Physical data report by station

Station n°133

LMD / UMR 8539 / Paris / France
LPO / UMR 6523 / Brest / France
IBENS / INSERM 1024 stations/ CNRS 8197 / Paris / France

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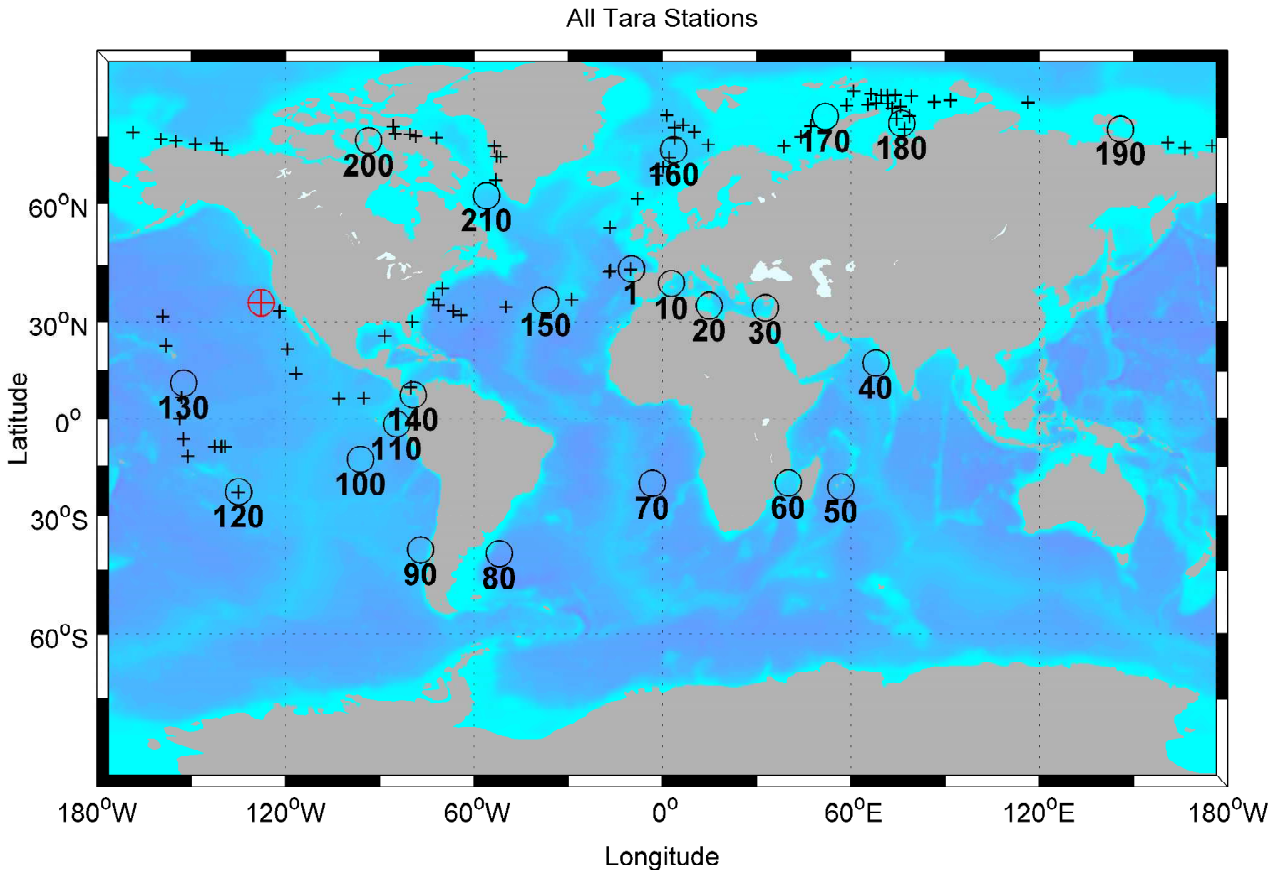

Contents

Station overview

We present here the geographical situation of the station and a quick overview of the physical data available. For more information please see the next sections. About availability in the table below, 1 means "available" and 0 "not available".

Station n°	133
Location	North Pacific Ocean
Date	18/10/2011
Mean Longitude	-127.3227°
Mean Latitude	35.0127°
CTDs profiles	11

Availability:	
UV Satellite fields	1
SST Satellite fields	1
SSH Satellite fields	1
CHL1 Satellite fields	1
Argo floats	1

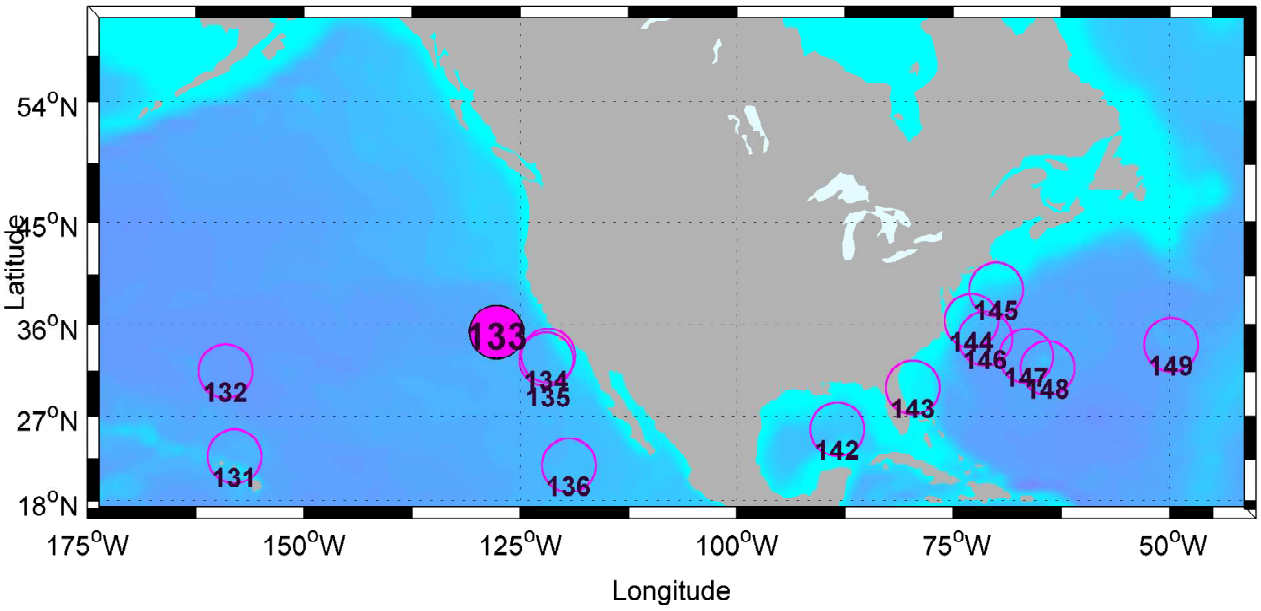

Figure 1: Filled magenta black circle indicate the station of this study.

1 Sea surface temperature, height and chlorophyll

1.1 Introduction

We present here several sea surface properties at the station position using satellite data (SSH $[m]$ in Fig.2 and Fig.3, the SST $[°C]$ in Fig.4 and Fig.5 and the CHL1 $[mg/m^3]$ in Fig.6 and Fig.7). We give definitions and information about these quantities below:

- Sea Surface Height (SSH): Maps of Absolute Dynamic Topography (MADT) from the global 1/4° (approx. $27km$) Daily Delayed Time Archiving Validation and Interpretation of Satellite Data in Oceanography (AVISO) field (Rio and Hernandez, 2004; Capet et al., 2014). The altimeter products were produced by Ssalto/Duacs and distributed by Aviso, with support from Cnes (`http://www.aviso.oceanobs.com/duacs/`).
- Sea Surface Temperature (SST): OSTIA uses satellite data provided by the GHRSST project, together with in-situ observations to determine the sea surface temperature. The analysis is performed using a variant of optimal interpolation (OI) described by Martin et al. (2007). The National Centre for Ocean Forecasting produces the analysis at a resolution of 1/20° (approx. $5km$). OSTIA data is provided in GHRSST netCDF format every day.
- Chlorophyll (CHL1): Weekly 1/10°Chlorophyll maps processed and distributed by ACRI-ST GlobColour service, supported by EU FP7 MyOcean & ESA GlobColour Projects, using ESA ENVISAT MERIS data, NASA MODIS and SeaWiFS data.

Legend In order to relieve figures we describe here their general legend:

- ● indicate the casts of Tara stations identified by their respective numbers.
- ○ are used to locate other Tara's stations around.
- □ refer to CTD profiles. When filled, each colour corresponds to a reference used in profiles plots (see CTD section) to make distinction between them.
- We indicate bathymetry by grey contours, horizontal geostrophic surface velocity field by dark arrows proportional to the current intensity, and SSH field by white contours.
- The ▼ is the nearest coast point (zlevel=0) of each ctd profile from etopo2 database
- When shown, ▽ represent Argo's data available around the mean longitude and latitude position of CTDs. We defined a box around the mean position with $\Delta X \pm 4°$ $lat - lon$ and $\Delta t \pm 15$ $julian\ days$. Argo's numbers are only an index.
- Date refers to the day when SST, SSH or Chlorophyll maps are available.

1.2 SSH maps

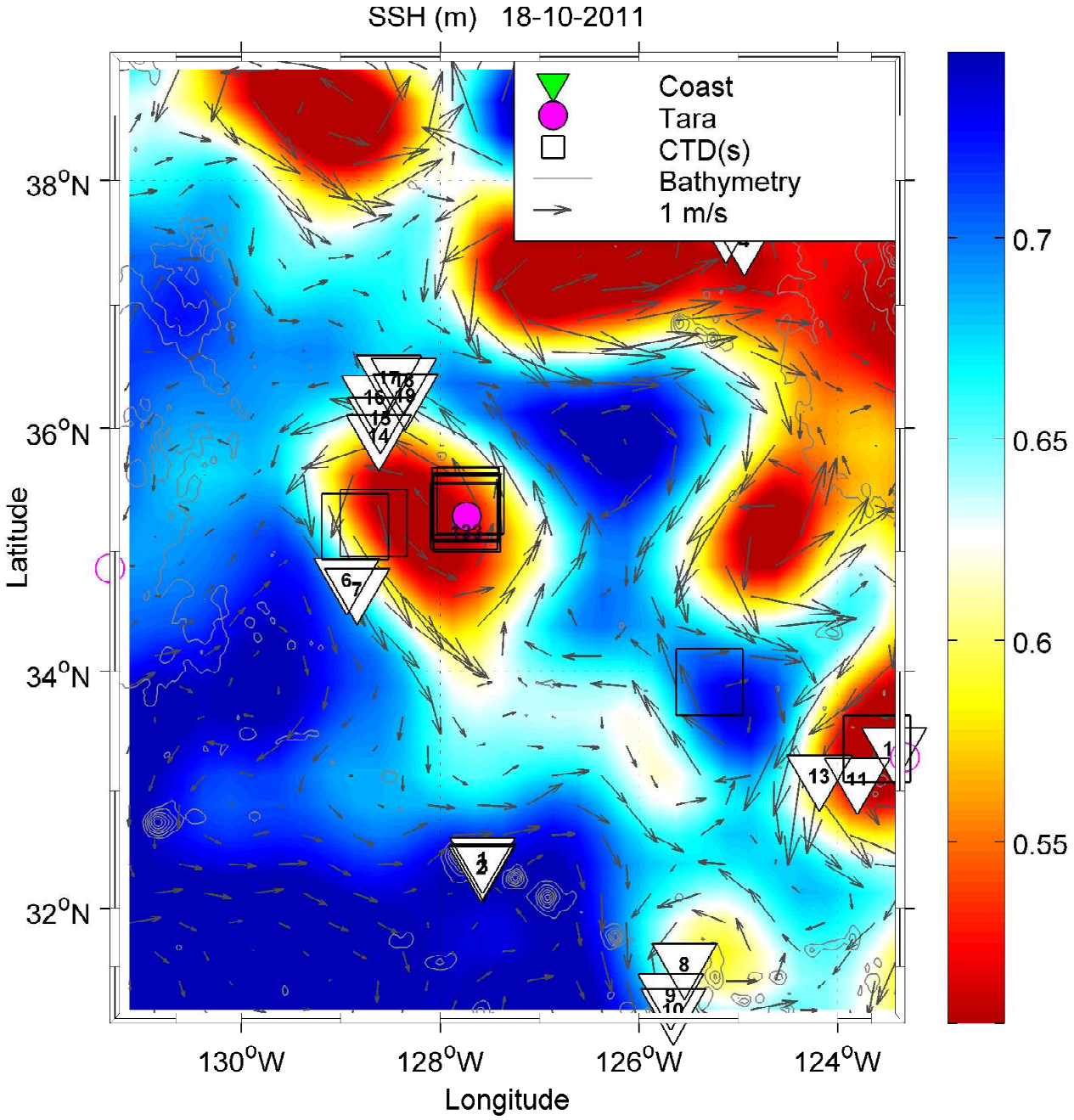

Figure 2: Description: see legend p. 14

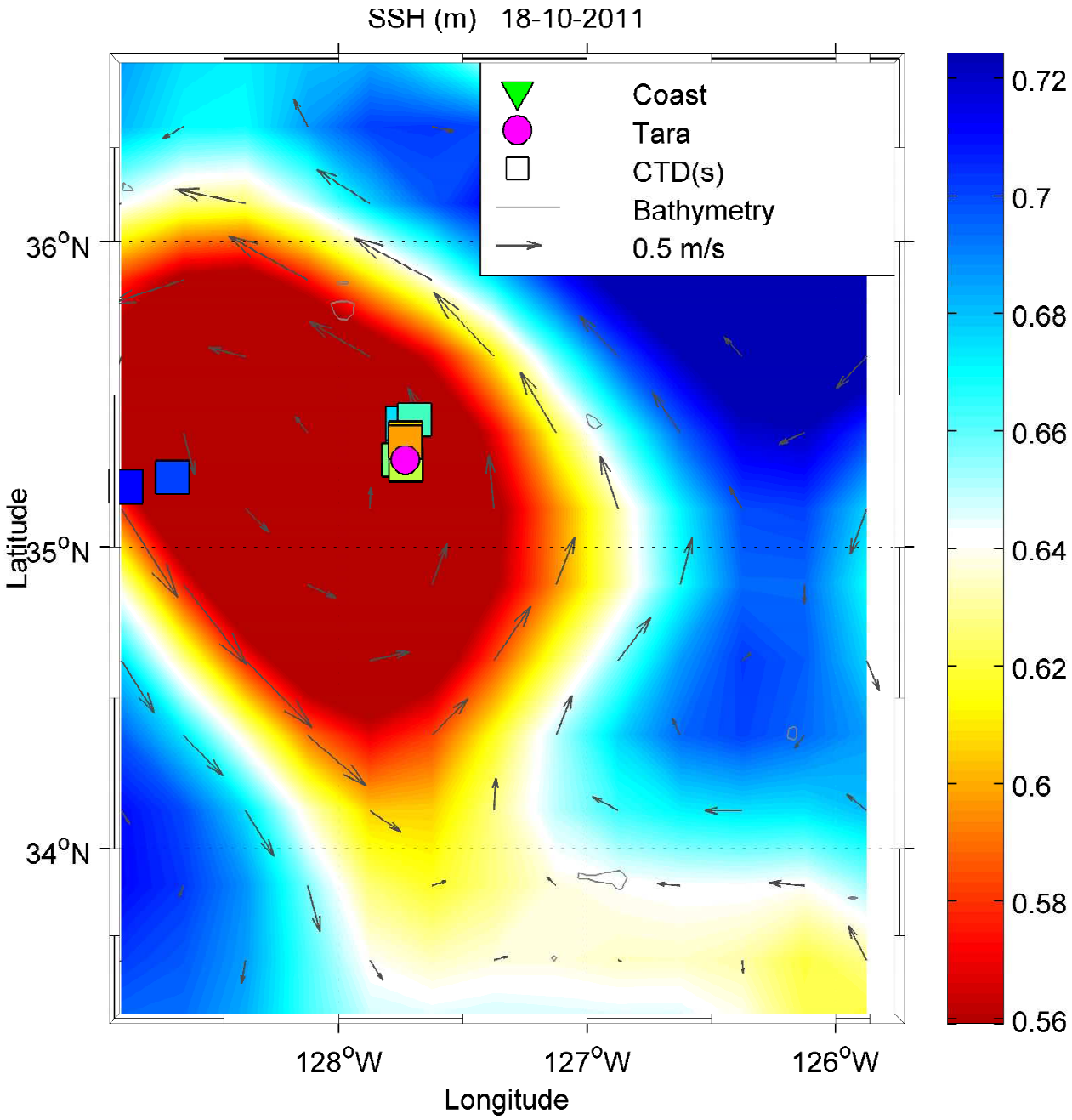

Figure 3: Description: see legend p. 14

1.3 SST maps

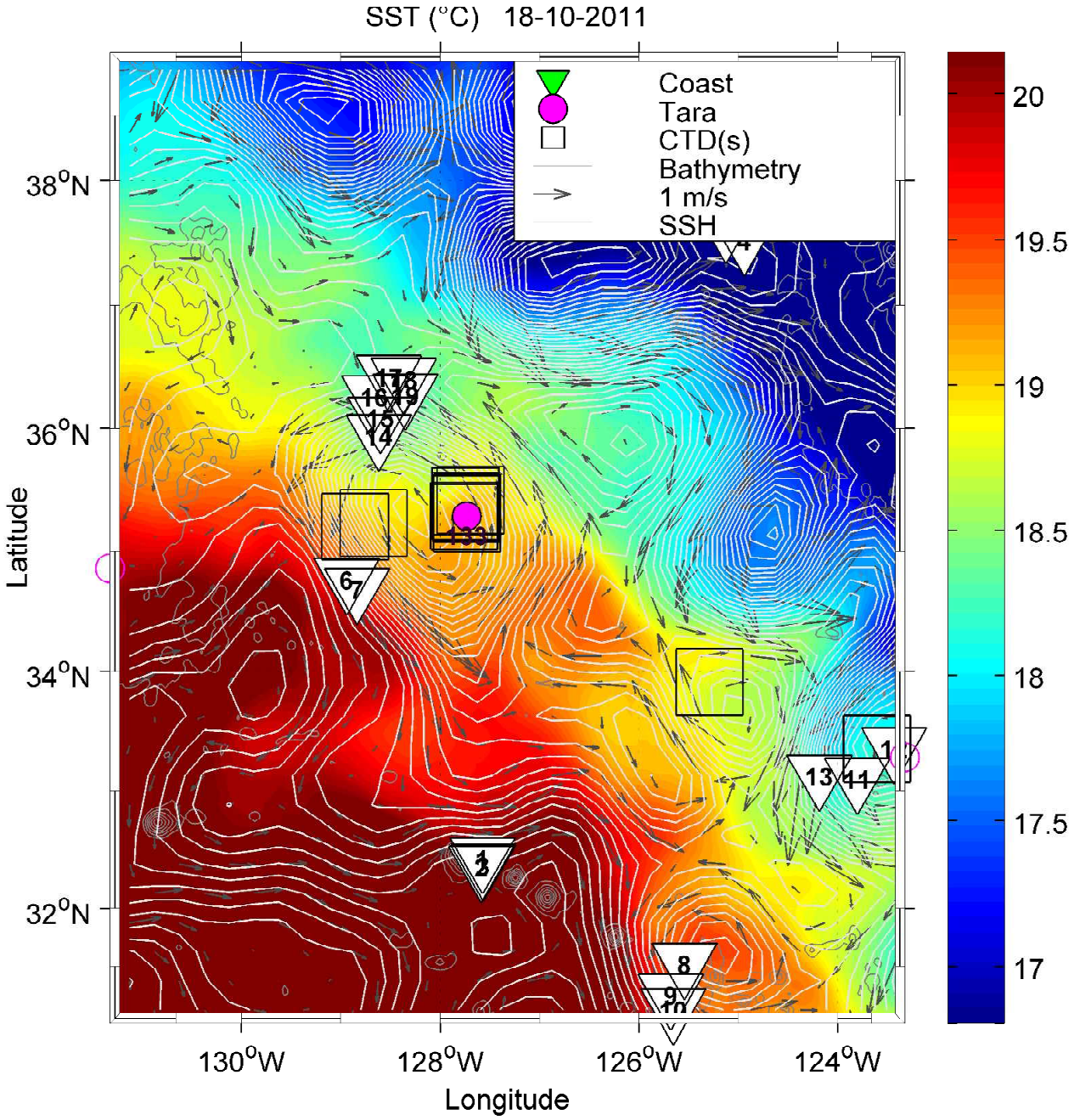

Figure 4: Description: see legend p. 14

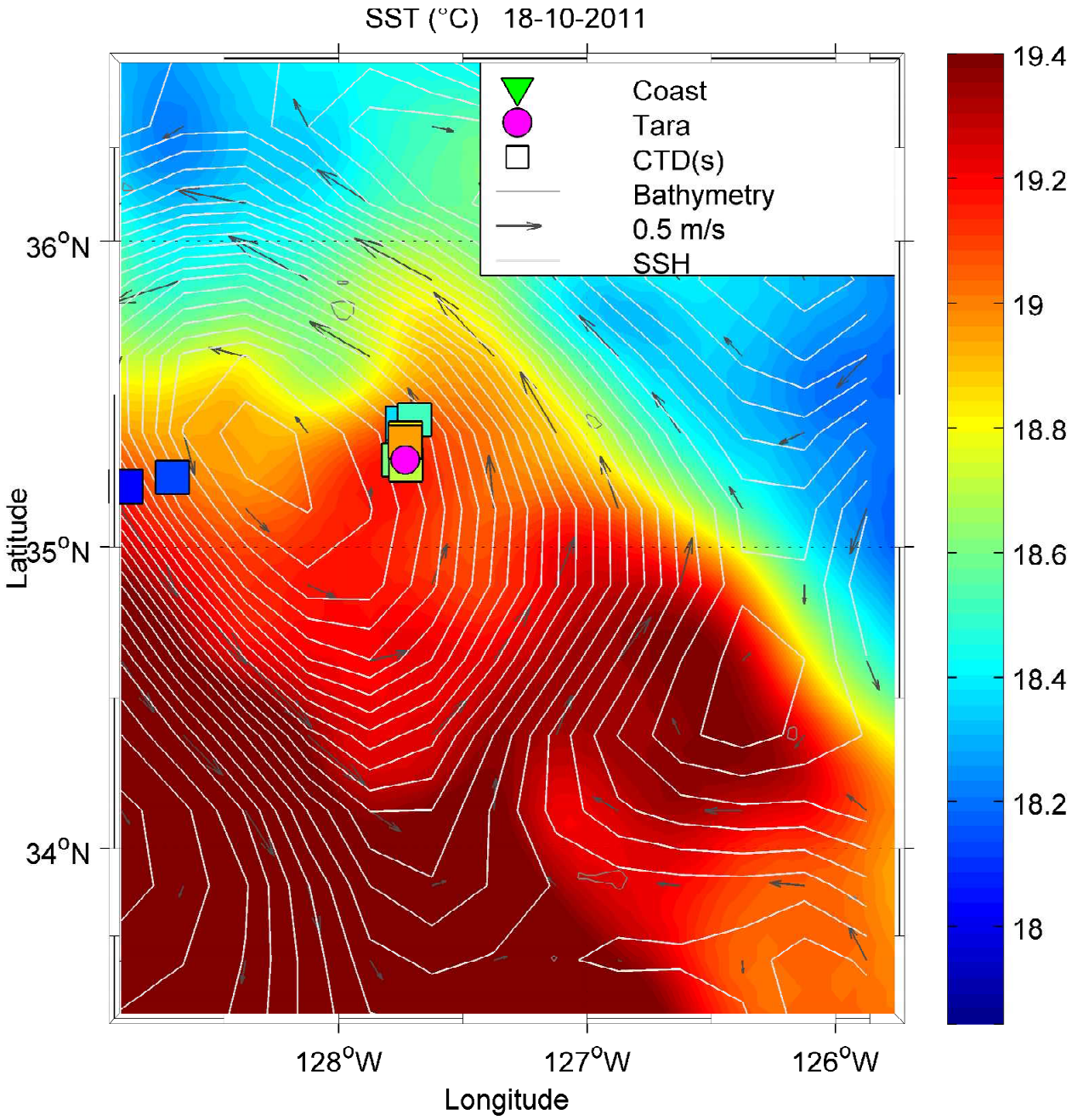

Figure 5: Description: see legend p. 14

1.4 Chlorophyl maps

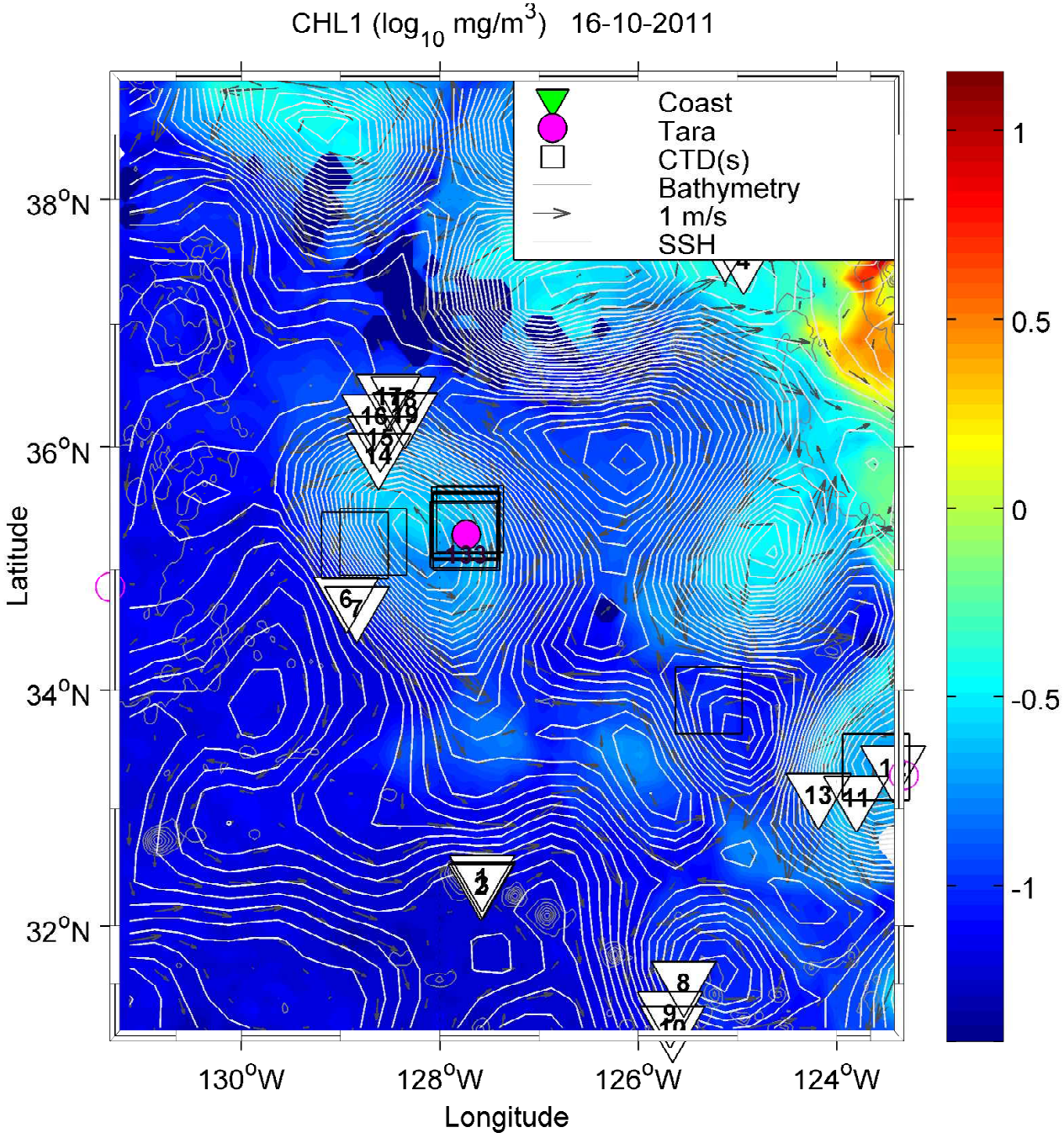

Figure 6: Description: see legend p. 14

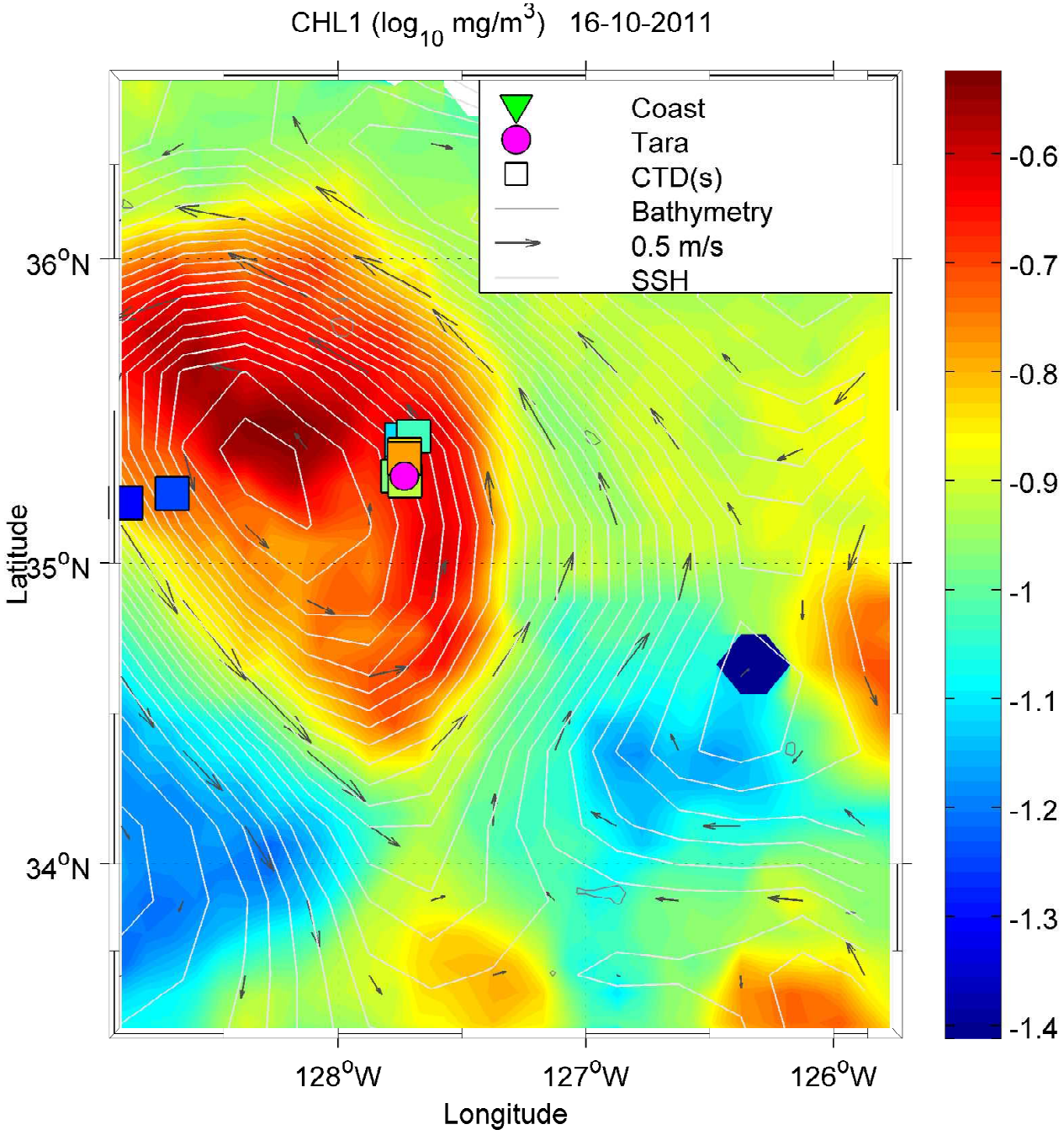

Figure 7: Description: see legend p. 14

2 TSG

2.1 Introduction

To complete the hydrological surface study, we use ThermoSalinoGraph (TSG) data measured by the Tara around the stations. Thermosalinographs are used to collect information about the sea surface, typically in flow-through systems operating continuously throughout a cruise.

We looked for the nearest TSG data available at $\Delta t \pm 15$ *julian days* around Tara stations. TSG data from the TARA OCEAN project (station 1 to 151) are validated but this is not the case of TSG data recorded during the TARA Porlar Cicle project that might present errors.31751 records satisfy these conditions. It is important to emphasize that TSG data are measure along the boat path whereas satellite data are snapshots.

TSG surface temperature is plotted over the Sea Surface Temperature measured by satellite and provided by OSTIA in figure 8.

TSG absolute salinity is plotted over the weekly Sea Surface Salinity data measured by Soil Moisture and Ocean Salinity (SMOS) mission in figure 9. The L3 SMOS data are available on the LOCEAN website (via a request form) but they still experience large biases and noise on various time and space scales. Nicolas KOLODZIEJCZYK work with a team at the LOCEAN to reduce these errors (see Hernandez et al. (2014), Kolodziejczyk et al. (2015b) and Kolodziejczyk et al. (2015a) for more information). These products are not perfect and large biases still exist but they are very promising. He gracefully gave us two types of corrected data for the context of this study:

- The most accurate set of data is composed of weekly map over the Atlantic (between 42N and 42S) with a resolution of 75 km for the period spanning from 2011 to 2013. Corrections are applied to reduce costal, large scale and seasonal orbit biases. An Optimal Interpolation using ISAS Argo interpolated products is performed.
- The other product is the 1/4 2days L3 SMOS data spanning from 30-Jun-2010 to 30-Aug-2014 on which a monthly filter and a systematic coastal bias correction are applied.

The Optimal interpolation product is not available for this station so the L3 band + coastal biais correction is ploted.

2.2 TSG Temperature maps

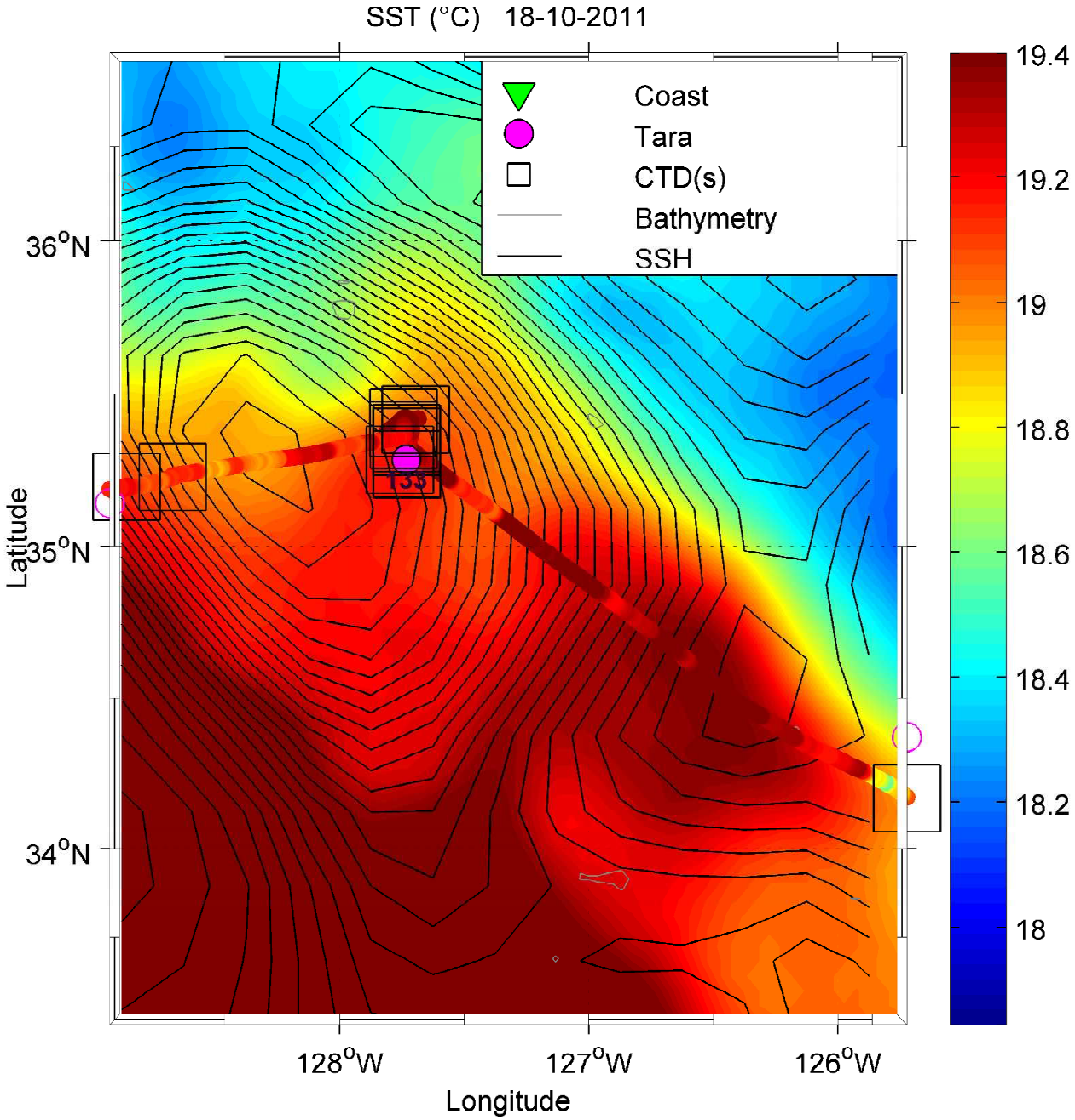

Figure 8: Description: see legend p. 14

2.3 TSG Salinity maps

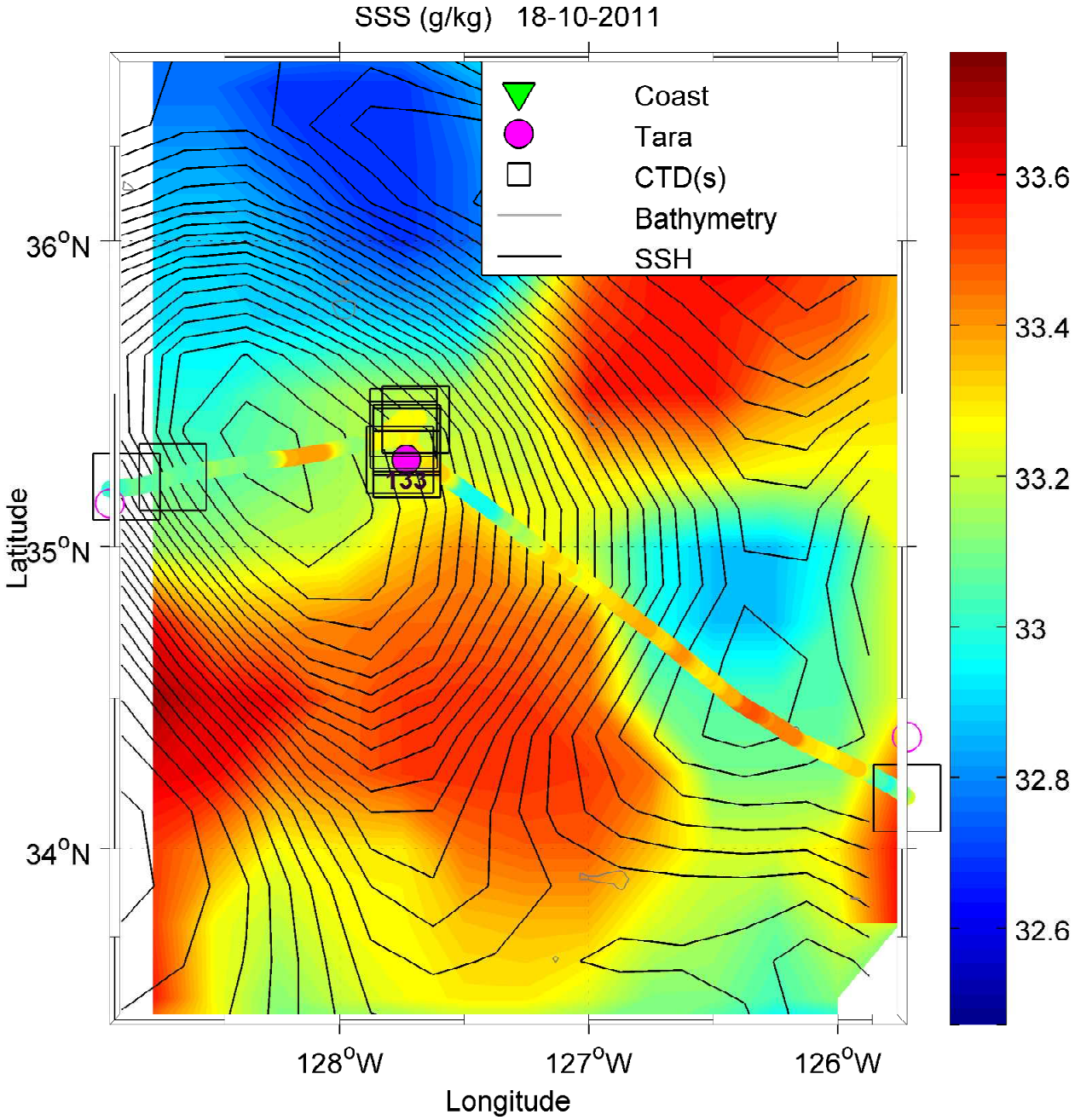

Figure 9: Description: see legend p. 14

3 Conductivity, Temperature and Depth (CTD) measurements

3.1 Introduction

In this study, CTD's measurements have been realized by a `Seabird vertical profiler`. The CTD profiles shown here are provided by the Villefranche Oceanographic Laboratory (LOV), Villefranche-Sur-Mer, France (http://www.obs-vlfr.fr/LOV/ZooPart/Portal/). Moreover, vertical profiles of Nitrate and Oxygen are provided. Additional quantities like salinity or density are then inferred using the Gibbs SeaWater (GSW) Oceanographic Toolbox (`http://www.teos-10.org/pubs/gsw/html/gsw_contents.html`).

For the Tara station n133, 11 CTD profiles are available. We calculate the potential density σ_0 referred to surface and the Brunt-Vaisala frequency (N^2). This one is a pulsation known as the "Brunt-Vaisala frequency" (s^{-2}), and given by:

$$N^2(z) = -\frac{g}{\rho_*}\frac{d\sigma}{dz} \tag{1}$$

where g is the vertical component of gravity, ρ_* a constant density value, d/dz the vertical derivative operator and σ the potential density (we use here σ_0). For more information please refer to Gerkema and Zimmerman (2008) (Eq. 3.18, p. 48 in the book). For each profile, $N^2(z)$ is calculated with a finite differences numerical scheme using $dz = 1m$. When calculated, $N^2(z)$ is averaged with a running median window on $30dbar$ (± 5 $dbar$, centred) to filter noise at small vertical scales (~ 1 m).

We calculate the depth of mixed layer using two definitions given by De Boyer Montégut et al. (2004) to determine the MLD (m). Given a potential temperature profile $\theta(z)$ or a potential density profile $\sigma(z)$, we calculate z for which:

$$|\theta(z) - \theta(10m)| \leq 0.2\ ^\circ C \tag{2}$$

$$|\sigma(z) - \sigma(10m)| \leq 0.03\ kg/m^3 \tag{3}$$

Profiles and $\theta - S$ diagrams are presented on Fig. 10 and 11. Colors are used to distinct each CTD profile (dark blue for the first to red for the last one, "jet colorbar-like": dark blue, blue, light blue, cyan, green, yellow, orange, dark orange, red, dark red). Filled circles represent the bottle depths. We give bottles depths, and we calculate the N^2 and fluorescence maximum depths. We give the values of N^2 at all these different depths. Results are given in the Tab. 1

Several indices were computed to describe the context of CTD sampling. A season flag and a position in the season are given for each ctd sample. 4 "submesoscale" structures indices were computed at each ctd location from Satellite data. The intensity of the STT gradient and the intensity of the geostrophic currents are directly understandable. Strain rate is linked to the derivative of geostrophic current [see Waugh et al. (2006)] and Lyapunov exponent (computed by F.D'Ovidio [see d'Ovidio et al. (2004)])is a measure of the presence of a transport front where values in excess of 0.1 day-1 are typically fronts.

Legend In order to relieve figures we describe here their general legend:

- For each CTD we give the Tara's cast's number, CTD number, the bottom depth inferred from `eTopo2` bathymetry product, the distance, azimuth and position of nearest coast point (also inferred from etopo).
- Time information are then presented by giving the date in classic and julian format. Two season indices are presented: the season and the position in this season
- We give the fluo value at Max_{Fluo} depth, and a simple sum of fluo along vertical profile (from 1 to 200m, when possible).
- "Submesoscale" indices computed from satellite data are then presented.

- Ctd properties are then computed at precise depths: MLD_θ, MLD_σ, Max_{Fluo}, Max_{N^2} and each bottle depth.

3.2 CTD profiles

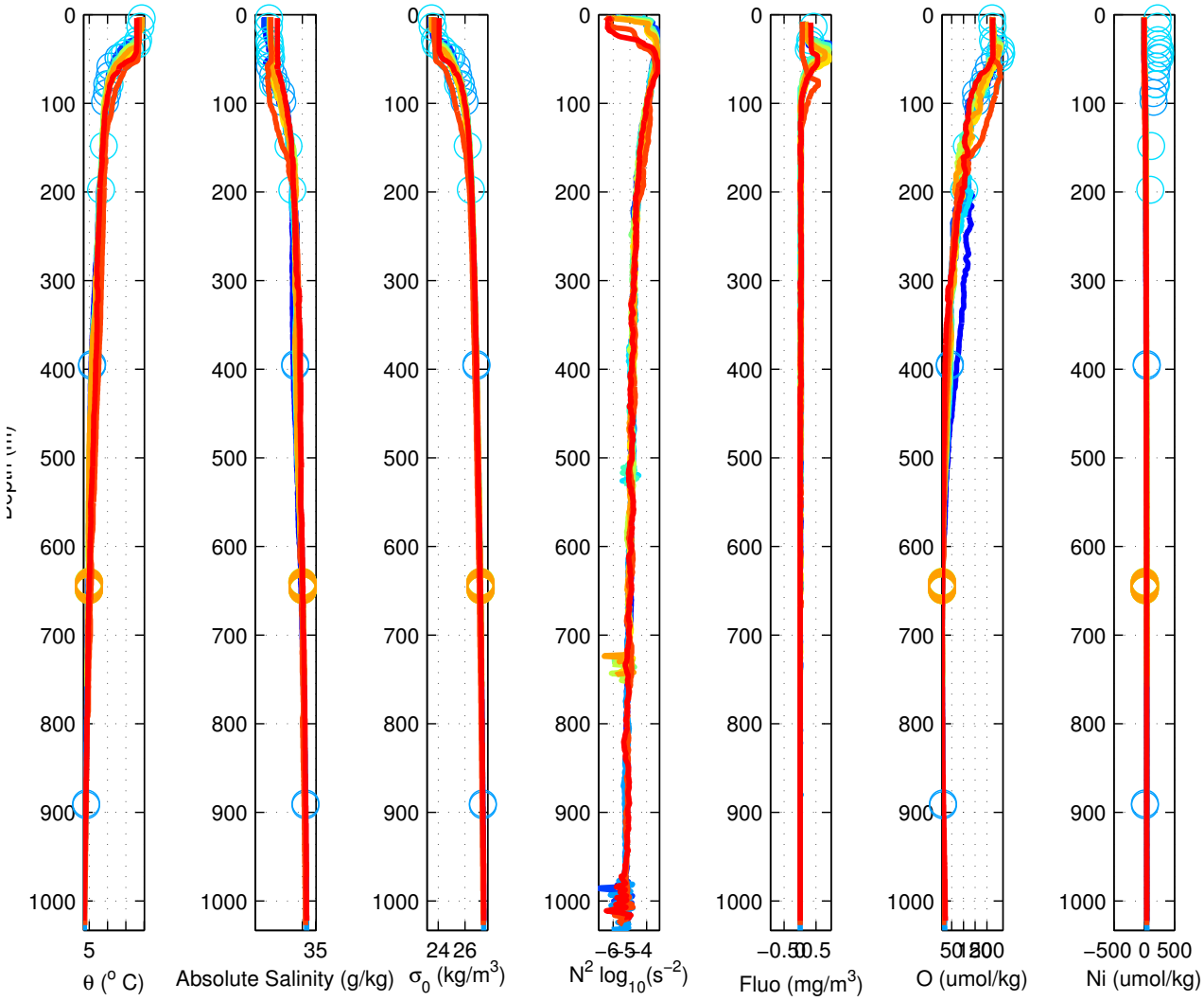

Figure 10: Description: see paragraph p. 14

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3.3 CTD $\theta - S$ diagrams

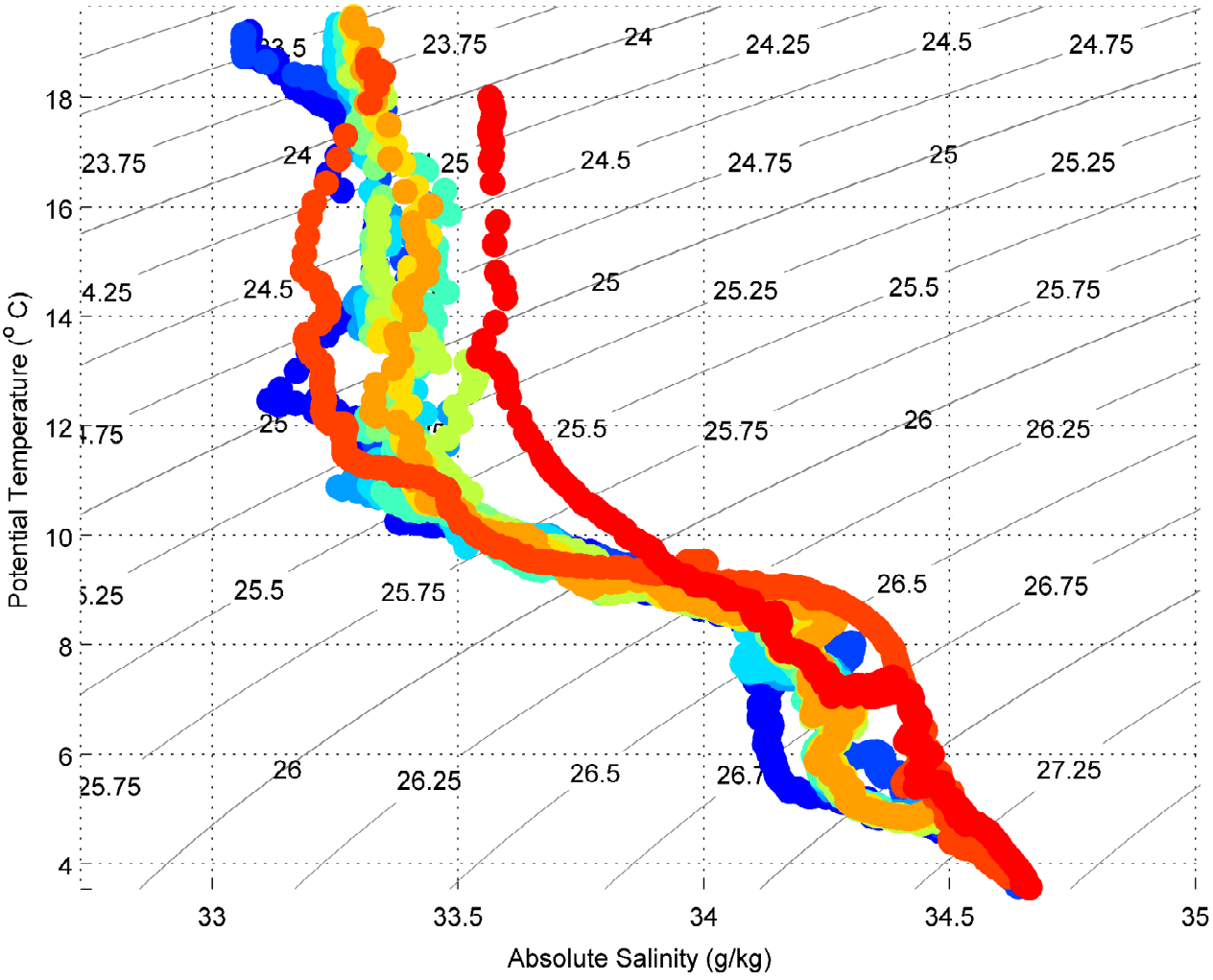

Figure 11: Description: see paragraph p. 14

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3.4 Water column characterization from CTD measurements

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	1	-128.8562	35.1973	1024	-4846	610/57	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
18	10	2011	2455853	0	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.82759	43	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.89115	0.36926	9.7789e-06	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.1318	33.0762	23.4052	4.5128e-05	0.08601	221.309	-3.5378
Max	1024	3.6906	34.6454	27.414	NaN	0	18.7169	43.4023
MLD_σ	13	19.0048	33.0716	23.4339	0.00016405	0.088909	223.9627	-2.8333
MLD_θ	13	19.0048	33.0716	23.4339	0.00016405	0.088909	223.9627	-2.8333
Max_{N2}	45	14.9181	33.3352	24.5919	0.00036198	0.8784	253.8195	-3.7143
Max_{Fluo}	43	15.5917	33.3314	24.4416	0.00064189	0.82759	261.8592	-4.0081
Max_O	38	16.9318	33.2548	24.0779	0.00093022	0.43377	251.3005	-3.2544
Min_O	742	4.4921	34.5242	27.2333	8.6522e-06	0	8.8553	41.966
$Depth\ Nitro$	69	11.5223	33.3034	25.2436	0.00010821	0.29478	216.9907	4.9817
B i1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Table 1:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	2	-128.6697	35.2291	1021	-4811	594/57	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
18	10	2011	2455853	0	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.92421	32	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.79925	0.26796	4.8425e-06	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.1275	33.0636	23.3967	5.3135e-05	0.11335	222.8934	-0.40959
Max	1021	3.6687	34.6395	27.4115	NaN	0	16.7919	44.6657
MLD_σ	12	19.0212	33.063	23.4232	0.00031323	0.12884	223.9985	-0.31083
MLD_θ	12	19.0212	33.063	23.4232	0.00031323	0.12884	223.9985	-0.31083
Max_{N2}	35	14.2477	33.3954	24.78	0.00058134	0.92421	244.0363	-0.2189
Max_{Fluo}	32	15.4167	33.3561	24.499	0.00067815	0.92421	259.6878	-1.909
Max_O	27	17.7772	33.3509	23.9498	0.0011011	0.34791	245.2309	-0.64915
Min_O	684	4.728	34.5104	27.196	2.0462e-06	0	9.1089	43.6796
$Depth\ Nitro$	64	10.6429	33.4689	25.528	0.00025038	0.18785	193.0475	12.3282
B i1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Table 2:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	3	-127.7427	35.3666	1033	-4758	516/54	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
18	10	2011	2455853	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.69465	40	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.87662	0.15871	1.9883e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.131	33.2589	23.5441	3.0193e-05	0.14757	222.1242	-1.6634
Max	1033	3.7342	34.6558	27.4181	NaN	0	19.9326	44.1614
MLD_σ	15	19.0015	33.2525	23.5722	NaN	0.14149	225.449	-0.49205
MLD_θ	16	18.9372	33.2533	23.5891	0.00022079	0.14149	224.9799	-1.025
Max_{N2}	45	14.2499	33.2912	24.6997	0.0002496	0.8424	251.2235	0.12964
Max_{Fluo}	40	15.2856	33.3406	24.5157	0.00061808	0.69465	258.2256	-1.9921
Max_O	36	17.0623	33.2822	24.0682	0.00067201	0.33898	253.4719	-1.2638
Min_O	676	4.8945	34.5246	27.1886	9.1401e-06	0	9.2854	42.3151
$Depth\ Nitro$	51	13.4278	33.3921	24.9462	0.00025078	0.69465	225.0513	1.7673
B i1	900	4.1192	34.614	27.345	5.3901e-06	0	13.851	43.7452
B i2	898	4.121	34.6139	27.3447	5.7522e-07	0	13.794	44.261
B i3	400	5.7058	34.2386	26.8654	7.4917e-06	0.03021	43.497	38.0878
B i4	398	5.7306	34.2366	26.8608	2.1835e-05	0.029269	43.5578	37.4959
B i5	100	9.4499	33.7419	25.9409	0.00011962	0.040949	149.8456	20.8591
B i6	90	9.9428	33.6967	25.8246	0.00013926	0.066985	158.5393	20.939
B i7	80	9.9644	33.5348	25.6951	2.1665e-05	0.066985	177.3736	16.3531
B i8	70	10.5796	33.4544	25.5279	0.00019073	0.15967	189.2204	12.6462
B i9	60	10.8567	33.2646	25.3323	0.00015568	0.23537	213.084	8.5331
B i10	50	13.5036	33.3832	24.924	0.00035257	0.78584	229.2339	1.1115

Table 3:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	4	-127.7431	35.4068	532	-4747	513/54	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
18	10	2011	2455853	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.64503	39	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
1.0633	0.17497	8.3949e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.079	33.2512	23.5514	9.5647e-05	0.044529	224.5575	-0.23175
Max	532	5.1128	34.3478	27.0229	NaN	0	22.0193	42.2075
MLD_σ	11	19.0373	33.2516	23.5623	0.00028131	0.066214	227.3625	-0.75231
MLD_θ	11	19.0373	33.2516	23.5623	0.00028131	0.066214	227.3625	-0.75231
Max_{N2}	41	15.1815	33.3271	24.5284	0.00054694	0.72623	259.5914	-0.90092
Max_{Fluo}	39	15.324	33.3593	24.522	0.00027708	0.64503	262.9239	-1.3752
Max_O	33	17.6689	33.3047	23.9409	0.0007541	0.35076	248.4975	-0.54455
Min_O	532	5.1128	34.3478	27.0229	NaN	0	22.0193	42.2075
$Depth\ Nitro$	95	9.9893	33.674	25.7993	2.1337e-05	0.014469	161.4606	17.7705
B i1	200	8.1159	34.1196	26.4439	8.4161e-05	0	132.3845	27.2434
B i2	150	8.9544	33.9796	26.2059	3.7796e-05	0	113.0748	26.6179
B i3	80	10.3271	33.4887	25.5981	1.6126e-05	0.091086	191.6918	15.441
B i4	50	13.3055	33.411	24.9853	0.00026245	0.62413	227.6472	5.1359
B i5	45	14.0084	33.3194	24.7717	0.00032256	0.7781	244.64	0.8238
B i6	40	15.271	33.3254	24.5077	0.00010177	0.68162	261.5861	-0.6935
B i7	35	16.9025	33.3129	24.1287	0.0011821	0.40727	262.842	-0.93433
B i8	30	18.249	33.2755	23.7777	0.00028746	0.24615	235.5597	-1.0122
B i9	15	18.6676	33.2526	23.656	9.2251e-05	0.10336	228.6001	-0.42183
B i10	5	19.2688	33.2583	23.5084	8.2119e-05	NaN	224.808	0.47456

Table 4:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	5	-127.6947	35.4171	530	-4697	509/54	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
19	10	2011	2455854	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.63256	32	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
1.0638	0.20302	6.9845e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.2187	33.2717	23.5316	0.00033491	0.18188	224.9705	0.14833
Max	530	5.0775	34.36	27.0365	NaN	0	19.9891	42.9995
MLD_σ	10	19.2187	33.2717	23.5316	0.00033491	0.18188	224.9705	0.14833
MLD_θ	11	19.0196	33.2711	23.5816	0.00063059	0.18188	227.3784	-0.19972
Max_{N2}	38	15.1117	33.4538	24.6407	0.00032929	0.9082	235.7018	-0.059152
Max_{Fluo}	32	16.7601	33.419	24.2431	0.00054525	0.63256	254.7775	-0.20642
Max_O	29	17.5436	33.3099	23.9749	0.0010076	0.51415	253.1541	-0.89286
Min_O	530	5.0775	34.36	27.0365	NaN	0	19.9891	42.9995
$Depth\ Nitro$	95	9.4077	33.7396	25.9459	0.00018021	0	146.1382	19.181
B i1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Table 5:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	6	-127.7587	35.2859	754	-4740	523/53	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
19	10	2011	2455854	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.79832	37	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.36992	0.14627	1.377e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.339	33.2812	23.5082	2.0872e-06	0.11119	221.7423	-2.7219
Max	754	4.5656	34.5613	27.2547	NaN	0	9.8522	42.5342
MLD_σ	12	19.296	33.281	23.5191	0.00019148	0.12683	225.5381	-2.4647
MLD_θ	13	19.2059	33.2889	23.548	0.00047123	0.1299	226.7469	-3.8285
Max_{N2}	38	15.2022	33.3285	24.5249	0.00061054	0.85907	258.542	-2.7587
Max_{Fluo}	37	15.4388	33.3257	24.471	0.00070201	0.79832	261.5955	-3.3218
Max_O	31	17.5262	33.2958	23.9684	0.00038986	0.51484	245.0275	-4.9157
Min_O	695	4.7668	34.532	27.2089	8.6063e-06	0	9.1733	41.7202
$Depth\ Nitro$	61	11.2542	33.4298	25.3897	0.00020464	0.24414	199.6264	7.5278
B i1	655	4.891	34.5098	27.1771	7.8095e-06	0	9.444	41.8025
B i2	654	4.8975	34.5094	27.176	1.0787e-05	0	9.5059	41.3116
B i3	653	4.9002	34.5083	27.1749	8.412e-06	0	9.4452	42.0879
B i4	652	4.8999	34.5076	27.1743	4.4958e-06	0	9.4596	42.0879
B i5	651	4.9005	34.5073	27.174	4.0016e-06	0	9.4734	41.3402
B i6	650	4.9043	34.5072	27.1735	5.2855e-06	0.0067415	9.4676	41.8613
B i7	649	4.9057	34.5067	27.1729	3.206e-06	0.0071475	9.4501	40.7325
B i8	648	4.9081	34.5069	27.1729	4.9461e-06	0.0071475	9.5154	40.3386
B i9	647	4.9119	34.5063	27.1719	9.6213e-06	0.0071986	9.3744	41.801
B i10	646	4.9207	34.5063	27.1709	1.3806e-05	0.032686	9.4406	40.5897

Table 6:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	7	-127.7298	35.2698	758	-4691	521/53	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
19	10	2011	2455854	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.77339	38	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.15994	0.15348	1.3897e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.3461	33.2823	23.5072	2.505e-05	0.11001	222.818	1.6387
Max	758	4.4536	34.5705	27.2741	NaN	0	10.5035	44.8655
MLD_σ	13	19.3086	33.2822	23.5168	0.00028838	0.1299	225.561	1.083
MLD_θ	13	19.3086	33.2822	23.5168	0.00028838	0.1299	225.561	1.083
Max_{N2}	42	14.4247	33.3728	24.7257	0.00043359	0.89208	251.8503	1.6093
Max_{Fluo}	38	15.4181	33.3389	24.4856	0.00067895	0.77339	258.301	0.18674
Max_O	33	17.9881	33.3518	23.8996	0.00064826	0.36754	254.5487	1.3769
Min_O	656	4.8482	34.5165	27.1872	4.0675e-06	0	9.5881	44.4123
$Depth\ Nitro$	49	13.3881	33.4492	24.998	0.00043687	0.64681	224.0903	3.904
B i1	655	4.8524	34.5165	27.1868	7.7912e-06	0	9.7203	44.0035
B i2	654	4.8574	34.5158	27.1856	9.7152e-06	0	8.7434	44.7187
B i3	653	4.8608	34.5152	27.1848	1.0469e-05	0	8.8837	44.3035
B i4	652	4.8627	34.5139	27.1835	1.198e-05	0	9.3838	44.6417
B i5	651	4.8625	34.5124	27.1823	5.8015e-06	0	9.4359	44.6329
B i6	650	4.8669	34.513	27.1823	1.2032e-05	0	9.4869	44.4988
B i7	649	4.886	34.5127	27.1799	1.9612e-05	0	9.56	44.132
B i8	648	4.8996	34.5126	27.1783	1.5923e-05	0	9.521	44.17
B i9	647	4.9043	34.5112	27.1766	1.1557e-05	0	9.4866	44.0139
B i10	646	4.905	34.5104	27.1759	6.1278e-06	0	9.4777	44.078

Table 7:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	8	-127.7308	35.3579	745	-4735	516/54	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
19	10	2011	2455854	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.78795	44	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.79101	0.17036	1.7509e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.4423	33.2861	23.4855	2.7885e-05	0.18188	223.2188	0.27387
Max	745	4.5788	34.5621	27.2538	NaN	0	9.7632	44.6363
MLD_σ	16	19.3305	33.2823	23.5115	0.00010695	0.19743	224.3499	0.37182
MLD_θ	17	19.2656	33.2862	23.531	0.00032678	0.19998	228.2681	0.25213
Max_{N2}	45	16.0157	33.4305	24.4228	0.00059214	0.8205	250.2877	0.09275
Max_{Fluo}	44	16.3656	33.4151	24.3314	0.0010213	0.78795	250.0391	0.036549
Max_O	43	16.7853	33.3887	24.2144	0.0010426	0.69474	252.0949	0.10072
Min_O	678	4.8349	34.5159	27.1884	1.8019e-05	0	9.0682	44.9109
$Depth\ Nitro$	65	12.2435	33.3882	25.1749	8.3877e-05	0.33811	216.8118	6.8902
B i1	655	4.9291	34.5067	27.1703	7.1693e-06	0.0053619	9.2504	43.4042
B i2	654	4.9345	34.5077	27.1706	1.1849e-05	0.0053619	9.3612	42.5122
B i3	653	4.9471	34.5065	27.1681	1.3602e-05	0.023548	9.3208	44.6232
B i4	652	4.9527	34.5066	27.1676	3.5059e-06	0.023548	9.3221	43.7444
B i5	651	4.9557	34.5066	27.1673	1.3791e-06	0.023548	9.4056	43.6744
B i6	650	4.9583	34.5072	27.1674	1.2607e-06	0.023548	9.4035	44.2353
B i7	649	4.9633	34.5076	27.1672	8.3015e-06	0.023548	9.3609	44.2157
B i8	648	4.97	34.5066	27.1656	1.0566e-05	0.020434	9.3128	44.0371
B i9	647	4.9728	34.5063	27.165	1.2095e-05	0.0053619	9.3349	43.8953
B i10	646	4.9801	34.5049	27.1631	1.5949e-05	0.020434	9.3112	43.5316

Table 8:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	9	-127.7322	35.3445	746	-4731	517/53	-123	38.0182

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
20	10	2011	2455855	1	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.70468	41	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.7114	0.17242	1.4243e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	19.4252	33.2883	23.4915	6.9641e-06	0.18304	223.946	2.0267
Max	746	4.5982	34.556	27.2469	NaN	0	9.7319	46.1464
MLD_σ	16	19.3311	33.2887	23.5162	0.00011965	0.19412	224.0925	1.8745
MLD_θ	17	19.275	33.2925	23.5334	0.00045625	0.19743	227.1934	3.1089
Max_{N2}	46	14.5744	33.4143	24.726	0.00019029	0.77934	246.7268	2.4901
Max_{Fluo}	41	15.7048	33.4078	24.4751	0.00039243	0.70468	253.4272	1.8853
Max_O	36	17.8918	33.3137	23.8942	0.00064223	0.47818	243.4947	2.23
Min_O	690	4.7589	34.5211	27.2011	1.5073e-05	0	9.3323	45.6512
$Depth\ Nitro$	61	11.6232	33.4029	25.3019	8.9939e-05	0.23656	212.1986	10.3716
B i1	655	4.926	34.5099	27.1732	1.267e-05	0	9.5138	44.0099
B i2	654	4.9303	34.509	27.172	7.8187e-06	0	9.6504	45.7876
B i3	653	4.9317	34.5087	27.1716	2.5023e-06	0	9.5059	45.5805
B i4	652	4.9324	34.5087	27.1715	1.01e-06	0	9.5954	44.111
B i5	651	4.9331	34.5087	27.1714	1.7142e-06	0	9.5992	44.2529
B i6	650	4.9349	34.5086	27.1712	4.5038e-06	0	9.5906	43.0041
B i7	649	4.9372	34.5081	27.1705	6.5069e-06	0	9.3618	43.1686
B i8	648	4.9407	34.5078	27.1699	8.3e-06	0	9.6006	45.7872
B i9	647	4.9472	34.5074	27.1688	1.2713e-05	0	9.6993	43.9747
B i10	646	4.9569	34.5068	27.1673	1.646e-05	0	9.43	45.0481

Table 9:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	10	-125.2883	33.9128	1027	-4572	407/50	-121.837	36.2333

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
21	10	2011	2455856	0	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.49869	74	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.25223	0.098428	1.9233e-05	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	18.6818	33.3178	23.7018	1.1094e-06	0.066985	223.6356	-1.9075
Max	1027	3.8524	34.6179	27.3763	NaN	0	15.2249	43.8938
MLD_σ	32	18.5984	33.3181	23.7238	0.00014545	0.066985	224.5881	-1.9888
MLD_θ	37	18.4901	33.3272	23.7578	1.4176e-05	0.057065	224.9529	-2.2677
Max_{N2}	62	14.6964	33.2011	24.5371	0.00038666	0.20676	254.1201	-2.566
Max_{Fluo}	74	13.4381	33.1949	24.793	0.00020733	0.49869	249.6941	-3.2801
Max_O	62	14.6964	33.2011	24.5371	0.00038666	0.20676	254.1201	-2.566
Min_O	810	4.4782	34.5164	27.2292	3.6963e-06	0	8.7755	42.8032
$Depth\ Nitro$	152	9.4215	33.819	26.0064	0.00013717	0.0081766	147.5473	18.377
B i1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Table 10:

$Profil$	CTD	Lon	Lat	CTD Depth max (m)	Bathy (m)	Dist[km]/azimuth[°] coast	Lon coast	Lat coast
133	11	-123.6037	33.352	1022	-4257	304/63	-120.652	34.5667

Day	Month	Year	Julian day	Core biology Flag	Season	Season part (early-middle-late)
21	10	2011	2455856	0	Autumn	Early

$Max_{Fluo}(mg/m^3)$	Depth (m)	Sum $Fluo$ $1-200m(mg/m^3)$
0.53582	46	57.841

Intensity SST Gradient $(°/100km)$	Intensity Geostrophic current (m/s)	Strain $rate$ (s^{-2})	Lyapunov exponent $(1/days)$
0.12666	0.047487	4.8887e-07	0.025778

	Depth (m)	T $(°C)$	AS (g/kg)	σ_0 (kg/m^3)	N^2 (s^{-2})	$Fluo$ (mg/m^3)	O $(\mu mol/kg)$	Ni $(\mu mol/kg)$
$10m$	10	17.9846	33.5651	24.062	3.4172e-07	0.33436	224.6798	-0.96049
Max	1022	3.6501	34.6627	27.4317	NaN	0	22.8743	43.4322
MLD_σ	42	17.9103	33.5669	24.0828	0.00013262	0.3742	225.8404	-1.2115
MLD_θ	43	17.8527	33.5698	24.099	0.00026589	0.3823	224.7245	-1.6031
Max_{N2}	57	13.8932	33.5761	24.9931	0.00063356	0.51717	211.714	5.8192
Max_{Fluo}	46	17.4369	33.5644	24.1951	0.00024233	0.53582	225.319	-1.9634
Max_O	35	17.981	33.5654	24.0642	8.0981e-06	0.34759	224.7053	-1.7177
Min_O	676	4.8838	34.5289	27.1932	1.0059e-05	0	9.2666	41.4734
$Depth\ Nitro$	53	15.3191	33.5744	24.6881	0.0009806	0.5471	218.5106	0.27513
B i1	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i5	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i6	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i7	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i8	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i9	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
B i10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Table 11:

4 ARGO

4.1 Introduction

To complete the CTD study, we use ARGO data available around Tara's stations. ARGO is a global array of autonomous profiling floats that observe pressure, temperature and salinity in the upper $2000m$ of the ocean. These data were collected and made freely available by the International Argo Program and the national programs that contribute to it (http://www.argo.ucsd.edu, http://argo.jcommops.org).

The Argo Program is part of the Global Ocean Observing System. The ARGO profiles were downloaded on the Aviso ftp web site where only pressure (P), temperature (T), and salinity (S) data. However, some of these profiles were still suspicious so applied another analysis in the same way that Chaigneau et al. (2011) using the following conditions:

- Data flagged as good and probably good (Argo quality flag 1 and 2)
- The shallowest data above 15 dbar and the deepest data below 300m
- A difference of pressure level inferior than 25 dbar between 0-100dbar and inferior than 50 dbar between 100-300dbar

We looked for the nearest ARGO floats available in box defined by $\Delta X \pm 4°$ $lat - lon$ and $\Delta t \pm 15$ $julian\ days$ around Tara stations. For each CTD profile we search for the best matching ARGO profile. We computed distance dx, delay time dt, and radius $r = \sqrt{dx^2 + dt^2}$ between each ARGO and CTD profiles. We add correlations calculations between CTD-ARGO salinity and temperature. Correlations are calculated using the `corrcoef` function in `Matlab`. To make correlations calculation possible we interpolate ARGO profiles (defined on the 152 levels vertical grid) on a CTD-compatible 1 decibar vertical grid. We present the results in Tab. 15 with the ARGO profiles we kept after tests. We show the CTD and **all** ARGO profiles on Fig. 12, and a $\theta - S$ diagram on Fig. 13.

4.2 Correlations with CTD profiles

CTD	Argo	*Radius*	*dt* (*jul*)	*dx* (*km*)	θ correl.	S correl.	Lon Argo	Lat Argo
1	1	329.256	11	329.0722	0.96806	0.88005	-127.573	32.44
1	2	336.3338	1	336.3323	0.97057	0.86898	-127.587	32.366
1	3	335.9123	-10	335.7634	0.96946	0.84094	-127.566	32.378
1	4	437.1928	11	437.0544	0.993	0.9892	-124.938	37.535
1	5	430.4662	0	430.4662	0.98441	0.98465	-125.124	37.634
1	6	47.4653	4	47.2965	0.98139	0.93015	-128.94	34.778
1	7	55.8225	-6	55.4992	0.98925	0.95662	-128.836	34.699
1	8	510.8084	9	510.7291	0.97596	0.9476	-125.541	31.538
1	9	527.697	-1	527.6961	0.97234	0.91678	-125.679	31.271
1	10	540.7604	-12	540.6273	0.99046	0.96233	-125.653	31.147
1	11	520.3494	11	520.2331	0.99229	0.9873	-123.801	33.112
1	12	538.81	0	538.81	0.99312	0.98758	-123.431	33.369
1	13	487.7053	-11	487.5813	0.98913	0.9778	-124.183	33.138
1	14	88.6278	14	87.515	0.98958	0.98733	-128.617	35.959
1	15	103.7148	9	103.3236	0.9892	0.97968	-128.601	36.102
1	16	121.326	4	121.26	0.99252	0.96771	-128.661	36.275
1	17	141.5018	-2	141.4877	0.98815	0.95702	-128.516	36.438
1	18	143.0061	-7	142.8347	0.983	0.95751	-128.365	36.417
1	19	130.5058	-12	129.953	0.98532	0.95729	-128.35	36.29
2	1	326.7996	11	326.6144	0.95663	0.83912	-127.573	32.44
2	2	334.0789	1	334.0774	0.95607	0.83323	-127.587	32.366
2	3	333.5406	-10	333.3906	0.95638	0.7978	-127.566	32.378
2	4	421.6756	11	421.5321	0.99107	0.99379	-124.938	37.535
2	5	415.2965	0	415.2965	0.99691	0.99513	-125.124	37.634
2	6	56.0785	4	55.9356	0.9635	0.91453	-128.94	34.778
2	7	61.2216	-6	60.9269	0.9739	0.94744	-128.836	34.699
2	8	503.4041	9	503.3237	0.95742	0.93411	-125.541	31.538
2	9	521.136	-1	521.135	0.95455	0.90563	-125.679	31.271
2	10	534.3594	-12	534.2247	0.97835	0.94997	-125.653	31.147
2	11	506.6083	11	506.4889	0.99104	0.97899	-123.801	33.112
2	12	524.2819	0	524.2819	0.99435	0.98269	-123.431	33.369
2	13	474.2864	-11	474.1588	0.98545	0.9735	-124.183	33.138
2	14	82.5893	14	81.394	0.99592	0.99131	-128.617	35.959
2	15	97.7863	9	97.3713	0.99319	0.98342	-128.601	36.102
2	16	116.5023	4	116.4336	0.98689	0.96949	-128.661	36.275
2	17	135.304	-2	135.2892	0.97757	0.96068	-128.516	36.438
2	18	135.2496	-7	135.0683	0.97033	0.95635	-128.365	36.417
2	19	122.1717	-12	121.5809	0.97056	0.95472	-128.35	36.29
3	1	326.3537	11	326.1683	0.96037	0.87828	-127.573	32.44
3	2	334.3403	1	334.3388	0.96006	0.8677	-127.587	32.366
3	3	333.2437	-10	333.0936	0.9607	0.84031	-127.566	32.378
3	4	348.4718	11	348.2982	0.99252	0.99187	-124.938	37.535
3	5	344.3795	0	344.3795	0.9878	0.98775	-125.124	37.634
3	6	127.3103	4	127.2475	0.97129	0.93518	-128.94	34.778
3	7	124.4591	-6	124.3144	0.98193	0.96337	-128.836	34.699
3	8	472.7669	9	472.6813	0.9653	0.95499	-125.541	31.538
3	9	494.6542	-1	494.6532	0.96077	0.92607	-125.679	31.271
3	10	508.5156	-12	508.374	0.98493	0.96759	-125.653	31.147
3	11	441.1818	11	441.0447	0.99368	0.99301	-123.801	33.112
3	12	454.2626	0	454.2626	0.99318	0.98847	-123.431	33.369
3	13	410.9856	-11	410.8384	0.98644	0.9854	-124.183	33.138
3	14	103.9069	14	102.9595	0.99077	0.99199	-128.617	35.959
3	15	113.1232	9	112.7646	0.98914	0.98647	-128.601	36.102
3	16	130.8088	4	130.7477	0.98886	0.97599	-128.661	36.275
3	17	138.1646	-2	138.1501	0.982	0.96775	-128.516	36.438
3	18	129.8841	-7	129.6954	0.97722	0.96653	-128.365	36.417
3	19	117.1047	-12	116.4883	0.97844	0.96509	-128.35	36.29
4	1	330.8229	11	330.6399	0.94833	0.78643	-127.573	32.44
4	2	338.8128	1	338.8113	0.94617	0.73967	-127.587	32.366
4	3	337.7132	-10	337.5651	0.94823	0.67624	-127.566	32.378

Table 12: Description: see paragraph p. 23

.

CTD	Argo	*Radius*	*dt* (*jul*)	*dx* (*km*)	θ correl.	S correl.	Lon Argo	Lat Argo
4	4	345.369	11	345.1938	0.99597	0.98521	-124.938	37.535
4	5	341.0991	0	341.0991	0.99147	0.97681	-125.124	37.634
4	6	129.6145	4	129.5527	0.96061	0.88764	-128.94	34.778
4	7	127.1318	-6	126.9901	0.97657	0.94217	-128.836	34.699
4	8	476.8012	9	476.7163	0.95117	0.93604	-125.541	31.538
4	9	498.7796	-1	498.7786	0.94476	0.86787	-125.679	31.271
4	10	512.6497	-12	512.5093	0.98282	0.95361	-125.653	31.147
4	11	443.703	11	443.5666	0.99643	0.98901	-123.801	33.112
4	12	456.4202	0	456.4202	0.99702	0.97845	-123.431	33.369
4	13	413.6705	-11	413.5242	0.9915	0.98203	-124.183	33.138
4	14	101.08	14	100.1058	0.99552	0.98991	-128.617	35.959
4	15	109.8869	9	109.5177	0.99601	0.99313	-128.601	36.102
4	16	127.3422	4	127.2793	0.9906	0.98292	-128.661	36.275
4	17	134.2913	-2	134.2764	0.97945	0.97333	-128.516	36.438
4	18	125.8469	-7	125.6521	0.97052	0.96863	-128.365	36.417
4	19	113.1715	-12	112.5335	0.96988	0.96472	-128.35	36.29
5	1	331.8225	12	331.6054	0.94034	0.72974	-127.573	32.44
5	2	339.8041	2	339.7982	0.93912	0.67565	-127.587	32.366
5	3	338.6452	-9	338.5256	0.94069	0.60396	-127.566	32.378
5	4	341.4601	12	341.2492	0.99419	0.98779	-124.938	37.535
5	5	337.2898	1	337.2883	0.99354	0.98479	-125.124	37.634
5	6	133.9787	5	133.8853	0.95486	0.83173	-128.94	34.778
5	7	131.2655	-5	131.1703	0.97142	0.8955	-128.836	34.699
5	8	475.9488	10	475.8437	0.94559	0.88884	-125.541	31.538
5	9	498.1244	0	498.1244	0.93842	0.79957	-125.679	31.271
5	10	511.9981	-11	511.8799	0.97853	0.9168	-125.653	31.147
5	11	440.7467	12	440.5833	0.99451	0.97436	-123.801	33.112
5	12	453.124	1	453.1229	0.99733	0.9671	-123.431	33.369
5	13	410.8218	-10	410.7001	0.98848	0.95562	-124.183	33.138
5	14	104.0018	15	102.9144	0.99657	0.99099	-128.617	35.959
5	15	112.3115	10	111.8654	0.99483	0.98022	-128.601	36.102
5	16	129.4071	5	129.3105	0.98892	0.95846	-128.661	36.275
5	17	135.6292	-1	135.6256	0.97702	0.93839	-128.516	36.438
5	18	126.7892	-6	126.6472	0.96689	0.93467	-128.365	36.417
5	19	114.2687	-11	113.738	0.96639	0.92996	-128.35	36.29
6	1	317.4919	12	317.265	0.94777	0.82073	-127.573	32.44
6	2	325.4317	2	325.4255	0.94748	0.79469	-127.587	32.366
6	3	324.3171	-9	324.1921	0.94843	0.74877	-127.566	32.378
6	4	355.8977	12	355.6953	0.99286	0.9919	-124.938	37.535
6	5	352.0612	1	352.0598	0.99093	0.99065	-125.124	37.634
6	6	121.7174	5	121.6147	0.96142	0.89493	-128.94	34.778
6	7	118.087	-5	117.9811	0.97501	0.93785	-128.836	34.699
6	8	465.3977	10	465.2902	0.95582	0.92076	-125.541	31.538
6	9	487.0046	0	487.0046	0.94918	0.87877	-125.679	31.271
6	10	500.8168	-11	500.696	0.97996	0.94145	-125.653	31.147
6	11	437.5295	12	437.3649	0.9952	0.98644	-123.801	33.112
6	12	451.3974	1	451.3963	0.99544	0.98367	-123.431	33.369
6	13	406.9155	-10	406.7926	0.98718	0.9755	-124.183	33.138
6	14	108.9566	15	107.9192	0.99287	0.98888	-128.617	35.959
6	15	118.9637	10	118.5427	0.99104	0.97852	-128.601	36.102
6	16	137.071	5	136.9798	0.98859	0.96293	-128.661	36.275
6	17	145.3185	-1	145.3151	0.97951	0.95233	-128.516	36.438
6	18	137.417	-6	137.2859	0.97355	0.94754	-128.365	36.417
6	19	124.3638	-11	123.8763	0.97341	0.94368	-128.35	36.29
7	1	315.5771	12	315.3488	0.95032	0.81707	-127.573	32.44
7	2	323.529	2	323.5229	0.95008	0.79143	-127.587	32.366
7	3	322.3992	-9	322.2735	0.95107	0.74585	-127.566	32.378
7	4	355.347	12	355.1443	0.99309	0.98877	-124.938	37.535
7	5	351.683	1	351.6816	0.98914	0.98746	-125.124	37.634
7	6	123.2604	5	123.1589	0.96319	0.89277	-128.94	34.778

Table 13: Description: see paragraph p. 23

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CTD	Argo	*Radius*	*dt* (*jul*)	*dx* (*km*)	θ correl.	S correl.	Lon Argo	Lat Argo
7	7	119.337	-5	119.2322	0.97676	0.93834	-128.836	34.699
7	8	462.621	10	462.5129	0.95863	0.92204	-125.541	31.538
7	9	484.3092	0	484.3092	0.95179	0.88265	-125.679	31.271
7	10	498.1324	-11	498.0109	0.98171	0.94126	-125.653	31.147
7	11	434.3567	12	434.1909	0.99549	0.98278	-123.801	33.112
7	12	448.2473	1	448.2462	0.99562	0.98163	-123.431	33.369
7	13	403.7413	-10	403.6175	0.98791	0.97531	-124.183	33.138
7	14	112.0559	15	111.0474	0.9915	0.98594	-128.617	35.959
7	15	122.0074	10	121.5969	0.99091	0.97824	-128.601	36.102
7	16	140.0651	5	139.9758	0.98929	0.96307	-128.661	36.275
7	17	148.13	-1	148.1266	0.98114	0.95364	-128.516	36.438
7	18	140.1029	-6	139.9743	0.97546	0.94859	-128.365	36.417
7	19	127.1009	-11	126.624	0.97539	0.94516	-128.35	36.29
8	1	325.3636	12	325.1423	0.95868	0.83218	-127.573	32.44
8	2	333.324	2	333.318	0.96103	0.812	-127.587	32.366
8	3	332.1885	-9	332.0665	0.96209	0.77376	-127.566	32.378
8	4	348.424	12	348.2173	0.99289	0.98477	-124.938	37.535
8	5	344.3817	1	344.3803	0.98005	0.97604	-125.124	37.634
8	6	127.7875	5	127.6897	0.97603	0.91634	-128.94	34.778
8	7	124.7158	-5	124.6155	0.98653	0.95783	-128.836	34.699
8	8	471.4333	10	471.3272	0.97435	0.95736	-125.541	31.538
8	9	493.3277	0	493.3277	0.96713	0.90547	-125.679	31.271
8	10	507.1713	-11	507.052	0.99051	0.97106	-125.653	31.147
8	11	439.7662	12	439.6025	0.99381	0.98592	-123.801	33.112
8	12	452.8487	1	452.8476	0.99253	0.9789	-123.431	33.369
8	13	409.5101	-10	409.388	0.99193	0.98327	-124.183	33.138
8	14	105.4886	15	104.4167	0.98684	0.98676	-128.617	35.959
8	15	114.6546	10	114.2177	0.98853	0.99072	-128.601	36.102
8	16	132.2829	5	132.1883	0.99376	0.98474	-128.661	36.275
8	17	139.5419	-1	139.5383	0.99118	0.97778	-128.516	36.438
8	18	131.1806	-6	131.0433	0.98782	0.97679	-128.365	36.417
8	19	118.3708	-11	117.8586	0.98813	0.9752	-128.35	36.29
9	1	323.9227	13	323.6618	0.95228	0.82122	-127.573	32.44
9	2	331.8501	3	331.8366	0.9534	0.80121	-127.587	32.366
9	3	330.683	-8	330.5863	0.9536	0.75772	-127.566	32.378
9	4	349.6023	13	349.3605	0.99248	0.98914	-124.938	37.535
9	5	345.5812	2	345.5754	0.98566	0.98274	-125.124	37.634
9	6	126.9816	6	126.8398	0.9666	0.90842	-128.94	34.778
9	7	123.7119	-4	123.6472	0.97986	0.95237	-128.836	34.699
9	8	470.1779	11	470.0492	0.96012	0.94529	-125.541	31.538
9	9	492.0138	1	492.0128	0.95433	0.89588	-125.679	31.271
9	10	505.8319	-10	505.733	0.98412	0.96259	-125.653	31.147
9	11	439.0821	13	438.8896	0.99356	0.98594	-123.801	33.112
9	12	452.2682	2	452.2638	0.99396	0.98053	-123.431	33.369
9	13	408.716	-9	408.6169	0.98787	0.98049	-124.183	33.138
9	14	106.493	16	105.2841	0.98935	0.98918	-128.617	35.959
9	15	115.7424	11	115.2185	0.98936	0.98782	-128.601	36.102
9	16	133.3998	6	133.2648	0.98942	0.97866	-128.661	36.275
9	17	140.7613	0	140.7613	0.9823	0.97083	-128.516	36.438
9	18	132.425	-5	132.3306	0.97644	0.96799	-128.365	36.417
9	19	119.532	-10	119.113	0.97791	0.9656	-128.35	36.29
10	1	269.0407	14	268.6762	0.96868	0.82941	-127.573	32.44
10	2	274.8944	4	274.8653	0.96911	0.84494	-127.587	32.366
10	3	272.5817	-7	272.4918	0.97398	0.82005	-127.566	32.378
10	4	404.7071	14	404.4648	0.98609	0.94913	-124.938	37.535
10	5	414.5221	3	414.5112	0.97209	0.9346	-125.124	37.634
10	6	349.2256	7	349.1554	0.9786	0.93541	-128.94	34.778
10	7	337.7563	-3	337.7429	0.98364	0.96579	-128.836	34.699
10	8	265.6859	12	265.4148	0.98853	0.9843	-125.541	31.538
10	9	296.3604	2	296.3536	0.98079	0.94036	-125.679	31.271

Table 14: Description: see paragraph p. 23

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CTD	Argo	*Radius*	*dt* (*jul*)	*dx* (*km*)	θ correl.	S correl.	Lon Argo	Lat Argo
10	10	309.9106	-9	309.7799	0.9895	0.98117	-125.653	31.147
10	11	164.9136	14	164.3183	0.98617	0.95261	-123.801	33.112
10	12	182.4808	3	182.4562	0.98363	0.94458	-123.431	33.369
10	13	134.249	-8	134.0104	0.99234	0.96985	-124.183	33.138
10	14	380.029	17	379.6486	0.9799	0.95806	-128.617	35.959
10	15	388.2461	12	388.0606	0.98482	0.97893	-128.601	36.102
10	16	404.3834	7	404.3228	0.9919	0.99035	-128.661	36.275
10	17	406.4938	1	406.4926	0.99547	0.99298	-128.516	36.438
10	18	395.0783	-4	395.058	0.99736	0.99476	-128.365	36.417
10	19	384.4887	-9	384.3834	0.99431	0.9939	-128.35	36.29
11	1	384.8733	14	384.6186	0.95936	0.89337	-127.573	32.44
11	2	388.2976	4	388.277	0.95969	0.89222	-127.587	32.366
11	3	386.0565	-7	385.9931	0.96337	0.86473	-127.566	32.378
11	4	481.3015	14	481.0978	0.98827	0.9897	-124.938	37.535
11	5	496.1718	3	496.1628	0.97322	0.98109	-125.124	37.634
11	6	517.0321	7	516.9847	0.97443	0.95683	-128.94	34.778
11	7	505.4166	-3	505.4077	0.98243	0.97636	-128.836	34.699
11	8	272.0949	12	271.8302	0.98107	0.97127	-125.541	31.538
11	9	302.9503	2	302.9437	0.97086	0.94553	-125.679	31.271
11	10	312.3182	-9	312.1885	0.98805	0.97804	-125.653	31.147
11	11	35.3154	14	32.4218	0.9909	0.99289	-123.801	33.112
11	12	16.4473	3	16.1713	0.98728	0.99273	-123.431	33.369
11	13	59.4973	-8	58.957	0.9906	0.99462	-124.183	33.138
11	14	543.2482	17	542.9821	0.98132	0.9886	-128.617	35.959
11	15	550.23	12	550.0991	0.98304	0.98935	-128.601	36.102
11	16	565.158	7	565.1147	0.99161	0.98425	-128.661	36.275
11	17	564.8168	1	564.8159	0.99312	0.98053	-128.516	36.438
11	18	552.555	-4	552.5405	0.99442	0.98027	-128.365	36.417
11	19	543.1812	-9	543.1067	0.99267	0.97945	-128.35	36.29

Table 15: Description: see paragraph p. 23

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4.3 ARGO and CTD profiles

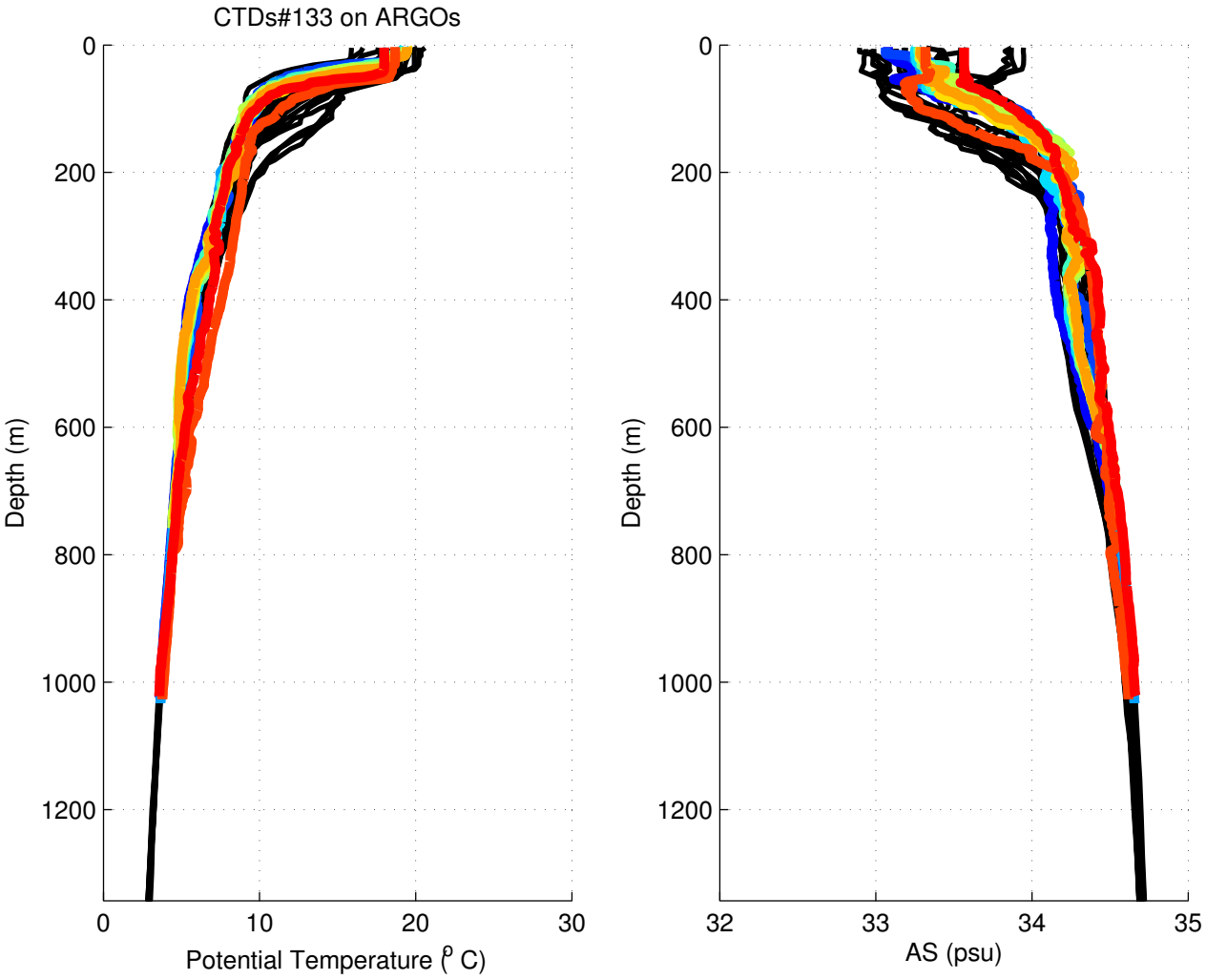

Figure 12: Description: see paragraph p. 23

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4.4 ARGO and CTD $\theta - S$ diagrams

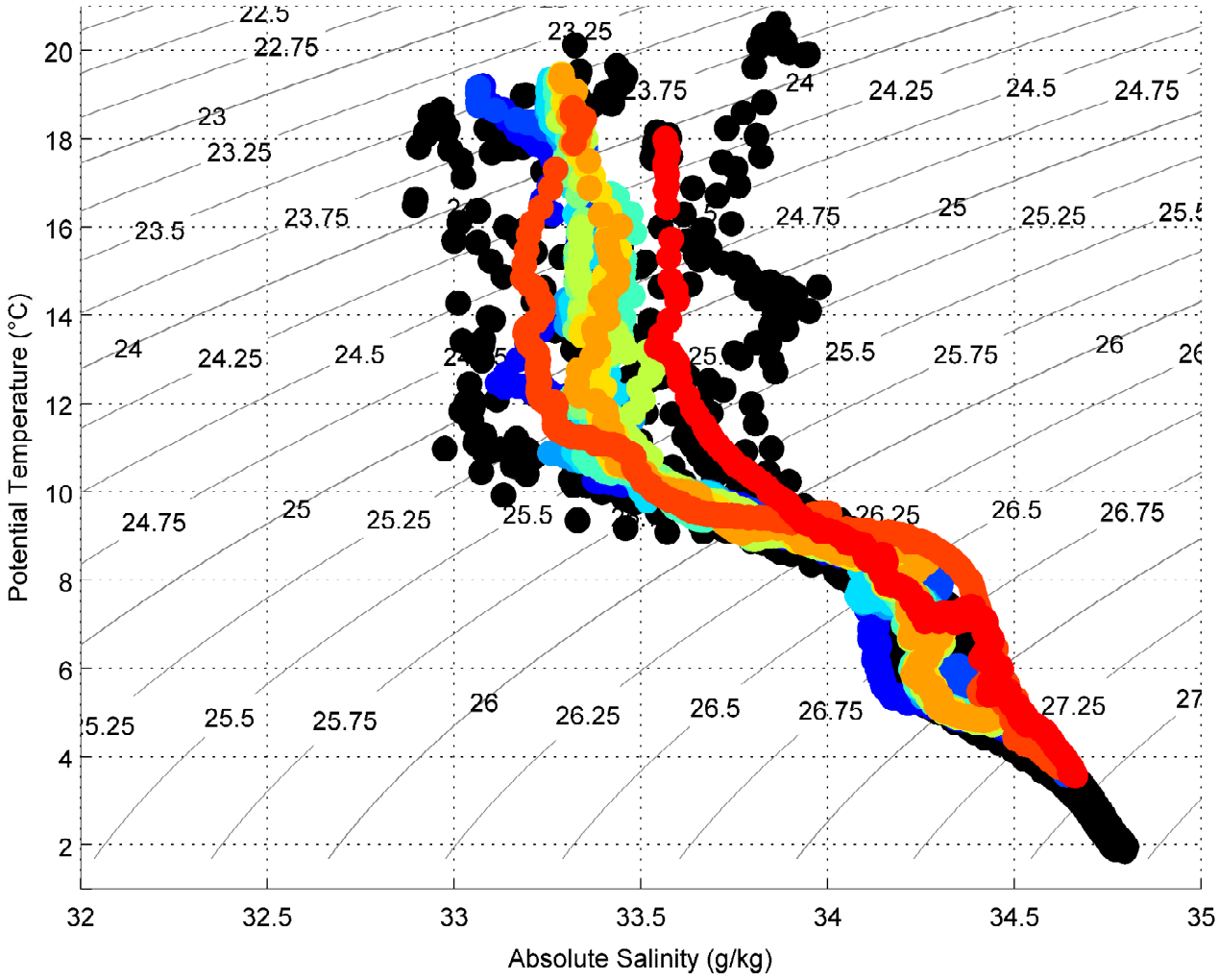

Figure 13: Description: see paragraph p. 23

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