

The BOUSSOLE project technical reports; report #7-6, issue 1.

BOUSSOLE buoy deployment & maintenance log.

June 16, 2005 – June 09, 2006

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BOUSSOLE project

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Foreword

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

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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 3", from June 16 of 2005 to June 09 of 2006.

DESCRIPTION OF OPERATIONS

2.1 UPPER SECTION PREPARATION (2005-04 AND 2005-05)

The Buoy III was again prepared in the CCI local in Villefranche-Sur-Mer. The preparation was rather easy with the experience of the few previous buoy deployments. Note that some copper pieces were fixed around optical sensors where possible, to try to avoid a too fast algal contamination.



2.2 MOORING DEPLOYMENT

2.2.1 Thursday 2nd June 2005

The work began early in the morning for this day. At 05:30 am, the upper section of the buoy was loaded on the CASTOR-02 (from "FOSELEV MARINE" company) from the port of Villefranche-Sur-Mer, with the help of many people of the Laboratory, as well as the laboratory sailors (with the SAGITA boat). The lower section (with the floating

sphere) as well as the 2400 meter kevlar cable were already loaded on the CASTOR-02 few days ago. After 5 hours sailing and almost as many hours recovering the ancient mooring (from buoy II), sailors of the CASTOR-02 began to deploy the kevlar cable with the appropriate deep sea floating sphere, acoustic releases, concrete ballast, chain and manilas. The acoustic releases anodes were replaced, as the ancient were totally disintegrated. Besides, the acoustic releases batteries were also replaced with new one.





2.2.2 Friday 3rd June 2005

The work began at about 06:00 am, but was quickly finished, as the rope that was hanging the kevlar cable to the (ANTARES) yellow buoy has broken. One acoustic release was opened as soon as possible to recover both of them and the cable. Despite the deep sea floating

spheres, the floated cable end stayed quite a long time at about 50 meters bellow the surface. The second acoustic release needed to be opened to gain the 3 meters chain weight and then recover completely the cable and the releases before leaving for La Seyne-Sur-Mer.

2.2.3 Thursday 16th June 2005

A new concrete ballast and new rings were ordered to replace the lost ones during the unsuccessful mooring deployment of 2nd June 2005. Departure was on Wednesday 15th June from La Seyne-Sur-Mer at 07:00 pm. Arrival was on 16th June at 08:00 am. The kevlar cable that was recovered on 2nd June was again deployed at sea, attached to the concrete ballast on one side and to the ANTARES yellow buoy to the other side, with a brand new rope.

This time the rope didn't break and the cable could be strained at 3 tons. This operation was nevertheless perilous, as there was a lot of current.

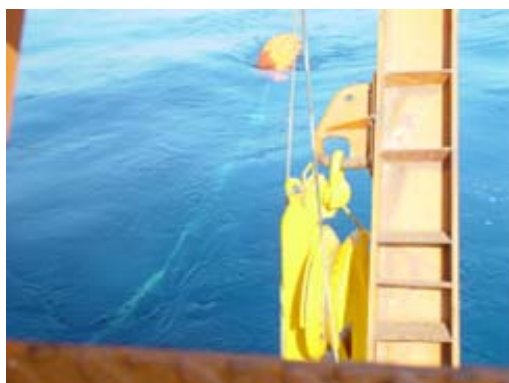
Then the lower and upper parts of the buoy were deployed with no major difficulty, except that the 3 tons ballast that was used to deepen the lower part at 21 meters bellow the surface had to be attached a second time, as the cable end reascend 3 meters. It was suspected that the cable took a long time to be strained in its final state, due to the strong current.

Some deep sea floating sphere reappeared at the surface few minutes after the concrete ballast was put at sea. Their attach were just broken, but for unexplainable reasons.

The work day finished at about 10:00 pm.

At this date, buoy is equipped with

- DACNet #2
- Stan's rads, MVDS062, OCP036 and OCP037
- HS2 #2031247
- No strain sensor
- Transmissionmeter C-Star #847PR (4m) and #626PR(9m)
- Fluorometer #175217 (4m) and #175218 (9m)
- ARGOS beacon #17152







2.2.4 Wednesday 22nd June 2005

Since the 16th June, only 2 ARGOS messages were sent by the buoy, and furthermore these messages looked very weird and short. It was suspected that there was a major problem with the system, so that an urgent mission was organized with the SAMAR divers. One spare DACNet and one spare buoy battery (in fact the ones of the ancient batteries) were taken in case these needed to be replaced.

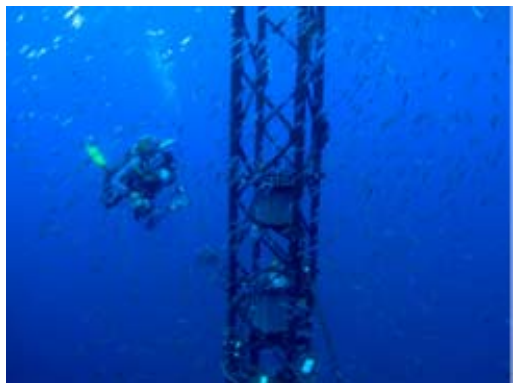
When arrived at site, a CISCO communication was attempted, but unsuccessfully. A RS-232 communication was also attempted, but also unsuccessfully. So that DACNet was unconnected and unassembled from the buoy and tested on the boat deck. It was found to be OK. Before the battery was unconnected from the buoy, the divers found that the charge load controller ("CLC") was suspect, because of white foam on it. They brought it on the deck, and when disassembled, it was found to be flooded.



2.2.5 Tuesday 28th June 2005

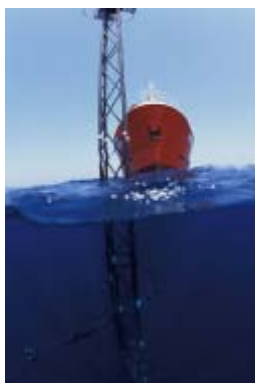
This day is part of the BOUSSOLE 43 mission. OOV divers exchanged the damaged CLC with the ancient that was recovered on the previous mooring few weeks before. The Junction Box, as well as the **ARGOS beacon (put the #26021 instead of #17152)** were also exchanged with the ancient, in case they were damaged when the CLC was flooded.

One hour after these operations, the buoy was working again.



2.2.6 Thursday 28th July 2005

This day is part of the BOUSSOLE 44 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.2.7 Friday 9th September 2005

This day is part of the BOUSSOLE 45 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.

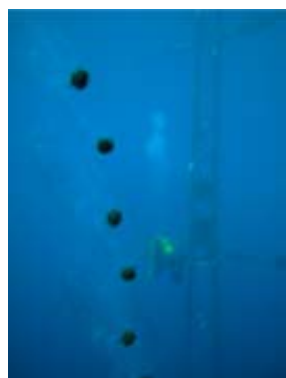
2.2.8 Thursday 6th October 2005

This day is part of the BOUSSOLE 46 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.2.9 Monday 7th November 2005

This day is part of the BOUSSOLE 47 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.2.10 Thursday 15th December 2005

This day is part of the BOUSSOLE 48 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments. They also had to manually switch on a laptop connection, as it was impossible to get one via wireless Ethernet bridge (CISCO system). Indeed, when connected to the buoy, it was found that the node clock was reset to January 1, 1970 on November 11, 2005. The time offset was carefully written in order to process the buoy data properly.



2.2.11 Friday 3rd February 2006

This day is part of the BOUSSOLE 49 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.2.12 Wednesday 15th March 2006

This day is part of the BOUSSOLE 51 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.2.13 Wednesday 5th April 2006

This day is part of the BOUSSOLE 52 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.2.14 Monday 2nd May 2006

This day is part of the BOUSSOLE 53 mission. OOV divers checked the buoy structure and sensors state under the sea surface, and cleaned the optical surface of the instruments.



2.3 UPPER SECTION EXCHANGE (2006-06)

2.3.1 Friday 9th June 2006: "old" upper section recovering

IX-SURVEY divers (SAMAR company joined IX-SURVEY) went alone on site with their GG-IX catamaran to clean sensors, wait one or two hours (to correct data from biofouling) and then stop the buoy and unfix it from the mooring. They didn't encounter any problem and phoned to LOV on evening saying all was all right.

2.3.2 Saturday 10th June 2006: "new" upper section deployment

Once again, this operation was scheduled with the help of a helicopter to bring the upper part on BOUSSOLE site. To avoid the problem of the previous upper part exchange, not only helicopter pilot was told to navigate slowly (not more than 60 knots), but also the 4 arms were each supported by two solid tubes, fixed on the buoy structure, one vertically, the other horizontally.

One hour after having left Villefranche-sur-Mer with the new upper part of the buoy, the helicopter brought back the former one, which had been transported to the warehouse for instrumentation disassembling.











QUANTITATIVE SUMMARY

The deployment lasted 359 days, among which 16 days were without data acquisition, due to the flooded CLC (12 days at the beginning of the mooring), as well as for an unknown reason the system stopped and started up again (4 days in August 2005). Nevertheless, the system was functioning very regularly and properly during this mooring, and did not encounter any major problem.

INSTRUMENT SCHEDULE

?????

ANY PROBLEMS ENCOUNTERED ?

- 1- biofouling: mooring resté encore trop longtemps a l'eau
- 2- serrage trop important des colliers métalliques autour des boitiers etanches en delrin (CLC)

LESSONS LEARNED

- 1- biofouling: mooring resté encore trop longtemps a l'eau
- 2- ne pas trop serrer les colliers métalliques autour des boitiers etanches en delrin (CLC)

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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 IX-Survey (former 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.

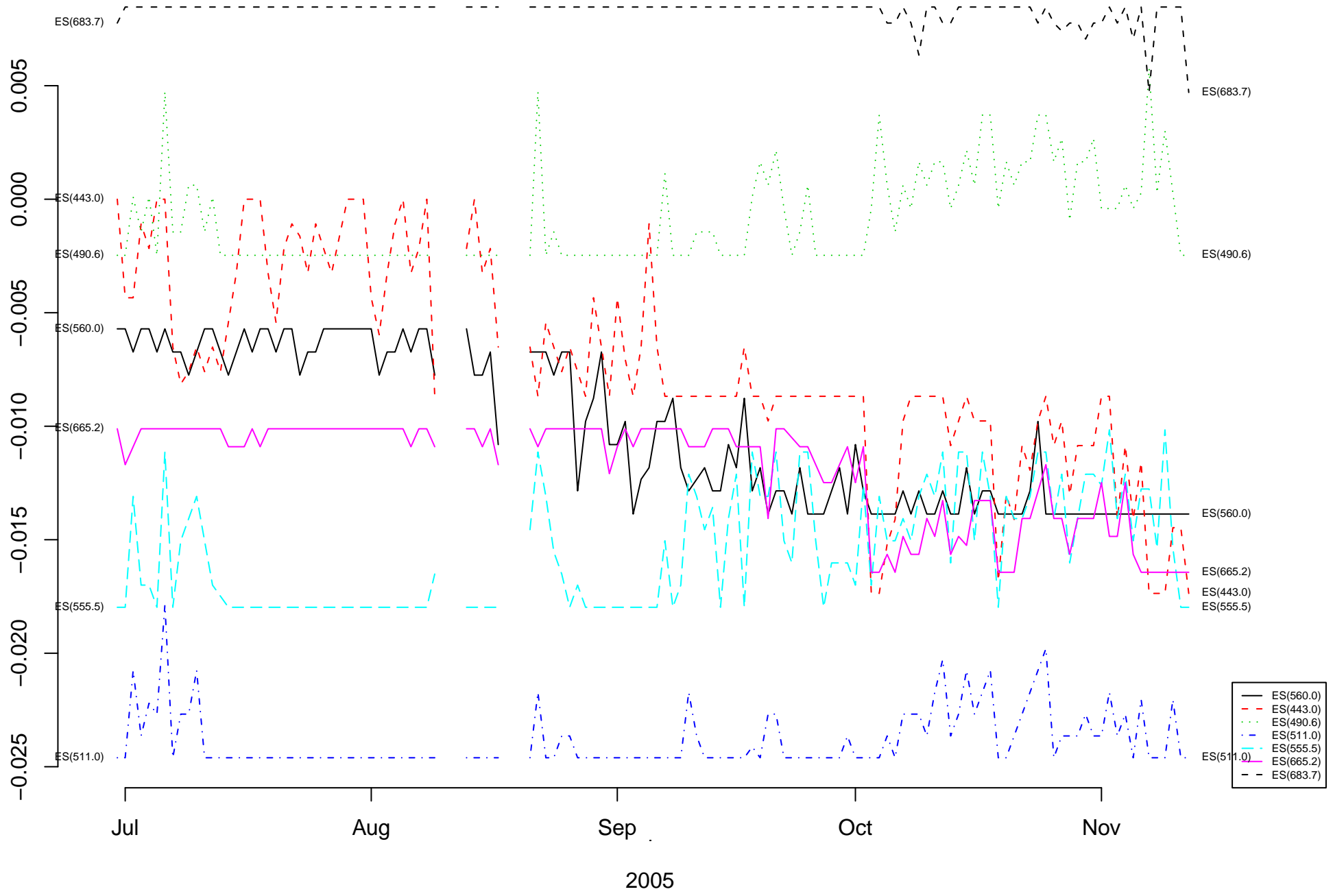
The French institute IFREMER and the Norwegian Marintek company are also thanked for their help and fairness in the engineering studies that were ordered to them after the major failure of the buoy in spring of 2002.

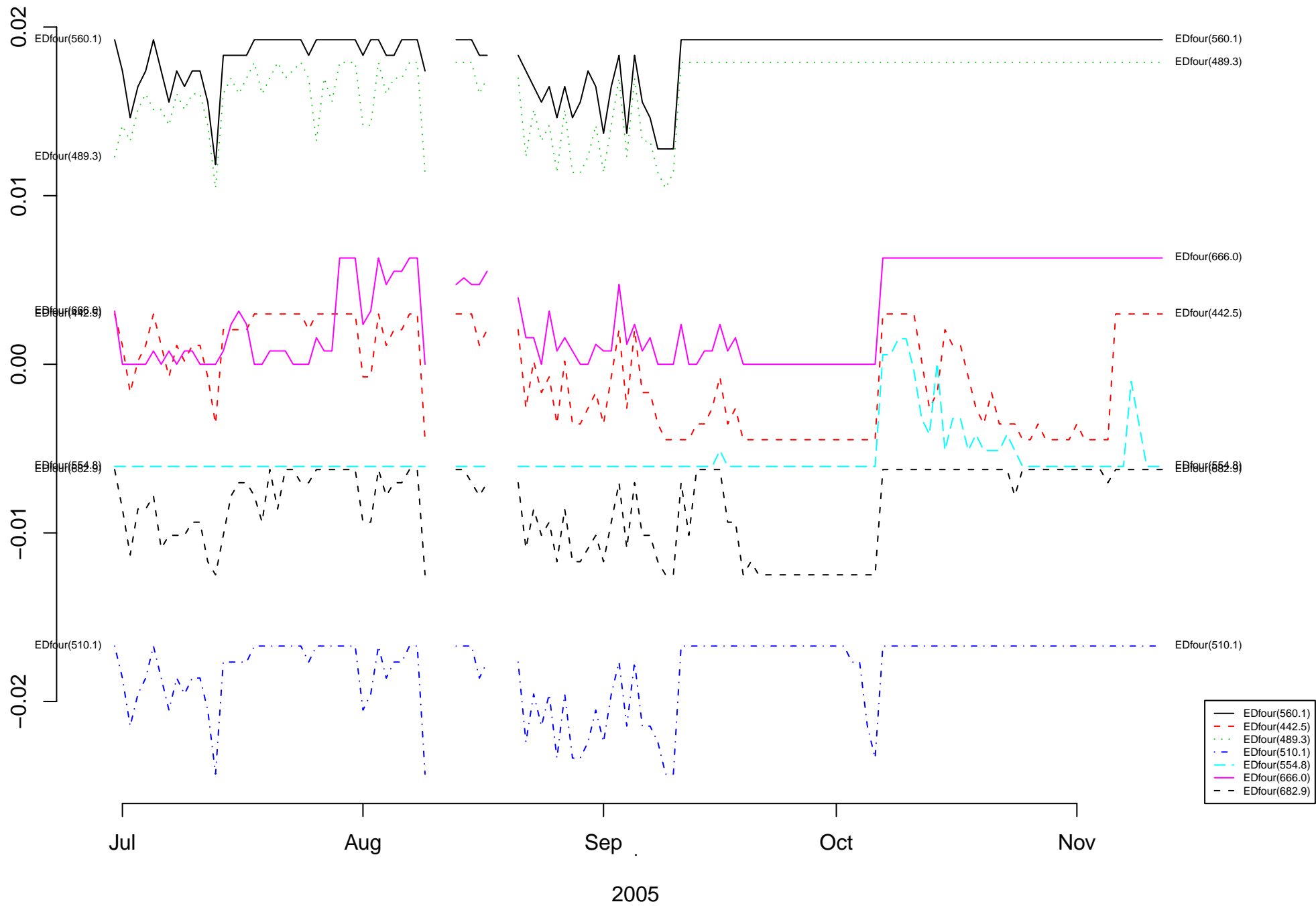
The data that are collected for several years near the BOUSSOLE site by the French weather forecast Agency, "Meteo France", and which are provided in real time on the internet, have been of great help in the day-to-day management of the monthly cruises.

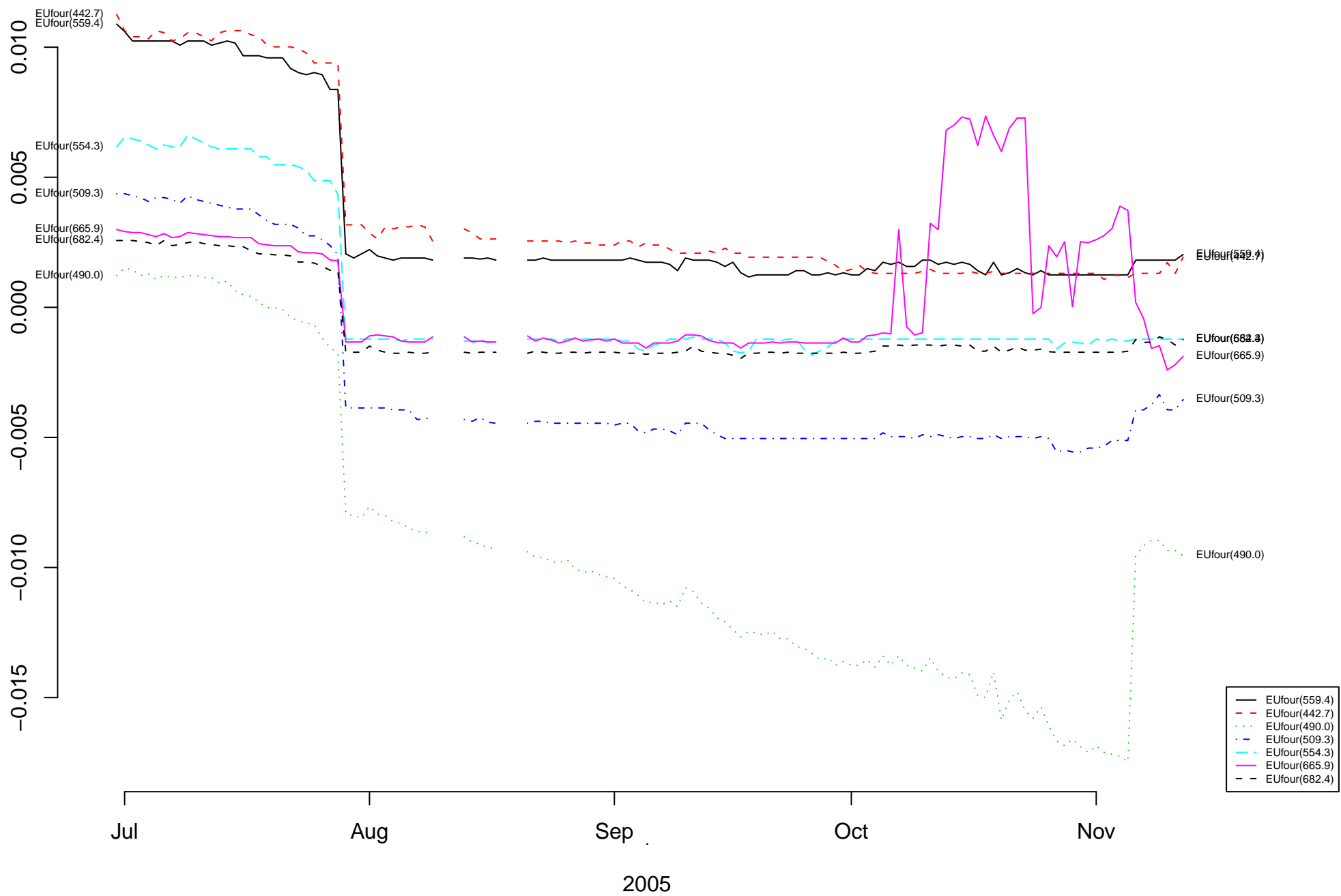
Two companies have largely contributed to the BOUSSOLE project, namely the ACRI-in/Genimar company, Sophia Antipolis, France (buoy conception) and Satlantic Inc., Halifax, NS Canada (buoy centralized acquisition system and radiometers); their help is specifically acknowledged here.

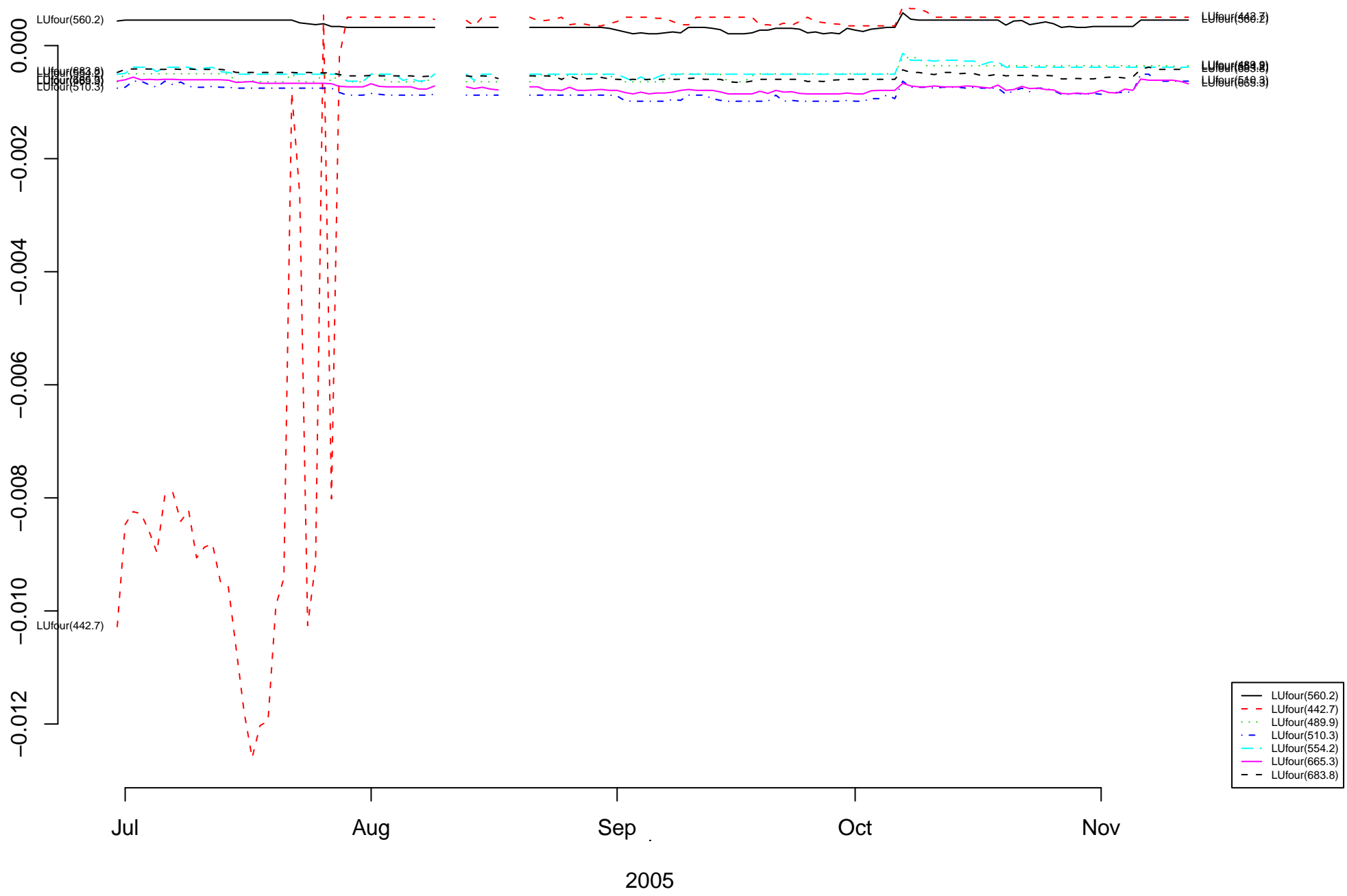
DAILY DATA COLLECTION SHEETS

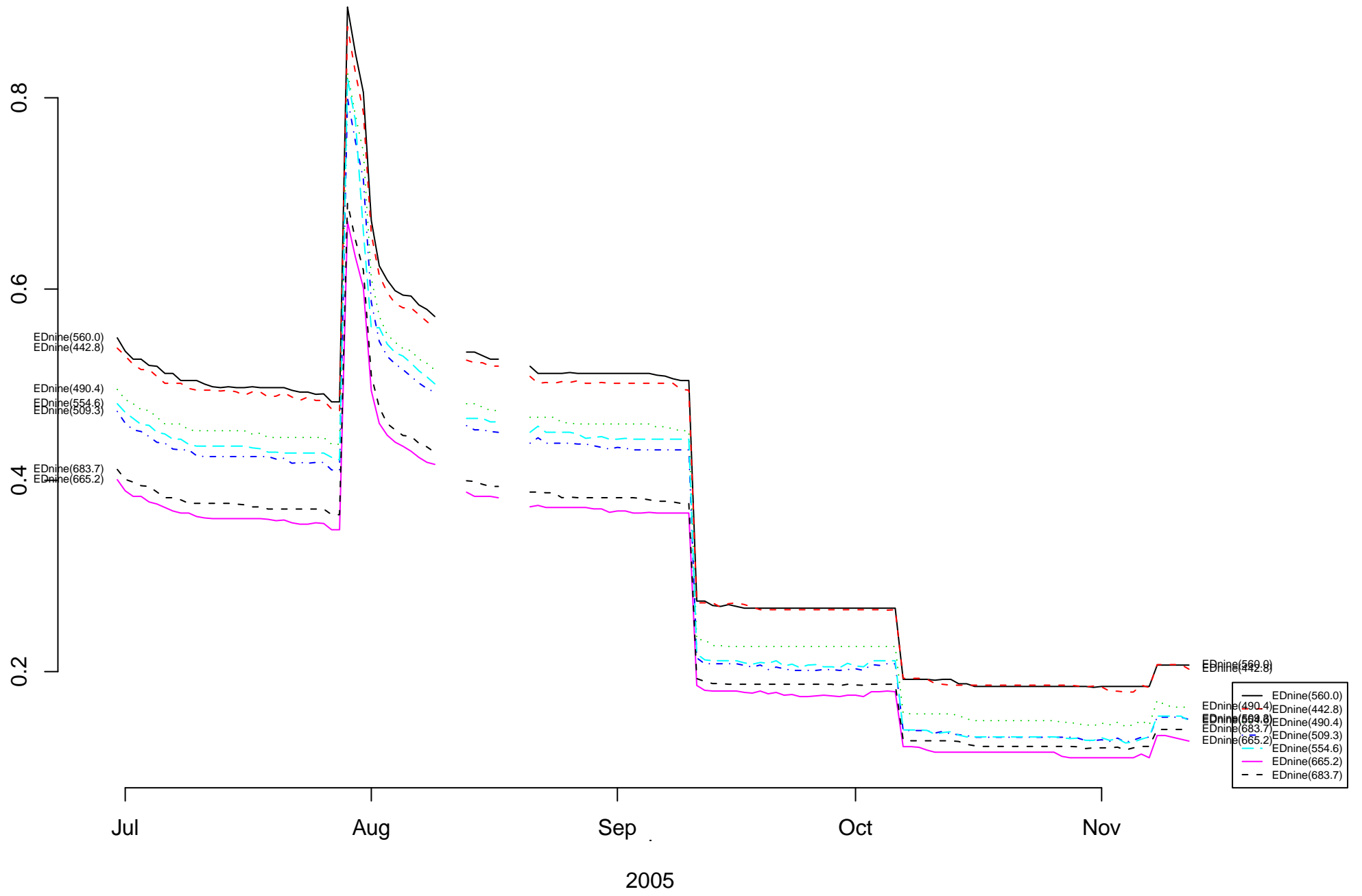
The following pages are meant to summarize the data collected each day by the buoy.

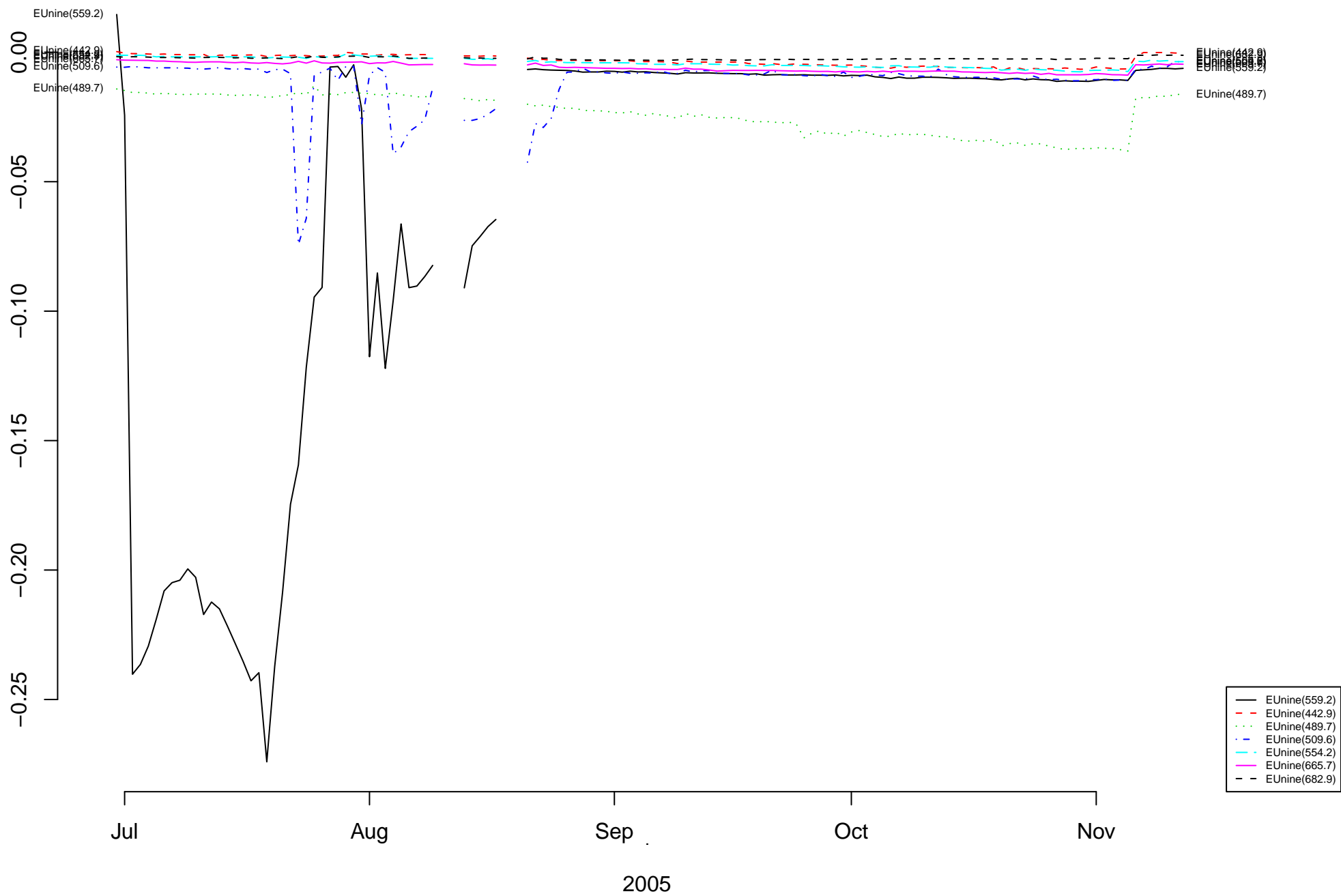


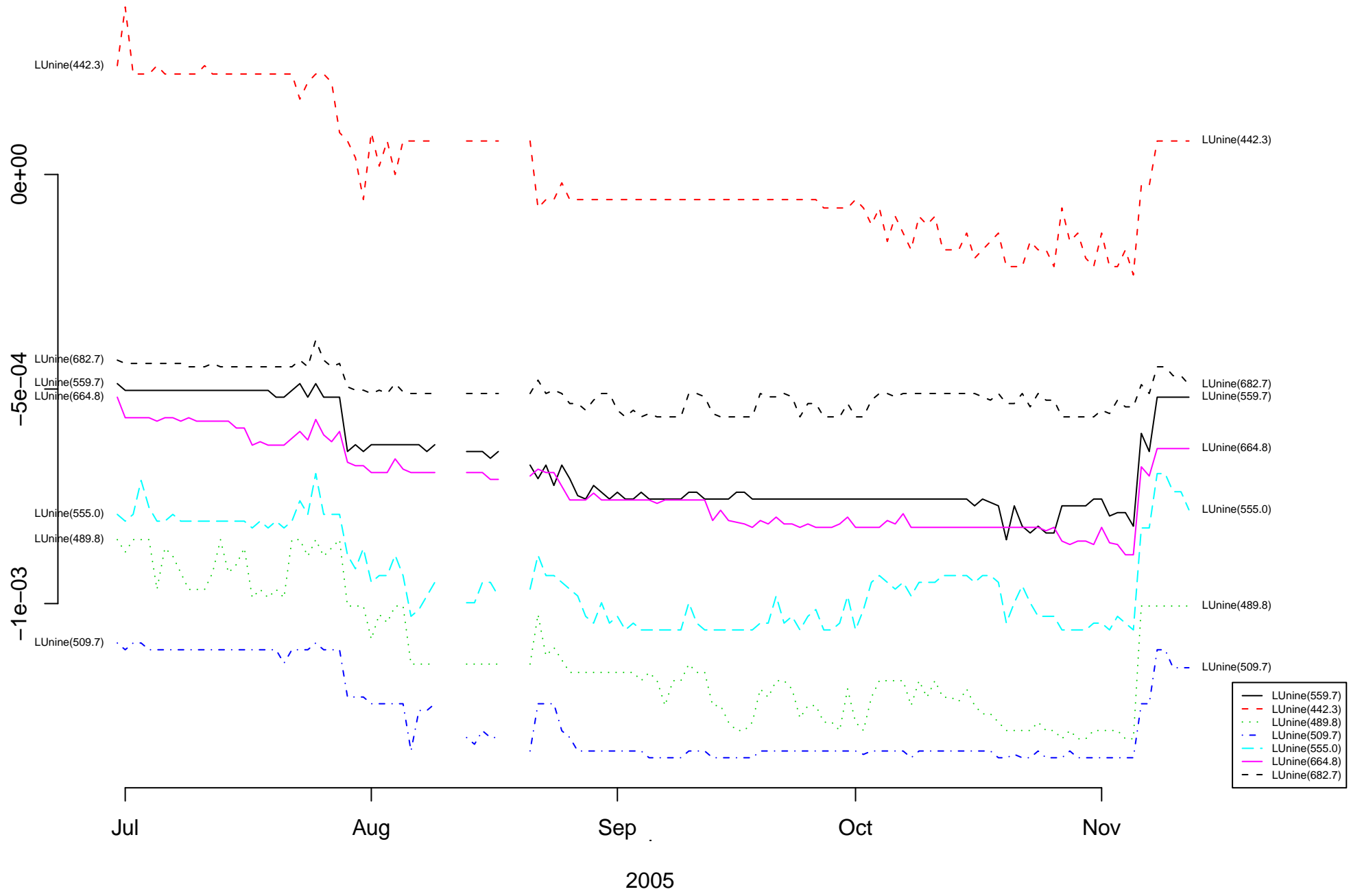


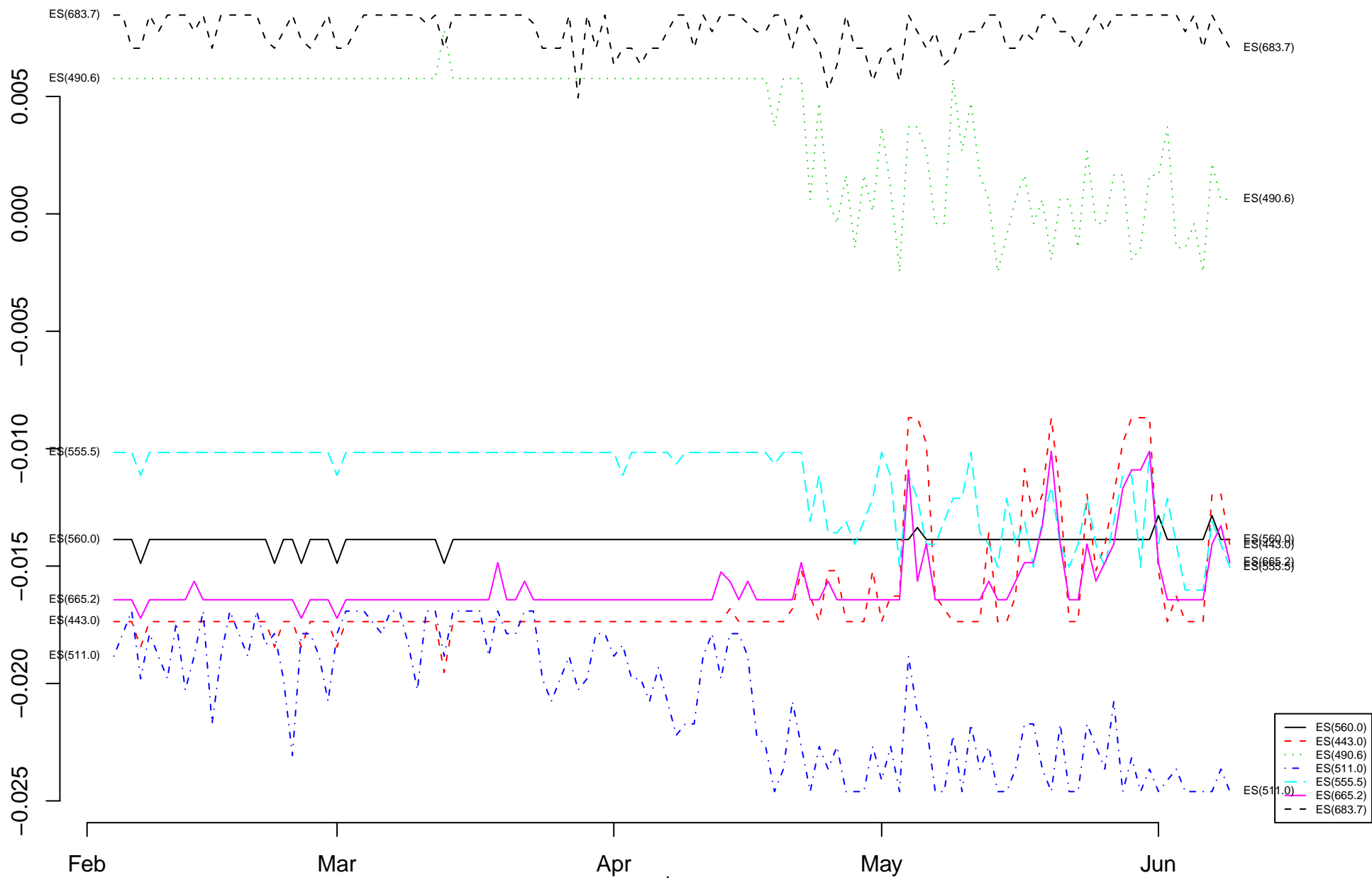




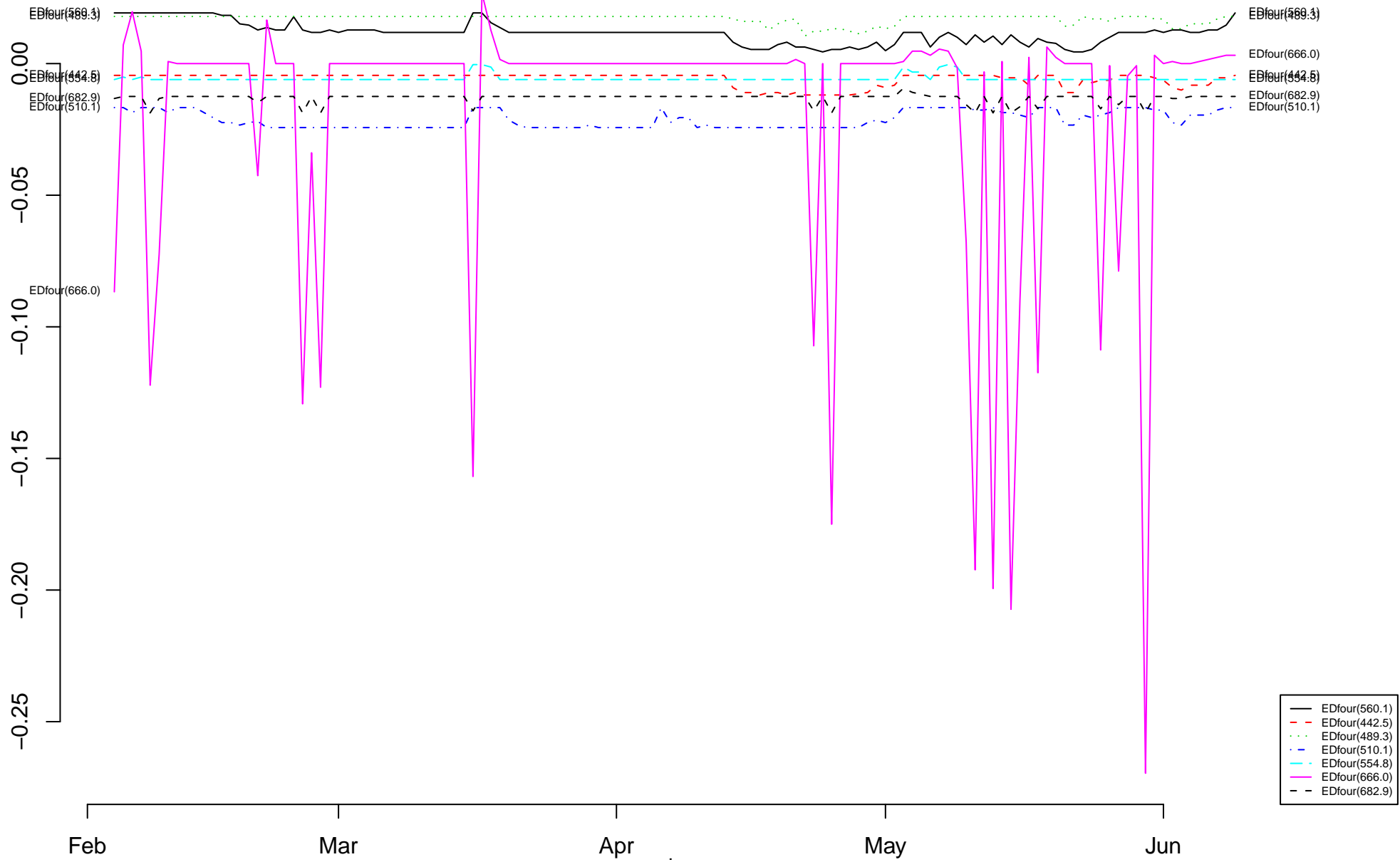








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