BOUSSOLE Monthly Cruise Report

Cruise 31
March 03 – 07, 2004

Duty Chief: Alec Scott (alec.scott@obs-vlfr.fr)
Vessel: R/V Téthys II
(Captain: Rémy Lafond)

Science Personnel: Alec Scott, Dominique Tailliez, Davey Merien and Sophie Bonnet

Laboratoire d'Océanographique de Villefranche (LOV), 06238 Villefranche sur mer cedex, France

Fig 1. Buoy launch with "CASTOR" ship from FOSELEV-MARINE.

BOUSSOLE project

ESA/ESRIN contract N° 17286/03/I-OL

Deliverable from WP#400/200

December 2, 2005

Foreword

This report is part of the technical report series that is being established by the BOUSSOLE project.

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European Space Agency

Centre National d'Etudes Spatiales, France

National Aeronautics and Space Administration of the USA

Centre National de la Recherche Scientifique, France

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Université Pierre & Marie Curie, France

Observatoire Océanologique de Villefranche sur mer, France

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Cruise Objectives

Multiple SPMR profiles are to occur within 1 hour of satellite overhead passes of SeaWiFS and MERIS and around solar noon. Optimal conditions: Clear blue skies and flat, calm sea surface. If the sky is clear and sea conditions are reasonably calm (no whitecaps or large swell), SIMBADA measurements are to be performed consecutively where possible with SPMR profiles. If sea conditions are poor but sky is good, SIMBADA sun photometer measurements can be made at intervals throughout the day to measure atmospheric optical thickness. A floating platform is to be used to support the SPMR Eu sensor approximately 20cm below the surface for up to 3 minutes of stable light field before a release mechanism triggers the release of the profiler to start a descent as normal. Multiple descents ideally will be started in this way and the data will be used to assess near-surface Eu extrapolation model calculations. CTD deployments are required at the start and end of the SPMR profiling day and around noon in the longer summer days or when there is a high possibility of a satellite matchup. In addition to the depth profile from the CTD, CDOM fluorometer, Chl fluorometer and AC9, seawater samples are to be collected, filtered and stored in LN2 for HPLC pigment and particulate absorption spectrophotometric analysis in the lab. A gimbled PAR sensor positioned on the foredeck and operated from the CTD computer serves as a light field stability indicator during SPMR profiling.

For each cruise, at the end of the optics measurements on site, there will be one ctd transect between the Boussole site and the Port of Nice. This transect consists of four fixed locations on-route from Boussole and a final two station positions to be decided during the transect in order to sample on both sides of the main frontal structure between the coastal waters and Ligurian Sea. The time of day of this transect should be similar for each cruise, if possible to minimise influence of diurnal variability. On other uninterrupted transits between Nice and Boussole, Simbada measurements of optical thickness should be taken every 30 minutes to characterise variability between the Cap Ferrat sun photometer site and the Boussole site.

The Boussole buoy is scheduled to be reinstalled the morning of 4th March. After installation, profiles with the SPMR synchronous with the buoy sampling should be attempted as a means of cross calibration and validation.

Davey Merien will be assisting Dominique Tailliez with CTD operations in order to establish an efficient protocol for processing the data from the AC9. CTD water samples are to collected for Annick Bricaud.

PhD student Sophie Bonnet is participating on the cruise with the intention of sampling seawater to a depth of 40m for dissolved and particulate iron and pigments. This is a monthly activity but there is particular urgency for these samples since a major rainfall deposition of Saharan dust occurred two weeks prior.

Cruise Summary

The ship departed port in the very early hours of the morning of the 3rd March to allow Sophie Bonnet to filter seawater uninterrupted on the site before the start of the scheduled optics work. Weather conditions for this first day were ideal for the optics with very calm seas and a clear and very blue sky. Unfortunately, the supermarket used by the ship had been closed for a period before the cruise so the provisions aboard the Tethys II were running low. Therefore, it was necessary to leave the site before 1330 UTC to be in port in time for a delivery. However, optical profiling was performed during the morning and early afternoon with ideal conditions for matchups for the data with both SeaWiFS and Modis.

For the second day, the 4th March, the conditions in the morning were very good, similar to those of the previous day. The Foselev Marine ship, Castor, was also on the Boussole site this day in order to set in place the upper section of the buoy, which had been under repairs since December. The scheduled optics program was performed in the vicinity of the buoy installation operations throughout the morning. The Castor left the site around midday but, unfortunately, the clear sky conditions of the morning ended just after lunchtime as relatively heavy cirrus cloud set in and a the wind increased to around 15 knots. A good data set was collected during the morning session with the SPMR both with and without the surface float and the early afternoon session was proving a little difficult because of increasingly awkward wind/current patterns. Therefore, it was decided to leave the site a little earlier than scheduled and to start the transect to Nice.

The weather continued to deteriorate throughout the following three days. Despite overcast skies and winds of around 20 knots on the 5th March, the mission was continued in order to position on the buoy site and download

the data. However, upon arrival on site, the buoy could not be seen. After over 1 hour of searching. It was finally spotted over 180m from the launch point and the solar panels were 3-5m underwater. It was, therefore, not possible to make communication. Argos messages were received over 4 hours later confirming that the buoy was back above the surface. Most likely, the submergence was due to strong currents combining with wind and waves. It was later discovered that the buoy cap had actually been hit by a ship, most probably the Tethys during the search, so 2 further visits to the site were required to firstly confirm that the buoy was sitting well at the surface and then, for the second trip, to make the repairs.

The final two days were cancelled due to bad weather with forecast winds of Beaufort Force 6 to 8.

Cruise Report

3rd March, 2004 (Times UTC)

0130 Depart port of Nice
0445 Arrival at Boussole Site (43°22'N 7°54'E).
0450 Start of pumping for seawater iron analysis
0914 End of pumping
0943 CTD Boussole 1. Max 400m. Bottle depths (m): 200,150,100,70,60,50,40,30,20,10, 5.
10?? CTD on deck
1002 SPMR in water
1053 SPMR on deck (4 profiles + Meris 1010)
1215 SPMR in water
1250 SPMR on deck (3 profiles + SeaWiFS 1216)
1306 CTD Boussole 2. Max 400m. Bottle depths (m): 10, 5.
1337 CTD on deck
1330 Depart station for port of Nice
1645 Arrival in port of Nice

4th March, 2004

0530 Depart port of Nice
0845 Arrival at Boussole Site (43°22'N 7°54'E).
0915 CTD Boussole 3. Max 400m. Bottle depths (m):150,100,70,60,50,40,30,20,10, 5.
0944 CTD on deck
0951 SPMR in water
1010 SPMR on deck (2 profiles + Meris 0939)
1020 SPMR surface float session started
1054 SPMR on deck (2 profiles + SeaWiFS 1119)
1215 SPMR surface float session started
1305 SPMR on deck (2 profiles)
1318 SPMR in water
1335 SPMR on deck (2 profiles + SeaWiFS 1257)
1354 CTD Boussole 4. Max 400m. Boussole Site. Bottle depths (m): 10, 5.
1500 CTD Boussole 5. Max 400m. Transect Station 1 (43°25'N 7°28'E).
1559 CTD Boussole 6. Max 400m. Transect Station 2 (43°28'N 7°42'E).
1700 CTD Boussole 7. Max 400m. Transect Station 3 (43°31'N 7°37'E).
1759 CTD Boussole 8. Max 400m. Transect Station 4 (43°34'N 7°31'E).
1902 CTD Boussole 9. Max 400m. Transect Station 5 (43°37'N 7°25'E).
1926 Depart Station 4 for port of Nice
Arrival in port of Nice

5th March, 2004

0700 Depart port of Nice
1045 Arrival at buoy site and start search for buoy
1230 Buoy located submerged. GPS fix
1245 Depart for port of Nice
1630 Arrival in port of Nice

6th March, 2004
Cancelled due to bad weather

7th March, 2004
Cancelled due to bad weather

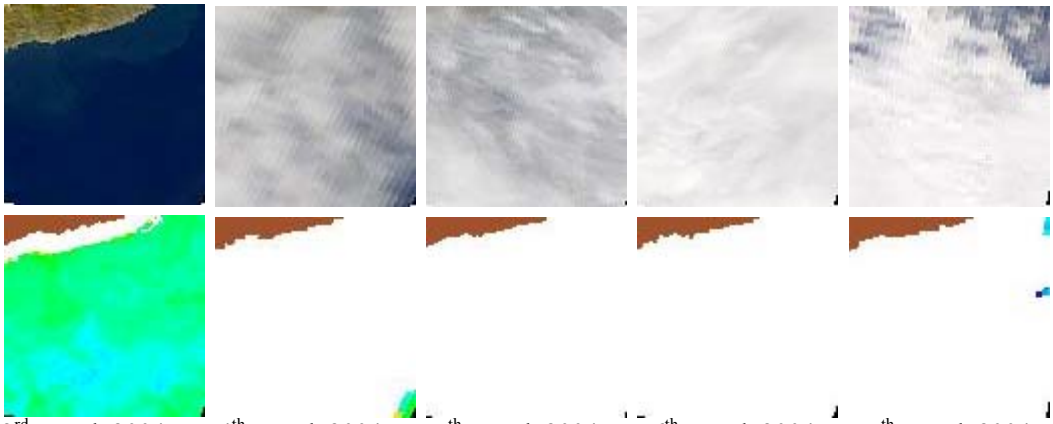
Boussole Site Satellite Overhead Pass Schedule

SeaWiFS: Viewing Times
Date Time Lat Lon Sat. Sat. Range Sun Sun Tilt Flags*
(UTC) (DEG) (DEG) Azi. Elev. (km) Azi. Elev.
---
03 Mar 2004 12:16:48 43.220 7.540 184.50 67.74 749 191.34 39.59 AFT 2
04 Mar 2004 11:19:28 43.220 7.540 108.30 22.52 1478 172.81 40.34 AFT 2 3
04 Mar 2004 12:57:04 43.220 7.540 270.95 36.18 1092 204.02 37.73 AFT 2
05 Mar 2004 11:59:55 43.220 7.540 135.06 53.18 851 186.13 40.81 AFT 2
05 Mar 2004 13:37:11 43.220 7.540 285.76 16.33 1762 215.76 34.44 AFT 2 3
06 Mar 2004 11:02:31 43.220 7.540 103.60 15.49 1805 167.34 40.59 AFT 2 3
06 Mar 2004 12:40:14 43.220 7.540 256.34 51.10 872 199.26 39.57 AFT 2
07 Mar 2004 11:43:01 43.220 7.540 118.67 37.13 1073 180.74 41.76 AFT 2
07 Mar 2004 13:20:25 43.220 7.540 280.84 22.78 1471 211.59 36.79 AFT 2 3
MERIS: Viewing Times
Date Time Lat Lon Sat. Sat. Range Sun Sun Tilt Flags*
(UTC) (DEG) (DEG) Azi. Elev. (km) Azi. Elev.
---
03 Mar 2004 10:10:17 43.220 7.540 287.32 77.26 808 151.50 36.05 NADIR
04 Mar 2004 09:39:03 43.220 7.540 100.14 55.84 932 142.72 33.33 NADIR
06 Mar 2004 10:16:00 43.220 7.540 287.70 68.73 841 152.87 37.68 NADIR
07 Mar 2004 09:44:47 43.220 7.540 100.94 63.22 873 143.84 35.08 NADIR

Ligurian Sea Boussole Site Satellite Images

http://seawifs.gsfc.nasa.gov/cgi/seawifs_region_extracts.pl

SeaWiFS

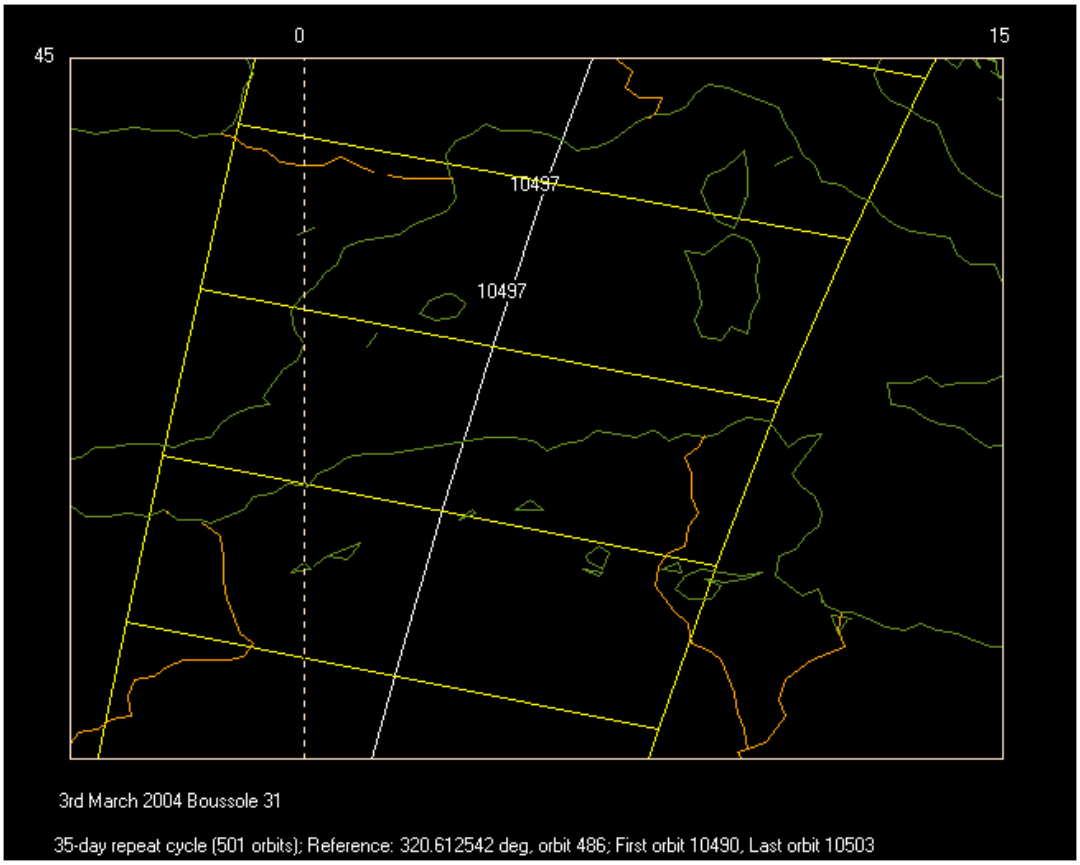


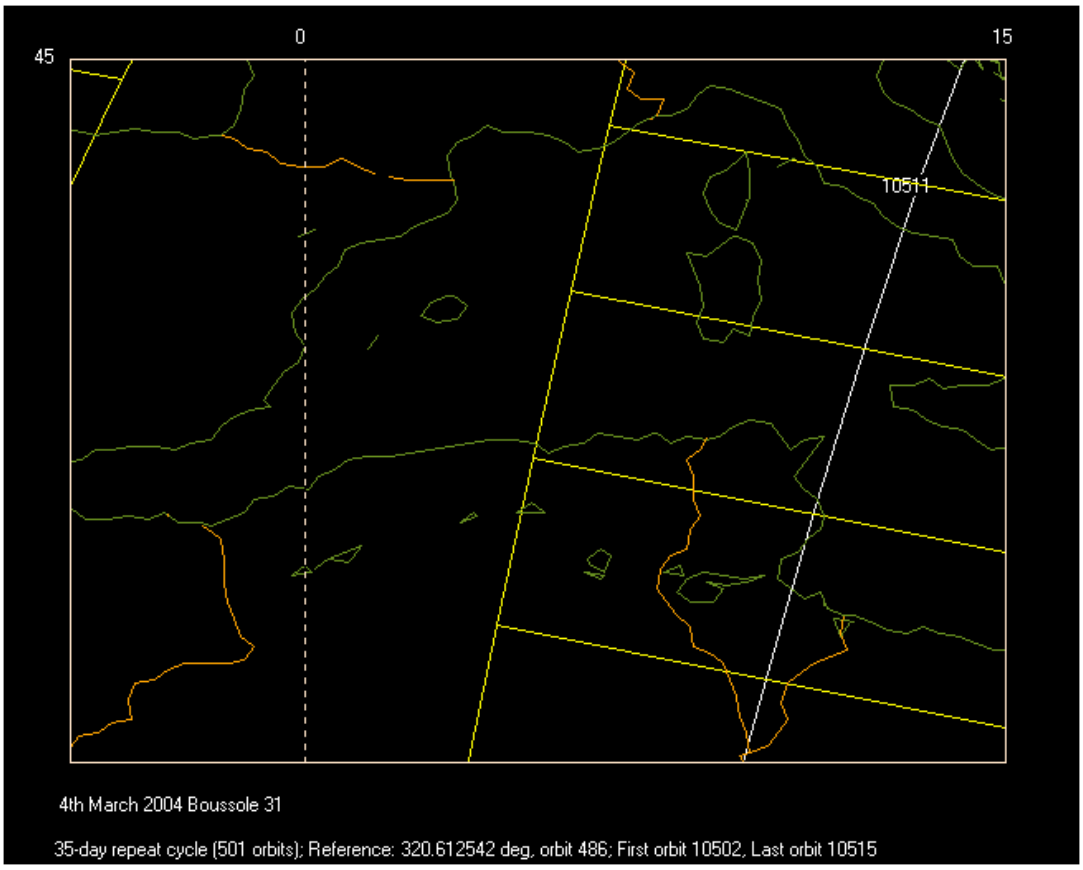
3rd March 2004 4th March 2004 5th March 2004 6th March 2004 7th March 2004

Figure 2. SeaWiFS images Level 1 hdf (upper) and Level 2 hdf (lower) images of the french coastline and Boussole site. (http://seawifs.gsfc.nasa.gov/cgi/seawifs_region_extracts)

Modis images not available at time of last document edit

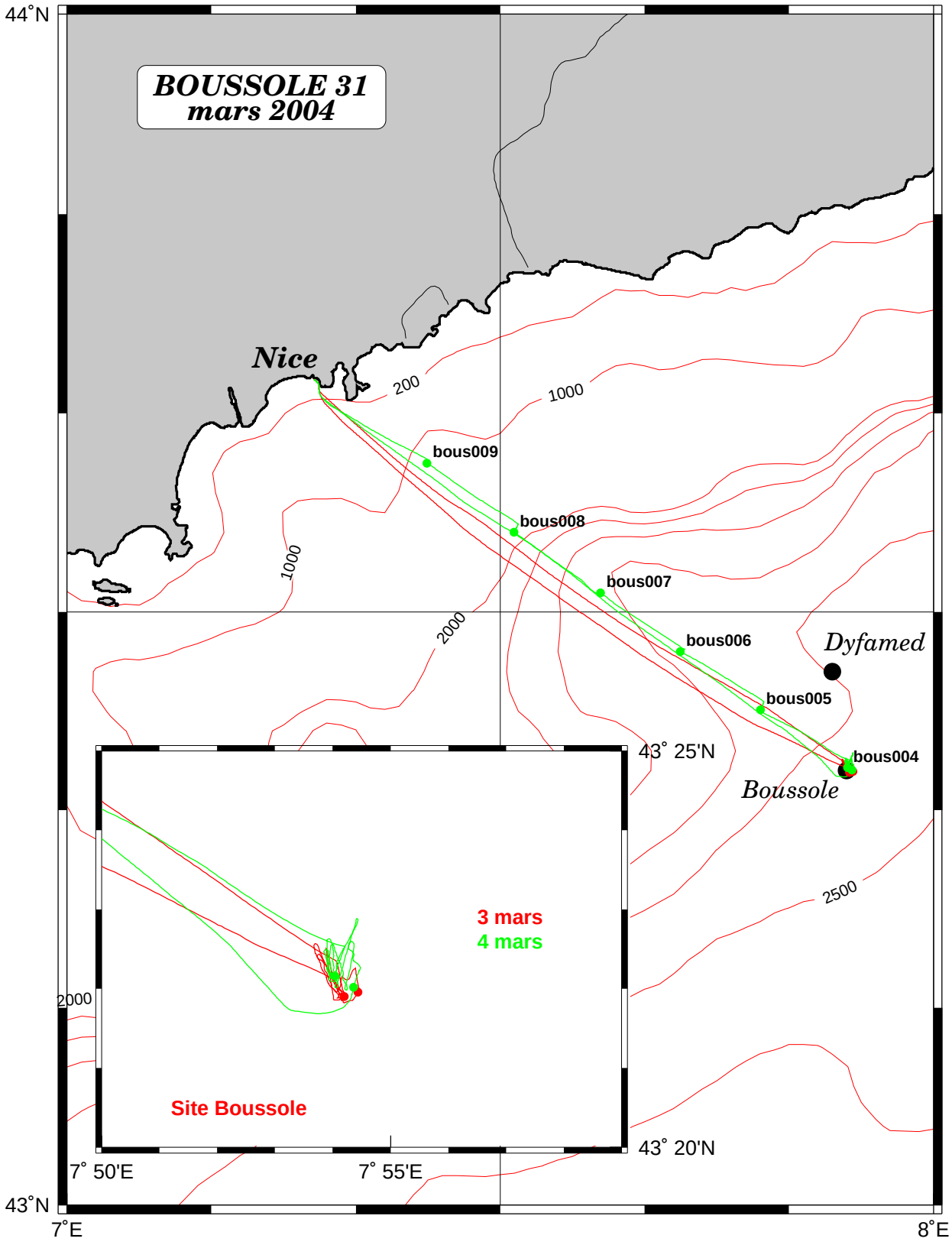
Calculated Swath paths for Meris Sensor (ESOV Software)





Tabulated Cruise Summary for Boussole 31

Date	Sensors:	Black names	Profile names	CTD notées /	Start Time	Duration	Depth max	Latitude (N)		Longitude (E)		Other sensors	cast	PAR	Start/Finish				Weather							Sea		
	spmr&smsr, smsr	(file extension: ".raw")	(file extension: ".raw")	satellite overpass	GMT (hh.mm)	(min.sec)	(meter)	(Degree)	(Minute)	(Degree)	(Minute)				S/F mark#	Sky	Clouds	Qty (#/8)	Wind speed	Wind dir.	Atm. Pres	humidity	Visibility	T air	T water	Sea	Swell ht	Swell dir.	White horses
03/03/04				CTDBOUS001	09:14	29:00	400	43	21.959	7	54.44							3	7kts	289	1027.4	41		11.6	12.99	calm			
	spmr&smsr, smsr	bou030304black1			9.53	03:00																						
			bou030304a	Meris 1010	10.05	04:08	200	43	22.008	7	53.996					milky blue	cirrus	1	6kts	260	1026.9	54	v.good	10.7		calm	0.2		no
			bou030304b		10.20	04:09	200	43	22.091	7	53.941					milky blue	cirrus	1	6kts	260	1026.9	54	v.good	10.7		calm	0.2		no
			bou030304c		10.31	04:22	200	43	22.12	7	53.89					milky blue	cirrus	1	6kts	260	1026.9	54	v.good	10.7		calm	0.2		no
			bou030304d		10.45	04:33	200	43	22.264	7	53.774					milky blue	cirrus	1	6kts	260	1026.9	54	v.good	10.7		calm	0.2		no
		bou030304black2			11.00	03:00																						
		bou030304black3			12.10	03:00																						
			bou280104e	SeaWiFS 1216	12.20	04:24	200	43	22.018	7	53.982					blue		0	7kts	234	1025.2	47	v.good	11		calm	0.2	-	no
			bou280104f		12.32	04:27	200	43	22.196	7	53.858					blue		0	7kts	234	1025.2	47	v.good	11		calm	0.2	-	no
			bou280104g		12.42	04:00	200	43	22.407	7	53.729	SimbadA	12:40			blue		0	7kts	234	1025.2	47	v.good	11		calm	0.2	-	no
		bou030304black4			12.55	03:00																						
				CTDBOUS002	13.06	31:00	400	43	21.904	7	54.199							2	7kts	246	1025.4	45		11.6	13.27	calm			
												SimbadA	13:42															
												SimbadA	14:20															
												SimbadA	14:55															
												SimbadA	16:00															
04/03/04				CTDBOUS003	9.15	29:00	400	43	22.021	7	54.364							1	9kts	255	1022.1	65		11.9	13.01	calm			
			bou040304a		9.51	03:00	400	43	22.366	7	54.352					milky	cirrus	1	9kts	258	1022	60	v.good	12.3		calm	0.2	-	no
			bou040304b		10.00	05:03	400	43	22.536	7	54.274					milky	cirrus	1	9kts	258	1022	60	v.good	12.3		calm	0.2	-	no
			bou040304spmratsurface1		10.25	07:59	400	43	22.109	7	54.185					milky	cirrus	1	9kts	258	1022	60	v.good	12.3		calm	0.2	-	no
			bou040304spmratsurface2		10.44	05:38	400	43	22.322	7	54.118																	
		bou040304black1			11.00	03:00																						
			bou040304spmratsurface3		12.22	07:02	200	43	22.253	7	53.895					milky blue	cirrus	5	12kts	234	1021.1	60	good	12		calm	0.2	-	
			bou040304spmratsurface4		12.47	16:58	200	43	22.157	7	54.05					milky blue	cirrus	5	12kts	234	1021.1	60	good	12		calm	0.2	-	
			bou040304c		13.21	03:00	120	43	22.212	7	54.024					milky blue	cirrus	5	12kts	234	1021.1	60	good	12		calm	0.2	-	
			bou040304d		13.28	04:32	200	43	22.342	7	54.004					milky blue	cirrus	5	12kts	234	1021.1	60	good	12		calm	0.2	-	
		bou040304black2			13.44	03:00																						
				CTDBOUS004	13.54		400	43	22.161	7	54.035							8	14kts	229	1020.1	70		12.2	13.15	calm			
				CTDBOUS005	15.00		400	43	25.069	7	48.014							8	16kts	237	1019.6	65		12.4	13.18	slightly rough			
				CTDBOUS006	15.59	26:00	400	43	28.011	7	42.483							8	15kts	240	1019.1	67		11.8	13.12	slightly rough			
				CTDBOUS007	17.00	23:00	400	43	30.972	7	36.94							7	12kts	235	1018.7	76		12.4	13.09	slightly rough			
				CTDBOUS008	17.59	24:00	400	43	34.012	7	30.958							8	13kts	242	1019	70		12.2	13.04	slightly rough			
				CTDBOUS009	19.02	26:00	400	43	37.5	7	24.939							9	5kts	232	1018.9	69		12.4	13.19	slightly rough			
05/03/04																												
06/03/04																												
07/03/04																												



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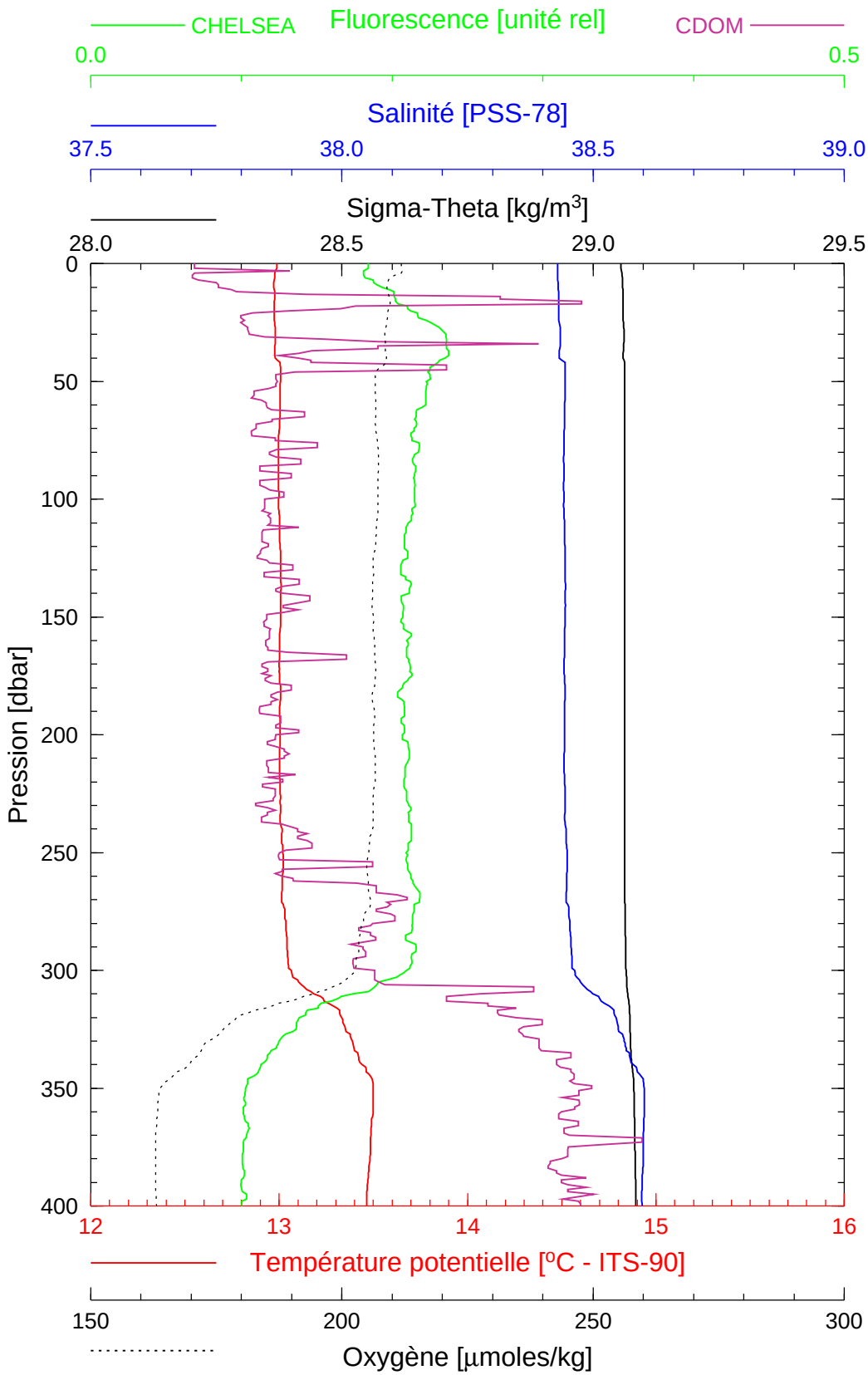
Boussole 31 **03/03/2004** **BOUS040303_01**

BOUS001

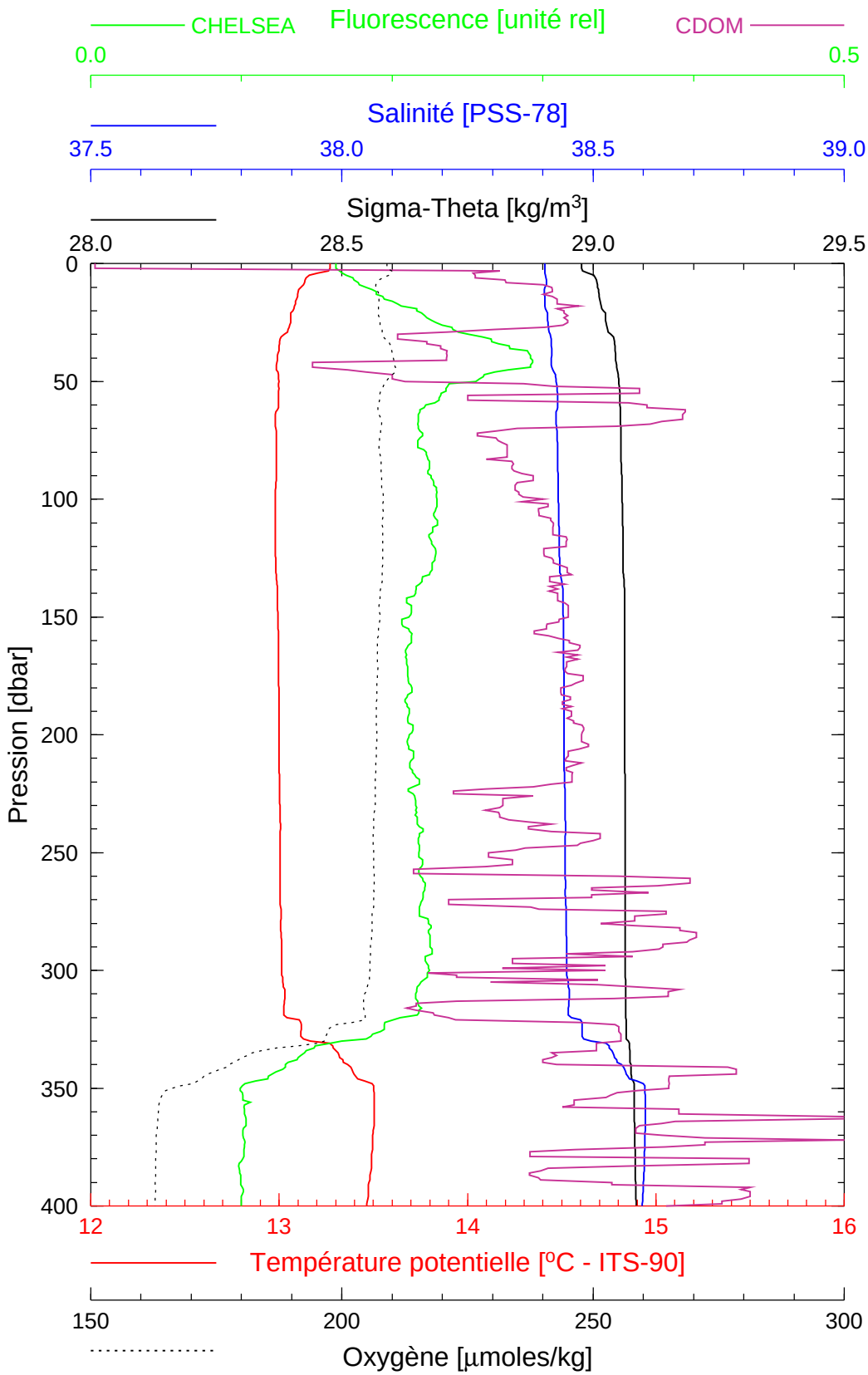


Date *03/03/2004* *Latitude* *43º21.959 N*

Heure déb *09h 14min [TU]* *Longitude* *07º54.440 E*

Boussole 31 **03/03/2004** **BOUS040303_02**

BOUS002



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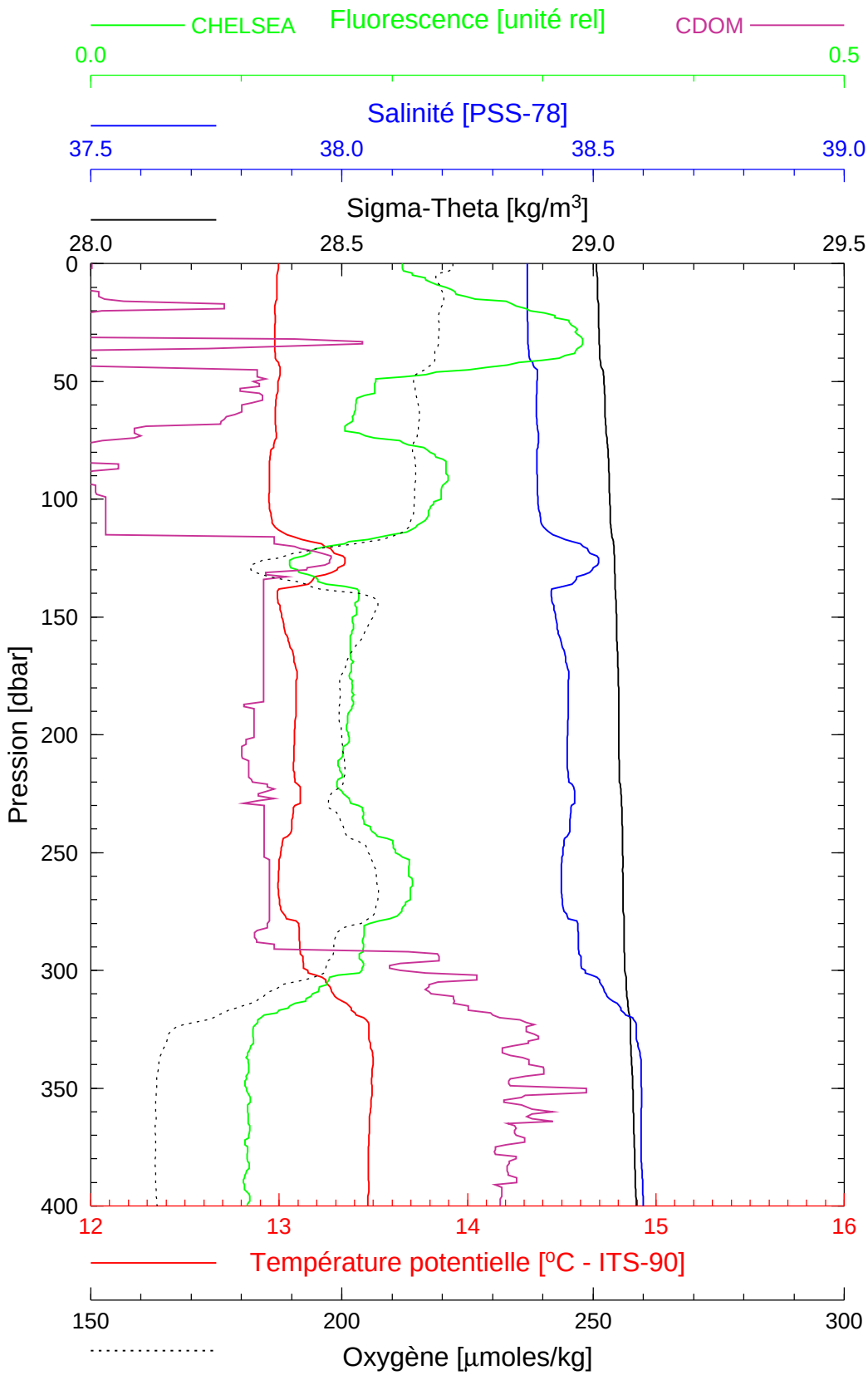
BOUS003



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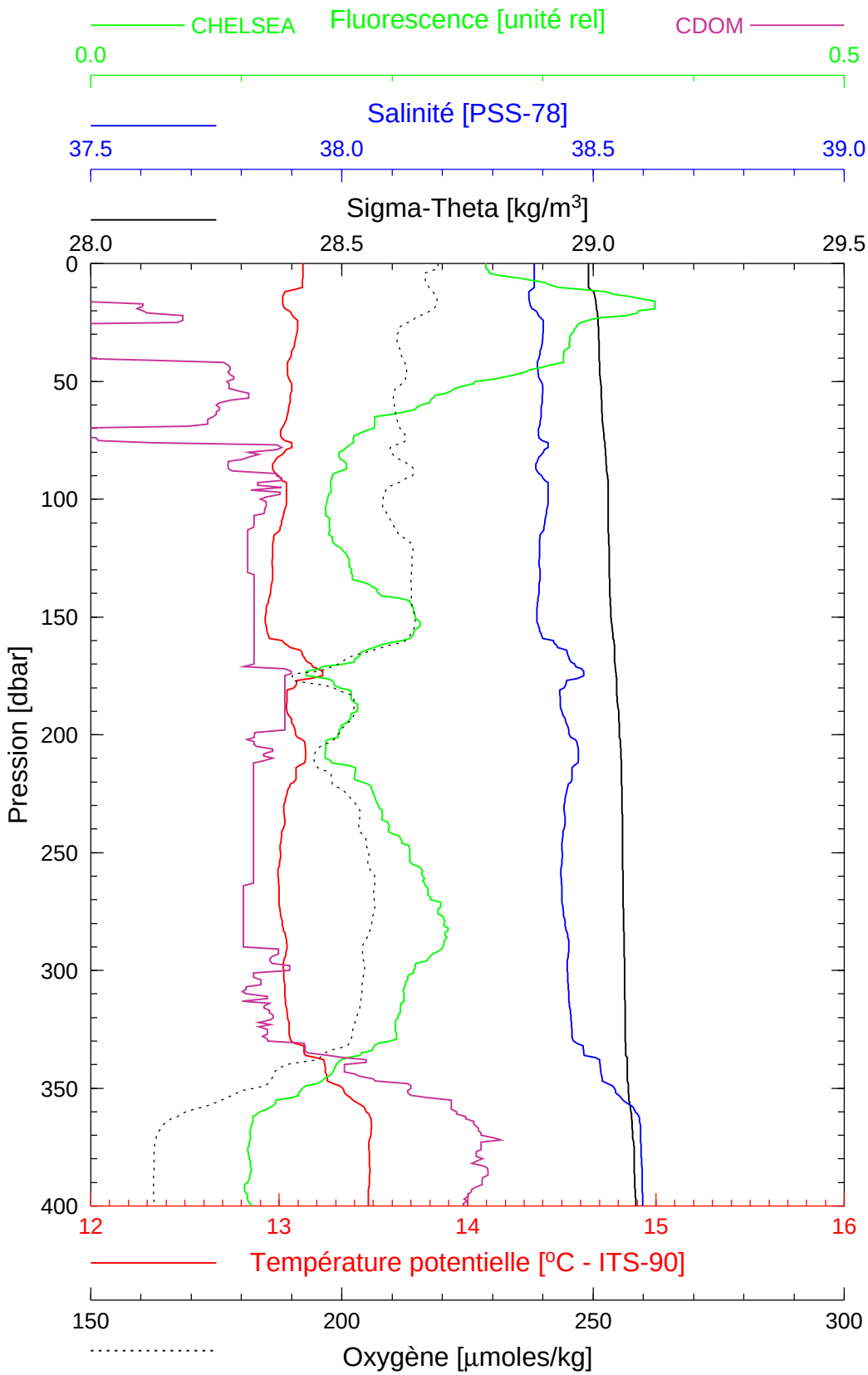
Boussole 31 **04/03/2004** **BOUS040304_02**

BOUS004



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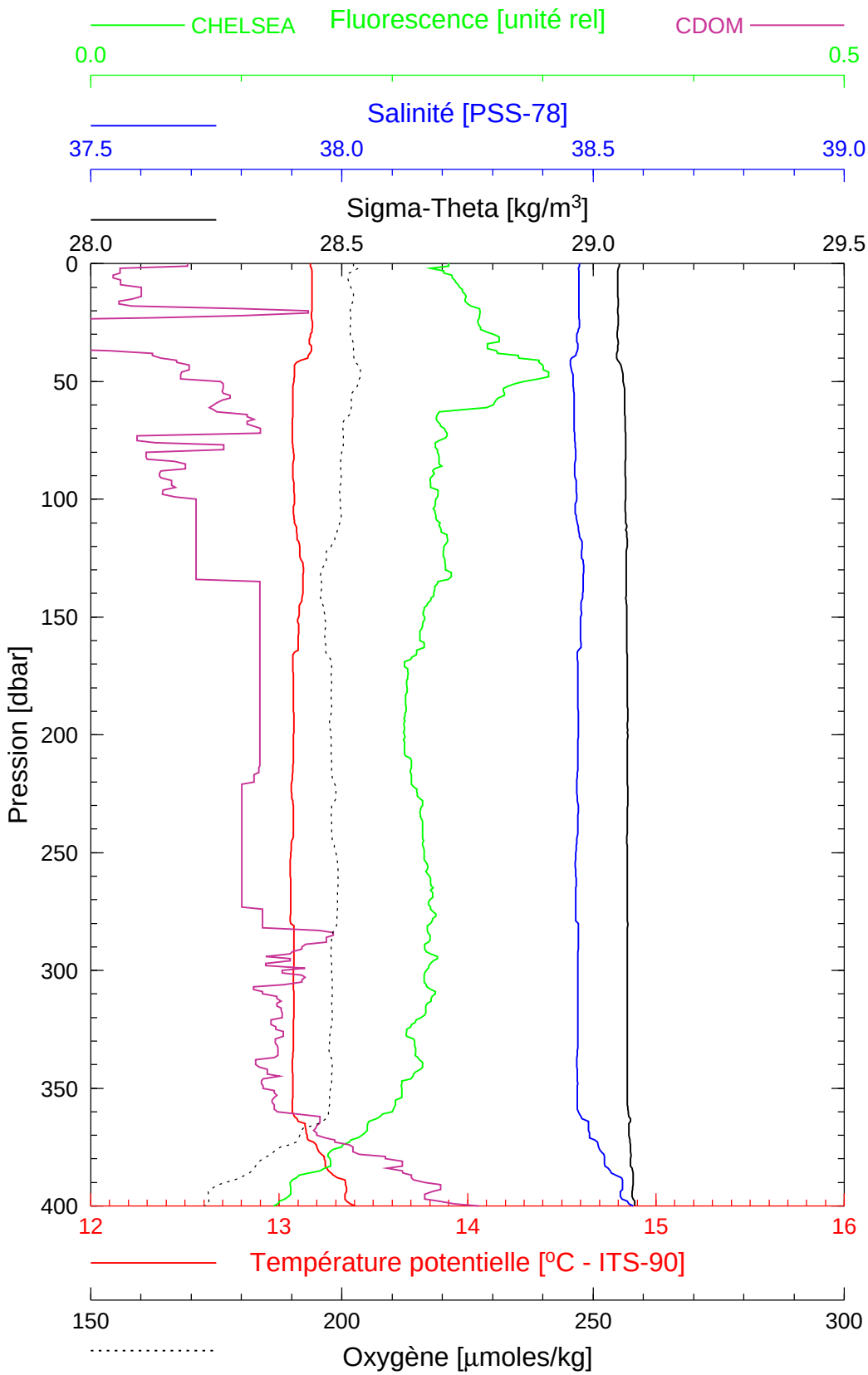
Boussole 31 **04/03/2004** **BOUS040304_03**

BOUS005



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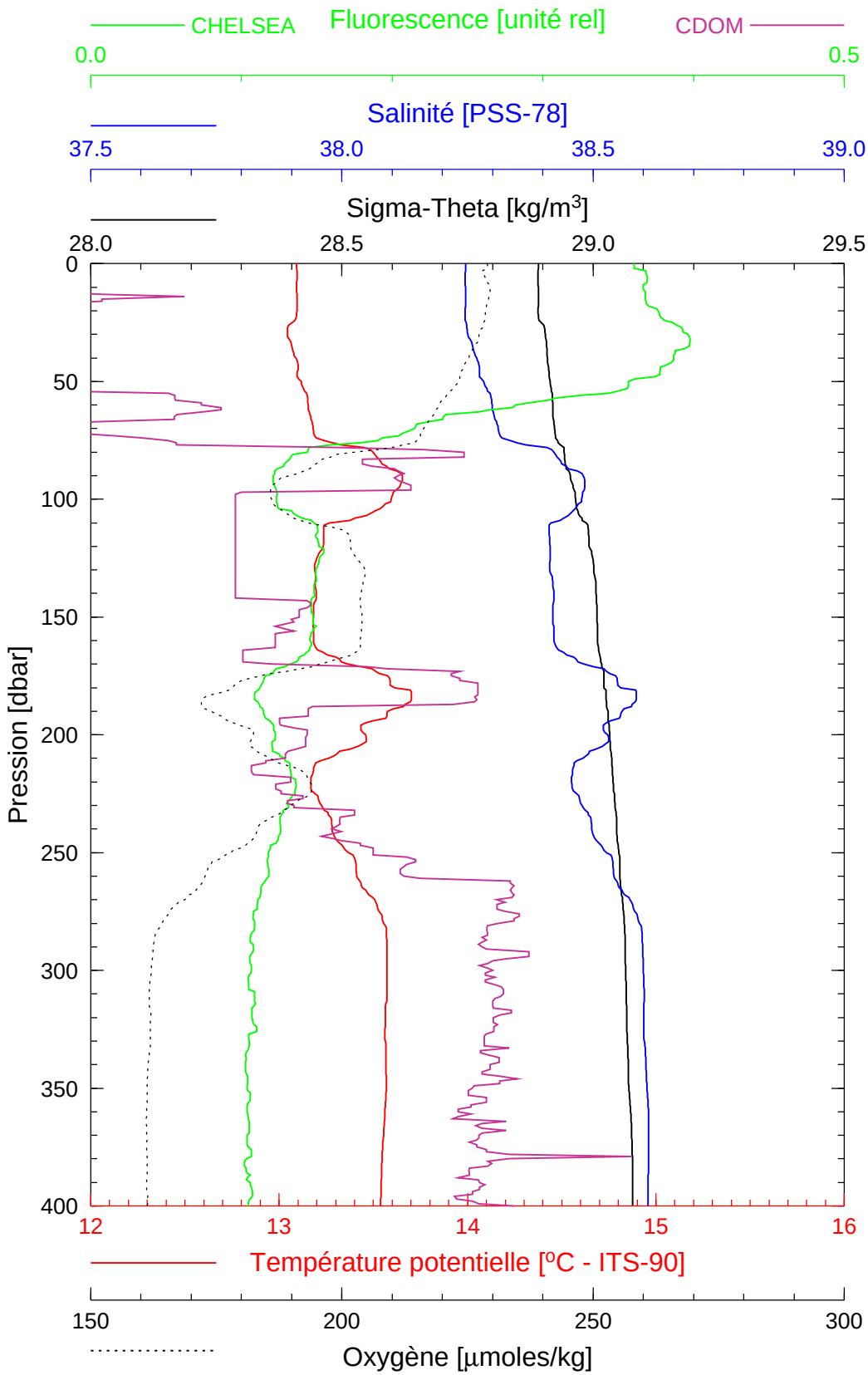
Boussole 31 **04/03/2004** **BOUS040304_04**

BOUS006



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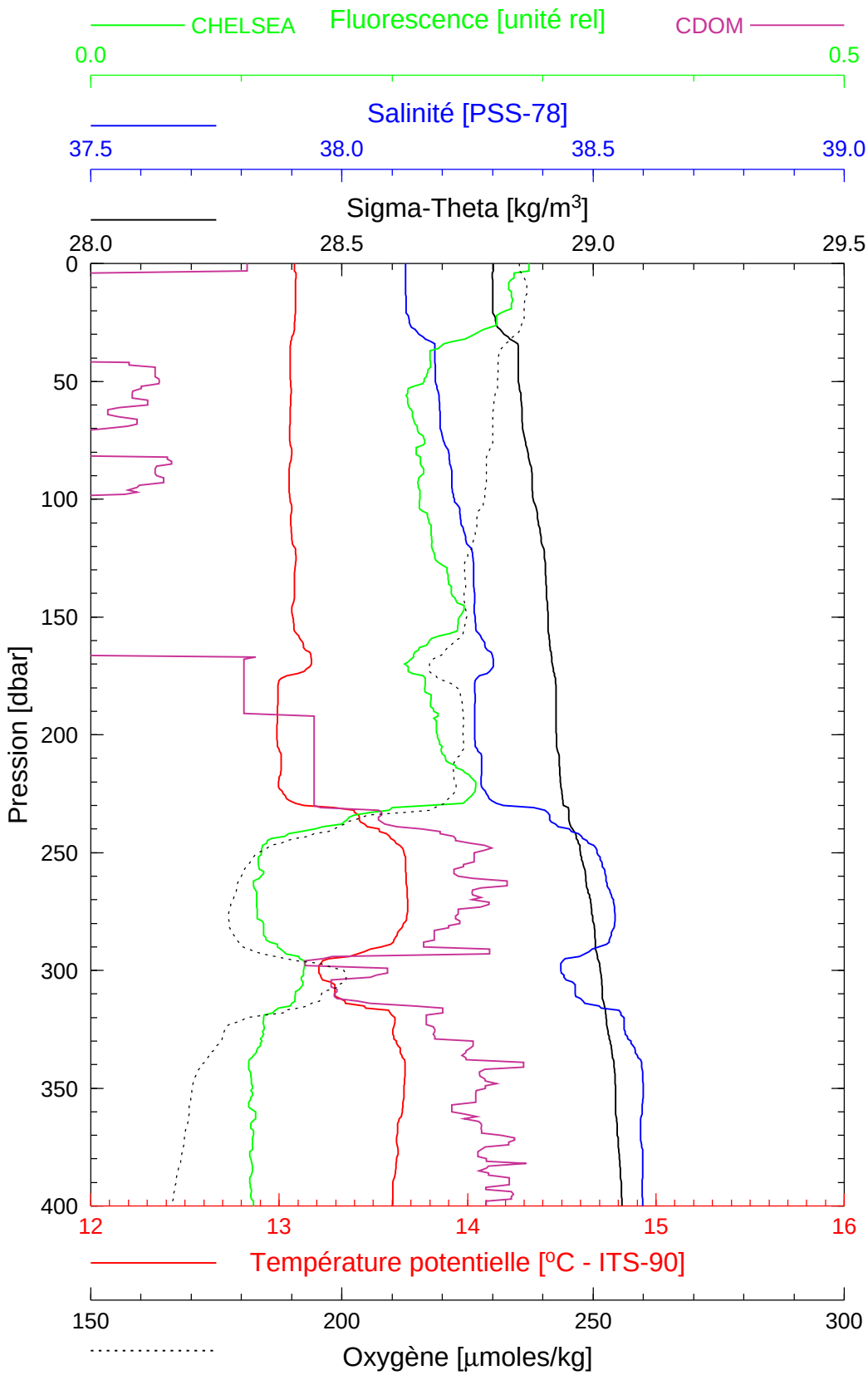
BOUS007



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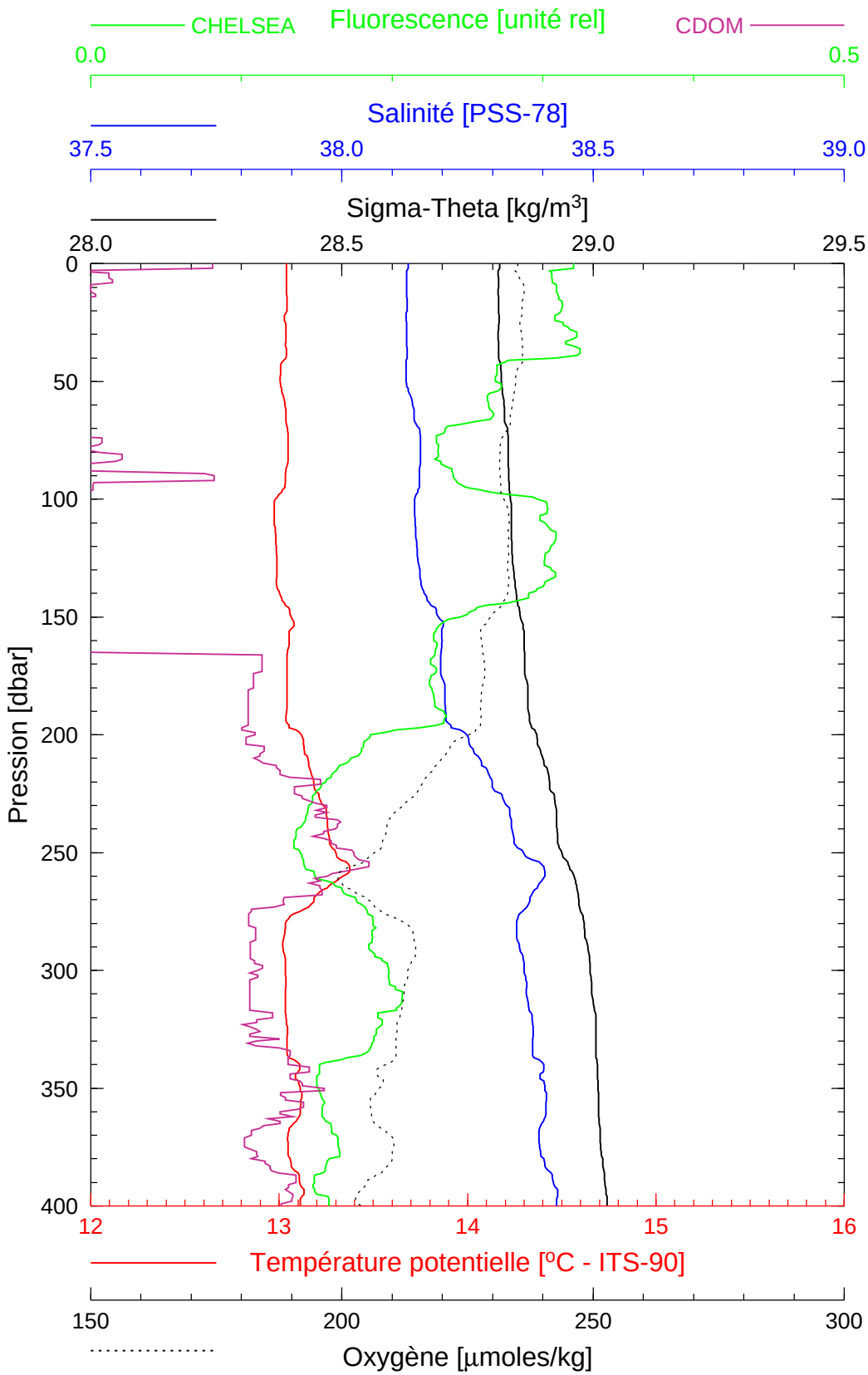
Boussole 31 **04/03/2004** **BOUS040304_06**

BOUS008



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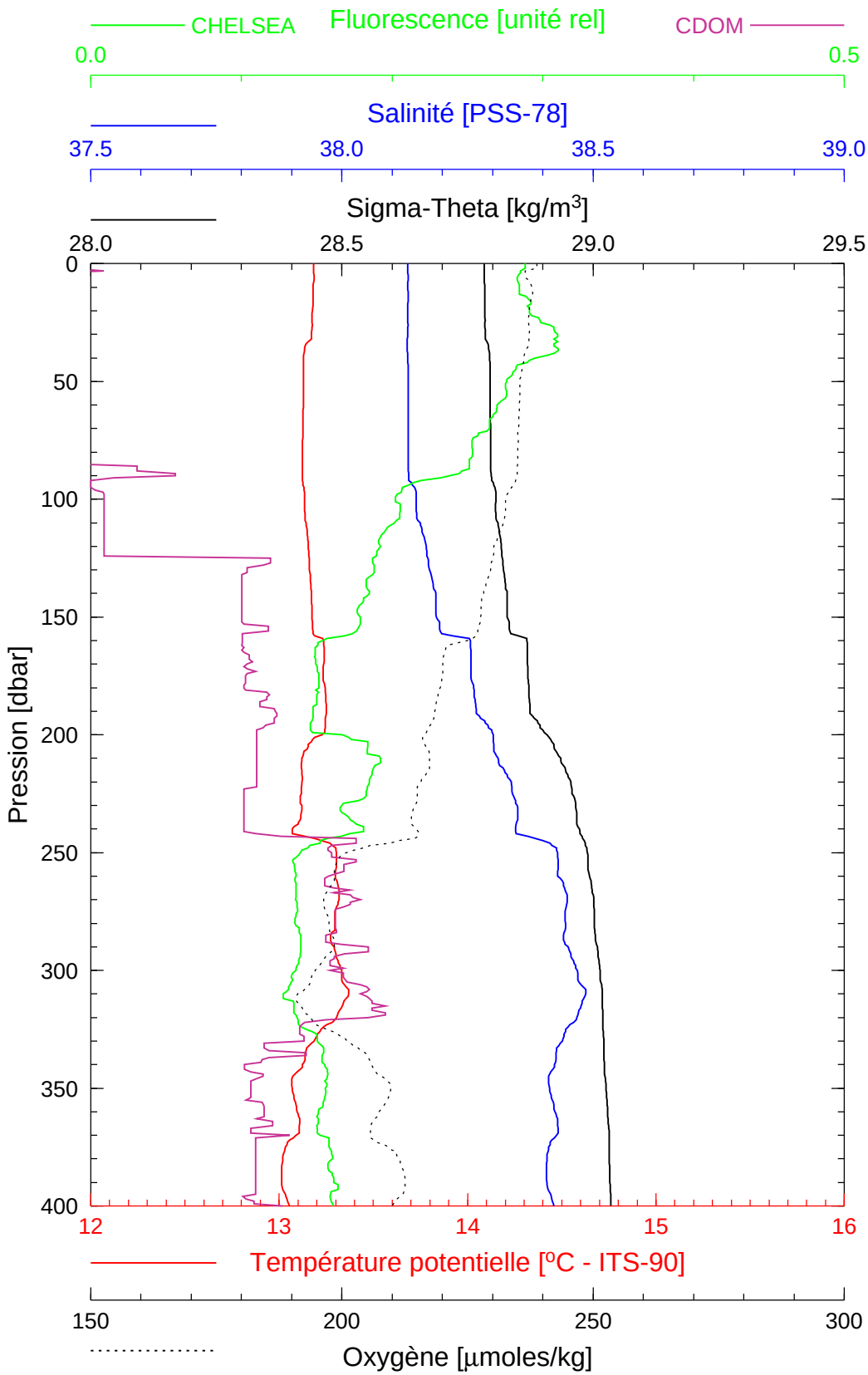
Boussole 31 **04/03/2004** **BOUS040304_07**

BOUS009



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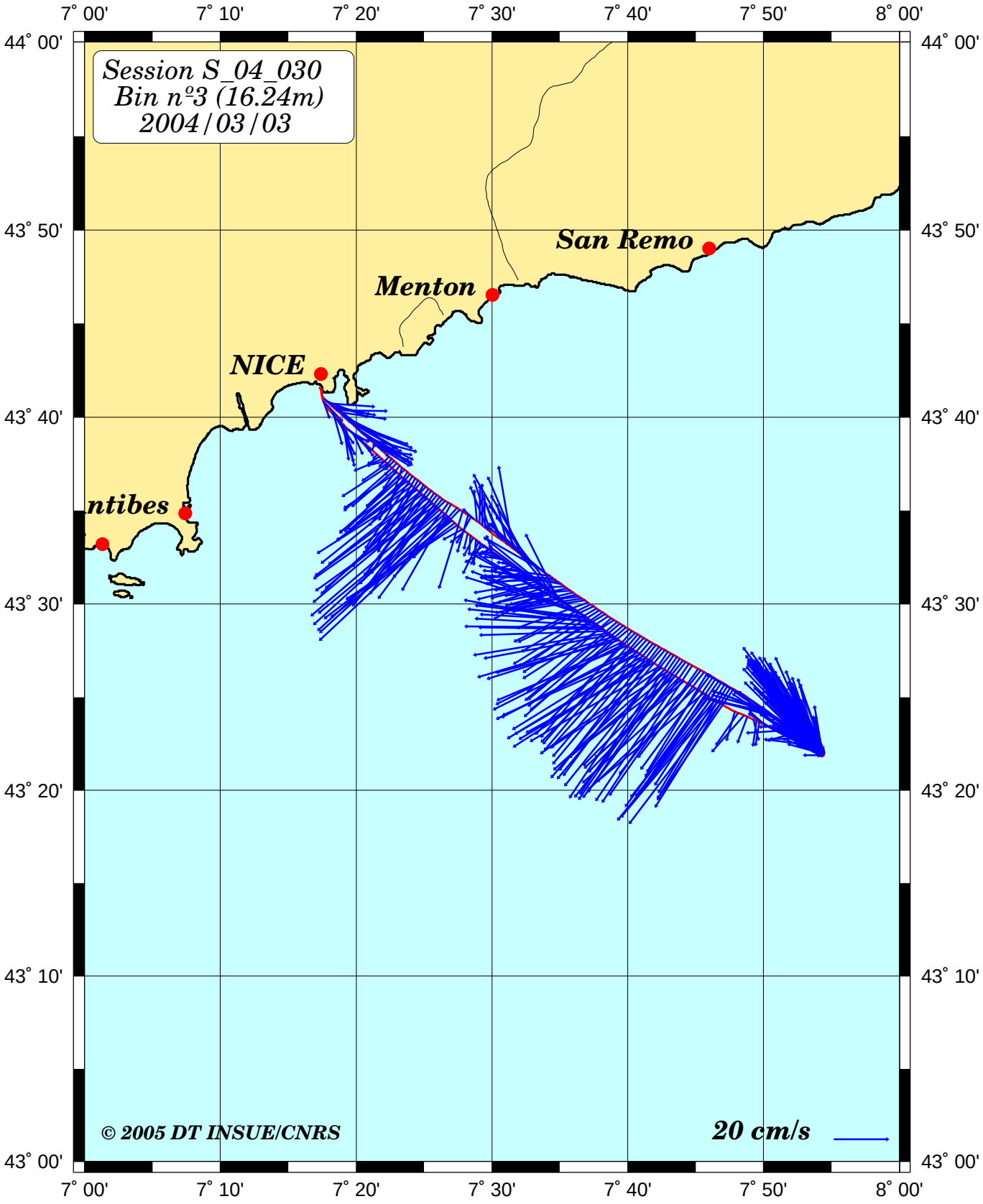

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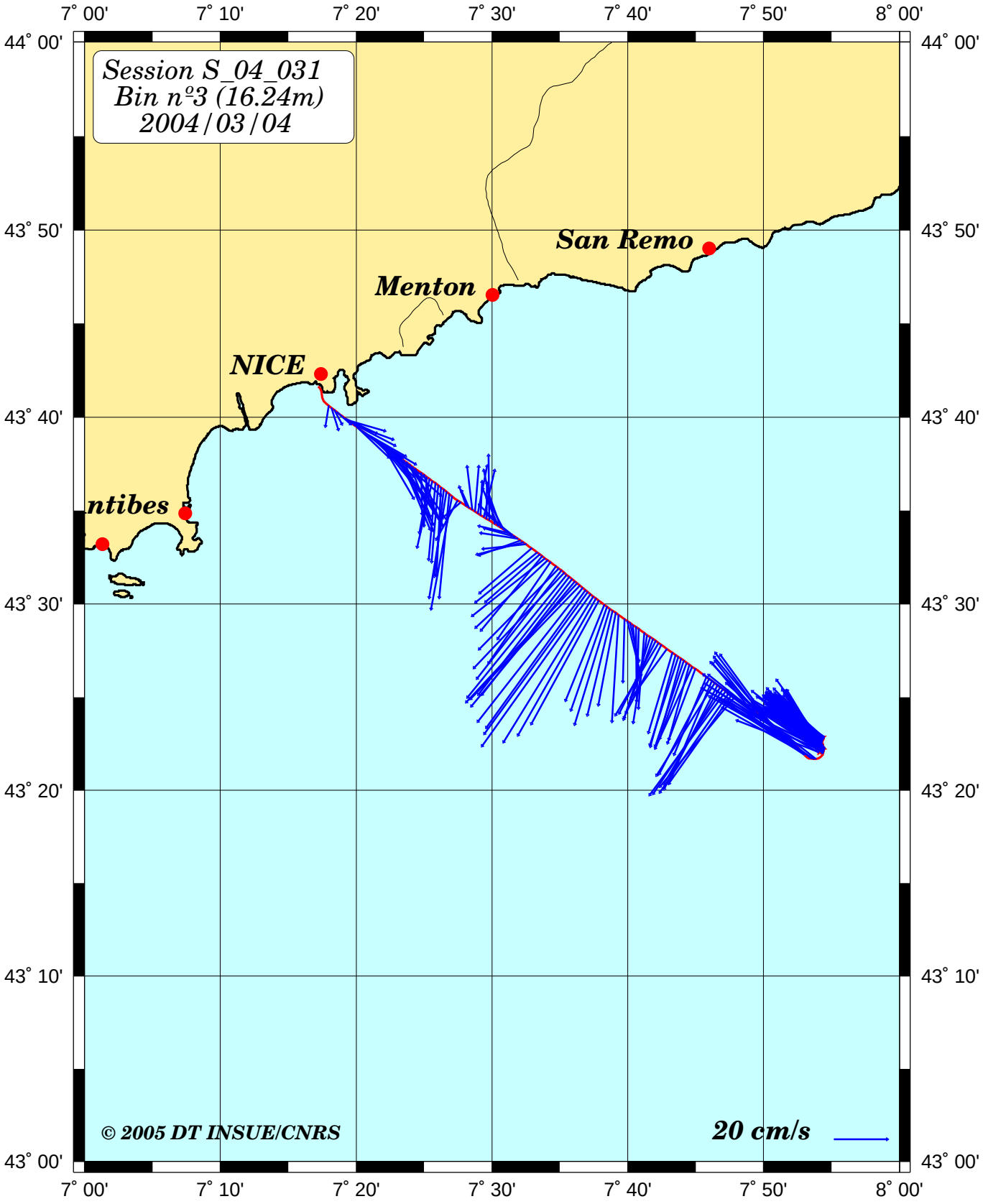

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