

The BOUSSOLE project technical reports; report #7-13, issue 1.

BOUSSOLE buoy deployment & maintenance log.

April 22 2010 - September 04, 2010

Vincenzo VELLUCCI, David ANTOINE, Emilie DIAMOND and Francis LOUIS

Laboratoire d'Océanographie de Villefranche (LOV), 06238 Villefranche sur mer cedex, FRANCE

BOUSSOLE project

ESA/ESRIN contract N° 17286/03/I-OL

Deliverable from WP#300/100

September 29, 2010

Foreword

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

BOUSSOLE is funded/supported by the following Agencies, Institutions or Programs



European Space Agency



Centre National d'Etudes Spatiales, France



National Aeronautics and Space Administration of the USA



Centre National de la Recherche Scientifique, France



Institut National des Sciences de l'Univers, France



Université Pierre & Marie Curie, France



Observatoire Océanologique de Villefranche sur mer, France

Table of contents

1. SCOPE OF DOCUMENT	4
2. DESCRIPTION OF OPERATIONS	5
2.1 UPPER SECTION PREPARATION (2008-06).....	5
2.2 MOORING DEPLOYMENT.....	7
2.2.1 Saturday 28 th June 2008.....	7
2.2.2 Tuesday 15 th July 2008.....	Erreur ! Signet non défini.
2.2.3 Monday 4 th August 2008.....	10
2.2.4 Thursday 14 th August 2008.....	Erreur ! Signet non défini.
2.2.5 Wednesday 27 th August 2008.....	Erreur ! Signet non défini.
2.2.6 Sunday 31 st August 2008.....	Erreur ! Signet non défini.
2.2.7 Tuesday 16 th September 2008...	Erreur ! Signet non défini.
2.2.8 Tuesday 16 th September 2008...	Erreur ! Signet non défini.
2.2.9 Monday 29 th September 2008.....	Erreur ! Signet non défini.
2.2.10 Wednesday 15 th October 2008...	Erreur ! Signet non défini.
2.2.11 Friday 17 th October 2008.....	Erreur ! Signet non défini.
2.2.12 Monday-Wednesday 16-19 November 2008	Erreur ! Signet non défini.
2.2.13 Tuesday 9 th December 2008.....	Erreur ! Signet non défini.
2.2.14 Monday 22 th December 2008.....	Erreur ! Signet non défini.
2.2.15 Monday 5 th January 2009.....	Erreur ! Signet non défini.
2.2.16 Sunday-Thursday 18-21 January 2009 ..	Erreur ! Signet non défini.
2.2.17 Tuesday 16 th February 2009.....	Erreur ! Signet non défini.
2.2.18 Wednesday 17 th February 2009..	Erreur ! Signet non défini.
2.2.19 Thursday 19 th February 2009...	Erreur ! Signet non défini.
2.2.20 Monday 2 nd March 2009.....	Erreur ! Signet non défini.
2.2.21 Saturday 14 th March 2009.....	Erreur ! Signet non défini.
2.2.22 Saturday 04 nd April 2009.....	Erreur ! Signet non défini.
2.2.23 Sunday 05 nd April 2009.....	13
3. QUANTITATIVE SUMMARY	13
4. INSTRUMENT SCHEDULE	13
5. ANY PROBLEMS ENCOUNTERED ?	13
6. LESSONS LEARNED	14
7. ACKNOWLEDGEMENTS	14
8. APPENDIX	15

1. SCOPE OF DOCUMENT

The BOUSSOLE buoy deployment and maintenance log is a record of all events that occur from the deployment to the recovery of one of the two upper sections of the buoy.

The aim is to keep track of all maintenance operations, such as instruments cleaning or rotations, instruments malfunctions, incidents with the buoy structure, if any, biofouling development and so on.

This information is crucial to a subsequent correct interpretation of the data.

Keeping track of these events also allows their analysis in view of the permanent improvement of protocols.

The present report concerns "buoy deployment X", from April 22 of 2010 to September 03 of 2010.

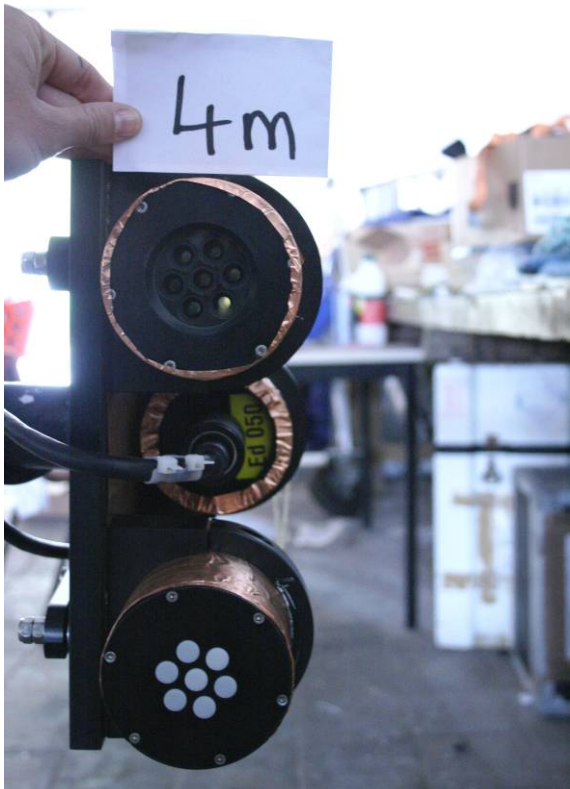
2. DESCRIPTION OF OPERATIONS

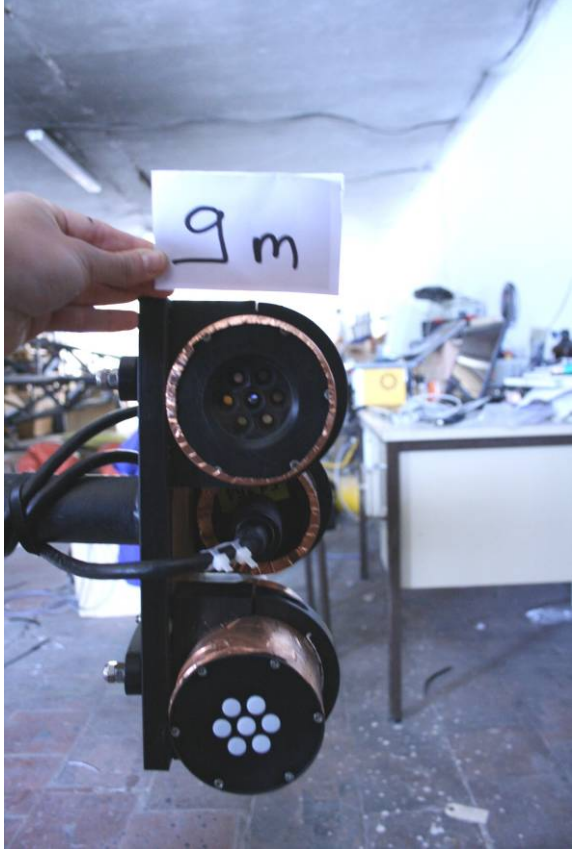
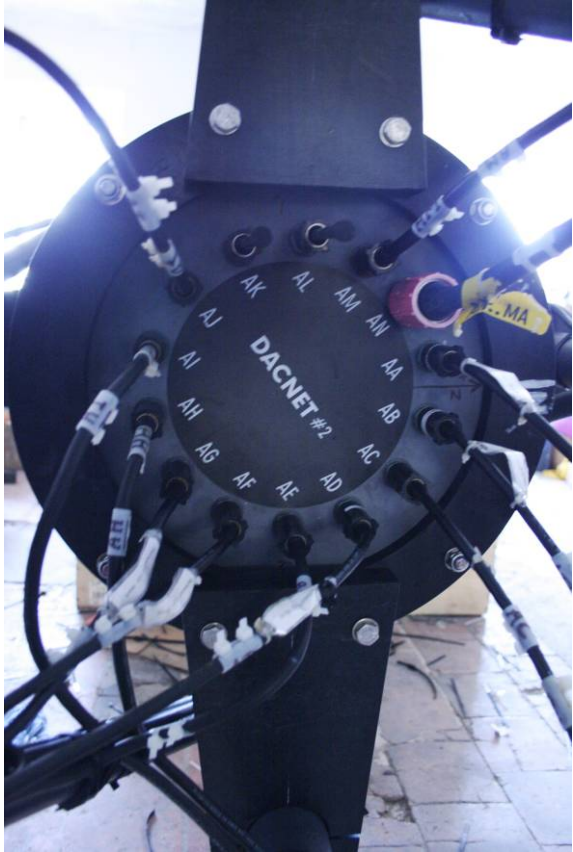
2.1 UPPER SECTION PREPARATION (2010-04)

The buoy System (called system #2) was delivered from Satlantic on April 12th, and the installation on the structure begun immediately having the deployment scheduled as soon as possible. The deployment had place on 22th April 2010.

The Buoy was equipped with sensors used for the deployment of the buoy VIII recovered on October 2009. The system was prepared in the CCI local in Villefranche-Sur-Mer and since 22nd September was ready for deployment. Copper sheets and pieces were again fixed wherever possible to avoid biofouling arising. The system was tested for some days running both with solar panel and battery. No anomalies were observed:

Dark IOPs measurements were also made for dark corrections.







2.2 MOORING DEPLOYMENT

2.2.1 Tuesday 22th April 2010

The upper structure to be deployed was brought to the Rochambeau field at local 06:30am with the help of 7 people from the LOV. The 4 arms were assembled and connected to the buoy, the helicopter left Carros at about 08:30am. As usual the go/return trip lasted about one hour. At about 13h the ARGOS messages arrived regularly. Divers found the blaze broken on the buoy head.





At this date, buoy is equipped with

- DACNet #002
- CLC #004
- Junction Box #002
- Rads set: OCI #048_Eu4m, #050_Ed4m, #163_Eu9m, #164_Ed9m #030_Es, OCR #036_Lu4m and #037_Lu9m), MVDS #062, OCP#036(4m) and OCP#037(9m)
- Hyper spectral units HOCR #276_Lu4m, #277_Lu9m, #327_Es, STOR-X #068 and Bio-shutters #118_Lu4m and #119_Lu9m (Bio-shutters are not powered and are without copper plate).
- HS4 #H4080705
- Strain-100 #002
- Transmissometers C-Star #1057-PR (4m) and #1058-PR(9m)
- ECOFLNTUS #608 (4m) and #609 (9m)
- ARGOS beacon #003 (prog id#26021)
- CTD #37SI 30260-2404
- Strain gauge OML CSCB40K
- PAR #061

The lower part of the buoy is still equipped with the emergency ARGOS beacon #5433 (prog. id. #12237).

2.2.2 Saturday and Sunday 24-25th April 2010

These days are part of the BOUSSOLE#97 cruise. The first day data were downloaded through a CISCO connection. The second day, divers went at sea to check all buoy sensors and to clean them. Everything was in a good state. Dark HS4 and transmissometers measurements at 09:30, 09:45 and 10:00 were also made. Divers also installed the hydrophone of the CRC (Marineland). A direct connection with the buoy was established for data retrieval. The light blaze on the top of the buoy, broken during the last deployment, was also changed.

2.2.3 Sunday 08 May 2010

At about 10UTC of this day ARGOS messages from instruments connected to the OCP at 4m started to be constant.

2.2.4 Monday 10 May 2010

This day is part of the BOUSSOLE#98 cruise. When on site Divers went at sea for cleaning sensors and verifying OCP at 4m that was in good

physical conditions. Dark measurements were also performed at 10h15, 10h30 and 10h45 UTC. Data were downloaded through CISCO and confirmed the malfunctioning of the OCP at 4 m (files were written with no data). So an attempt to exchange the OCP--Dacnet cable was done but the following data download showed the problem persisted.

2.2.5 Friday 21 May 2010

This day the private boat Lollipop was rent from Darkpelican company in Villefranche to go to the Boussole site with two divers from Mare Nostrum. Scope of the mission was to exchange the OCP at 4m and verify the ARGOS functioning since it stopped to dispatch messages since few days. The ARGOS beacon just needed to have the connectors cleaned to start working again. The OCP#036 was removed and the OCP#040 just arrived from the other system from Satlantic was installed. The configuration file was updated but the problem persisted, no data from OCP at 4m were collected. We decided to leave anyway the new OCP on the buoy and verify in the lab the retrieved OCP. This showed high current drain so fuse damage in the Dacnet is suspected. The OCP#036 was then sent back to Satlantic.

At this date, buoy is equipped with

- OCP #040(4m)

Dark measurements were made and instruments cleaned too.

2.2.6 Saturday 12 June 2010

This day is part of the BOUSSOLE#99 cruise. When on site, the zodiac was put at sea for going to the buoy with divers. A direct connection was established for data download. Then the system was switched off and divers dismantled the DACNet and the hydrophone. When on board the AC (OCP4) fuse was found burned, as expected, and replaced with a new one. The internal battery was verified to be in good state (however it was mistakenly removed from the motherboard causing a time bias to 1 january 1970). Then the DACNet was reinstalled on the buoy, optical sensors and ARGOS and CISCO connectors were cleaned and system restarted. The light on the top of the buoy was exchanged since the port authorities called the R/V *Tethys II* to announce it was not working.

However the retrieved light was working fine though some internal part was unglued. Some CISCO attempts were made to communicate with the buoy to verify the functioning of OCP at 4m but no connection was got. Land was called to verify the data transmission through the ARGOS and it was confirmed that the OCP restarted working.

2.2.7 Tuesday 15 June 2010

This day the ARGOS dispatch stopped.

2.2.8 Thursday 17 June 2010

This day the *Téthys II*, working near the buoy for MOOSE project the 17th, arrived at the BOUSSOLE site at noon (TU). Near 12:30, the zodiac was ready and Emilie Diamond climbed on the buoy to connect the computer to the buoy. During this time, the Argos connector and solar panels were cleaned.

At 13:20 (TU), the direct connection was got, data were retrieved and the DACNet clock synchronized. Then, the Cisco connector was cleaned too. The ARGOS dispatch restarted for just half a day.

On June 12 the buoy restarted at 1 January 1970, with the following delay on files:

1970-01-01_00-45-00 is 2010-06-12_09-05-54.

2.2.9 Monday 28 June 2010

This day the private boat Lollipop from Darkpelican was rent in Villefranche for going at the Boussole site for the intra cruise cleaning. Two divers from the Nice University were on board. When on site divers went at sea for buoy cleaning. In the meantime connectors on the top of the buoy were cleaned and the ARGOS beacon was exchanged. Then neoprene caps were put on IOPs sensors for 4 dark measurements at 9h15, 9h30, 9h45, 10h00. Then a direct connection with the buoy was obtained for data download. ARGOS dispatch restarted regularly.

At this date, buoy is equipped with

- ARGOS beacon #18797 (prog id#26021)

2.2.10 Saturday-Monday 10-12 July 2010

These days are part of the BOUSSOLE#100 cruise. The first day a CISCO connection with the buoy was obtained and data downloaded. The third day divers went at sea for cleaning the instruments and changing the cable between the Dacnet and the ARGOS beacon on the top of the buoy. This beacon was also substituted. After this operation the ARGOS dispatch restarted regularly. Then they took off the old emergency ARGOS beacons, whose battery was still good (17.5 V). Finally they put neoprene caps on the HS4 and on the transmissometers for acquiring three dark measurements. A direct connection with the buoy was established for data retrieval.

At this date, buoy is equipped with

- ARGOS beacon #003 (prog id#26021)

2.2.11 Friday-Saturday 28 July 2010

This day private divers from MARE NOSTRUM company in Nice, went to the BOUSSOLE site for instrument cleaning and dark measurements.

2.2.12 Friday-Saturday 6-7 August 2010

These days are part of the BOUSSOLE#101 cruise. On Friday two attempts of CISCO connection were made unsuccessfully. On Saturday divers went at sea for cleaning the instruments, re-installing the old emergency ARGOS beacon, and removing the new one for battery exchange (the batteries in the beacon where still good). Divers also put neoprene caps on the HS4 and on the transmissometers for

acquiring three dark measurements. A direct connection with the buoy was established for data retrieval and the CISCO and Argos connections were cleaned. On the top of the buoy, solar panels and instruments were covered of sea birds excrements.

2.2.13 Friday 20 August 2010

This day the private boat LOLLIPOP from Dark Pelican in Villefranche was rent for going at the BOUSSOLE site. Divers went at sea for cleaning instruments and performing dark measurements. The new emergency ARGOS beacon was also re-installed on the buoy. A direct connection was established with the buoy and data downloaded. ARGOS connector was cleaned and the message dispatch restarted, however stopping again after two days.

2.2.14 Saturday 04th September 2010

This day the buoy upper structure was dismantled for the rotation with the system #1. The helicopter delivered the buoy at about 10h00. The structure was in very good conditions. The buoy was not even cleaned with the Karcher before being transported into the CCI local where it was dismantled in the following days. Data into the DACNET have been recovered directly from the microdrive since it was not possible to get a connection (probably due to the corruption of the disk). Instruments were shipped for calibration on September 09th, whereas the aluminium structure was sent to the CNB on September 23th.

3. QUANTITATIVE SUMMARY

The deployment lasted 135 days without interruption in data acquisition.

4. INSTRUMENT SCHEDULE

1 minute acquisition every 15 minutes. The opening of the shutters are slightly delayed one from the other for avoiding high current demand and possible system shutdown for low voltage.

5. ANY PROBLEMS ENCOUNTERED ?

- 1- The fuse in the OCP control within the DacNET was burn.
- 2- The ARGOS dispatch stopped several times.
- 3- The CISCO connection stopped to working after sometime.

6. LESSONS LEARNED

- 1- Changing the whole fuse set at each rotation may minimize risk of loosing data due to their burning.
- 2- Replacing the CISCO cable systematically to favorize its use during the whole deployment.

7. ACKNOWLEDGEMENTS

The BOUSSOLE project has been set up thanks to the work of numerous people, and thanks to the support and funding of several Agencies and Institutions. The latter are listed in the foreword of this report. Specifically, the following contracts are acknowledged : the French Space Agency CNES provided funds through the TAOB and TOSCA scientific committees, ESA through ESTEC contract N°14393/00/NL/DC, including CCNs #1, #2 and #3, ESRIN through contract N° 17286/03/I-OL, and NASA through a "Letter of Agreement". Funding has been also obtained from the French CSOA committee and the "Observatoire Océanologique de Villefranche".

The crews and Captains of the following ships are also warmly thanked for their help at sea: the Castor-02 vessel from the Fosevel Marine company (buoy/mooring operations), the INSU R/V Téthys-II and Georges Petit (regular monthly cruises), the GG-IX from the Samar company and the Nika-III (on-demand short operations on site). Pilots and crew members of the Valair and Commerçair helicopter companies are also thanked for their willingness in accomplishing for us unusual survey missions above the BOUSSOLE site. Emmanuel Bosc, Maria Vlachou, Guillaume Lecomte, who have occasionally provided some help in collecting data, are also thanked for their help.

The French institute IFREMER and the Norvegian Marintek company are also thanked for their help and fairness in the engineering studies that were ordered to them after the major failure of the buoy in spring of 2002.

The data that are collected for several years near the BOUSSOLE site by the French weather forecast Agency, "Meteo France", and which are provided in real time on the internet, have been of great help in the day-to-day management of the monthly cruises.

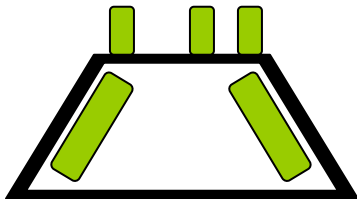
Two companies have largely contributed to the BOUSSOLE project, namely the ACRI-in/Genimar company, Sophia Antipolis, France (buoy conception) and Satlantic Inc., Halifax, NS Canada (buoy centralized acquisition system and radiometers); their help is specifically acknowledged here.

8. APPENDIX

The following page contains the schema of the buoy and the list of the calibration files.

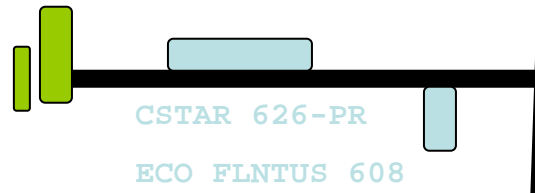
- SATLANTIC
- HOBILABS
- WETLABS
- SEABIRD
- GARROS

MVD (OCI) 030
 ARGOS 17152 (18797)
 Es (HOI) 327
 Junction Box SJB 002
 MVDS 0062
 PAR 0061
 Feux: ?
 Solar Panels:
 I2020718 2206688
 C2081020 8379557
 C1081031 8401228

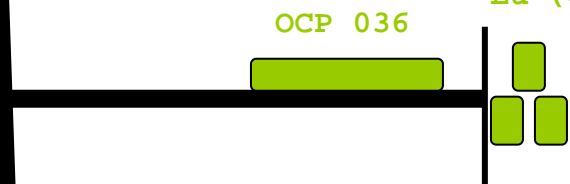


Lu (HOCR) 276
 bio shutter 118

Ed (OCI) 050
 Eu (OCI) 048
 Lu (OCR) 036



CSTAR 626-PR
 ECO FLNTUS 608



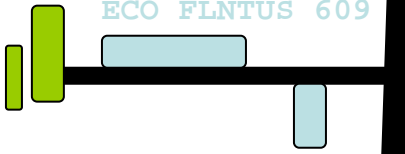
OCP 036



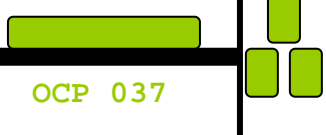
STOR-X 068
 CLC 004
 DACNet (mSM) 002
 Battery xxxx
 Strain-100 002

Lu (HOCR) 277
 bio shutter 119

CSTAR 847-PR
 ECO FLNTUS 609



CTD 37SI30260-2404



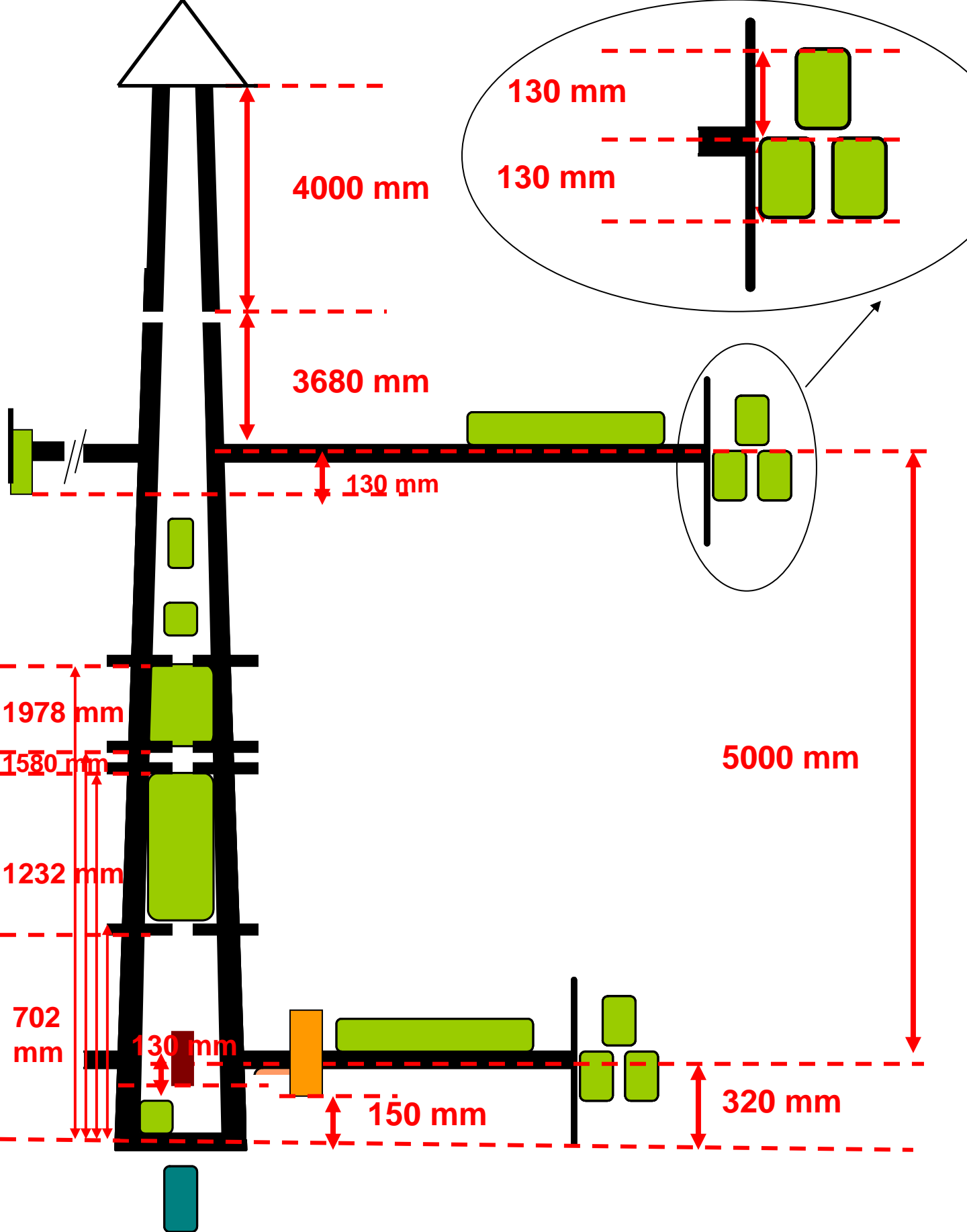
OCP 037

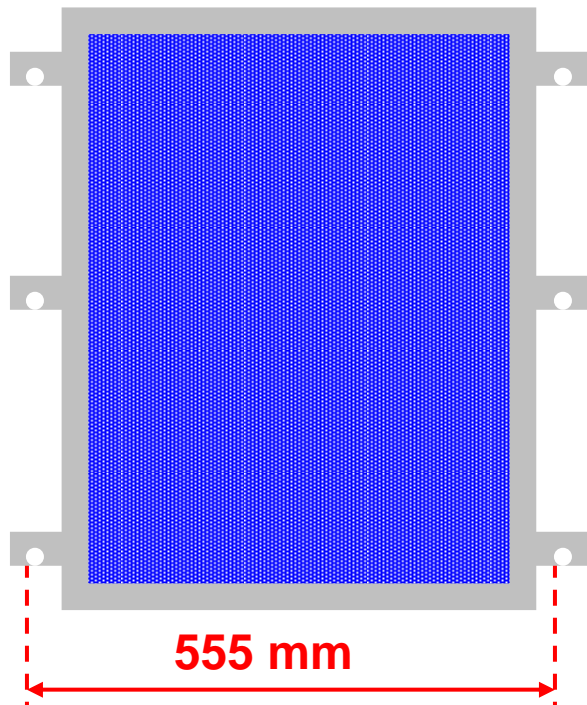
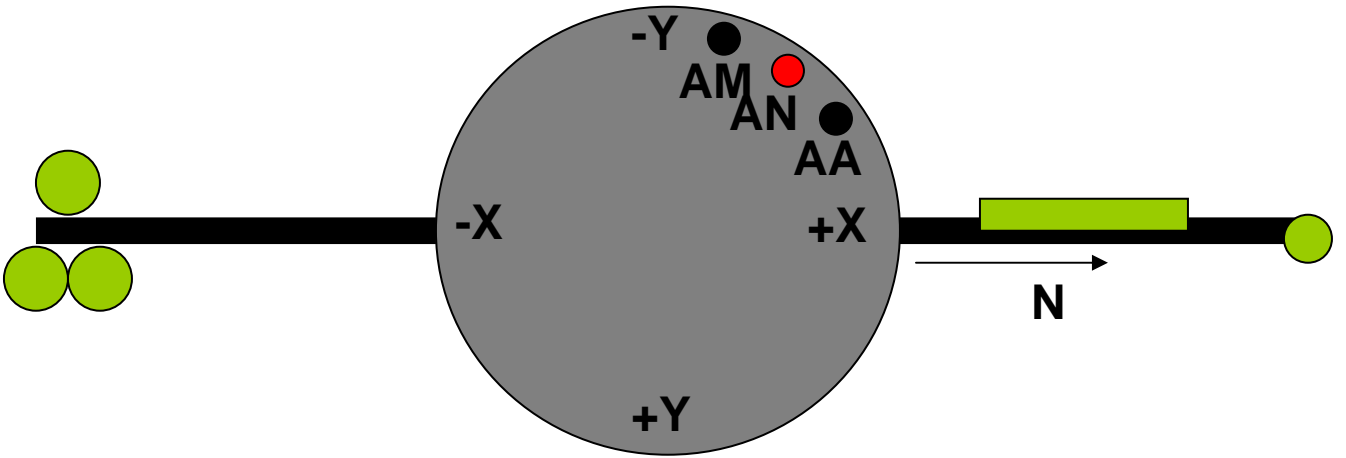
Ed (OCI) 164
 Eu (OCI) 163
 Lu (OCR) 037

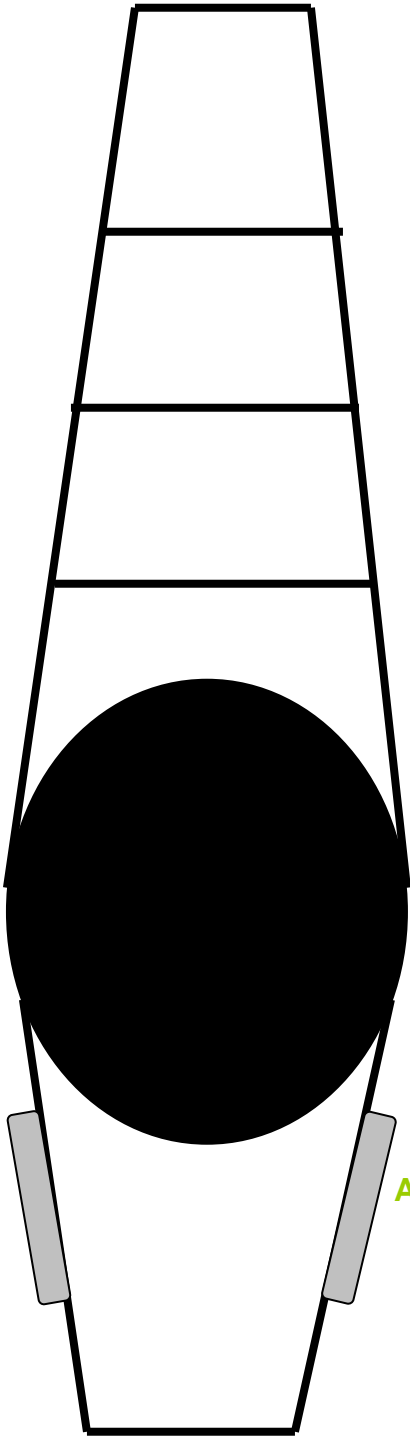


HS4 H4080705
 GAROS OML CSCB40K









ARGOS 5433

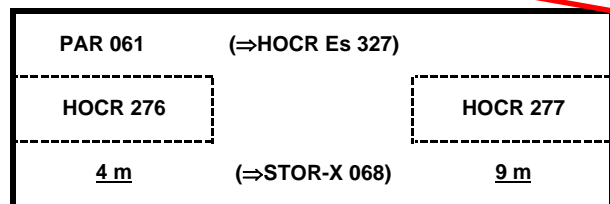
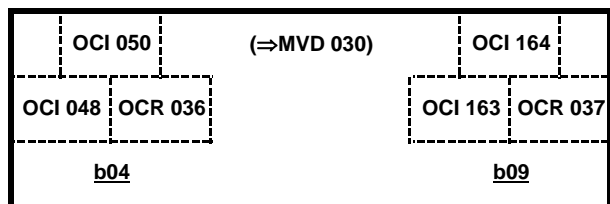
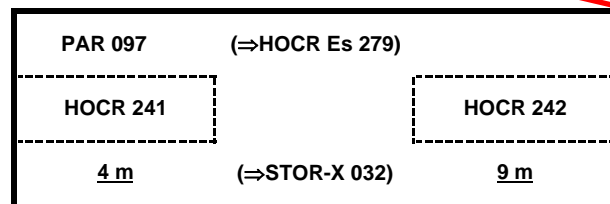
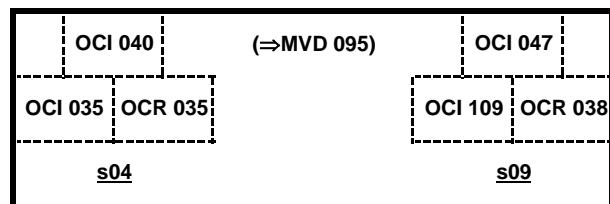
ARGOS 74605

2010

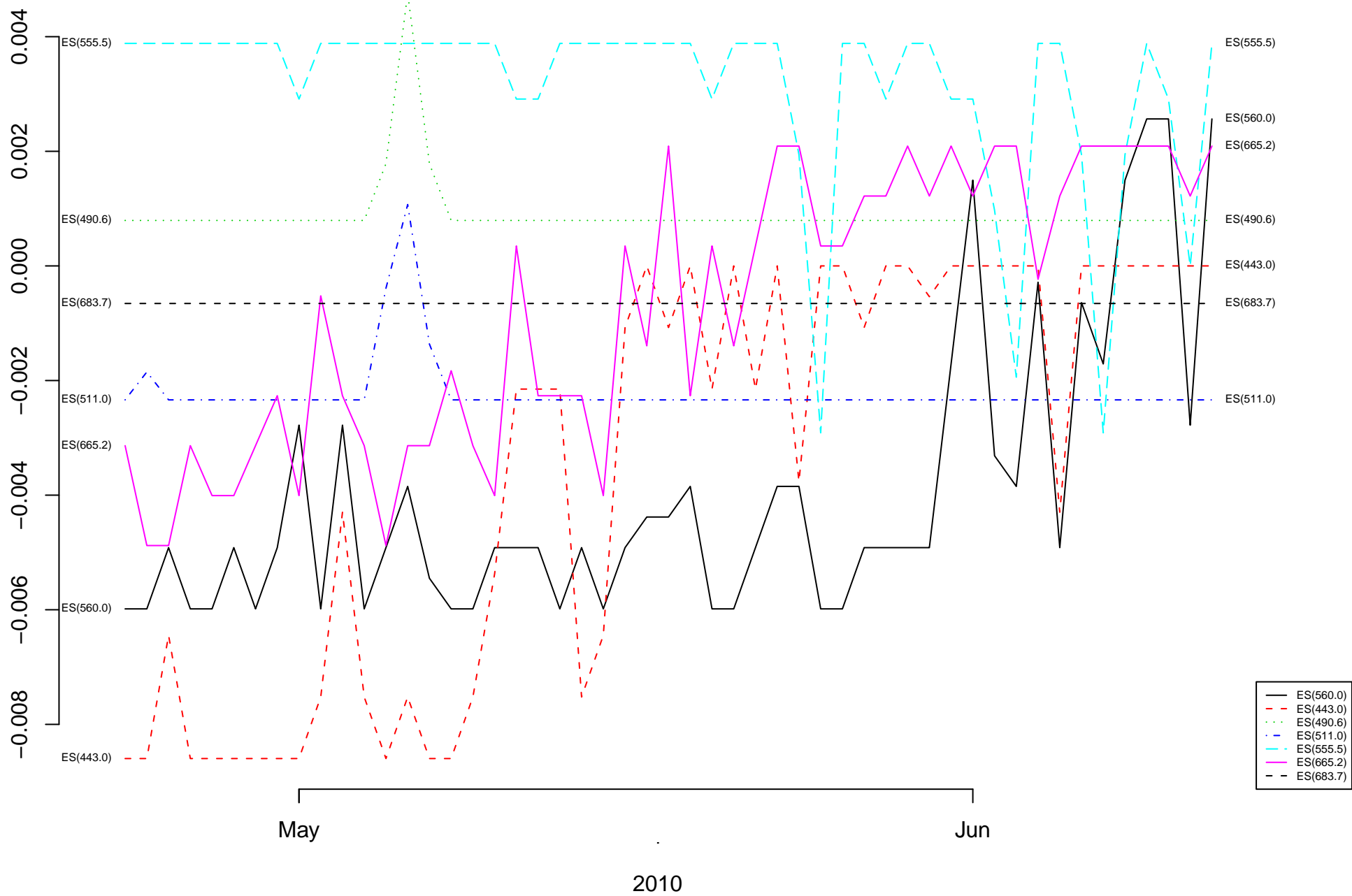
2010																		
JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER							
12-Jan	13-Feb	06-Mar	23-Mar	06-Apr	25-Apr	0-May	21-May	12-Jun	28-Jun	12-Jul	28-Jul	06-Aug	20-Aug	01-Sep	23-Sep	15-Nov	11-Dec	
(only rads cleaning)																		
4 m																		
ocp040e.cal		ocp036j_bis.cal		21 May		ocp040_replaced_036.cal		ocp036l.cal										
CST-1057PR 726_2009-10-27		HPL241d & PLD241d.cal		tx-meter : CST-626PR fl-meter : 608_2010-04-09		HPL276b.cal & PLD276b.cal		CST-1057PR 726_2010-08-25		HPL241e & PLD241e.cal								
9 m																		
ocp041e.cal		ocp037j_bis.cal		ocp041h.cal														
CST-1058PR 727_2009-10-27		HPL242d & PLD242d.cal		tx-meter : CST-847PR fl-meter : 609_2010-04-09		HPL277b.cal & PLD277b.cal		CST-1058PR 727_2010-08-25		HPL242f & PLD242f.cal								
MVD																		
mvd053i.cal		mvd062i.cal		mvd053j.cal														
HED279d.cal & Hse279d.cal		HED327c.cal & Hse327c.cal		HED279e.cal & Hse279e.cal														
H4070403 2009-8-8.cal		H4080705 2009-11-22.cal		H4070403 2010-5-15.cal														
SATSTX0032b.cal		Strain100_002b.cal		Strain100_001b.cal														
		SATSTX0068b.cal		SATSTX0032c.cal														

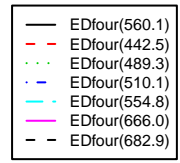
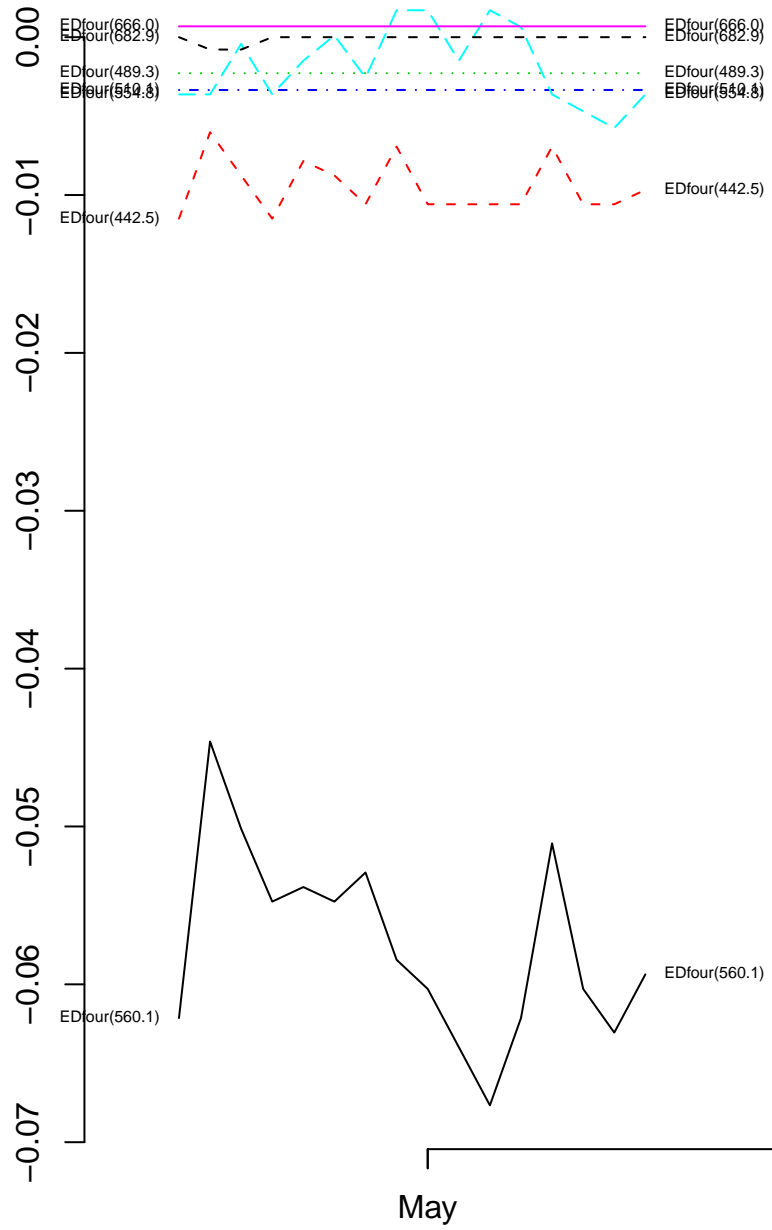
buoy X deployment (2010-04-22, vf2)

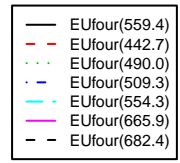
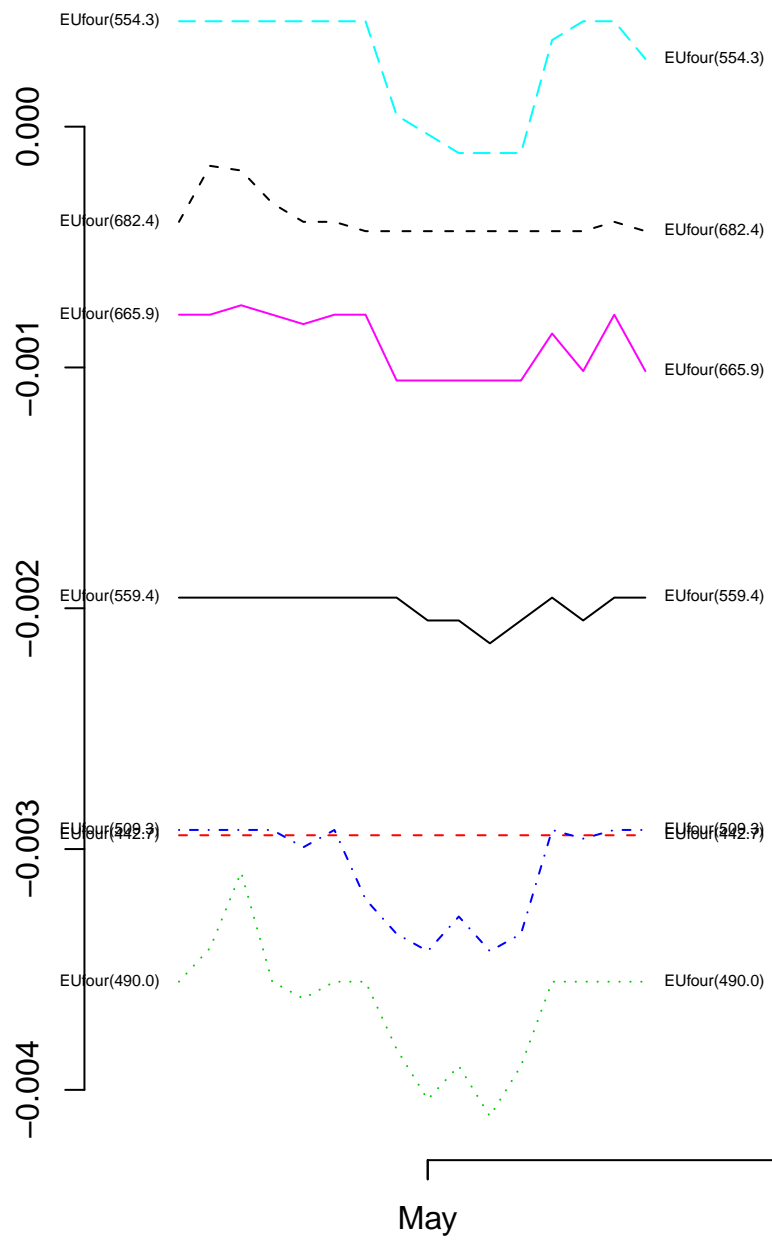
buoy XI deployment (2010-09-04, vf1)



same configuration of buoy IX







2010

