N 54° 43' 10.128''	E 3° 40' 47.237''	CTD	8-1
28/04/2013	4:01:17	N 54° 43' 11.993''	E 3° 40' 48.914''	CTD	8-7
28/04/2013	6:02:40	N 54° 43' 13.141''	E 3° 40' 50.959''	CTD	8-8
28/04/2013	12:03:52	N 54° 43' 12.738''	E 3° 40' 50.153''	CTD	8-15
28/04/2013	19:01:03	N 55° 10' 13.552''	E 3° 9' 3.55''	CTD	7-1
29/04/2013	4:01:53	N 55° 10' 11.878''	E 3° 8' 59.726''	CTD	7-5
29/04/2013	4:42:28	N 55° 10' 12.54''	E 3° 9' 0.083''	CTD	7-6
29/04/2013	6:01:08	N 55° 10' 11.24''	E 3° 9' 0.745''	CTD	7-7
29/04/2013	7:15:11	N 55° 10' 9.538''	E 3° 9' 3.391''	CTD	7-8
29/04/2013	11:37:15	N 55° 10' 10.805''	E 3° 9' 1.048''	CTD	7-14
29/04/2013	19:00:14	N 55° 44' 25.224''	E 3° 22' 51.398''	CTD	4-1
30/04/2013	3:59:04	N 55° 44' 24.144''	E 3° 22' 48.54''	CTD	4-5
30/04/2013	6:03:31	N 55° 44' 23.629''	E 3° 22' 48.23''	CTD	4-6
30/04/2013	11:37:58	N 55° 44' 23.071''	E 3° 22' 52.766''	CTD	4-12
30/04/2013	19:38:29	N 56° 34' 49.188''	E 2° 10' 12.846''	CTD	1-1
01/05/2013	3:59:35	N 56° 34' 48.475''	E 2° 10' 12.238''	CTD	1-4
01/05/2013	4:39:52	N 56° 34' 48.22''	E 2° 10' 13.318''	CTD	1-5
01/05/2013	5:58:34	N 56° 34' 48.457''	E 2° 10' 12.007''	CTD	1-6
01/05/2013	6:59:31	N 56° 34' 51.308''	E 2° 10' 8.746''	CTD	1-7
01/05/2013	12:06:49	N 56° 34' 49.339''	E 2° 10' 12.511''	CTD	1-11
01/05/2013	18:58:33	N 56° 14' 59.532''	E 2° 30' 0.13''	CTD	2-1
02/05/2013	3:57:44	N 56° 14' 59.737''	E 2° 30' 0.094''	CTD	2-5
02/05/2013	6:00:51	N 56° 14' 59.579''	E 2° 30' 0.274''	CTD	2-6
02/05/2013	12:03:38	N 56° 15' 1.793''	E 2° 29' 56.886''	CTD	2-12

Date	Time (UTC) (+2h)	Latitude (deg. min.milli)	Longitude (deg. min.milli)	Device name	Station-cast
24/04/2013	20:04:11	N 53° 24' 9.634''	E 5° 8' 44.372''	Vertical Net 200	13-2
24/04/2013	20:08:58	N 53° 24' 8.957''	E 5° 8' 42.95''	Vertical Net 200	13-3
24/04/2013	20:13:04	N 53° 24' 8.41''	E 5° 8' 42.756''	Vertical Net 200	13-4
25/04/2013	8:08:26	N 53° 24' 8.006''	E 5° 8' 39.498''	Vertical Net 200	13-9
25/04/2013	8:13:53	N 53° 24' 8.827''	E 5° 8' 41.456''	Vertical Net 200	13-10
25/04/2013	8:16:32	N 53° 24' 9.292''	E 5° 8' 38.947''	Vertical Net 200	13-11
25/04/2013	8:19:08	N 53° 24' 8.795''	E 5° 8' 36.035''	Vertical Net 200	13-12
25/04/2013	19:58:40	N 53° 55' 11.95''	E 4° 36' 7.168''	Vertical Net 200	11-2
25/04/2013	20:04:55	N 53° 55' 11.748''	E 4° 36' 6.79''	Vertical Net 200	11-3
25/04/2013	20:10:59	N 53° 55' 13.062''	E 4° 36' 5.627''	Vertical Net 200	11-4
26/04/2013	8:06:35	N 53° 55' 10.661''	E 4° 36' 3.582''	Vertical Net 200	11-7
26/04/2013	8:13:24	N 53° 55' 10.988''	E 4° 36' 7.744''	Vertical Net 200	11-8
26/04/2013	8:19:05	N 53° 55' 12.526''	E 4° 36' 9.875''	Vertical Net 200	11-9
26/04/2013	8:24:49	N 53° 55' 11.136''	E 4° 36' 8.892''	Vertical Net 200	11-10
26/04/2013	19:52:25	N 54° 7' 48.594''	E 4° 20' 3.75''	Vertical Net 200	10-2
26/04/2013	20:01:07	N 54° 7' 47.87''	E 4° 20' 2.234''	Vertical Net 200	10-3
26/04/2013	20:08:50	N 54° 7' 46.2''	E 4° 19' 59.452''	Vertical Net 200	10-4
27/04/2013	8:07:35	N 54° 7' 48.486''	E 4° 19' 48.299''	Vertical Net 200	10-9
27/04/2013	8:15:51	N 54° 7' 47.698''	E 4° 19' 48.929''	Vertical Net 200	10-10
27/04/2013	8:24:29	N 54° 7' 48.389''	E 4° 19' 48.835''	Vertical Net 200	10-11
27/04/2013	8:31:40	N 54° 7' 48.745''	E 4° 19' 47.878''	Vertical Net 200	10-12
27/04/2013	20:00:29	N 54° 43' 9.757''	E 3° 40' 47.446''	Vertical Net 200	8-2
27/04/2013	20:04:22	N 54° 43' 9.732''	E 3° 40' 54.059''	Vertical Net 200	8-3
27/04/2013	20:22:38	N 54° 43' 7.496''	E 3° 40' 48.292''	Vertical Net 200	8-4
27/04/2013	20:25:28	N 54° 43' 9.563''	E 3° 40' 48.713''	Vertical Net 200	8-5
27/04/2013	20:29:01	N 54° 43' 10.7''	E 3° 40' 50.614''	Vertical Net 200	8-6
28/04/2013	8:05:22	N 54° 43' 12.551''	E 3° 40' 56.557''	Vertical Net 200	8-9
28/04/2013	8:09:16	N 54° 43' 11.611''	E 3° 40' 57.079''	Vertical Net 200	8-10
28/04/2013	8:13:15	N 54° 43' 9.548''	E 3° 40' 56.683''	Vertical Net 200	8-11
28/04/2013	8:18:01	N 54° 43' 5.873''	E 3° 41' 4.862''	Vertical Net 200	8-12
28/04/2013	20:03:43	N 55° 10' 25.835''	E 3° 9' 21.553''	Vertical Net 200	7-2
28/04/2013	20:10:36	N 55° 10' 28.286''	E 3° 9' 45.702''	Vertical Net 200	7-3
28/04/2013	20:17:33	N 55° 10' 30.929''	E 3° 9' 50.756''	Vertical Net 200	7-4
29/04/2013	8:08:45	N 55° 10' 11.701''	E 3° 9' 3.607''	Vertical Net 200	7-9
29/04/2013	8:14:18	N 55° 10' 10.261''	E 3° 9' 8.982''	Vertical Net 200	7-10
29/04/2013	8:19:07	N 55° 10' 9.466''	E 3° 9' 16.387''	Vertical Net 200	7-11
29/04/2013	8:24:26	N 55° 10' 7.702''	E 3° 9' 22.644''	Vertical Net 200	7-12
29/04/2013	20:07:26	N 55° 44' 22.812''	E 3° 22' 49.066''	Vertical Net 200	4-2
29/04/2013	20:15:04	N 55° 44' 24.569''	E 3° 22' 57.889''	Vertical Net 200	4-3
29/04/2013	20:22:43	N 55° 44' 22.837''	E 3° 22' 55.513''	Vertical Net 200	4-4
30/04/2013	8:03:06	N 55° 44' 23.618''	E 3° 22' 45.185''	Vertical Net 200	4-7
30/04/2013	8:12:44	N 55° 44' 25.469''	E 3° 22' 50.002''	Vertical Net 200	4-8
30/04/2013	8:22:31	N 55° 44' 25.829''	E 3° 22' 54.912''	Vertical Net 200	4-9
30/04/2013	8:31:44	N 55° 44' 26.588''	E 3° 22' 52.712''	Vertical Net 200	4-10
30/04/2013	20:29:19	N 56° 34' 49.332''	E 2° 10' 20.248''	Vertical Net 200	1-2
30/04/2013	20:43:39	N 56° 34' 56.287''	E 2° 10' 26.551''	Vertical Net 200	1-3
01/05/2013	8:06:52	N 56° 34' 48.691''	E 2° 10' 11.114''	Vertical Net 200	1-8
01/05/2013	8:19:26	N 56° 34' 49.915''	E 2° 10' 12.713''	Vertical Net 200	1-9
01/05/2013	20:17:13	N 56° 14' 56.497''	E 2° 30' 3.794''	Vertical Net 200	2-2
01/05/2013	20:32:24	N 56° 14' 55.118''	E 2° 29' 50.575''	Vertical Net 200	2-3
01/05/2013	20:43:43	N 56° 14' 54.521''	E 2° 29' 39.53''	Vertical Net 200	2-4
02/05/2013	8:05:03	N 56° 14' 59.737''	E 2° 29' 59.219''	Vertical Net 200	2-7
02/05/2013	8:16:09	N 56° 14' 58.783''	E 2° 29' 58.405''	Vertical Net 200	2-8
02/05/2013	8:27:02	N 56° 15' 0.414''	E 2° 30' 0.403''	Vertical Net 200	2-9
02/05/2013	8:36:46	N 56° 14' 58.999''	E 2° 30' 0.032''	Vertical Net 200	2-10

Date	Time (UTC)	Latitude	Longitude	Device name	Station-cast
	(+2h)	(deg. min.milli)	(deg. min.milli)		
25/04/2013	11:10:35	N 53° 24' 7.463''	E 5° 8' 40.682''	RAMSES underwater light sensors	13-13
26/04/2013	11:10:48	N 53° 55' 11.219''	E 4° 36' 2.142''	RAMSES underwater light sensors	11-11
27/04/2013	11:11:51	N 54° 7' 48.569''	E 4° 19' 50.999''	RAMSES underwater light sensors	10-13
28/04/2013	11:07:00	N 54° 43' 10.286''	E 3° 40' 24.542''	RAMSES underwater light sensors	8-13
28/04/2013	11:34:45	N 54° 43' 27.581''	E 3° 41' 4.232''	RAMSES underwater light sensors	8-14
29/04/2013	11:10:39	N 55° 10' 9.48''	E 3° 8' 58.07''	RAMSES underwater light sensors	7-13
30/04/2013	11:01:56	N 55° 44' 23.554''	E 3° 22' 55.906''	RAMSES underwater light sensors	4-11
01/05/2013	11:08:53	N 56° 34' 50.138''	E 2° 10' 16.763''	RAMSES underwater light sensors	1-10
02/05/2013	11:08:29	N 56° 15' 3.197''	E 2° 30' 1.692''	RAMSES underwater light sensors	2-11

```
Date: 04/29/2013

Instrument configuration file: C:\Data\CTD\64PE368\64PE368#1.CON *

Configuration report for SBE 911plus/917plus CTD
------------------------------------------------

Frequency channels suppressed : 0
Voltage words suppressed      : 0
Computer interface            : RS-232C
Deck unit                     : SBE11plus Firmware Version >= 5.0
Scans to average              : 1
NMEA position data added      : Yes
NMEA depth data added         : No
NMEA time added               : Yes
NMEA device connected to      : PC
Surface PAR voltage added     : Yes
Scan time added               : Yes

1) Frequency 0, Temperature

   Serial number : 032118
   Calibrated on : 9 jan 2013
   G             : 4.12887603e-003
   H             : 6.28752139e-004
   I             : 2.13755745e-005
   J             : 2.26164422e-006
   F0            : 1000.000
   Slope         : 1.00000000
   Offset        : 0.0000

2) Frequency 1, Conductivity

   Serial number : 043035
   Calibrated on : 09 jan 2013
   G             : -9.56572715e+000
   H             : 1.35672629e+000
   I             : 7.41743640e-004
   J             : 1.91397961e-005
   CTcor         : 3.2500e-006
   CPcor         : -9.57000000e-008
   Slope         : 1.00000000
   Offset        : 0.00000

3) Frequency 2, Pressure, Digiquartz with TC

   Serial number : 53978
   Calibrated on : 5 januari 2009
   C1            : -4.560326e+004
   C2            : 6.384354e-001
   C3            : 1.351670e-002
   D1            : 3.987300e-002
   D2            : 0.000000e+000
   T1            : 3.036575e+001
   T2            : -1.373321e-004
   T3            : 4.342220e-006
   T4            : 1.893830e-009
   T5            : 0.000000e+000
```

```
   Slope          : 0.99994000
   Offset         : -2.49120
   AD590M         : 1.143000e-002
   AD590B         : -8.526850e+000

4) Frequency 3, Free

5) Frequency 4, Free

6) A/D voltage 0, Fluorometer, Chelsea Aqua 3

   Serial number : 088-008
   Calibrated on : 28 feb 2013
   VB            : 0.505600
   V1            : 2.120700
   Vacetone      : 0.820400
   Scale factor  : 1.000000
   Slope         : 1.000000
   Offset        : 0.000000

7) A/D voltage 1, Oxygen, SBE 43

   Serial number : 431141
   Calibrated on : 02-feb-2013
   Equation      : Sea-Bird
   Soc           : 4.95200e-001
   Offset        : -5.09600e-001
   A             : -2.81170e-003
   B             : 9.96990e-005
   C             : -1.95470e-006
   E             : 3.60000e-002
   Tau20         : 2.50000e+000
   D1            : 1.92630e-004
   D2            : -4.64800e-002
   H1            : -3.30000e-002
   H2            : 5.00000e+003
   H3            : 1.45000e+003

8) A/D voltage 2, Turbidity Meter, Seapoint

   Serial number : 11541
   Calibrated on : jan 2011
   Gain setting  : 20 x
   Scale factor  : 1.000

9) A/D voltage 3, Transmissometer, Chelsea/Seatech

   Serial number : CST-1112DR
   Calibrated on : 27-3-2012
   M             : 21.0837
   B             : -1.2650
   Path length   : 0.250

10) A/D voltage 4, PAR/Irradiance, Biospherical/Licor

    Serial number        : 092
    Calibrated on        : 15 - 2 - 2012
    M                    : 0.88510000
```

```
    B                    : 1.27800000
    Calibration constant : 1000000000.00000000
    Multiplier           : 1.35890000
    Offset               : 0.00000000

11) A/D voltage 5, Free

12) A/D voltage 6, Altimeter

    Serial number : 47597
    Calibrated on : Jan. 2011
    Scale factor  : 15.000
    Offset        : 0.000

13) A/D voltage 7, Free

14) SPAR voltage, Unavailable

15) SPAR voltage, SPAR/Surface Irradiance

    Serial number     : 095
    Calibrated on     : 15 - 2 - 2012
    Conversion factor : 1053.00000000
    Ratio multiplier  : 0.00000000

* - The configuration was changed after the file was opened.
Scan length                   : 48
```

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	***NOTE: Dutch style = comma instead of decimal***							***responsible PI***	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*
2															
3	**Station**	**Cast**	**date**	**Time (+2h)**	**Lat**	**Lon**	**Depth bottom (m)**	**Notes**	**bottle #**	**Depth**	**Temperature**	**Salinity**	**Density**	**Transmission**	**Fluorescence**
4										DepSM	T090C	Sal00	Sigma-é00	Xmiss	FlCS-ug/L
5	**13**	**1**	24/04/2013	19:45:25	N 53° 24' 6.934"	E 5° 8' 39.494"	7								
6									2	3	6,2	31,5	24,8	61,5	1,8
7									1	4	6,2	31,5	24,8	62,0	2,1
8	**13**	**5**	25/04/2013	4:04:54	N 53° 24' 7.384"	E 5° 8' 41.096"									
9									24	4	7,2	31,0	24,3	35,6	3,0
10									23	4	7,2	31,0	24,3	36,3	3,0
11									22	5	7,2	31,0	24,3	36,7	3,1
12									21	5	7,2	31,0	24,3	35,3	3,3
13									20	4	7,2	31,0	24,3	35,1	3,4
14									19	4	7,2	31,0	24,3	35,1	3,4
15									18	4	7,2	31,0	24,3	33,3	3,3
16									17	5	7,2	31,0	24,3	33,6	3,5
17									16	5	7,2	31,0	24,3	34,3	3,2
18									15	4	7,2	31,0	24,3	34,2	3,1
19									14	4	7,2	31,0	24,3	34,5	3,0
20									13	4	7,2	31,0	24,3	35,1	2,9
21									12	4	7,2	31,0	24,3	35,1	3,0
22									11	5	7,2	31,0	24,3	34,8	3,1
23									10	5	7,2	31,0	24,3	35,0	3,2
24									9	5	7,2	31,0	24,3	34,7	2,8
25									8	4	7,2	31,0	24,3	34,8	3,0
26									7	4	7,2	31,0	24,3	34,8	2,9
27									6	4	7,2	31,0	24,3	34,3	3,0
28									5	4	7,2	31,0	24,3	36,1	3,2
29									4	5	7,2	31,0	24,3	38,0	3,2
30									3	4	7,2	31,0	24,3	37,4	2,9
31									2	4	7,2	31,0	24,3	38,3	2,9
32									1	4	7,2	31,0	24,3	38,5	3,0
33	**13**	**6**	25/04/2013	4:46:14	N 53° 24' 7.564"	E 5° 8' 40.646"									
34									24	4	6,8	31,2	24,4	43,6	2,9
35									23	4	6,8	31,2	24,4	42,8	2,9
36									22	5	6,8	31,2	24,4	42,4	3,0
37									21	4	6,8	31,2	24,4	42,2	3,1
38									20	4	6,8	31,2	24,4	42,3	2,8
39									19	3	6,8	31,2	24,4	42,1	3,1
40									18	3	6,8	31,2	24,4	42,6	3,1
41									17	4	6,8	31,2	24,4	42,4	2,9
42									16	4	6,8	31,2	24,4	43,1	3,2
43									15	5	6,8	31,2	24,4	44,3	3,0
44									14	4	6,8	31,2	24,4	43,7	3,0
45									13	4	6,8	31,2	24,4	44,0	3,1
46									12	4	6,8	31,2	24,4	44,4	2,9
47									11	3	6,8	31,2	24,4	44,2	2,9
48									10	3	6,8	31,2	24,4	45,1	2,8
49									9	4	6,8	31,2	24,4	43,4	3,0
50									8	4	6,8	31,2	24,4	42,1	3,0
51									7	4	6,8	31,2	24,4	42,3	2,7
52									6	4	6,8	31,2	24,4	42,1	2,9
53									5	4	6,8	31,2	24,4	41,9	3,0
54									4	4	6,8	31,2	24,4	42,1	3,0
55									3	3	6,8	31,2	24,4	42,1	3,0
56									2	4	6,8	31,2	24,4	41,7	3,0
57									1	5	6,8	31,2	24,4	43,6	2,7
58	**13**	**7**	25/04/2013	6:23:02	N 53° 24' 6.426"	E 5° 8' 41.143"									
59									18	4	6,5	31,4	24,7	57,2	2,5

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
60									17	4	6,5	31,4	24,7	57,4	2,8
61									16	4	6,5	31,4	24,7	56,9	2,8
62									15	4	6,5	31,4	24,7	56,8	2,6
63									14	4	6,5	31,4	24,7	56,8	2,5
64									13	4	6,5	31,4	24,7	56,2	2,2
65									12	4	6,5	31,4	24,7	56,9	2,3
66									11	4	6,5	31,4	24,7	56,6	2,3
67									10	4	6,5	31,4	24,7	56,0	2,4
68									9	4	6,5	31,4	24,7	56,2	2,4
69									8	4	6,5	31,4	24,7	56,0	2,5
70									7	4	6,5	31,4	24,7	56,8	2,7
71									6	4	6,5	31,4	24,7	56,7	2,5
72									5	4	6,5	31,4	24,7	56,6	2,2
73									4	4	6,5	31,4	24,7	56,7	2,2
74									3	4	6,5	31,4	24,7	57,1	2,4
75									2	4	6,5	31,4	24,7	56,2	2,3
76									1	4	6,5	31,4	24,7	56,9	2,1
77	**13**	**8**	25/04/2013	6:58:00	N 53° 24' 7.034''	E 5° 8' 41.903''									
78									24	5	6,3	31,5	24,8	58,9	2,3
79									23	5	6,3	31,5	24,8	58,5	2,5
80									22	5	6,3	31,5	24,8	58,3	2,6
81									21	4	6,3	31,5	24,8	58,6	2,4
82									20	4	6,4	31,5	24,8	58,8	2,4
83									19	4	6,4	31,5	24,8	58,9	2,1
84									18	4	6,4	31,5	24,8	58,7	2,3
85									17	4	6,4	31,5	24,8	58,9	2,8
86									16	4	6,4	31,5	24,8	58,9	2,7
87									15	5	6,4	31,5	24,8	58,5	2,4
88									14	5	6,4	31,5	24,8	58,6	2,6
89									13	5	6,4	31,5	24,8	58,2	2,9
90									12	4	6,4	31,5	24,8	58,1	2,9
91									11	4	6,4	31,5	24,8	58,1	2,6
92									10	4	6,4	31,5	24,8	58,3	2,3
93									9	4	6,4	31,5	24,8	58,0	2,3
94									8	4	6,4	31,5	24,8	58,3	2,3
95									7	5	6,4	31,5	24,8	59,3	2,3
96									6	5	6,4	31,5	24,8	60,1	2,5
97									5	5	6,4	31,5	24,8	59,6	2,6
98									4	4	6,4	31,5	24,8	59,2	2,3
99									3	4	6,4	31,5	24,8	58,7	2,4
100									2	4	6,4	31,5	24,8	58,9	2,5
101									1	4	6,4	31,5	24,8	59,2	2,3
102	**13**	**14**	25/04/2013	12:00:01	N 53° 24' 7.585''	E 5° 8' 39.991''									
103									24	2	7,9	30,8	24,0	33,9	3,4
104									23	2	7,8	30,8	24,0	33,1	4,0
105									22	2	7,9	30,8	24,0	33,1	3,2
106									21	4	7,6	30,9	24,1	24,9	4,4
107									20	4	7,7	30,9	24,1	26,0	4,1
108									19	4	7,7	30,9	24,1	25,8	4,5
109									18	4	7,7	30,9	24,1	25,3	4,6
110									17	4	7,7	30,9	24,1	25,4	4,6
111									16	4	7,8	30,9	24,1	25,7	4,3
112									15	4	7,7	30,9	24,1	23,1	3,8
113									14	4	7,6	30,9	24,1	25,3	4,3
114									13	4	7,6	30,9	24,1	25,5	4,1
115									12	4	7,6	30,9	24,1	25,1	4,3
116									11	4	7,7	30,9	24,1	24,5	4,7
117									10	4	7,7	30,9	24,1	25,2	4,8
118									9	4	7,7	30,9	24,1	25,1	4,2
119									8	4	7,7	30,9	24,1	25,2	4,2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
120									7	4	7,7	30,9	24,1	25,7	4,0
121									6	4	7,7	30,9	24,1	25,1	4,2
122									5	4	7,7	30,9	24,1	24,0	4,5
123									4	4	7,7	30,9	24,1	23,0	4,6
124									3	4	7,7	30,9	24,1	22,4	4,7
125									2	4	7,7	30,9	24,1	21,9	4,7
126									1	7	7,6	30,9	24,1	9,5	6,3
127	**11**	**1**	25/04/2013	18:58:58	N 53° 55' 13.224"	E 4° 36' 2.927"	43,5								
128									12	4	5,6	34,3	27,0	83,4	0,5
129									11	3	5,6	34,3	27,0	83,5	0,4
130									10	7	5,6	34,3	27,0	83,4	0,3
131									9	7	5,6	34,3	27,0	83,5	0,3
132									8	15	5,4	34,3	27,0	85,1	0,2
133									7	15	5,4	34,3	27,0	85,1	0,3
134									6	25	4,9	34,3	27,1	81,4	0,4
135									5	25	4,9	34,3	27,1	81,3	0,4
136									4	35	4,7	34,3	27,2	64,7	0,9
137									3	35	4,7	34,3	27,2	64,8	1,0
138									2	41	4,7	34,3	27,2	57,9	1,1
139									1	40	4,7	34,3	27,2	58,7	1,2
140	**11**	**5**	26/04/2013	4:01:35	N 53° 55' 11.24"	E 4° 36' 0.59"									
141									24	7	5,4	34,3	27,1	85,5	0,4
142									23	7	5,4	34,3	27,1	85,7	0,3
143									22	7	5,4	34,3	27,1	85,6	0,3
144									21	7	5,4	34,3	27,1	85,5	0,3
145									20	7	5,4	34,3	27,1	85,5	0,3
146									19	7	5,4	34,3	27,1	85,7	0,3
147									18	7	5,4	34,3	27,1	85,8	0,3
148									17	7	5,4	34,3	27,1	85,7	0,3
149									16	7	5,4	34,3	27,1	85,9	0,3
150									15	7	5,4	34,3	27,1	85,6	0,3
151									14	7	5,4	34,3	27,1	85,9	0,3
152									13	7	5,4	34,3	27,1	85,6	0,3
153									12	7	5,4	34,3	27,1	85,7	0,3
154									11	7	5,4	34,3	27,1	85,5	0,3
155									10	7	5,4	34,3	27,1	85,2	0,3
156									9	7	5,4	34,3	27,1	85,9	0,3
157									8	7	5,4	34,3	27,1	85,2	0,4
158									7	7	5,4	34,3	27,1	85,6	0,4
159									6	7	5,4	34,3	27,1	85,3	0,3
160									5	7	5,4	34,3	27,1	85,7	0,3
161									4	7	5,4	34,3	27,1	85,6	0,3
162									3	7	5,4	34,3	27,1	85,9	0,3
163									2	7	5,4	34,3	27,1	85,8	0,2
164									1	7	5,4	34,3	27,1	85,9	0,3
165	**11**	**6**	26/04/2013	6:04:09	N 53° 55' 11.888"	E 4° 35' 59.179"									
166									24	3	5,4	34,3	27,0	85,3	0,2
167									23	3	5,4	34,3	27,0	85,1	0,2
168									22	7	5,4	34,3	27,0	85,3	0,3
169									21	7	5,4	34,3	27,0	85,4	0,3
170									20	7	5,4	34,3	27,0	85,4	0,3
171									19	7	5,4	34,3	27,0	85,0	0,3
172									18	7	5,4	34,3	27,0	85,3	0,3
173									17	7	5,4	34,3	27,0	85,4	0,3
174									16	7	5,4	34,3	27,0	85,2	0,3
175									15	7	5,4	34,3	27,0	85,1	0,3
176									14	7	5,4	34,3	27,0	85,0	0,3
177									13	7	5,4	34,3	27,0	85,5	0,2
178									12	15	5,3	34,3	27,1	84,6	0,3
179									11	15	5,3	34,3	27,1	84,3	0,2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
180									10	25	4,9	34,3	27,1	81,4	0,4
181									9	25	5,0	34,3	27,1	81,5	0,4
182									8	25	5,0	34,3	27,1	81,7	0,4
183									7	25	5,0	34,3	27,1	81,7	0,4
184									6	25	5,0	34,3	27,1	81,5	0,3
185									5	25	5,0	34,3	27,1	81,6	0,3
186									4	25	4,9	34,3	27,1	81,3	0,4
187									3	25	5,0	34,3	27,1	81,3	0,4
188									2	41	4,8	34,3	27,1	49,5	1,5
189									1	41	4,8	34,3	27,1	49,6	1,6
190	**11**	**12**	26/04/2013	12:07:14	N 53° 55' 11.665''	E 4° 36' 1.181''									
191									24	3	5,5	34,3	27,0	84,6	0,3
192									23	3	5,6	34,3	27,0	84,3	0,2
193									22	7	5,2	34,3	27,1	83,3	0,5
194									21	8	5,2	34,3	27,1	83,5	0,5
195									20	8	5,2	34,3	27,1	83,5	0,5
196									19	8	5,2	34,3	27,1	83,3	0,5
197									18	7	5,2	34,3	27,1	83,4	0,5
198									17	7	5,2	34,3	27,1	83,4	0,5
199									16	8	5,2	34,3	27,1	83,3	0,4
200									15	7	5,2	34,3	27,1	82,9	0,4
201									14	10	5,2	34,3	27,1	83,7	0,4
202									13	10	5,2	34,3	27,1	83,5	0,5
203									12	15	5,0	34,3	27,1	82,9	0,4
204									11	15	5,0	34,3	27,1	82,8	0,5
205									10	20	4,9	34,3	27,1	80,6	0,5
206									9	20	4,9	34,3	27,1	80,7	0,4
207									8	25	4,9	34,3	27,1	78,7	0,5
208									7	26	4,9	34,3	27,1	78,6	0,4
209									6	30	4,9	34,3	27,1	76,0	0,6
210									5	30	4,9	34,3	27,1	75,8	0,5
211									4	35	4,9	34,3	27,1	60,2	1,0
212									3	35	4,9	34,3	27,1	59,2	1,0
213									2	39	4,9	34,3	27,1	48,0	1,5
214									1	39	4,9	34,3	27,1	49,5	1,6
215	**10**	**1**	26/04/2013	19:15:25	N 54° 7' 45.62''	E 4° 19' 44.281''	49								
216									10	1	5,8	34,5	27,2	85,7	0,4
217									9	2	5,8	34,5	27,2	85,9	0,4
218									8	6	5,8	34,5	27,2	86,0	0,5
219									7	7	5,8	34,5	27,2	86,0	0,5
220									6	26	4,0	34,6	27,5	80,5	0,6
221									5	26	4,0	34,6	27,5	80,6	0,6
222									4	39	4,0	34,6	27,5	69,2	1,3
223									3	39	4,0	34,6	27,5	68,6	1,1
224									2	45	4,0	34,6	27,5	61,1	1,6
225									1	45	4,0	34,6	27,5	60,7	1,5
226	**10**	**5**	27/04/2013	4:00:44	N 54° 7' 47.734''	E 4° 19' 48.047''									
227									24	7	5,5	34,5	27,2	82,0	0,8
228									23	7	5,5	34,5	27,2	82,0	0,9
229									22	6	5,5	34,5	27,2	82,0	0,8
230									21	7	5,6	34,5	27,2	82,0	0,9
231									20	7	5,6	34,5	27,2	82,3	0,9
232									19	7	5,6	34,5	27,2	82,1	0,7
233									18	7	5,5	34,5	27,2	82,2	0,8
234									17	7	5,5	34,5	27,2	81,9	0,7
235									16	7	5,5	34,5	27,2	82,2	0,8
236									15	7	5,5	34,5	27,2	82,0	0,9
237									14	7	5,5	34,5	27,2	81,9	0,8
238									13	7	5,5	34,5	27,2	81,8	0,8
239									12	7	5,6	34,5	27,2	82,2	0,9

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
240									11	7	5,6	34,5	27,2	82,2	0,9
241									10	7	5,5	34,5	27,2	82,3	0,9
242									9	6	5,5	34,5	27,2	82,2	1,0
243									8	6	5,5	34,5	27,2	82,1	0,9
244									7	7	5,5	34,5	27,2	82,4	0,8
245									6	7	5,6	34,5	27,2	82,5	0,7
246									5	7	5,5	34,5	27,2	82,3	0,8
247									4	7	5,5	34,5	27,2	82,3	0,9
248									3	7	5,5	34,5	27,2	82,1	0,9
249									2	7	5,5	34,5	27,2	82,2	0,8
250									1	7	5,5	34,5	27,2	82,1	0,7
251	**10**	**6**	27/04/2013	4:43:23	N 54° 7' 47.86''	E 4° 19' 48.77''									
252									24	7	5,5	34,5	27,2	81,7	1,0
253									23	6	5,5	34,5	27,2	81,3	0,9
254									22	7	5,5	34,5	27,2	81,2	1,0
255									21	7	5,5	34,5	27,2	81,2	1,0
256									20	7	5,5	34,5	27,2	81,2	1,0
257									19	6	5,5	34,5	27,2	81,4	1,0
258									18	7	5,5	34,5	27,2	81,6	1,1
259									17	7	5,5	34,5	27,2	81,3	1,2
260									16	6	5,5	34,5	27,2	81,3	1,1
261									15	7	5,4	34,5	27,2	81,1	1,0
262									14	7	5,5	34,5	27,2	81,5	1,3
263									13	7	5,4	34,5	27,2	80,8	1,4
264									12	6	5,4	34,5	27,2	81,0	1,3
265									11	7	5,4	34,5	27,2	80,3	1,2
266									10	7	5,4	34,5	27,2	80,3	1,1
267									9	7	5,5	34,5	27,2	80,3	1,0
268									8	7	5,5	34,5	27,2	80,4	1,2
269									7	7	5,5	34,5	27,2	80,5	1,2
270									6	7	5,4	34,5	27,2	80,6	1,2
271									5	7	5,4	34,5	27,2	80,2	1,4
272									4	7	5,4	34,5	27,3	80,0	1,5
273									3	14	4,7	34,6	27,4	78,2	1,5
274									2	26	4,1	34,6	27,5	77,6	0,8
275									1	25	4,1	34,6	27,5	77,2	0,7
276	**10**	**7**	27/04/2013	6:04:00	N 54° 7' 47.917''	E 4° 19' 47.262''									
277									24	2	5,6	34,5	27,2	82,9	0,6
278									23	2	5,6	34,5	27,2	82,9	0,4
279									22	7	5,6	34,5	27,2	82,5	0,8
280									21	7	5,6	34,5	27,2	82,6	0,6
281									20	7	5,6	34,5	27,2	82,7	0,8
282									19	7	5,6	34,5	27,2	82,9	0,9
283									18	7	5,6	34,5	27,2	82,6	0,7
284									17	7	5,6	34,5	27,2	83,0	0,7
285									16	7	5,6	34,5	27,2	83,1	0,7
286									15	7	5,6	34,5	27,2	82,8	0,8
287									14	7	5,6	34,5	27,2	83,0	0,8
288									13	7	5,6	34,5	27,2	82,7	0,6
289									12	15	5,3	34,6	27,3	79,3	1,6
290									11	15	5,3	34,6	27,3	78,4	1,7
291									10	25	4,2	34,6	27,5	79,1	0,7
292									9	25	4,1	34,6	27,5	78,5	0,7
293									8	25	4,1	34,6	27,5	78,5	0,7
294									7	25	4,1	34,6	27,5	78,8	0,8
295									6	25	4,1	34,6	27,5	78,6	0,7
296									5	25	4,2	34,6	27,5	78,7	0,7
297									4	25	4,2	34,6	27,5	78,8	0,7
298									3	25	4,2	34,6	27,5	79,2	0,7
299									2	41	4,1	34,6	27,5	74,4	0,9

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
300									1	40	4,1	34,6	27,5	74,6	0,9
301	**10**	**8**	27/04/2013	7:05:32	N 54° 7' 48.752"	E 4° 19' 48.742"									
302									24	7	5,6	34,5	27,2	83,6	0,4
303									23	7	5,6	34,5	27,2	83,7	0,4
304									22	7	5,6	34,5	27,2	83,7	0,4
305									21	7	5,6	34,5	27,2	83,7	0,5
306									20	7	5,6	34,5	27,2	83,8	0,5
307									19	7	5,6	34,5	27,2	83,8	0,5
308									18	7	5,6	34,5	27,2	83,5	0,5
309									17	7	5,6	34,5	27,2	83,2	0,5
310									16	7	5,6	34,5	27,2	83,2	0,5
311									15	7	5,6	34,5	27,2	83,5	0,6
312									14	7	5,6	34,5	27,2	83,7	0,6
313									13	7	5,6	34,5	27,2	83,8	0,6
314									12	7	5,6	34,5	27,2	83,4	0,5
315									11	7	5,6	34,5	27,2	83,1	0,5
316									10	7	5,6	34,5	27,2	83,4	0,4
317									9	7	5,6	34,5	27,2	83,6	0,4
318									8	7	5,6	34,5	27,2	83,4	0,4
319									7	7	5,6	34,5	27,2	83,4	0,4
320									6	7	5,6	34,5	27,2	83,7	0,5
321									5	7	5,6	34,5	27,2	84,0	0,6
322									4	7	5,6	34,5	27,2	84,2	0,6
323									3	7	5,6	34,5	27,2	83,8	0,5
324									2	7	5,6	34,5	27,2	83,9	0,5
325									1	7	5,6	34,5	27,2	83,7	0,6
326	**10**	**14**	27/04/2013	12:01:03	N 54° 7' 47.762"	E 4° 19' 49.267"									
327									24	2	6,0	34,5	27,2	83,9	0,2
328									23	2	6,0	34,5	27,2	83,8	0,2
329									22	7	5,8	34,5	27,2	83,1	0,3
330									21	7	5,7	34,5	27,2	82,7	0,4
331									20	7	5,8	34,5	27,2	82,9	0,4
332									19	7	5,8	34,5	27,2	82,8	0,4
333									18	7	5,8	34,5	27,2	82,7	0,4
334									17	7	5,8	34,5	27,2	82,7	0,4
335									16	7	5,7	34,5	27,2	82,8	0,4
336									15	7	5,7	34,5	27,2	82,7	0,4
337									14	10	5,4	34,5	27,2	80,1	1,6
338									13	11	5,4	34,5	27,2	79,9	1,6
339									12	15	5,2	34,6	27,4	77,0	2,3
340									11	15	5,1	34,6	27,4	76,2	2,0
341									10	20	4,4	34,6	27,5	80,2	0,7
342									9	20	4,4	34,6	27,5	79,9	0,7
343									8	25	4,2	34,6	27,5	78,4	0,8
344									7	25	4,2	34,6	27,5	78,2	0,7
345									6	30	4,2	34,6	27,5	77,4	0,7
346									5	30	4,2	34,6	27,5	77,0	0,6
347									4	35	4,2	34,6	27,5	76,7	0,7
348									3	35	4,2	34,6	27,5	76,9	0,6
349									2	40	4,2	34,6	27,5	74,5	0,6
350									1	40	4,2	34,6	27,5	75,1	0,7
351	**8**	**1**	27/04/2013	19:03:04	N 54° 43' 10.128"	E 3° 40' 47.237"	46								
352									11	1	5,9	34,5	27,2	89,4	0,2
353									10	2	5,9	34,5	27,2	89,4	0,2
354									9	2	5,9	34,5	27,2	89,4	0,2
355									8	7	5,9	34,5	27,2	89,6	0,2
356									7	7	5,9	34,5	27,2	89,6	0,2
357									6	15	5,7	34,5	27,2	87,5	0,3
358									5	15	5,6	34,5	27,2	87,4	0,3
359									4	25	4,5	34,5	27,4	68,9	1,4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
360									3	25	4,5	34,5	27,4	68,9	1,5
361									2	35	4,5	34,5	27,4	66,8	1,6
362									1	35	4,5	34,5	27,4	66,8	1,7
363	**8**	**7**	28/04/2013	4:01:17	N 54° 43' 11.993"	E 3° 40' 48.914"									
364									24	6	5,8	34,5	27,2	89,2	0,2
365									23	5	5,8	34,5	27,2	89,1	0,3
366									22	6	5,8	34,5	27,2	89,2	0,3
367									21	7	5,8	34,5	27,2	89,2	0,3
368									20	7	5,8	34,5	27,2	89,1	0,2
369									19	6	5,8	34,5	27,2	89,2	0,2
370									18	6	5,8	34,5	27,2	89,2	0,3
371									17	6	5,8	34,5	27,2	89,3	0,3
372									16	6	5,8	34,5	27,2	89,2	0,3
373									15	7	5,8	34,5	27,2	89,1	0,3
374									14	7	5,8	34,5	27,2	89,2	0,3
375									13	6	5,8	34,5	27,2	89,3	0,3
376									12	7	5,8	34,5	27,2	89,2	0,3
377									11	7	5,8	34,5	27,2	89,2	0,2
378									10	7	5,8	34,5	27,2	89,2	0,2
379									9	6	5,8	34,5	27,2	89,3	0,2
380									8	6	5,8	34,5	27,2	89,2	0,2
381									7	7	5,8	34,5	27,2	89,3	0,3
382									6	7	5,8	34,5	27,2	89,3	0,3
383									5	6	5,8	34,5	27,2	89,3	0,3
384									4	6	5,8	34,5	27,2	89,5	0,3
385									3	6	5,8	34,5	27,2	89,3	0,2
386									2	7	5,8	34,5	27,2	89,1	0,3
387									1	7	5,8	34,5	27,2	88,9	0,3
388	**8**	**8**	28/04/2013	6:02:40	N 54° 43' 13.141"	E 3° 40' 50.959"									
389									24	2	5,7	34,5	27,2	88,6	0,2
390									23	2	5,7	34,5	27,2	88,6	0,2
391									22	7	5,8	34,5	27,2	88,9	0,2
392									21	7	5,8	34,5	27,2	89,0	0,2
393									20	7	5,8	34,5	27,2	88,9	0,2
394									19	7	5,8	34,5	27,2	89,1	0,2
395									18	7	5,8	34,5	27,2	89,1	0,2
396									17	7	5,8	34,5	27,2	89,0	0,2
397									16	7	5,8	34,5	27,2	89,0	0,2
398									15	7	5,8	34,5	27,2	89,0	0,2
399									14	7	5,8	34,5	27,2	89,0	0,2
400									13	7	5,8	34,5	27,2	88,9	0,2
401									12	7	5,8	34,5	27,2	88,9	0,2
402									11	10	5,7	34,5	27,2	88,8	0,2
403									10	15	5,7	34,5	27,2	87,4	0,3
404									9	15	5,7	34,5	27,2	87,2	0,3
405									8	26	4,4	34,5	27,4	63,7	1,6
406									7	26	4,4	34,5	27,4	63,5	1,6
407									6	25	4,4	34,5	27,4	64,5	1,6
408									5	24	4,4	34,5	27,4	65,8	1,6
409									4	25	4,4	34,5	27,4	65,1	1,7
410									3	25	4,4	34,5	27,4	63,9	1,7
411									2	41	4,4	34,5	27,4	62,7	1,8
412									1	41	4,4	34,5	27,4	62,8	1,8
413	**8**	**15**	28/04/2013	12:03:52	N 54° 43' 12.738"	E 3° 40' 50.153"									
414									24	4	5,8	34,5	27,2	88,9	0,1
415									23	3	5,8	34,5	27,2	88,9	0,1
416									22	7	5,8	34,5	27,2	88,8	0,1
417									21	6	5,8	34,5	27,2	88,9	0,1
418									20	6	5,8	34,5	27,2	88,9	0,1
419									19	7	5,8	34,5	27,2	88,8	0,1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
420									18	7	5,8	34,5	27,2	88,9	0,1
421									17	7	5,8	34,5	27,2	88,9	0,1
422									16	7	5,8	34,5	27,2	88,8	0,1
423									15	7	5,8	34,5	27,2	88,9	0,1
424									14	10	5,8	34,5	27,2	88,6	0,2
425									13	10	5,8	34,5	27,2	88,6	0,1
426									12	15	5,7	34,5	27,2	87,3	0,3
427									11	15	5,7	34,5	27,2	87,3	0,3
428									10	20	4,8	34,5	27,3	79,6	0,9
429									9	20	4,8	34,5	27,3	79,6	0,8
430									8	25	4,5	34,5	27,4	73,4	1,3
431									7	25	4,6	34,5	27,4	73,7	1,3
432									6	30	4,5	34,5	27,4	65,9	1,7
433									5	30	4,5	34,5	27,4	65,9	1,6
434									4	35	4,5	34,5	27,4	61,8	1,7
435									3	35	4,5	34,5	27,4	62,2	1,8
436									2	40	4,5	34,5	27,4	59,1	2,0
437									1	40	4,5	34,5	27,4	58,6	2,0
438	**7**	**1**	28/04/2013	19:01:03	N 55° 10' 13.552"	E 3° 9' 3.55"	31								
439									8	4	6,1	34,8	27,4	88,9	0,1
440									7	3	6,1	34,8	27,4	88,9	0,1
441									6	7	6,1	34,8	27,4	88,9	0,2
442									5	7	6,1	34,8	27,4	88,9	0,1
443									4	16	6,1	34,8	27,4	88,6	0,1
444									3	16	6,1	34,8	27,4	88,9	0,1
445									2	25	6,1	34,8	27,4	88,1	0,2
446									1	25	6,1	34,8	27,4	87,9	0,2
447	**7**	**5**	29/04/2013	4:01:53	N 55° 10' 11.878"	E 3° 8' 59.726"									
448									24	7	6,1	34,8	27,4	89,8	0,2
449									23	7	6,1	34,8	27,4	89,8	0,1
450									22	7	6,1	34,8	27,4	89,6	0,1
451									21	7	6,1	34,8	27,4	89,8	0,1
452									20	7	6,1	34,8	27,4	89,5	0,1
453									19	7	6,1	34,8	27,4	89,4	0,1
454									18	7	6,1	34,8	27,4	89,5	0,1
455									17	7	6,1	34,8	27,4	89,7	0,1
456									16	7	6,1	34,8	27,4	89,7	0,1
457									15	7	6,1	34,8	27,4	89,7	0,1
458									14	7	6,1	34,8	27,4	89,4	0,1
459									13	7	6,1	34,8	27,4	89,5	0,1
460									12	7	6,1	34,8	27,4	89,6	0,1
461									11	7	6,1	34,8	27,4	89,8	0,1
462									10	7	6,1	34,8	27,4	89,7	0,1
463									9	7	6,1	34,8	27,4	89,5	0,1
464									8	7	6,1	34,8	27,4	89,5	0,1
465									7	7	6,1	34,8	27,4	89,4	0,1
466									6	7	6,1	34,8	27,4	89,7	0,1
467									5	7	6,1	34,8	27,4	89,7	0,1
468									4	7	6,1	34,8	27,4	89,7	0,1
469									3	7	6,1	34,8	27,4	89,8	0,1
470									2	7	6,1	34,8	27,4	89,8	0,1
471									1	7	6,1	34,8	27,4	89,7	0,1
472	**7**	**6**	29/04/2013	4:42:28	N 55° 10' 12.54"	E 3° 9' 0.083"									
473									24	7	6,1	34,8	27,4	89,1	0,1
474									23	7	6,1	34,8	27,4	89,1	0,1
475									22	7	6,1	34,8	27,4	89,2	0,2
476									21	7	6,1	34,8	27,4	89,2	0,2
477									20	7	6,1	34,8	27,4	89,1	0,2
478									19	7	6,1	34,8	27,4	88,8	0,2
479									18	7	6,1	34,8	27,4	88,9	0,2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
480									17	7	6,1	34,8	27,4	88,8	0,1
481									16	7	6,1	34,8	27,4	89,1	0,1
482									15	7	6,1	34,8	27,4	89,3	0,1
483									14	7	6,1	34,8	27,4	89,4	0,1
484									13	7	6,1	34,8	27,4	89,4	0,1
485									12	8	6,1	34,8	27,4	89,4	0,1
486									11	7	6,1	34,8	27,4	89,7	0,1
487									10	7	6,1	34,8	27,4	89,7	0,2
488									9	7	6,1	34,8	27,4	89,3	0,3
489									8	7	6,1	34,8	27,4	89,5	0,3
490									7	7	6,1	34,8	27,4	89,8	0,2
491									6	7	6,1	34,8	27,4	89,8	0,1
492									5	7	6,1	34,8	27,4	89,9	0,1
493									4	25	6,1	34,8	27,4	89,0	0,2
494									3	25	6,1	34,8	27,4	88,6	0,2
495									2	25	6,1	34,8	27,4	88,8	0,2
496									1	25	6,1	34,8	27,4	88,7	0,2
497	**7**	**7**	29/04/2013	6:01:08	N 55° 10' 11.24''	E 3° 9' 0.745''									
498									24	2	6,1	34,8	27,4	89,7	0,1
499									23	2	6,1	34,8	27,4	89,6	0,1
500									22	6	6,1	34,8	27,4	89,9	0,1
501									21	6	6,1	34,8	27,4	89,9	0,1
502									20	7	6,1	34,8	27,4	89,8	0,1
503									19	7	6,1	34,8	27,4	89,8	0,1
504									18	6	6,1	34,8	27,4	89,9	0,1
505									17	6	6,1	34,8	27,4	89,7	0,1
506									16	7	6,1	34,8	27,4	89,8	0,1
507									15	6	6,1	34,8	27,4	89,7	0,1
508									14	6	6,1	34,8	27,4	89,7	0,1
509									13	6	6,1	34,8	27,4	89,9	0,1
510									12	7	6,1	34,8	27,4	89,8	0,1
511									11	6	6,1	34,8	27,4	89,7	0,1
512									10	10	6,1	34,8	27,4	89,3	0,1
513									9	10	6,1	34,8	27,4	89,6	0,1
514									8	16	6,1	34,8	27,4	89,6	0,1
515									7	16	6,1	34,8	27,4	89,4	0,1
516									6	25	6,1	34,8	27,4	88,9	0,2
517									5	25	6,1	34,8	27,4	88,9	0,1
518									4	25	6,1	34,8	27,4	88,6	0,2
519									3	25	6,1	34,8	27,4	87,2	0,4
520									2	26	6,1	34,8	27,4	87,1	0,2
521									1	25	6,1	34,8	27,4	87,3	0,2
522	**7**	**8**	29/04/2013	7:15:11	N 55° 10' 9.538''	E 3° 9' 3.391''									
523									24	7	6,0	34,8	27,4	90,1	0,1
524									23	7	6,0	34,8	27,4	90,0	0,1
525									22	7	6,0	34,8	27,4	90,1	0,1
526									21	7	6,0	34,8	27,4	90,1	0,1
527									20	7	6,0	34,8	27,4	90,1	0,1
528									19	7	6,0	34,8	27,4	90,3	0,1
529									18	7	6,0	34,8	27,4	90,1	0,1
530									17	7	6,0	34,8	27,4	90,0	0,1
531									16	7	6,0	34,8	27,4	89,8	0,1
532									15	7	6,0	34,8	27,4	90,0	0,1
533									14	7	6,0	34,8	27,4	89,9	0,1
534									13	7	6,0	34,8	27,4	89,9	0,1
535									12	7	6,0	34,8	27,4	90,1	0,1
536									11	7	6,0	34,8	27,4	89,9	0,1
537									10	7	6,0	34,8	27,4	89,9	0,1
538									9	7	6,0	34,8	27,4	90,1	0,1
539									8	7	6,0	34,8	27,4	90,0	0,1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
540									7	7	6,0	34,8	27,4	89,8	0,1
541									6	7	6,0	34,8	27,4	89,8	0,1
542									5	7	6,0	34,8	27,4	90,0	0,1
543									4	7	6,0	34,8	27,4	89,8	0,1
544									3	7	6,0	34,8	27,4	89,8	0,1
545									2	7	6,0	34,8	27,4	89,8	0,1
546									1	7	6,0	34,8	27,4	89,8	0,1
547	**7**	**14**	29/04/2013	11:37:15	N 55° 10' 10.805"	E 3° 9' 1.048"									
548									24	3	6,1	34,8	27,4	89,8	0,1
549									23	3	6,1	34,8	27,4	89,8	0,1
550									22	2	6,1	34,8	27,4	90,0	0,1
551									21	7	6,1	34,8	27,4	90,0	0,1
552									20	6	6,1	34,8	27,4	89,9	0,1
553									19	6	6,1	34,8	27,4	90,0	0,1
554									18	7	6,1	34,8	27,4	89,9	0,1
555									17	7	6,1	34,8	27,4	90,0	0,1
556									16	7	6,1	34,8	27,4	90,0	0,1
557									15	7	6,1	34,8	27,4	90,1	0,1
558									14	6	6,1	34,8	27,4	90,1	0,1
559									13	7	6,1	34,8	27,4	90,0	0,1
560									12	10	6,1	34,8	27,4	89,8	0,1
561									11	10	6,1	34,8	27,4	90,0	0,1
562									10	10	6,1	34,8	27,4	90,1	0,1
563									9	15	6,1	34,8	27,4	89,9	0,1
564									8	15	6,1	34,8	27,4	89,7	0,1
565									7	14	6,1	34,8	27,4	89,9	0,1
566									6	20	6,1	34,8	27,4	89,8	0,1
567									5	20	6,1	34,8	27,4	90,0	0,1
568									4	20	6,1	34,8	27,4	89,7	0,1
569									3	25	6,1	34,8	27,4	89,0	0,1
570									2	25	6,1	34,8	27,4	88,7	0,1
571									1	25	6,1	34,8	27,4	88,8	0,1
572	**4**	**1**	29/04/2013	19:00:14	N 55° 44' 25.224"	E 3° 22' 51.398"	53								
573									12	2	5,0	34,6	27,4	92,2	0,2
574									11	2	5,0	34,6	27,4	92,1	0,2
575									10	6	5,0	34,6	27,4	92,2	0,2
576									9	7	5,0	34,6	27,4	92,2	0,2
577									8	15	5,0	34,6	27,4	92,2	0,2
578									7	15	5,0	34,6	27,4	92,2	0,2
579									6	25	4,9	34,6	27,4	92,3	0,2
580									5	25	4,9	34,6	27,4	92,3	0,2
581									4	34	4,9	34,6	27,4	92,6	0,2
582									3	34	4,9	34,6	27,4	92,5	0,2
583									2	46	4,3	34,6	27,4	86,6	0,5
584									1	46	4,3	34,6	27,4	87,1	0,5
585	**4**	**5**	30/04/2013	3:59:04	N 55° 44' 24.144"	E 3° 22' 48.54"									
586									24	7	4,9	34,6	27,4	93,0	0,1
587									23	7	4,9	34,6	27,4	92,9	0,1
588									22	7	4,9	34,6	27,4	92,9	0,1
589									21	7	4,9	34,6	27,4	93,0	0,1
590									20	7	4,9	34,6	27,4	93,0	0,1
591									19	7	4,9	34,6	27,4	93,0	0,1
592									18	7	4,9	34,6	27,4	92,8	0,2
593									17	7	4,9	34,6	27,4	93,0	0,2
594									16	7	4,9	34,6	27,4	93,0	0,1
595									15	7	4,9	34,6	27,4	93,0	0,1
596									14	7	4,9	34,6	27,4	92,9	0,1
597									13	7	4,9	34,6	27,4	92,9	0,1
598									12	7	4,9	34,6	27,4	92,9	0,1
599									11	7	4,9	34,6	27,4	92,9	0,1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
600									10	7	4,9	34,6	27,4	93,0	0,1
601									9	7	4,9	34,6	27,4	93,0	0,1
602									8	7	4,9	34,6	27,4	92,9	0,1
603									7	7	4,9	34,6	27,4	92,9	0,1
604									6	7	4,9	34,6	27,4	92,8	0,1
605									5	7	4,9	34,6	27,4	92,9	0,1
606									4	7	4,9	34,6	27,4	93,0	0,1
607									3	24	4,9	34,6	27,4	92,9	0,1
608									2	24	4,9	34,6	27,4	93,0	0,1
609									1	24	4,9	34,6	27,4	93,0	0,1
610	**4**	**6**	30/04/2013	6:03:31	N 55° 44' 23.629''	E 3° 22' 48.23''									
611									24	2	4,9	34,6	27,4	92,9	0,1
612									23	2	4,9	34,6	27,4	92,9	0,1
613									22	6	4,9	34,6	27,4	92,9	0,1
614									21	6	4,9	34,6	27,4	93,0	0,1
615									20	7	4,9	34,6	27,4	92,9	0,1
616									19	7	4,9	34,6	27,4	92,9	0,1
617									18	6	4,9	34,6	27,4	92,9	0,1
618									17	6	4,9	34,6	27,4	92,9	0,1
619									16	7	4,9	34,6	27,4	92,9	0,1
620									15	7	4,9	34,6	27,4	92,9	0,1
621									14	7	4,9	34,6	27,4	92,9	0,1
622									13	6	4,9	34,6	27,4	92,9	0,1
623									12	7	4,9	34,6	27,4	92,9	0,1
624									11	15	4,9	34,6	27,4	92,9	0,1
625									10	15	4,9	34,6	27,4	93,0	0,1
626									9	25	4,9	34,6	27,4	92,9	0,1
627									8	25	4,9	34,6	27,4	92,8	0,1
628									7	25	4,9	34,6	27,4	92,9	0,1
629									6	25	4,9	34,6	27,4	92,9	0,1
630									5	26	4,9	34,6	27,4	92,9	0,1
631									4	35	4,8	34,6	27,4	92,7	0,1
632									3	35	4,7	34,6	27,4	92,6	0,2
633									2	45	4,3	34,6	27,4	82,8	0,7
634									1	45	4,3	34,6	27,4	82,4	0,8
635	**4**	**12**	30/04/2013	11:37:58	N 55° 44' 23.071''	E 3° 22' 52.766''									
636									24	2	5,1	34,6	27,3	93,1	0,1
637									23	2	5,1	34,6	27,3	93,1	0,1
638									22	7	5,1	34,6	27,3	93,1	0,1
639									21	7	5,1	34,6	27,3	93,1	0,1
640									20	7	5,1	34,6	27,3	93,1	0,1
641									19	7	5,1	34,6	27,3	93,2	0,1
642									18	7	5,1	34,6	27,3	93,2	0,1
643									17	7	5,1	34,6	27,3	92,8	0,1
644									16	7	5,1	34,6	27,3	93,3	0,1
645									15	9	5,0	34,6	27,4	93,0	0,1
646									14	16	5,0	34,6	27,4	93,1	0,1
647									13	15	5,0	34,6	27,4	93,0	0,1
648									12	19	4,9	34,6	27,4	92,6	0,2
649									11	25	4,9	34,6	27,4	92,6	0,2
650									10	26	4,9	34,6	27,4	92,6	0,2
651									9	31	4,9	34,6	27,4	93,1	0,1
652									8	30	4,9	34,6	27,4	93,1	0,1
653									7	35	4,6	34,6	27,4	92,3	0,1
654									6	34	4,6	34,6	27,4	92,5	0,1
655									5	41	4,2	34,6	27,4	88,4	0,3
656									4	41	4,2	34,6	27,4	88,5	0,3
657									3	46	4,2	34,6	27,4	85,3	0,6
658									2	50	4,2	34,6	27,4	69,4	2,2
659									1	50	4,2	34,6	27,4	76,3	1,4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
660	**1**	**1**	30/04/2013	19:38:29	N 56° 34' 49.188"	E 2° 10' 12.846"	75								
661									14	2	5,9	35,1	27,7	85,4	0,7
662									13	2	5,9	35,1	27,7	86,4	0,6
663									12	7	5,9	35,1	27,7	85,7	0,8
664									11	7	5,9	35,1	27,7	85,6	0,8
665									10	15	5,8	35,1	27,7	84,3	0,7
666									9	15	5,8	35,1	27,7	84,9	0,9
667									8	27	5,8	35,1	27,7	85,4	0,8
668									7	26	5,8	35,1	27,7	84,8	0,9
669									6	36	5,7	35,1	27,7	85,1	0,9
670									5	36	5,7	35,1	27,7	85,5	0,8
671									4	50	5,3	35,1	27,7	85,9	0,7
672									3	50	5,3	35,1	27,7	85,4	0,7
673									2	81	5,2	35,1	27,7	82,9	1,0
674									1	80	5,2	35,1	27,7	83,0	1,0
675	**1**	**4**	01/05/2013	3:59:35	N 56° 34' 48.475"	E 2° 10' 12.238"									
676									24	7	5,7	35,1	27,7	85,0	0,6
677									23	7	5,7	35,1	27,7	84,9	0,9
678									22	7	5,7	35,1	27,7	85,3	1,0
679									21	7	5,7	35,1	27,7	85,9	0,8
680									20	7	5,8	35,1	27,7	84,9	0,6
681									19	7	5,8	35,1	27,7	85,0	0,8
682									18	8	5,8	35,1	27,7	85,2	0,8
683									17	8	5,8	35,1	27,7	84,8	0,5
684									16	7	5,7	35,1	27,7	85,2	0,6
685									15	6	5,7	35,1	27,7	84,7	0,7
686									14	7	5,8	35,1	27,7	85,1	0,9
687									13	7	5,8	35,1	27,7	84,7	0,8
688									12	7	5,8	35,1	27,7	84,8	0,7
689									11	8	5,8	35,1	27,7	85,3	0,9
690									10	8	5,8	35,1	27,7	85,2	0,8
691									9	7	5,7	35,1	27,7	85,3	0,8
692									8	7	5,7	35,1	27,7	85,3	0,9
693									7	7	5,7	35,1	27,7	85,1	0,9
694									6	7	5,8	35,1	27,7	85,3	0,7
695									5	7	5,8	35,1	27,7	84,7	0,8
696									4	7	5,8	35,1	27,7	84,7	0,8
697									3	8	5,8	35,1	27,7	85,0	0,7
698									2	7	5,8	35,1	27,7	85,4	0,9
699									1	7	5,7	35,1	27,7	85,3	0,9
700	**1**	**5**	01/05/2013	4:39:52	N 56° 34' 48.22"	E 2° 10' 13.318"	84								
701									24	6	5,8	35,1	27,7	85,8	1,1
702									23	6	5,8	35,1	27,7	85,7	1,0
703									22	6	5,8	35,1	27,7	85,6	0,8
704									21	7	5,8	35,1	27,7	85,5	0,8
705									20	7	5,8	35,1	27,7	85,4	0,7
706									19	6	5,8	35,1	27,7	84,6	0,6
707									18	6	5,8	35,1	27,7	85,0	0,7
708									17	7	5,8	35,1	27,7	86,1	0,8
709									16	7	5,8	35,1	27,7	86,0	0,8
710									15	7	5,8	35,1	27,7	85,2	0,6
711									14	7	5,8	35,1	27,7	85,0	0,5
712									13	6	5,8	35,1	27,7	85,3	0,7
713									12	6	5,8	35,1	27,7	85,4	0,9
714									11	6	5,8	35,1	27,7	85,3	0,8
715									10	7	5,8	35,1	27,7	85,5	0,9
716									9	7	5,8	35,1	27,7	85,4	0,7
717									8	7	5,8	35,1	27,7	85,6	0,5
718									7	7	5,8	35,1	27,7	85,3	0,8
719									6	7	5,8	35,1	27,7	85,5	0,9

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
720									5	25	5,8	35,1	27,7	86,1	0,9
721									4	25	5,8	35,1	27,7	86,0	1,0
722									3	26	5,8	35,1	27,7	86,0	1,0
723									2	26	5,8	35,1	27,7	85,4	0,8
724									1	26	5,8	35,1	27,7	85,4	0,9
725	**1**	**6**	01/05/2013	5:58:34	N 56° 34' 48.457"	E 2° 10' 12.007"									
726									24	3	5,8	35,1	27,7	86,1	0,7
727									23	2	5,8	35,1	27,7	85,5	0,7
728									22	7	5,8	35,1	27,7	85,4	0,5
729									21	7	5,8	35,1	27,7	84,8	0,6
730									20	7	5,8	35,1	27,7	85,0	0,7
731									19	6	5,8	35,1	27,7	85,7	0,7
732									18	6	5,8	35,1	27,7	85,4	0,9
733									17	7	5,8	35,1	27,7	85,3	1,0
734									16	7	5,8	35,1	27,7	85,7	1,1
735									15	7	5,8	35,1	27,7	85,6	1,3
736									14	7	5,8	35,1	27,7	85,6	1,0
737									13	7	5,8	35,1	27,7	86,0	1,0
738									12	15	5,8	35,1	27,7	85,7	0,7
739									11	14	5,8	35,1	27,7	85,6	0,6
740									10	25	5,7	35,1	27,7	86,2	0,7
741									9	25	5,7	35,1	27,7	85,5	0,9
742									8	25	5,7	35,1	27,7	85,3	0,7
743									7	24	5,7	35,1	27,7	85,4	0,6
744									6	35	5,7	35,1	27,7	85,2	0,8
745									5	35	5,8	35,1	27,7	85,3	0,7
746									4	51	5,2	35,1	27,7	85,6	0,6
747									3	51	5,2	35,1	27,7	85,1	0,7
748									2	61	5,2	35,1	27,7	84,4	0,7
749									1	80	5,2	35,1	27,7	78,6	1,0
750	**1**	**7**	01/05/2013	6:59:31	N 56° 34' 51.308"	E 2° 10' 8.746"									
751									24	7	5,8	35,1	27,7	85,3	0,9
752									23	7	5,8	35,1	27,7	85,7	0,9
753									22	7	5,8	35,1	27,7	86,1	0,8
754									21	7	5,8	35,1	27,7	85,9	0,8
755									20	7	5,8	35,1	27,7	85,2	0,6
756									19	7	5,8	35,1	27,7	85,8	0,6
757									18	7	5,8	35,1	27,7	85,7	0,6
758									17	7	5,8	35,1	27,7	85,1	0,8
759									16	7	5,8	35,1	27,7	85,3	0,8
760									15	7	5,8	35,1	27,7	85,8	1,0
761									14	7	5,8	35,1	27,7	86,2	0,9
762									13	7	5,8	35,1	27,7	85,4	0,7
763									12	7	5,8	35,1	27,7	86,1	0,6
764									11	7	5,8	35,1	27,7	85,9	0,5
765									10	7	5,8	35,1	27,7	85,7	0,6
766									9	7	5,8	35,1	27,7	85,6	0,7
767									8	7	5,8	35,1	27,7	85,2	0,6
768									7	7	5,8	35,1	27,7	85,1	0,6
769									6	7	5,8	35,1	27,7	85,8	0,6
770									5	7	5,8	35,1	27,7	86,0	0,6
771									4	7	5,8	35,1	27,7	85,8	0,5
772									3	7	5,8	35,1	27,7	84,2	0,5
773									2	7	5,8	35,1	27,7	84,8	0,6
774									1	7	5,8	35,1	27,7	86,4	0,7
775	**1**	**11**	01/05/2013	12:06:49	N 56° 34' 49.339"	E 2° 10' 12.511"									
776									24	2	5,8	35,1	27,7	85,3	0,3
777									23	2	5,8	35,1	27,7	85,2	0,4
778									22	7	5,8	35,1	27,7	85,0	0,6
779									21	7	5,8	35,1	27,7	84,7	0,6

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
780									20	7	5,8	35,1	27,7	84,8	0,6
781									19	7	5,8	35,1	27,7	85,4	0,6
782									18	7	5,8	35,1	27,7	84,8	0,5
783									17	7	5,8	35,1	27,7	84,4	0,5
784									16	14	5,8	35,1	27,7	85,8	1,2
785									15	14	5,8	35,1	27,7	84,7	0,9
786									14	20	5,8	35,1	27,7	85,2	0,8
787									13	25	5,8	35,1	27,7	85,3	0,9
788									12	30	5,8	35,1	27,7	84,9	0,9
789									11	34	5,7	35,1	27,7	83,6	1,0
790									10	41	5,6	35,1	27,7	85,1	0,7
791									9	40	5,6	35,1	27,7	84,5	1,0
792									8	46	5,5	35,1	27,7	84,9	0,8
793									7	50	5,3	35,1	27,7	84,7	0,8
794									6	55	5,2	35,1	27,7	84,6	0,7
795									5	56	5,2	35,1	27,7	84,3	0,7
796									4	60	5,2	35,1	27,7	84,3	0,7
797									3	65	5,2	35,1	27,7	82,4	0,8
798									2	70	5,2	35,1	27,7	81,3	0,9
799									1	76	5,2	35,1	27,7	79,8	1,3
800	**2**	**1**	01/05/2013	18:58:33	N 56° 14' 59.532"	E 2° 30' 0.13"									
801									10	2	5,7	34,9	27,5	88,6	0,4
802									9	2	5,7	34,9	27,5	88,9	0,4
803									8	7	5,7	34,9	27,5	89,1	0,3
804									7	7	5,7	34,9	27,5	88,7	0,5
805									6	25	5,6	35,0	27,6	88,2	0,3
806									5	25	5,6	35,0	27,6	88,5	0,4
807									4	50	5,6	35,1	27,6	88,7	0,4
808									3	50	5,6	35,1	27,6	88,7	0,5
809									2	70	5,0	35,1	27,7	82,8	0,9
810									1	70	5,0	35,1	27,7	82,8	1,1
811	**2**	**5**	02/05/2013	3:57:44	N 56° 14' 59.737"	E 2° 30' 0.094"									
812									24	7	5,6	34,9	27,5	89,1	0,3
813									23	7	5,6	34,9	27,5	89,0	0,2
814									22	7	5,6	34,9	27,5	89,2	0,3
815									21	7	5,6	34,9	27,5	89,1	0,4
816									20	7	5,6	34,9	27,5	89,3	0,4
817									19	7	5,6	34,9	27,5	89,2	0,4
818									18	7	5,6	34,9	27,5	89,0	0,4
819									17	7	5,6	34,9	27,5	89,1	0,4
820									16	7	5,6	34,9	27,5	89,1	0,4
821									15	7	5,6	34,9	27,5	89,0	0,3
822									14	7	5,6	34,9	27,5	89,0	0,3
823									13	7	5,6	34,9	27,5	89,0	0,3
824									12	7	5,6	34,9	27,5	88,8	0,3
825									11	7	5,6	34,9	27,5	88,2	0,5
826									10	7	5,6	34,9	27,5	88,7	0,5
827									9	7	5,6	34,9	27,5	89,1	0,4
828									8	7	5,6	34,9	27,5	89,4	0,4
829									7	7	5,6	34,9	27,5	89,0	0,3
830									6	7	5,6	34,9	27,5	89,3	0,3
831									5	7	5,6	34,9	27,5	89,3	0,3
832									4	7	5,6	34,9	27,5	89,2	0,4
833									3	25	5,7	34,9	27,5	88,9	0,3
834									2	25	5,7	34,9	27,5	89,1	0,3
835									1	25	5,7	34,9	27,5	88,9	0,3
836	**2**	**6**	02/05/2013	6:00:51	N 56° 14' 59.579"	E 2° 30' 0.274"									

	P	Q	R	S	T	U	V	W	X
1	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*	*Brussaard*
2									
3	**Oxygen**	**Par**	**Spar**	**PO4**	**NH4**	**NOx**	**NO2**	**NO3**	**Fv/Fm**
4	)eox0 mm/k	ɔl quanta/m	ol quanta/m	µmol/L	µmol/L	µmol/L	µmol/L	µmol/L	
5									
6	345,9	1	32						
7	345,5	1	21	0,03	0,29	15,02	0,42	14,60	0,676
8									
9	329,5	0	49						
10	329,6	0	57						
11	329,4	0	57						
12	329,5	0	57						
13	329,4	0	57						
14	329,6	0	57						
15	329,5	0	57						
16	329,5	0	57						
17	329,5	0	57						
18	329,5	0	57						
19	329,4	0	57						
20	329,5	0	57						
21	329,4	0	57						
22	329,5	0	57						
23	329,8	0	57						
24	329,6	0	57						
25	329,2	0	57						
26	329,3	0	57						
27	329,0	0	57						
28	329,5	0	57						
29	329,4	0	57						
30	329,5	0	57						
31	329,5	0	57						
32	329,5	0	57	0,04	0,37	15,67	0,43	15,24	0,667
33									
34	334,9	1	55						
35	334,2	0	48						
36	333,6	0	44						
37	333,7	0	44						
38	333,9	1	49						
39	334,0	1	44						
40	334,0	1	44						
41	334,1	1	55						
42	334,3	0	46						
43	334,5	0	49						
44	334,2	0	49						
45	333,7	0	44						
46	333,9	1	44						
47	334,3	1	44						
48	334,2	1	55						
49	334,5	1	49						
50	334,6	0	53						
51	333,9	0	66						
52	334,5	0	58						
53	333,8	0	61	0,06	0,55	15,41	0,43	14,98	
54	333,9	1	49						
55	335,0	1	54	0,06	0,31	15,41	0,43	14,98	
56	334,4	1	49	0,06	0,30	15,46	0,43	15,04	
57	334,1	0	44	0,05	0,37	15,41	0,43	14,98	0,656
58									
59	337,5	10	175						

	P	Q	R	S	T	U	V	W	X
60	337,4	10	175						
61	338,3	8	174						
62	338,0	8	174						
63	337,6	8	174						
64	338,1	8	175						
65	338,7	7	175						
66	338,3	7	175	0,06	0,30	14,51	0,41	14,10	
67	337,2	9	175	0,05	0,29	14,51	0,41	14,10	
68	336,9	10	175	0,03	0,33	14,52	0,41	14,12	
69	337,8	11	175	0,03	0,33	14,56	0,41	14,15	
70	338,2	9	175	0,05	0,34	14,53	0,41	14,12	
71	338,0	6	175	0,06	0,33	14,55	0,41	14,14	
72	337,8	6	175	0,06	0,35	14,56	0,41	14,15	
73	337,2	8	174	0,06	0,36	14,54	0,41	14,14	
74	337,6	10	174	0,05	0,40	14,59	0,41	14,18	
75	338,4	10	175	0,05	0,32	14,60	0,41	14,19	
76	337,9	8	175	0,04	0,30	14,57	0,41	14,16	
77									
78	339,8	11	356						
79	340,4	11	355						
80	340,5	15	356						
81	339,5	20	356						
82	339,7	20	356						
83	339,6	18	356						
84	339,7	18	356						
85	339,6	17	357						
86	339,4	15	357						
87	339,3	12	357						
88	339,4	11	357						
89	340,3	14	357						
90	340,6	18	357						
91	340,1	19	358						
92	339,7	17	357						
93	339,0	18	358						
94	339,1	19	358						
95	339,2	11	358						
96	339,0	10	358						
97	339,7	12	358						
98	339,9	14	359						
99	340,0	16	359						
100	339,4	19	359						
101	339,3	13	360	0,05	0,31	14,26	0,40	13,86	
102									
103	337,8	178	683	0,03	0,26	15,11	0,45	14,66	
104	336,7	120	683	0,04	0,25	15,13	0,45	14,69	0,647
105	338,7	133	684	0,06	0,26	15,15	0,45	14,70	
106	335,7	2	716						
107	338,0	4	716						
108	336,4	6	717						
109	337,6	6	718						
110	337,8	6	718						
111	337,9	10	720						
112	337,0	2	722						
113	337,2	2	722						
114	337,2	3	723						
115	335,7	4	723						
116	336,4	5	723						
117	338,0	6	723						
118	337,8	7	724						
119	337,7	7	724	0,05	0,31	15,16	0,44	14,71	

	P	Q	R	S	T	U	V	W	X
120	337,8	6	724	0,05	0,29	15,17	0,44	14,74	
121	336,1	4	725	0,05	0,31	15,22	0,44	14,78	
122	338,7	3	725	0,03	0,29	15,10	0,43	14,66	
123	336,6	6	725	0,04	0,30	15,12	0,44	14,68	
124	337,4	11	725	0,05	0,27	15,11	0,44	14,67	
125	337,6	10	724	0,05	0,29	15,11	0,44	14,67	0,681
126	336,6	0	721	0,05	0,31	15,26	0,44	14,81	0,624
127									
128	340,5	2	41						
129	340,4	2	57	0,13	0,36	6,66	0,19	6,47	
130	340,1	1	59						
131	340,4	1	54	0,13	0,30	6,71	0,19	6,52	
132	335,9	0	38						
133	336,1	0	66	0,13	0,29	7,13	0,19	6,93	
134	320,3	0	45						
135	321,4	0	28	0,21	0,48	8,28	0,18	8,10	
136	315,4	0	26						
137	315,7	0	26	0,24	0,58	8,60	0,17	8,43	
138	316,0	0	61						
139	315,0	0	61	0,24	0,59	8,59	0,17	8,42	
140									
141	337,7	0	41						
142	337,7	0	22						
143	339,3	0	41						
144	337,1	0	41						
145	336,6	0	47						
146	336,3	0	40						
147	334,8	0	58						
148	337,6	0	50						
149	337,7	0	54						
150	336,5	0	56						
151	338,0	0	45						
152	336,8	0	48						
153	337,0	0	55						
154	338,7	0	45						
155	337,8	0	54						
156	336,6	0	52						
157	336,5	0	47						
158	336,6	0	35						
159	336,4	0	32						
160	337,3	0	51						
161	336,1	0	41						
162	337,1	0	41						
163	336,3	0	54						
164	336,7	0	47	0,12	0,45	6,52	0,18	6,34	
165									
166	335,3	31	139						
167	335,4	28	141	0,14	0,36	6,90	0,19	6,71	0,683
168	334,8	10	130						
169	334,4	9	148	0,14	0,36	6,92	0,19	6,73	
170	335,0	9	134	0,15	0,34	6,96	0,19	6,77	
171	335,6	10	148	0,15	0,35	6,94	0,19	6,75	
172	335,3	10	134	0,16	0,34	6,94	0,19	6,75	
173	334,0	10	141	0,16	0,34	6,95	0,19	6,77	
174	334,6	10	146	0,16	0,34	6,95	0,19	6,76	
175	334,5	10	127	0,16	0,34	6,94	0,19	6,76	
176	334,7	9	140	0,15	0,35	6,93	0,19	6,75	
177	335,0	9	131	0,15	0,34	6,91	0,19	6,73	0,764
178	329,5	1	124						
179	328,9	1	119	0,17	0,35	7,47	0,18	7,28	0,772

	P	Q	R	S	T	U	V	W	X
180	322,4	0	112						
181	322,4	0	126	0,21	0,49	8,04	0,18	7,86	
182	321,8	0	140	0,22	0,48	8,09	0,17	7,91	
183	321,4	0	140	0,22	0,50	8,08	0,17	7,91	
184	321,1	0	119	0,22	0,48	8,09	0,17	7,92	
185	320,3	0	112	0,22	0,51	8,11	0,17	7,94	
186	320,3	0	123	0,21	0,47	8,08	0,17	7,91	
187	321,2	0	140	0,22	0,49	8,12	0,18	7,94	0,689
188	316,3	0	138						
189	316,1	0	137	0,25	0,60	8,46	0,17	8,29	0,674
190									
191	340,6	121	443						
192	340,3	114	443	0,14	0,41	6,60	0,19	6,41	0,570
193	335,9	28	375						
194	336,1	23	370						
195	336,9	24	370	0,18	0,39	7,14	0,19	6,95	
196	336,8	26	370	0,18	0,36	7,14	0,19	6,95	
197	335,9	27	369	0,18	0,36	7,15	0,19	6,96	
198	335,9	26	368	0,17	0,32	7,12	0,19	6,93	
199	336,5	25	364	0,18	0,32	7,15	0,19	6,96	
200	336,2	26	356						0,674
201	331,5	9	297						
202	331,8	9	292	0,18	0,35	7,49	0,18	7,30	0,746
203	324,9	3	326						
204	324,3	3	327	0,21	0,44	7,93	0,18	7,75	0,657
205	320,1	1	300						
206	319,9	1	299	0,24	0,50	8,31	0,18	8,13	0,732
207	317,5	0	318						
208	317,9	0	321	0,24	0,53	8,34	0,18	8,17	0,667
209	317,6	0	379						
210	317,3	0	379	0,25	0,53	8,42	0,17	8,25	0,679
211	316,2	0	388						
212	316,6	0	388	0,26	0,54	8,45	0,17	8,28	0,658
213	316,3	0	412						
214	316,2	0	413	0,26	0,56	8,42	0,17	8,25	0,648
215									
216	371,7	4	66						
217	371,9	4	66	0,03	0,27	1,31	0,12	1,18	
218	371,0	1	36						
219	371,6	1	38	0,03	0,26	1,30	0,12	1,18	
220	303,5	0	64						
221	302,7	0	63	0,33	0,70	8,62	0,11	8,50	
222	300,5	0	68						
223	300,3	0	68	0,33	0,74	8,71	0,12	8,60	
224	301,2	0	49						
225	302,1	0	65	0,34	0,74	8,68	0,12	8,57	
226									
227	377,3	0	60						
228	376,5	0	60						
229	375,6	1	60						
230	376,7	1	60						
231	376,8	0	60						
232	376,8	0	60						
233	377,0	0	60						
234	377,0	1	60						
235	377,6	1	60						
236	377,1	0	60						
237	377,0	0	60						
238	376,3	1	60						
239	375,8	0	60						

	P	Q	R	S	T	U	V	W	X
240	376,4	0	60						
241	376,3	0	60						
242	376,7	1	60						
243	377,3	1	60						
244	376,6	0	60						
245	377,1	0	60						
246	375,6	0	60						
247	376,1	0	60						
248	375,4	0	60						
249	376,8	0	60						
250	376,9	0	60	0,03	0,30	0,89	0,09	0,80	
251									
252	375,2	5	170						
253	377,2	5	166						
254	375,8	5	170						
255	375,9	5	170						
256	375,7	5	168						
257	375,7	5	165						
258	376,6	5	164						
259	376,2	5	164						
260	374,9	5	163						
261	377,4	5	163						
262	374,2	4	166						
263	375,1	5	164						
264	374,9	5	162						
265	375,1	5	160						
266	376,5	5	160						
267	376,4	5	161						
268	375,1	5	161						
269	374,0	5	162	0,03	0,33	0,61	0,08	0,53	
270	374,8	5	162	0,04	0,36	0,65	0,08	0,57	
271	375,4	4	162	0,04	0,36	0,63	0,08	0,55	
272	374,2	4	161	0,04	0,34	0,64	0,08	0,56	0,661
273	345,1	0	163	0,08	0,42	2,73	0,06	2,66	0,684
274	307,4	0	137	0,32	0,73	8,27	0,11	8,16	
275	307,8	0	137	0,33	0,69	8,34	0,11	8,23	0,643
276									
277	376,1	204	572						
278	377,2	207	561	0,03	0,23	0,67	0,09	0,58	0,667
279	376,2	23	559						
280	375,9	23	561	0,03	0,24	0,64	0,09	0,56	
281	376,7	22	568	0,03	0,24	0,71	0,09	0,63	
282	376,0	23	563	0,03	0,24	0,77	0,09	0,68	
283	374,8	25	549	0,03	0,26	0,71	0,09	0,63	
284	376,2	23	546	0,02	0,25	0,65	0,09	0,57	
285	375,7	22	576	0,03	0,25	0,78	0,09	0,69	
286	376,2	23	579	0,03	0,23	0,70	0,08	0,62	
287	376,8	23	551	0,03	0,22	0,71	0,09	0,62	
288	375,3	24	538	0,03	0,25	0,68	0,09	0,59	0,645
289	376,6	2	554						
290	376,0	1	557	0,05	0,30	1,10	0,05	1,05	0,663
291	310,3	0	559						
292	309,7	0	551						
293	309,3	0	550						
294	310,8	0	555						
295	310,4	0	562	0,31	0,58	7,98	0,10	7,88	
296	310,4	0	555	0,32	0,58	7,93	0,10	7,83	
297	310,9	0	547	0,31	0,57	7,97	0,10	7,87	
298	310,9	0	545	0,32	0,58	8,00	0,10	7,90	0,700
299	304,8	0	524						

	P	Q	R	S	T	U	V	W	X
300	305,0	0	528	0,34	0,64	8,44	0,11	8,34	0,692
301									
302	372,1	33	434						
303	371,6	32	433						
304	371,4	31	434						
305	371,4	31	436						
306	371,1	31	437						
307	371,3	32	437						
308	371,9	34	438						
309	371,8	35	439						
310	371,3	35	441						
311	371,4	34	444						
312	371,7	34	450						
313	371,1	34	456						
314	371,0	34	458						
315	371,0	36	458						
316	370,7	36	462						
317	370,8	35	470						
318	370,7	34	474						
319	370,9	36	476						
320	370,8	36	477						
321	370,5	35	485						
322	370,8	37	495						
323	370,7	39	492						
324	370,4	40	492						
325	370,7	41	520	0,05	0,22	0,95	0,09	0,85	
326									
327	381,6	841	1504						
328	381,7	840	1502	0,03	0,32	0,50	0,08	0,42	
329	389,1	35	1512						
330	389,6	35	1500	0,03	0,30	0,40	0,07	0,34	
331	389,8	37	1512	0,03	0,22	0,36	0,07	0,30	
332	390,0	39	1510						
333	390,0	38	1509						
334	390,1	36	1520						
335	389,8	34	1513						
336	390,0	36	1511	0,03	0,27	0,42	0,07	0,35	
337	392,8	11	1523						
338	392,0	10	1512	0,04	0,24	0,53	0,05	0,49	
339	370,1	3	1494						
340	373,1	3	1514	0,09	0,28	1,99	0,05	1,94	
341	316,1	0	1516						
342	317,2	0	1536	0,26	0,50	6,62	0,09	6,52	
343	310,1	0	1521						
344	310,2	0	1518	0,32	0,55	7,59	0,10	7,49	
345	308,9	0	1541						
346	309,8	0	1518	0,32	0,57	7,71	0,10	7,61	
347	309,7	0	1527						
348	308,9	0	1534	0,34	0,56	7,87	0,10	7,76	
349	308,2	0	1520						
350	308,7	0	1519	0,33	0,61	8,01	0,10	7,91	
351									
352	344,3	3	64						
353	344,8	3	64						
354	344,9	3	64	0,03	0,12	0,05	0,02	0,03	0,636
355	344,4	1	39						
356	343,9	1	47	0,03	0,11	0,04	0,02	0,02	0,521
357	350,1	0	67						
358	339,2	0	67	0,04	0,12	0,29	0,02	0,27	0,609
359	307,6	0	38						

	P	Q	R	S	T	U	V	W	X
360	307,8	0	44	0,26	0,18	5,43	0,09	5,34	0,659
361	307,1	0	57						
362	306,6	0	59	0,27	0,18	5,52	0,09	5,43	0,686
363									
364	346,7	1	59						
365	345,9	2	59						
366	346,9	1	60						
367	346,2	1	61						
368	346,7	1	61						
369	346,3	2	60						
370	345,4	2	60						
371	345,5	2	57						
372	345,8	1	52						
373	346,1	1	53						
374	346,2	1	59						
375	347,1	2	62						
376	347,0	1	62						
377	346,3	1	63						
378	346,3	1	63						
379	346,0	2	62						
380	346,3	1	63						
381	346,3	1	63						
382	345,7	1	63						
383	346,1	2	62						
384	346,3	2	62						
385	345,6	1	63						0,594
386	346,4	1	63						
387	346,1	1	63	0,03	0,20	0,09	0,02	0,07	
388									
389	344,8	55	375						
390	344,2	59	467	0,03	0,15	0,23	0,02	0,21	0,573
391	345,9	16	260						
392	345,7	17	461						
393	346,1	17	328	0,03	0,16	0,06	0,02	0,04	
394	346,1	17	300	0,03	0,13	0,06	0,02	0,04	
395	345,8	16	272	0,03	0,13	0,06	0,02	0,04	
396	344,7	17	419	0,03	0,12	0,06	0,02	0,03	
397	345,5	18	474	0,03	0,13	0,06	0,02	0,03	
398	346,1	17	392	0,03	0,12	0,06	0,02	0,04	
399	345,8	15	443	0,03	0,13	0,06	0,02	0,03	
400	346,6	16	397	0,03	0,12	0,05	0,02	0,03	
401	345,6	18	469	0,03	0,11	0,06	0,02	0,04	0,576
402	345,9	10	193	0,03	0,11	0,07	0,02	0,05	0,620
403	344,0	4	336						
404	341,5	5	397	0,04	0,12	0,40	0,02	0,38	0,634
405	306,7	0	191						
406	307,1	0	193						
407	306,5	0	199	0,25	0,16	5,75	0,09	5,65	
408	307,2	0	202	0,25	0,15	5,78	0,09	5,68	
409	306,7	0	199	0,25	0,15	5,79	0,09	5,70	
410	306,5	0	196	0,25	0,14	5,79	0,09	5,70	0,712
411	306,5	0	187						
412	306,6	0	186	0,26	0,16	5,79	0,09	5,70	0,691
413									
414	337,6	169	567						
415	337,6	196	584	0,06	0,12	0,16	0,02	0,13	0,540
416	338,1	80	602						
417	337,3	110	604	0,05	0,11	0,16	0,02	0,14	
418	337,4	107	604	0,05	0,11	0,16	0,03	0,14	
419	337,7	98	605	0,05	0,11	0,15	0,02	0,13	

	P	Q	R	S	T	U	V	W	X
420	337,8	86	605	0,06	0,13	0,16	0,03	0,13	
421	337,8	92	605						
422	338,1	92	605						
423	338,1	91	594	0,05	0,10	0,15	0,02	0,12	0,601
424	338,0	51	605						
425	337,4	51	612	0,05	0,13	0,26	0,03	0,23	0,585
426	334,7	22	620						
427	336,2	22	621	0,07	0,10	0,54	0,03	0,52	0,661
428	317,7	9	608						
429	317,4	9	608	0,17	0,18	2,92	0,06	2,86	0,650
430	310,0	2	654						
431	309,2	2	655	0,23	0,15	4,57	0,07	4,50	0,713
432	306,4	0	678						
433	307,0	0	678	0,25	0,16	4,90	0,08	4,82	0,682
434	306,5	0	716						
435	306,7	0	716	0,25	0,19	4,97	0,08	4,90	0,707
436	306,0	0	752						
437	306,2	0	751	0,24	0,15	5,02	0,08	4,95	0,691
438									
439	306,9	2	31						
440	306,9	1	37	0,14	0,14	0,03	0,02	0,01	0,693
441	307,3	1	36						
442	306,5	1	30	0,13	0,13	0,03	0,02	0,01	0,653
443	306,9	0	24						
444	306,3	0	30	0,14	0,11	0,03	0,02	0,01	0,684
445	306,6	0	24						
446	306,6	0	40	0,13	0,13	0,03	0,02	0,01	0,615
447									
448	305,2	1	31						
449	305,8	1	31						
450	305,6	1	45						
451	305,1	1	30						
452	304,9	1	31						
453	305,9	1	36						
454	305,6	1	37						
455	305,7	1	45						
456	305,3	1	34						
457	305,2	1	31						
458	305,2	1	31						
459	305,2	1	38						
460	305,1	1	50						
461	305,1	1	46						
462	305,5	1	46						
463	305,7	1	34						
464	305,3	1	30						
465	304,9	1	41						
466	304,9	1	54						
467	305,4	1	40						
468	305,5	1	39						
469	305,9	1	43						
470	305,7	1	46						
471	305,5	1	36	0,14	0,24	0,07	0,02	0,05	
472									
473	305,4	7	113						
474	305,4	8	115						
475	305,6	8	117						
476	305,5	7	116						
477	305,0	7	114						
478	304,9	8	113						
479	304,7	9	115						

	P	Q	R	S	T	U	V	W	X
480	305,0	8	116						
481	305,3	7	115						
482	305,0	8	115						
483	305,1	8	118						
484	304,9	8	116						
485	304,8	7	114						
486	305,0	8	114						
487	304,8	9	119						
488	304,9	8	124						
489	305,3	7	122	0,13	0,17	0,05	0,02	0,03	
490	305,0	7	124	0,14	0,16	0,05	0,02	0,03	
491	304,8	8	132	0,14	0,19	0,05	0,02	0,02	
492	305,1	8	132	0,14	0,18	0,05	0,02	0,02	0,682
493	304,8	0	103	0,15	0,15	0,04	0,02	0,01	
494	305,4	0	93	0,14	0,17	0,04	0,02	0,02	
495	304,9	0	104	0,14	0,11	0,03	0,02	0,01	
496	304,9	0	85	0,14	0,15	0,03	0,02	0,01	0,700
497									
498	305,8	103	201						
499	305,8	82	209	0,13	0,14	0,04	0,02	0,01	0,613
500	305,6	59	220	0,13	0,15	0,03	0,02	0,01	
501	305,6	57	214	0,13	0,13	0,03	0,02	0,01	
502	305,6	55	295	0,14	0,12	0,03	0,02	0,01	
503	305,6	64	376	0,13	0,13	0,03	0,03	0,00	
504	305,6	55	264	0,13	0,14	0,04	0,03	0,01	
505	305,8	53	282	0,14	0,11	0,03	0,02	0,00	
506	305,6	53	361	0,14	0,11	0,02	0,02	0,00	
507	305,7	58	406	0,14	0,12	0,03	0,02	0,00	
508	305,3	49	323	0,14	0,13	0,03	0,02	0,00	
509	305,3	56	223	0,14	0,14	0,03	0,03	0,00	
510	306,0	56	285						
511	305,9	61	358	0,14	0,11	0,03	0,02	0,01	0,696
512	306,0	27	211						
513	305,1	24	211	0,14	0,11	0,03	0,02	0,00	0,637
514	305,8	7	199						
515	305,3	6	198	0,14	0,12	0,03	0,02	0,00	0,664
516	304,6	2	204						
517	305,1	2	199						
518	304,7	2	202						
519	304,4	2	206	0,14	0,12	0,02	0,02	0,00	
520	305,2	2	201	0,13	0,12	0,02	0,02	0,00	
521	304,9	2	198	0,14	0,13	0,02	0,02	0,00	0,658
522									
523	305,8	48	232						
524	305,8	49	233						
525	306,1	43	360						
526	305,9	50	308						
527	305,9	53	244						
528	305,7	55	228						
529	305,7	56	356						
530	305,6	53	632						
531	305,7	44	740						
532	305,7	42	734						
533	305,7	50	738						
534	305,7	47	726						
535	305,8	39	686						
536	305,8	35	672						
537	305,7	38	662						
538	305,7	39	751						
539	305,7	37	714						

	P	Q	R	S	T	U	V	W	X
540	305,8	34	663						
541	305,7	35	645						
542	305,8	36	717						
543	305,7	34	743						
544	305,8	35	679						
545	305,6	31	516						
546	305,8	30	645	0,13	0,13	0,02	0,02	0,00	
547									
548	304,4	88	1506	0,14	0,13	0,03	0,02	0,01	
549	304,9	68	1495	0,14	0,13	0,03	0,02	0,01	
550	305,2	69	1523	0,14	0,14	0,03	0,02	0,00	0,339
551	305,2	25	1487						
552	305,1	26	1514	0,14	0,26	0,03	0,03	0,01	
553	304,9	26	1521	0,14	0,13	0,03	0,02	0,00	
554	305,1	27	1523	0,14	0,12	0,02	0,03	0,00	
555	305,1	25	1479	0,14	0,15	0,03	0,02	0,00	
556	305,2	24	1448	0,14	0,15	0,03	0,03	0,00	
557	304,8	25	1490	0,14	0,14	0,03	0,03	0,00	
558	304,8	30	1519	0,14	0,15	0,03	0,03	0,00	
559	305,0	29	1539	0,14	0,11	0,02	0,02	0,00	0,509
560	304,9	14	1510	0,14	0,12	0,02	0,02	0,00	
561	304,8	17	1569	0,14	0,16	0,03	0,03	0,00	
562	304,8	15	1505	0,14	0,12	0,03	0,03	0,00	0,515
563	305,5	8	1490	0,14	0,11	0,03	0,02	0,01	
564	305,1	9	1505	0,14	0,11	0,02	0,02	0,00	
565	305,1	9	1498	0,14	0,14	0,03	0,03	0,00	0,470
566	304,8	6	1527	0,14	0,12	0,03	0,03	0,00	
567	304,4	6	1497	0,14	0,13	0,02	0,02	0,00	
568	305,1	6	1508	0,14	0,13	0,03	0,03	0,00	0,502
569	304,8	3	1497	0,14	0,11	0,03	0,03	0,00	
570	305,5	4	1527	0,13	0,10	0,02	0,02	0,00	
571	305,7	3	1498	0,13	0,12	0,03	0,03	0,00	0,576
572									
573	308,7	5	71						
574	308,6	6	70	0,20	0,15	0,24	0,04	0,20	0,635
575	309,0	3	72						
576	309,3	3	73	0,19	0,13	0,24	0,04	0,20	0,620
577	308,1	1	75						
578	308,7	1	75	0,19	0,15	0,24	0,03	0,20	0,569
579	308,0	0	77						
580	308,0	0	75	0,19	0,16	0,25	0,04	0,21	0,623
581	308,0	0	78						
582	307,0	0	78	0,19	0,20	0,28	0,04	0,24	0,636
583	299,4	0	83						
584	298,8	0	83	0,16	0,44	0,28	0,03	0,25	0,670
585									
586	306,4	2	64						
587	306,5	2	64						
588	306,7	2	64						
589	306,4	2	64						
590	306,4	2	64						
591	306,8	2	64						
592	306,6	2	64						
593	306,3	2	64						
594	306,4	2	64						
595	306,3	2	64						
596	306,3	2	64						
597	306,3	2	64						
598	306,3	2	64						
599	306,4	2	64						

	P	Q	R	S	T	U	V	W	X
600	306,1	2	64						
601	306,3	2	64						
602	306,4	2	64						
603	306,4	2	64	0,19	0,18	0,31	0,04	0,27	
604	306,9	2	64	0,20	0,22	0,31	0,04	0,27	
605	306,5	2	64	0,19	0,17	0,29	0,04	0,25	
606	305,9	2	64	0,19	0,20	0,28	0,04	0,24	0,783
607	306,2	0	63	0,19	0,16	0,28	0,04	0,25	
608	306,8	0	63	0,19	0,15	0,28	0,04	0,24	
609	306,9	0	63	0,19	0,20	0,29	0,04	0,25	0,713
610									
611	306,7	227	557						
612	306,9	265	535	0,18	0,13	0,21	0,03	0,18	0,582
613	307,1	80	517						
614	306,9	86	538	0,18	0,15	0,21	0,03	0,18	
615	307,2	75	560	0,19	0,13	0,21	0,03	0,18	
616	307,3	79	540	0,19	0,13	0,21	0,03	0,18	
617	307,1	80	517	0,19	0,15	0,21	0,03	0,17	
618	306,0	83	522	0,19	0,15	0,21	0,03	0,17	
619	306,7	72	538	0,20	0,14	0,21	0,04	0,17	
620	306,9	73	548	0,20	0,15	0,20	0,03	0,17	
621	307,2	86	554	0,20	0,12	0,21	0,03	0,17	
622	307,1	80	537	0,19	0,14	0,21	0,03	0,17	0,613
623	307,0	78	519						
624	306,7	24	512						
625	306,5	25	511	0,19	0,20	0,21	0,03	0,18	0,592
626	305,9	7	517						
627	305,9	7	521						
628	306,2	7	509	0,19	0,15	0,21	0,03	0,17	
629	306,4	7	525	0,19	0,13	0,21	0,03	0,18	
630	306,6	7	525	0,18	0,19	0,21	0,04	0,17	0,664
631	303,4	2	495						
632	303,2	2	531	0,18	0,26	0,24	0,03	0,21	0,633
633	295,5	0	488	0,17	0,54	0,35	0,03	0,32	0,655
634	295,4	0	508						
635									
636	308,4	125	1466	0,21	0,21	0,26	0,04	0,22	
637	308,2	155	1502	0,19	0,14	0,23	0,04	0,19	0,587
638	307,6	37	1508	0,19	0,18	0,22	0,04	0,19	
639	307,6	35	1494	0,19	0,15	0,22	0,04	0,19	
640	307,8	34	1467	0,20	0,13	0,22	0,03	0,19	
641	307,2	33	1454	0,20	0,13	0,22	0,04	0,19	
642	307,4	34	1478	0,20	0,12	0,22	0,04	0,19	
643	308,1	35	1515	0,19	0,13	0,22	0,04	0,19	
644	308,3	37	1535	0,19	0,15	0,22	0,04	0,19	0,536
645	308,5	26	1501	0,20	0,15	0,22	0,04	0,19	0,661
646	307,9	13	1440	0,20	0,16	0,22	0,04	0,18	
647	308,3	13	1467	0,20	0,13	0,22	0,04	0,18	0,533
648	308,1	10	1503	0,20		0,20	0,04	0,17	0,679
649	307,8	7	1462	0,19	0,15	0,21	0,04	0,18	
650	307,6	7	1476	0,20	0,15	0,21	0,04	0,18	0,585
651	305,5	6	1478	0,20	0,18	0,26	0,04	0,22	
652	305,5	7	1490	0,21	0,18	0,26	0,04	0,22	0,736
653	300,8	6	1483						
654	299,7	7	1480	0,20	0,39	0,36	0,04	0,33	0,630
655	293,0	5	1472	0,20	0,60	0,55	0,03	0,51	
656	293,0	5	1465	0,21	0,61	0,55	0,04	0,52	0,608
657	291,5	2	1466	0,21	0,64	0,59	0,04	0,56	0,640
658	291,6	1	1455						
659	291,6	1	1482	0,22	0,62	0,61	0,04	0,58	0,584

	P	Q	R	S	T	U	V	W	X
660									
661	330,7	2	57						
662	331,6	2	53	0,16	0,15	0,04	0,02	0,02	0,618
663	330,2	1	56						
664	330,2	1	56	0,16	0,13	0,04	0,02	0,02	0,638
665	328,7	0	23						
666	328,3	0	27	0,18	0,14	0,04	0,02	0,02	0,643
667	325,7	0	57						
668	325,9	0	28	0,18	0,14	0,05	0,02	0,03	0,710
669	322,3	0	34						
670	321,6	0	23	0,18	0,17	0,07	0,02	0,05	0,668
671	299,7	0	24						
672	298,7	0	24	0,33	1,59	1,43	0,08	1,35	0,622
673	294,8	0	52						
674	294,9	0	54	0,35	1,90	1,60	0,09	1,51	0,661
675									
676	325,4	1	57						
677	325,4	1	57						
678	325,4	1	57						
679	325,4	1	58						
680	325,9	1	57						
681	325,8	1	57						
682	324,9	1	57						
683	324,3	1	57						
684	325,3	1	58						
685	325,4	1	57						
686	325,4	1	57						
687	325,4	1	57						
688	325,4	1	57						
689	325,5	1	57						
690	325,2	1	57						
691	325,5	1	57						
692	326,0	1	57						
693	325,5	1	57						
694	324,6	1	56						
695	325,4	1	56						
696	325,3	1	57						
697	324,6	1	57						
698	325,0	1	57						
699	325,4	1	57	0,15	0,18	0,07	0,02	0,04	
700									
701	325,8	6	82						
702	324,4	6	87						
703	324,2	6	87						
704	325,1	5	87						
705	325,3	5	87						
706	325,5	6	87						
707	325,2	6	87						
708	325,3	5	87						
709	325,9	5	87						
710	325,5	5	87						
711	324,8	6	87						
712	324,8	6	87						
713	324,4	6	87						
714	324,9	6	87						
715	325,6	5	87	0,16	0,19	0,07	0,02	0,04	
716	324,8	5	87	0,17	0,20	0,06	0,02	0,04	
717	325,0	6	87	0,17	0,16	0,06	0,02	0,04	
718	324,6	6	86	0,17	0,17	0,05	0,02	0,03	
719	324,5	5	87	0,17	0,14	0,05	0,02	0,03	0,646

	P	Q	R	S	T	U	V	W	X
720	323,9	0	82	0,17	0,16	0,06	0,02	0,03	
721	324,5	0	82	0,17	0,16	0,05	0,02	0,02	
722	324,9	0	82	0,17	0,13	0,04	0,02	0,02	
723	325,1	0	82	0,17	0,15	0,05	0,02	0,02	
724	325,0	0	82						0,649
725									
726	325,1	42	397						
727	325,0	47	431	0,18	0,15	0,06	0,02	0,03	0,596
728	325,2	17	398						
729	325,1	17	388	0,18	0,16	0,05	0,02	0,03	
730	324,9	17	401	0,18	0,15	0,04	0,02	0,02	
731	325,4	19	421	0,19	0,17	0,05	0,02	0,02	
732	324,6	20	430	0,19	0,13	0,04	0,02	0,02	
733	325,2	18	422	0,19	0,14	0,04	0,02	0,02	
734	325,3	16	404	0,19	0,13	0,03	0,02	0,01	
735	325,3	17	397	0,18	0,14	0,03	0,02	0,01	
736	325,3	18	398	0,18	0,13	0,03	0,02	0,01	
737	325,2	17	399	0,18	0,11	0,03	0,02	0,01	0,611
738	324,4	4	391						
739	325,3	4	392	0,17	0,15	0,03	0,02	0,00	0,628
740	321,8	1	356						
741	322,2	1	373	0,18	0,20	0,10	0,03	0,08	
742	323,0	1	380	0,16	0,19	0,11	0,03	0,08	
743	323,0	1	379	0,17	0,20	0,09	0,02	0,07	0,659
744	323,2	0	358						
745	322,9	0	345	0,19	0,21	0,13	0,03	0,10	0,662
746	294,8	0	262						
747	295,1	0	267	0,35	1,83	1,54	0,08	1,46	0,643
748	293,9	0	291	0,37	2,00	1,61	0,09	1,53	0,654
749	294,2	0	305	0,34	1,68	1,42	0,08	1,34	0,603
750									
751	323,5	24	659						
752	323,3	25	647						
753	323,4	22	643						
754	323,6	22	663						
755	323,8	25	686						
756	323,3	26	679						
757	322,5	23	659						
758	323,0	21	661						
759	324,1	23	674						
760	323,6	24	680						
761	322,9	24	680						
762	323,0	24	680						
763	322,7	24	675						
764	323,4	23	659						
765	323,4	21	648						
766	323,4	22	649						
767	322,7	24	653						
768	323,0	24	658						
769	323,3	22	668						
770	323,0	22	672						
771	323,1	23	662						
772	322,9	23	655						
773	322,6	22	657						
774	322,5	21	661	0,17	0,18	0,06	0,02	0,04	
775									
776	324,6	1062	1738	0,17	0,25	0,06	0,03	0,04	
777	324,8	1096	1758	0,17	0,13	0,05	0,02	0,03	
778	325,1	126	984	0,17	0,12	0,04	0,03	0,02	
779	325,1	129	1036	0,18	0,12	0,05	0,02	0,02	

	P	Q	R	S	T	U	V	W	X
780	325,1	127	1015	0,17	0,14	0,04	0,02	0,02	
781	325,1	126	967	0,17	0,12	0,04	0,02	0,02	
782	325,1	116	957	0,17	0,13	0,04	0,02	0,02	
783	325,1	112	1022	0,17	0,12	0,04	0,02	0,02	
784	327,7	28	1618	0,17	0,16	0,04	0,02	0,02	
785	325,7	33	1647	0,18	0,11	0,04	0,02	0,02	
786	325,1	21	1581	0,17	0,11	0,05	0,02	0,03	
787	326,1	5	1450	0,17	0,12	0,05	0,02	0,02	
788	324,5	3	1503	0,17	0,17	0,09	0,02	0,06	
789	323,6	2	1453	0,19	0,23	0,17	0,03	0,14	
790	318,0	1	1480	0,22	0,39	0,40	0,04	0,36	
791	317,3	1	1544	0,22	0,38	0,41	0,04	0,37	
792	308,7	0	1473	0,25	0,64	0,71	0,05	0,65	
793	301,4	0	1533	0,33	1,28	1,39	0,09	1,30	
794	293,3	0	1531	0,37	1,80	1,83	0,10	1,72	
795	294,2	0	1477	0,38	1,84	1,83	0,10	1,74	
796	293,0	0	1469	0,38	1,91	1,89	0,10	1,79	
797	291,5	0	1516	0,37	1,96	1,95	0,10	1,85	
798	292,3	0	1465	0,37	1,99	1,96	0,11	1,85	
799	292,6	0	1474	0,38	1,98	1,95	0,10	1,85	
800									
801	314,4	7	41						
802	313,7	7	36	0,13	0,14	0,03	0,02	0,01	0,576
803	314,0	3	42						
804	314,4	3	57	0,14	0,14	0,03	0,02	0,01	0,594
805	315,5	0	46						
806	316,4	0	41	0,13	0,13	0,03	0,02	0,01	0,599
807	314,4	0	44						
808	314,6	0	44	0,16	0,25	0,28	0,03	0,25	0,671
809	290,2	0	48						
810	290,1	0	48	0,37	1,11	2,29	0,09	2,20	0,582
811									
812	311,4	2	40						
813	312,4	2	39						
814	312,2	2	35						
815	311,9	2	35						
816	312,6	2	35						
817	312,8	2	35						
818	312,7	2	39						
819	312,2	2	36						
820	311,7	2	39						
821	311,8	2	42						
822	312,0	2	37						
823	311,7	2	35						
824	312,3	2	35						
825	312,2	2	43						
826	312,3	2	58						
827	312,8	2	57						
828	312,3	2	62						
829	311,1	2	63	0,13	0,22	0,06	0,02	0,05	
830	312,1	2	63	0,13	0,18	0,05	0,02	0,03	
831	312,4	2	63	0,13	0,16	0,04	0,02	0,02	
832	311,5	2	63	0,13	0,16	0,04	0,02	0,02	0,545
833	312,7	0	37	0,13	0,18	0,05	0,02	0,04	
834	311,4	0	38	0,14	0,17	0,07	0,02	0,05	
835	311,9	0	42	0,14	0,16	0,09	0,02	0,07	0,534
836									

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Station	Cast	Who	Responsible scientist	What are you sampling for?	Sampling device	time of day	Bottle #
13	1	S. Ossebaar	C Brussaard	Nutrients (PO4, NH4, NO3, NO2)	CTD	10PM	1
13	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1
13	6	S. Ossebaar	C Brussaard	Nutrients	CTD	6:30AM	1,2,3,5
13	7	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,2,3,4,5,6,7,8,9,10,11
13	8	S. Ossebaar	C Brussaard	Nutrients	CTD	9AM	1
13	14	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,2,3,4,5,6,7,8,22,23,24
11	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7,9,11
11	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1
11	6	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,3,4,5,6,7,8,9,11,13,14,15,16,17,18,19,20,21,23
11	12	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,3,5,7,9,11,13,16,17,18,19,20,23
10	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7,9
10	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1
10	6	S. Ossebaar	C Brussaard	Nutrients	CTD	6:30AM	1,2,3,4,5,6,7
10	7	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,3,4,5,6,11,13,14,15,16,17,18,19,20,21,23
10	8	S. Ossebaar	C Brussaard	Nutrients	CTD	9AM	1
10	14	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,3,5,7,9,11,13,15,20,21,23
8	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7,9
8	7	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1
8	8	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,3,4,5,6,9,11,12,13,14,15,16,17,18,19,20,23
8	15	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,3,5,7,9,11,13,15,18,19,20,21,23
7	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7
7	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1
7	6	S. Ossebaar	C Brussaard	Nutrients	CTD	6:30AM	1,2,3,4,5,6,7,8
7	7	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,2,3,7,9,11,13,14,15,16,17,18,19,20,21,22,23
7	8	S. Ossebaar	C Brussaard	Nutrients	CTD	9AM	1
7	8	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,22,23,24
4	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7,9,11
4	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1,2,3,4,5,6,7
4	6	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	2,3,5,6,7,10,13,14,15,16,17,18,19,20,21,23

4	12	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,3,4,5,6,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
1	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7,9,11,13
1	4	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1
1	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:30AM	1,2,3,4,6,7,8,9,10
1	6	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,2,3,5,7,8,9,11,13,14,15,16,17,18,19,20,21,23
1	7	S. Ossebaar	C Brussaard	Nutrients	CTD	9AM	1
1	11	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
2	1	S. Ossebaar	C Brussaard	Nutrients	CTD	9PM	1,3,5,7,9
2	5	S. Ossebaar	C Brussaard	Nutrients	CTD	6:00 AM	1,2,3,4,5,6,7
2	6	S. Ossebaar	C Brussaard	Nutrients	CTD	8AM	1,2,4,5,6,7,8,9,12,13,14,15,16,17,18,19,20,21,23
2	12	S. Ossebaar	C Brussaard	Nutrients	CTD	2PM	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

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Station	Cast	Who	Responsible scientist	What are you sampling for?	Sampling device	time of day	Depths (m)	Bottle #
13	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9.30 PM	3.8	1
13	1	Noordeloos	O'Connor/Brussaard	PAM	CTD	9.30 PM	3.8	1
13	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:30 AM	3.8	1
13	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:30 AM	3.8	1
13	7	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	4.0	1
13	7	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	4.0	1
13	7	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	4.0	1
13	7	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	4.0	1
13	8	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 AM	4.3	1
13	14	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	2:00 PM	2, 4, 6.8	1, 2, 23
13	14	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	2, 4, 6.8	1, 2, 23
13	14	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	2, 4, 6.8	1, 2, 23
11	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 PM	3, 7, 15, 25, 35, 40	1, 3, 5, 7, 9, 11
11	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	9:00 PM	3, 7, 15, 25, 35, 40	1, 3, 5, 7, 9, 11
11	5	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:00 AM	7	1
11	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	3, 7, 15, 25, 40	1, 3, 11, 13, 23
11	6	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	3, 7, 15, 25, 40	1, 3, 11, 13, 23
11	6	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	13
11	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	3, 7, 15, 25, 40	1, 3, 11, 13, 23
11	12	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	2:00 PM	3, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
11	12	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	3, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
11	12	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	3, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
10	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 PM	1.5, 7, 25, 40, 45	1, 3, 5, 7, 9
10	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	9:00 PM	1.5, 7, 25, 40, 45	1, 3, 5, 7, 9
10	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:30 AM	7, 15, 25	1, 3, 4
10	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:30 AM	7, 15, 25	1, 3, 4
10	7	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	2, 7, 15, 25, 40	1, 3, 11, 13, 23
10	7	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	2, 7, 15, 25, 40	1, 3, 11, 13, 23
10	7	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	7
10	7	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	2, 7, 15, 25, 40	1, 3, 11, 13, 23

10	8	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 AM	7	1
10	14	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	2, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
10	14	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	2, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
8	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 PM	2, 7, 15, 25, 35	1, 3, 5, 7, 9
8	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	9:00 PM	2, 7, 15, 25, 35	1, 3, 5, 7, 9
8	1	Noordeloos	O'Connor/Brussaard	PAM	CTD	9:00 PM	2, 7, 15, 25, 35	1, 3, 5, 7, 9
8	7	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:30 AM	7	3
8	7	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	6:30 AM	7	3
8	7	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:30 AM	7	3
8	8	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	2, 7, 10, 15, 25, 40	1, 3, 9, 11, 12, 23
8	8	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	2, 7, 10, 15, 25, 40	1, 3, 9, 11, 12, 23
8	8	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	13
8	8	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	2, 7, 10, 15, 25, 40	1, 3, 9, 11, 12, 23
8	15	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	3, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
8	15	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	3, 7, 10, 15, 20, 25, 30, 35, 40	1, 3, 5, 7, 9, 11, 13, 15, 23
7	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 PM	3, 7, 15, 25	1, 3, 5, 7
7	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	9:00 PM	3, 7, 15, 25	1, 3, 5, 7
7	1	Noordeloos	O'Connor/Brussaard	PAM	CTD	9:00 PM	3, 7, 15, 25	
7	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:00 AM	7, 25	1, 5
7	6	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	6:00 AM	7, 25	1, 5
7	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:00 AM	7, 25	1, 5
7	7	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	3, 7, 10, 15, 25	1, 7, 9, 11, 23
7	7	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	3, 7, 10, 15, 25	1, 7, 9, 11, 23
7	7	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	11
7	7	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	3, 7, 10, 15, 25	1, 7, 9, 11, 23
7	14	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	2:00 PM	3, 7, 10, 15, 20, 25	1, 4, 7, 10, 13, 33
7	14	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	3, 7, 10, 15, 20, 25	1, 4, 7, 10, 13, 33
7	14	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	3, 7, 10, 15, 20, 25	1, 4, 7, 10, 13, 33
4	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 PM	7, 25	5, 9
4	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	9:00 PM	3, 7, 15, 25, 35, 45	1, 3, 5, 7, 9, 11
4	1	Noordeloos	O'Connor/Brussaard	PAM	CTD	9:00 PM	3, 7, 15, 25, 35, 45	1, 3, 5, 7, 9, 11
4	5	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:00 AM	7, 25	1, 4

4	5	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	6:00 AM	7, 25	1, 4
4	5	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:00 AM	7, 25	1, 4
4	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	2, 7, 15, 25, 35, 45	2, 3, 5, 10, 13, 23
4	6	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	2, 7, 15, 25, 35, 45	2, 3, 5, 10, 13, 23
4	6	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	13
4	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	2, 7, 15, 25, 35, 45	2, 3, 5, 10, 13, 23
4	12	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	2, 7, 10, 15, 20, 25, 30, 35, 40, 45, 50	1, 3, 4, 6, 8, 10, 12, 13, 15, 16, 23
4	12	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	2, 7, 10, 15, 20, 25, 30, 35, 40, 45, 50	1, 3, 4, 6, 8, 10, 12, 13, 15, 16, 23
1	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:40 PM	7, 15, 25	7, 9, 11
1	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	9:40 PM	2, 7, 15, 25, 35, 50, 80	1, 3, 5, 7, 9, 11, 13
1	1	Noordeloos	O'Connor/Brussaard	PAM	CTD	9:40 PM	2, 7, 15, 25, 35, 50, 80	1, 3, 5, 7, 9, 11, 13
1	5	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:30 AM	7, 25	1, 6
1	5	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	6:30 AM	7, 25	1, 6
1	5	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:30 AM	7, 25	1, 6
1	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	2, 7, 15, 25, 35, 50, 60, 80	1, 2, 3, 5, 7, 11, 13, 23
1	6	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	2, 7, 15, 25, 35, 50, 60, 80	1, 2, 3, 5, 7, 11, 13, 23
1	6	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	13
1	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	2, 7, 15, 25, 35, 50, 60, 80	1, 2, 3, 5, 6, 9, 10, 23
1	7	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	9:00 AM	7	1
1	11	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 7	1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 17, 23
2	1	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 PM	2, 7, 15, 25, 50, 70	1, 5, 7, 11, 15, 23
2	1	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 PM	2, 7, 10, 15, 20, 25, 50, 55, 70	1, 3, 5, 7, 9, 11, 13, 15, 23
2	5	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	6:00 AM	7, 25	1, 4
2	5	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	6:00 AM	7, 25	1, 4
2	5	Noordeloos	O'Connor/Brussaard	PAM	CTD	6:00 AM	7, 25	1, 4
2	6	Noordeloos	O'Connor/Brussaard	FCM algal abundance	CTD	8:00 AM	2, 7, 15, 25, 40, 50, 60, 70	1, 2, 4, 5, 6, 12, 13, 23
2	6	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	8:00 AM	2, 7, 15, 25, 40, 50, 60, 70	1, 2, 4, 5, 6, 12, 13, 23
2	6	Noordeloos	O'Connor/Brussaard	FCM fractionation (<12µm)	CTD	8:00 AM	7	13
2	6	Noordeloos	O'Connor/Brussaard	PAM	CTD	8:00 AM	2, 7, 15, 25, 40, 50, 60, 70	1, 2, 4, 5, 6, 12, 13, 23
2	12	Noordeloos	O'Connor/Brussaard	fixation for algal, bact / viral abundance FCM	CTD	2:00 PM	10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 6	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 16, 17, 23
2	12	Noordeloos	O'Connor/Brussaard	PAM	CTD	2:00 PM	2, 7, 10, 15, 20, 25, 30, 40, 50, 60, 70	1, 3, 5, 8, 10, 11, 13, 14, 16, 17, 23

Charlet-4 cruise, 2013; 64PE368								
Station	Cast	Who	Responsible scientist	What are you sampling for?	Sampling device	time of day	Depths (m)	Bottle #
13	5	Grosse	Grosse/Boschker	13C uptake, different light intensities	CTD	6:00AM	7m	1-24
13	6	Grosse	Grosse/Boschker	13C uptake with nutrient additions 15NO3/15NH4 uptake	CTD	6:30AM	7m	5-24
13	11	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	7m	
11	5	Grosse	Grosse/Boschker	biomolecules analysis algae	CTD	6:00AM	7m	23,24
11	10	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	35m	
10	5	Grosse	Grosse/Boschker	13C uptake, different light intensities	CTD	6:00AM	7m	1-24
10	6	Grosse	Grosse/Boschker	13C uptake with nutrient additions 15NO3/15NH4 uptake	CTD	6:30AM	45m	07-24
10	11	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	45m	
8	5	Grosse	Grosse/Boschker	biomolecules analysis algae	CTD	6:00AM	7m	23,24
8	10	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	35m	
7	5	Grosse	Grosse/Boschker	13C uptake, different light intensities	CTD	6:00AM	7m	1-24
7	6	Grosse	Grosse/Boschker	13C uptake with nutrient additions 15NO3/15NH4 uptake	CTD	6:30AM	7m	09-24
7	11	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	25m	
4	5	Grosse	Grosse/Boschker	biomolecules analysis algae	CTD	6:00AM	7m	21,22,23,24
4	10	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	45m	
1	5	Grosse	Grosse/Boschker	13C uptake, different light intensities	CTD	6:00AM	7m	1-24
1	6	Grosse	Grosse/Boschker	13C uptake with nutrient additions 15NO3/15NH4 uptake	CTD	6:30AM	7m	23,24
1	11	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	75m	
2	5	Grosse	Grosse/Boschker	biomolecules analysis algae	CTD	6:00AM	7m	23,24
2	10	Grosse	Grosse/Boschker	Zooplankton biomolecule analysis	vertical net WP200	10:00 AM	65m	

Charlet-4 cruise, 2013; 64PE366								
Station	**Cast**	**Who**	**Responsible scientist**	**What are you sampling for?**	**Sampling device**	**time of day**	**Depths (m)**	**Bottle #**
13	7	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	7 m	1
13	14	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	2, 4, 7 m	1, 2, 23
11	6	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	40, 25, 15, 7, 3 m	1, 3, 11, 13, 23
11	12	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	40, 35, 30, 25, 20, 15, 10, 7, 3 m	1, 3, 5, 7, 9, 11, 13, 16, 23
10	7	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	5, 15, 9, 2 m	1, 3, 11, 13, 23
10	14	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	40, 35, 30, 25, 20, 15, 10, 7, 2 m	1, 3, 5, 7, 9, 11, 13, 15, 23
8	8	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	40, 25, 15, 10, 7, 2 m	1, 3, 9, 11, 12, 23
8	14	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	40, 35, 30, 25, 20, 15, 10, 7, 2 m	1, 3, 5, 7, 9, 11, 13, 15, 23
7	7	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	25, 15, 10, 7, 3 m	1, 7, 9, 11, 23
7	14	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	25, 20, 15, 10, 7, 2 m	1, 4, 7, 10, 13, 22
4	6	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	45, 35, 25, 15, 7, 2 m	2, 3, 5, 10, 13, 23
4	12	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	50, 40, 30, 25, 20, 15, 10, 7, 2 m	1, 4, 8, 10, 12, 13, 15, 16, 23
1	6	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	80, 60, 50, 35, 25, 15, 7, 2 m	1, 2, 3, 5, 7, 11, 13, 23
1	11	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	75, 60, 50, 40, 30, 20, 15, 7, 2 m	1, 4, 7, 9, 12, 14, 15, 17, 23
2	6	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	8:00 AM	70, 60, 50, 40, 25, 15, 7, 2 m	1, 2, 4, 5, 6, 12, 13, 23
2	12	Boschker	Grosse/Boschker	FRRF (Chl-a fluor.)	CTD	2:00 PM	70, 50, 40, 30, 20, 15, 10, 7, 2 m	1, 5, 8, 10, 13, 14, 16, 17, 23

Charlet-4 cruise, 2013; 64PE368								
Station	Cast	Who	Responsible scientist	What are you sampling for?	Sampling device	time of day	Depths (m)	Bottle #
13	7	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	4	1
13	8	Burson	Burson/Huisman	Bioassay	CTD	9:00 AM	4,3	1 to 24
13	14	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	6.8, 3.5, 2	1,10,23
11	6	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	40,25,15,7,3	1,3,11,13,23
11	12	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	40, 35, 30, 25, 20, 15, 10, 7, 3	1,3,5,7,9,11,13,16,23
10	7	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	25,15,7	3,11,13
10	8	Burson	Burson/Huisman	Bioassay	CTD	9:00 AM	7	1 to 24
10	14	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	40, 35, 30, 25, 20, 15, 10, 7, 2	2,4,5,8,10,11,14,17,23
8	8	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	25, 7	3, 12
8	15	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	40,35,30,25,20,15,10,7,2	2,4,5,8,9,11,14,16,23
7	7	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	25, 15, 10, 7, 3	1, 7, 9, 11, 23
7	8	Burson	Burson/Huisman	Bioassay	CTD	9:00 AM	7	1 to 24
7	14	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	25,20,15,10,7,2	2,5,8,11,14,23
4	6	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	25,7,2	6,13,23
4	12	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	50,45,40,35,30,25,20,15,10,7,2	2,3,4,7,8,11,12,14,15,17,23
1	6	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	80,60,50,35,25,15,7,2	1,2,3,5,7,11,13,23
1	7	Burson	Burson/Huisman	Bioassay	CTD	9:00 AM	7	1 to 24
1	11	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	55,50,45,40,35,30,25,20,15,10,7,2	1,2,4,5,7,8,9,11,13,15,17, 23
2	6	Burson	Burson/Huisman	Lugol algae	CTD	8:00 AM	70,60,50,40,25,15,7,2	1,2,4,5,6,12,13,23
2	12	Burson	Burson/Huisman	High resolution sampling	CTD	2:00 PM	70,65,60,55,50,45,40,35,30,25,20,15,10,7,2	1,2,3,4,5,6,8,9,10,11,13,14,16,17,23

Charlet-4 cruise, 2013; 64PE368								
Station	Cast	Who	Responsible scientist	What are you sampling for?	Sampling device	time of day	Depths (m)	Bottle #
13	14	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	3.5m	3, 4
11	5	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:00 AM	7m	4, 5 ,6
11	6	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	14, 15
11	12	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	17, 18
10	6	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:30 AM	7m	1, 2
10	7	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	14, 15
10	14	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	18, 19
8	7	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:00 AM	7m	3, 4, 5
8	8	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	13, 14
8	15	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	18, 19
7	6	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:30 AM	7m	6 ,7, 8
7	7	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	13, 14, 15
7	14	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	16, 17, 18
4	5	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:00 AM	7m	4, 5, 6
4	6	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	16, 17
4	12	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	19, 20
1	5	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:30 AM	7m	7, 8, 9
1	6	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	14, 15
1	11	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	19, 20
2	5	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	6:00 AM	7m	4, 5, 6
2	6	O'Connor	O'Connor/Brussaard	viral lysis and grazing algae LH	CTD	8:00 AM	7m	14, 15
2	12	O'Connor	O'Connor/Brussaard	viral infection algae TEM	CTD	2:00 PM	7m	19, 20

Charlet-4 cruise, 2013; 64PE368									
Station	**Cast**	**Who**	**Responsible scientist**	**What are you sampling for?**	**Sampling device**	**time of day**	**Depths (m)**	**Bottle #**	**Other comments (incubation time)**
13	7	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	7, 8	3h
13	14	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	5, 6	1.5h
11	6	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	18, 19	3h
11	12	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	19, 20	1.5h
10	7	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	18, 19	3h
10	14	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	20, 21	1.5h
8	8	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	17, 18	3h
8	15	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	20, 21	1.5h
7	7	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	19, 20	3h
7	14	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	19, 20	1.5h
4	6	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	18, 19	3h
4	12	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	21, 22	1.5h
1	6	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	18, 19	3h
1	11	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	21, 22	1.5h
2	6	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	8:00 AM	7 m	16, 17	3h
2	12	van Heuzen	O'Connor/Brussaard	algal sinking rates	CTD	2:00 PM	7 m	21, 22	1.5h

Charlet-4 cruise, 2013; 64PE368									
Station	**Cast**	**Who**	**Responsible scientist**	**What are you sampling for?**	**Sampling device**	**time of day**	**Depths (m)**	**Bottle #**	**Other comments**
13	7	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	3.5 m	5	
13	7	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	3.5 m	6	200 µm pre-screening
11	6	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7 m	16	
11	6	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	7 m	17	200 µm pre-screening
10	7	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7 m	16,17	
10	7	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	25m	5,6	2 depths
8	8	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7m	16,17	
8	8	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	25m	4,5	2 depths
7	7	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7m	16, 17	
7	7	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	7m	17, 18	200 µm pre-screening
4	6	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7m	14	
4	6	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	7m	15	200 µm pre-screening
1	6	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7m	16	
1	6	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	7m	17	200 µm pre-screening
2	6	Doggen	O'Connor/Brussaard	microzooplankton + HNF	CTD	8.00 AM	7m	20	
2	6	Doggen	O'Connor/Brussaard	grazing by fluorescent labeled prey	CTD	8.00 AM	7m	Paul's UF from 7m	UF test

Charlet-4 cruise, 2013; 64PE368								
Station	Cast	Who	Responsible scientist	What are you sampling for?	Sampling device	time of day	Depths (m)	Bottle #
13	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM	3,8	1,2
13	2,3,4	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	4	
13	7	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	4	1
13	9, 10, 11	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	4	
11	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM	40, 35, 25, 15, 7, 3	1, 3, 5, 7, 9, 11
11	2,3,4	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 PM	35	
11	6	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	40, 25, 15, 7, 3	1, 3, 11, 13, 23
11	7, 8, 9	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	35	
10	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM	40, 25, 7, 1.5	3, 5, 7, 9
10	2, 3, 4	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 PM	40	
10	7	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	40, 25, 15, 7, 2	1, 3, 11, 13, 23
10	9, 10, 11	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	40	
8	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM	35, 25, 15, 7, 2	1, 3, 5, 7, 9
8	2, 3, 4, 5, 6	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 PM	10	
8	8	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	40, 25, 15, 10, 7, 2	1, 3, 9, 11, 12, 23
8	9, 10, 11	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	15	
7	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM		1, 3, 5, 7
7	2, 3, 4	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 PM	25	
7	7	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	25, 15, 10, 7, 3	1, 7, 9, 11, 23
7	9, 10, 11	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	25	
4	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM	45, 35, 25, 15, 7, 3	1, 3, 5, 7, 9, 11
4	7.8.9.10	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	45	
4	6	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	45, 35, 25, 7, 2	2, 3, 5, 10, 13, 23
4	7, 8, 9	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	45	
1	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:40 PM	80, 50, 35, 25, 15, 7, 2	1, 3, 5, 7, 9, 11, 13
1	2, 3	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:30 PM	75	No grazing experiment
1	6	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	80, 60, 50, 35, 25, 15, 7, 2	70,50,25,7,2
1	8	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	75	No grazing experiment
2	1	Kooijman	O' Connor/Brussaard	HPLC	CTD	9:00 PM	70, 50, 25, 7, 2	1, 3, 5, 7, 9
2	2, 3, 4	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:15 PM	70	
2	6	Kooijman	O' Connor/Brussaard	HPLC	CTD	8:00 AM	70, 60, 50, 40, 25, 15, 7, 2	1, 2, 4, 5, 6, 12, 13, 23
2	7, 8, 9	Kooijman	O' Connor/Brussaard	Meso zoopl. Grazing	Vert. Net 200 um	10:00 AM	70	

Charlet-4 cruise, 2013; 64PE368								
Station	**Cast**	**Who**	**Responsible scientist**	**What are you sampling for?**	**Sampling device**	**time of day**	**Depths (m)**	**Bottle #**
13	7	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	8:00 AM	7	10-11
11	6	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	9:00 AM	7	20-21
10	7	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	10:00 AM	7 + 25	7-8 and 20-21
8	8	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	11:00 AM	8 + 25	7-9 and 19-20
7	7	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	12:00 PM	9 + 25	7-8 and 21-22
4	6	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	1:00 PM	10 + 25	7-8 and 20-21
1	6	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	2:00 PM	11 + 25	7-8 and 20-21
2	6	Fokkes	O'Connor/Brussaard	viral lysis bacteria	CTD	3:00 PM	12 + 25	7-8 and 18-19