FICE 2024

BLOG OF SHIFT 1

May 08, 2024
Acqua Alta Oceanographic Tower (CNR)
(45.3142467 N; 12.5082483 E)

Trainers:
Giuseppe Zibordi (NASA)
Vittorio Brando (ISMAR)

Blog compiled by:
Juan Gossn (EUMETSAT)

Blog of Shift 1

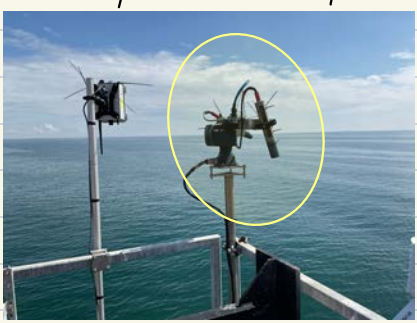
Always use GMT, never local time

06:50 : Departed from Arsenale

08:05 : Arrived

08:30 : Vittorio debriefed us about the instruments measuring in continuous in AAOT

PANTHYR (= robotic system + TriOS)

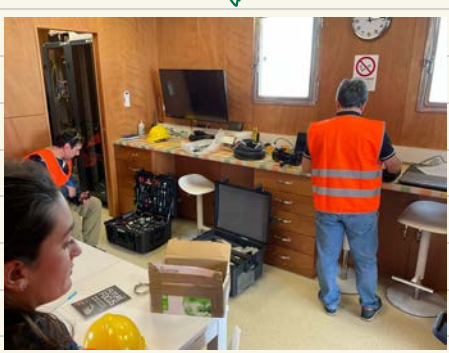


Pneumatic pole (added by Giuseppe and Pietro to deploy TriOS during today's campaign)

08.13 Giuseppe made a summary of the FICE plans

For each "station" the following sequence will be performed:

- accomodate azimuth
- acquire measurements with caps on (DARK)
- export dark files, remove caps
- acquire measurements without caps
- export light files



Some random tips:

- Always put caps and dummies ON when storing a radiometer
- Pneumatic poles of fix angle are more reliable to keep the desired azimuthal angle

09:34: Sky conditions continue to be suboptimal due to the presence of scattered clouds

North Corner

East Corner

West Corner

South Corner

Zenith picture

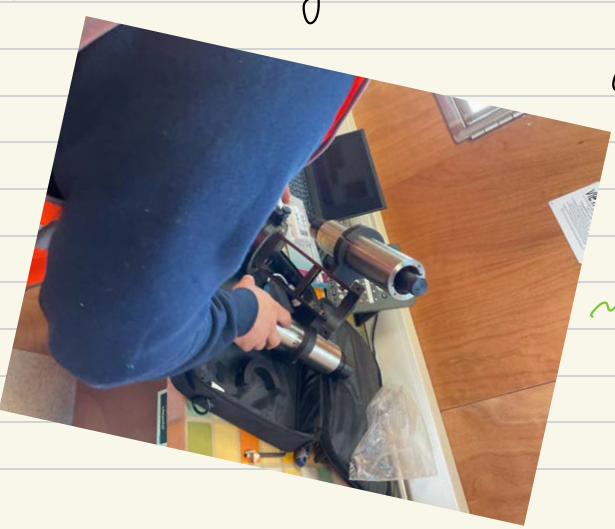
Sunglint patch: the main thing we try to avoid when following the recommended geometries

Pietro and Giuseppe setting up the rotating stage holding the radiometers.

→ Setting the "thermal bath" (steel cylinders sorrounding the CR housings): this allows to quantify the environmental temperature "perceived by the radiometer.

TriOS instruments come without internal thermistors, meaning that to address thermal effects, temperature has to be measured externally

Measuring temperature from inside these steel cylinders is much more accurate than taking the ambient temperature as a proxy of the internal



→ Radiometers (L_t and L_i) mounted to rotating stage including steel cylinders.

09:40

Everyone following the set up procedure and asking questions to Giuseppe.

This is the compact configuration (Ed together with L_4 and L_3), which may not be good in case Ed is impacted by optical obstructions.

Vertical spike to check the azimuthal plane with the shadow casted by the Sun

Rotating stage

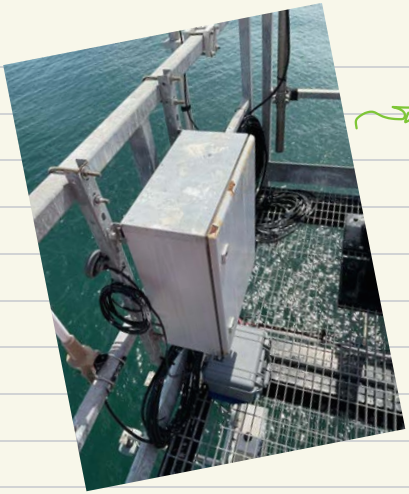
09:45 Deploying the rotating stage on top of the pneumatic pole.

Some tips

→ Dark measurements are taken once for every station, consisting of several casts.

→ Between each cast, cap should be on to minimize as much as possible the fouling by spray, aerosols, bird faeces, etc.

09:48 Instrument oriented azimuthally 90° away from the Sun.



Metal oxidation is maximized at sea...

Birds are not welcome close to the optical instruments

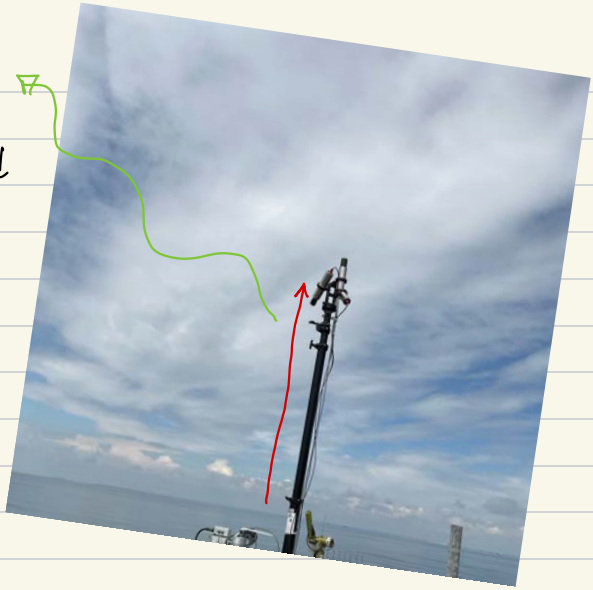
09:54 Cable set-up

Keep cables away from the floor

Even if you are aware of the cables, other people may not, and may step into the cables if they are left on the floor.

09:59 Pneumatic pole bumped-up

Unexpected issue: Steel cylinders used as thermal bath are adding too much weight on the pneumatic pole. Pneumatic pole was unable to reach its full height.



10:17 Measuring temperature

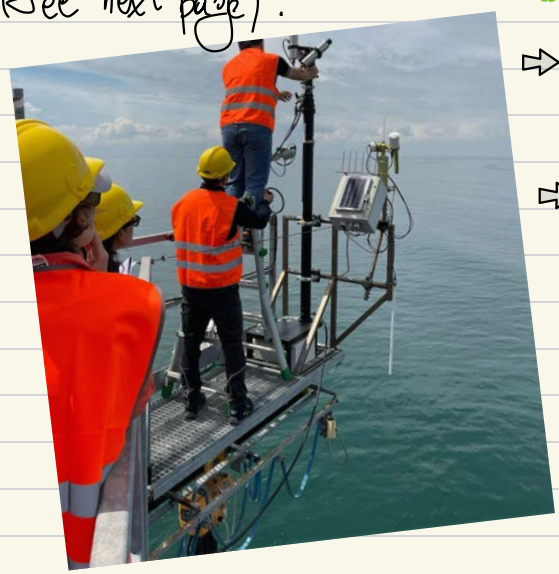
~ The tip of the thermocouple was placed between the radiometers' housings and the steel cylinders at two opposite angles (away and into the sun).

	DIRECTLY ILLUMINATED BY SUN	SHADED SIDE
T(Ls):	24.3	23.6°C
T(Li):	22.7°C	22.6°C
T(Es):	29.9°C	29.7°C

Slight differences still exist despite the steel cylinder acting as a thermal buffer.

10.19 : Giuseppe gave some tips on what is relevant when writing down notes.

Log sheets were handed in to the trainees with all the relevant information required for each cast. (See next page).



10.21 Putting caps ON

⇨ This is to measure the DARK signal of the first cast (see logsheet, next page).

⇨ TriOS does not have an internal shutter, instead has some BLACK-PAINTED PIXELS, used to estimate the dark signal.

⇨ However, measuring with caps ON is more accurate (see why later in this blog)

Giuseppe providing SOME TIPS

⇨ Always keep the uncalibrated data

⇨ Calibrated data in MSDA_XE may have been produced with a non-updated cal. file

Campaign ID: AAOT 2024	**Campaign #:** 01

Station #: 01	Location: AAOT ← NEVER USE LOCAL TIME
Date (*dd mmm yyyy*): 08 MAY 2024	Recording Time (*GMT*): 10:23
Longitude (*degrees.decimals*): 12.5082483 E	Latitude: (*degrees.decimals*): 45.3142467 N
Wind Speed ($m\ s^{-1}$): 8.7 knots - 4.5 m/s	Wind Direction (*degrees from N*): 114.4 degrees
Temp. air (C°): 15.2°C (is it correct??)	Temp. water (C°): unavailable
Cloud cover (*octs*): 7/8 (almost overcast)	Sea state (*WMO*): 1
Water depth (*m*): 70 m	**Compiled by:** JUAN GOSSN

Measurement cast (#): 01	Notes: JUAN GOSSN (EUMETSAT)
Viewing geometry (θ, ϕ): $\theta = 40°$ $\phi = 90°$	
L_T instrument programming:	BURST MODE
L_i instrument programming:	
E_S instrument programming:	When measuring Dark: integration time is LONG
L_T instrument cal-file: SAM-82CD	
L_i instrument cal-file: SAM-82CF	
E_S instrument cal-file: SAM-82C1	

Dark sequences (#): 01	Time start-end (*GMT*): 10:23
Dark file-name: AAOT-0101D (D=DARK)	Dark sequence-index:

Signal sequences (#):	Time start-end (*GMT*): 10:28
Signal file-name: AAOT-0101S (S=SIGNAL)	Signal sequence-index:

Temp. L_T(C°)	24.3	23.6				
Temp. L_i(C°)	22.7	22.6				
Temp. E_S(C°)	23.9	23.7				

Additional notes

For TriOS (RAMSES)
Take DARK measurements with caps on, even if CCD contains some black-painted pixels.

Sea state code

WMO Code	Wave height	Characteristics
0	0 m	Calm (glassy)
1	0.0 – 0.1 m	Calm (rippled)
2	0.1 – 0.5 m	Smooth (wavelets)
3	0.5 – 1.25 m	Slight
4	1.25 – 2.5 m	Moderate
5	2.5 – 4 m	Rough
6	4 – 6 m	Very rough
7	6 – 9 m	High
8	9 – 14 m	Very high

FOR WMO ≥ 5, FOAM OCCURS AND AWR IS HARD TO ACHIEVE

10.47 Concluding the measurement of the DARK signal

→ Define a folder for each station "AAOT_2024_0101D"

→ Identify dark with suffix "_D" and actual cast with suffix "_S".

→ Each scan is producing a file.

10:42 Now, we remove caps and measure (pneumatic pole up/down)

10:53 First cast concludes

Why a pneumatic pole?

The pneumatic pole minimizes the effect of superestructures

Cosine collector integrates the radiance contributions from the down-welling hemisphere

The pneumatic pole should be FIX azimuthally to keep to proper angle

Some additional tips

→ Before starting a new cast, remember to check the angles, sun position may change between casts.

→ Storing different casts in different folders prevents mixing up measurements

Discussion on the panel method

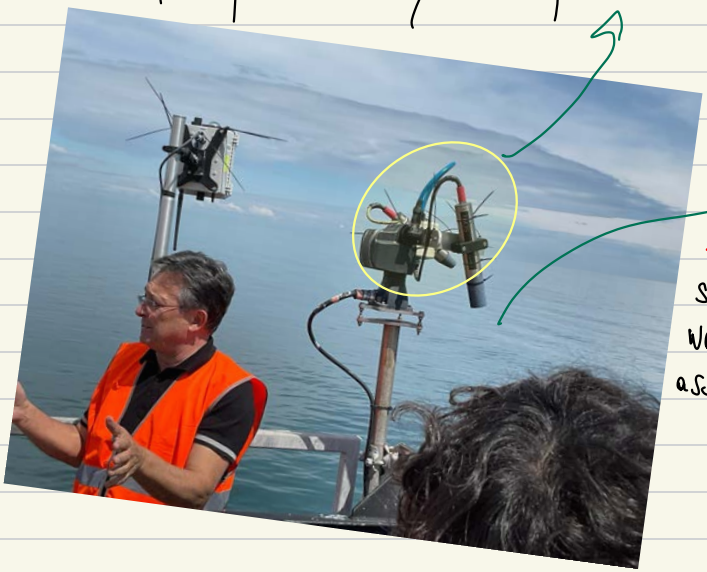
→ The panel method (i.e. using a reflectance plague to estimate E_d by pointing a radiometer to the plaque) is DISCOURAGED in the IOCCG Protocols (see Chapter 3).

→ This is because with this method it's impossible to meet basic metrologic requirements:

1. Calibration of the panel becomes the new challenge
2. Calibration status is hard to monitor
3. Panel gets easily damaged.
4. Shading over the panel while measuring E_d is intrinsic to the protocol, can have a hard-to-assess impact.
5. Geometry is hard to monitor.

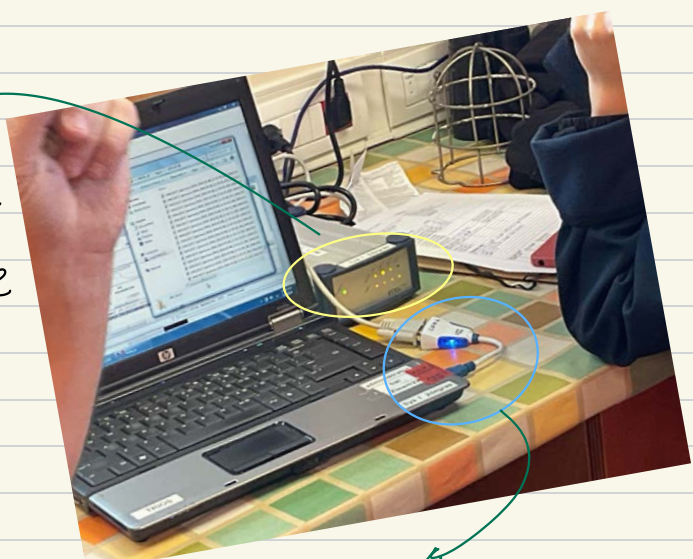
Some other tips

Soft spikes may not prevent birds from coming!



L_t is highly variable and spiky because of surface effects. Additionally, spatial variability of targeted water patch may need to be assessed.

Data logger lights indicate when the instrument is active



Spare interface cables are not so expensive and may save your day!

10:57 Several casts performed by several trainees.

11:00 LUNCH

Fine food, lively discussions, some rest :)

11:43 Resumed measurements

11:50 Temperature measurements repeated

$T(L_i) = 27.5\,^{\circ}C$

$T(E_s) = 29.7\,^{\circ}C$

$T(L_t) = 32.2\,^{\circ}C$

11:54 Caps are now on, we measure the dark signal

(w/ caps on)

How a dark measurement looks like in NSDA-XE

11:55 Everyone taking down notes together with Giuseppe in the log sheets that Vittoria provided.

Unexpected issue: meteorological information from the website was outdated

11:57 Caps removed and azimuthal plane checked once more with the spike shadow

GENERAL DISCUSSION ON OCR IN SITU MEASUREMENTS

BAD OPTICAL CONDITIONS FOR VALIDATION (GOOD DAY FOR LEARNING)

TWO REASONS why these measurements are not good for validation

1. SCATTERED CLOUDS
2. VESSELS PERTURBING THE MEASUREMENTS

THE RELEVANCE OF A COMMUNITY PROCESSOR

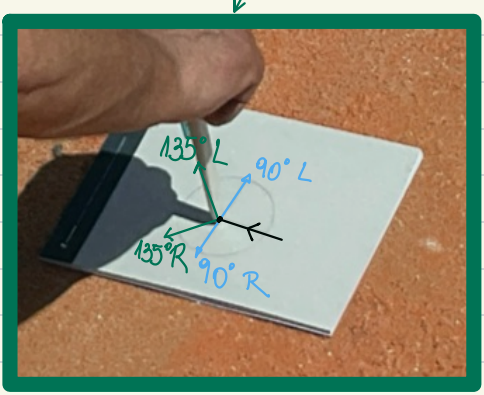
6: useppe explaining the relevance of a

COMMUNITY PROCESSOR

with the option to reprocess the measurements all the way from RAW digital counts to Rrs or nLw.

(and thus the need to archive RAW along processed data in a long-term database)

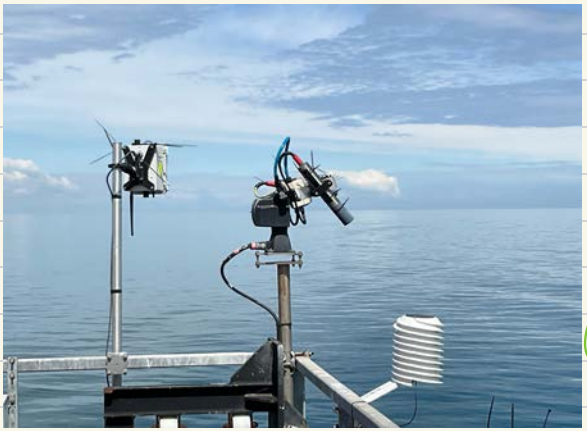
Giuseppe explains how to azimuthally orientate the rotating stage using the spike shadow.



It is recommended to keep $\Delta\phi = 90°$ throughout the day (or $\Delta\phi = 135°$) rather than changing between 90° and 135°.

This is to keep consistency with the modelling and the uncertainty budget.

In boats, keeping a stable geometry is much harder to achieve and aid from the crew is required



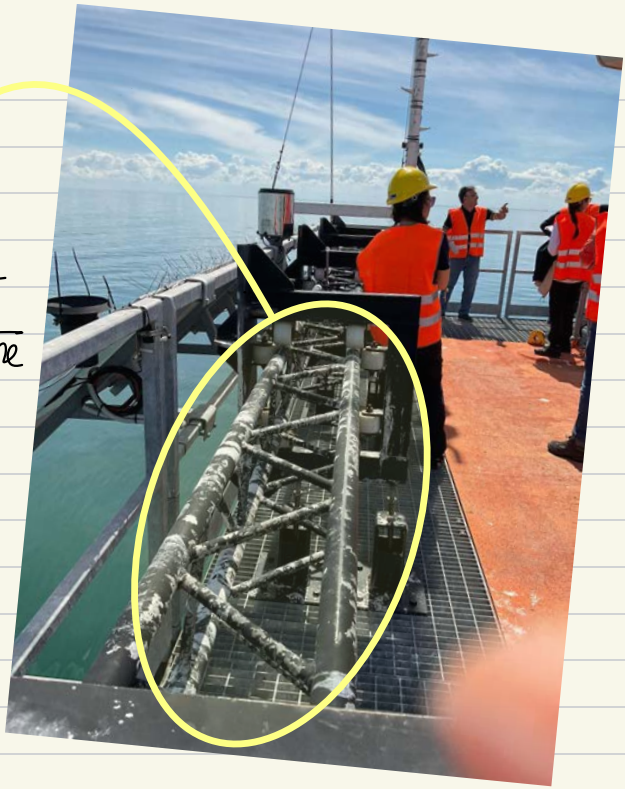
- Influence of the height of the deployment: NOT properly assessed.
- Investigating these dependencies requires a good modelling capability
- Adjacency to land must be assessed. A distance of 5 nautical miles typically ensures a negligible impact of adjacency for validation of space products.

Looking at the level oscillations around the tower's columns is a good strategy to estimate the wave height. (At 12:52 we determined a WMO index of 2 using this method).

- Counting CLOUD OKTAS is not an exact science...
- If all the octants are contaminated (as our case) but we are clearly not in an overcast condition, then we should indicate 7/8 to differentiate from full overcast.

Giuseppe talking about the history of the CIMEL instrument from the AERONET-OC instrument network.

Pole used to test the footprint of the AAOT structure in the above-water radiometry.

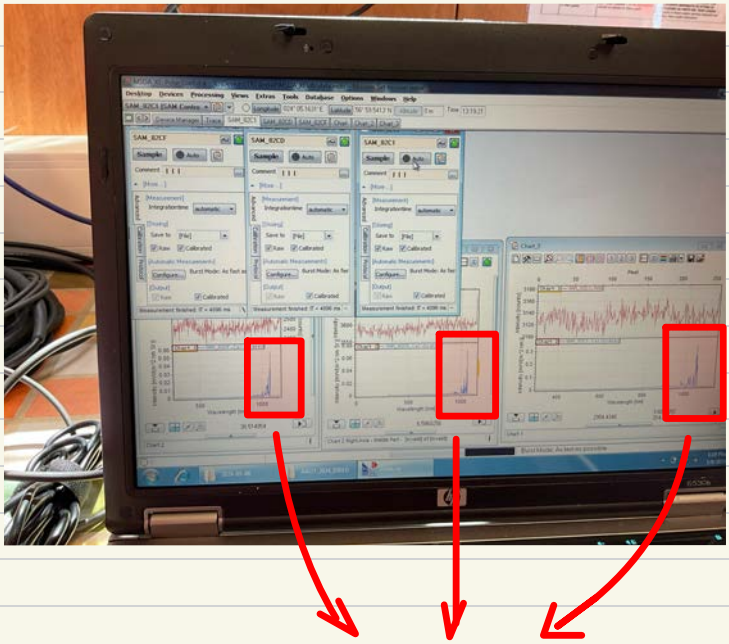


The issue of FOULING in AWR was discussed: spiderwebs, dust and other undesired stuff in the foreoptics.

In the case of AERONET-OC, a weather checker stops the acquisitions if rain is detected

With this weather checker in place, the foreoptics are kept cleaner, and cleaning can be spaced.

ISSUES WITH THE DARK CORRECTION DERIVED FROM BLACK-PAINTED PIXELS



The spikes here show that the dark correction applied by the MSDA_XE software does not perform optimally.

This means that a proper dark correction must be applied with the caps on.

This issue could be avoided if TriOS sensors had internal shutters.

At this time of the year the bottom perturbations are fully negligible in AAOT. In July, the water becomes more optically deep, and bottom perturbations become a little more relevant (1.2% in the green spectral region, negligible elsewhere)

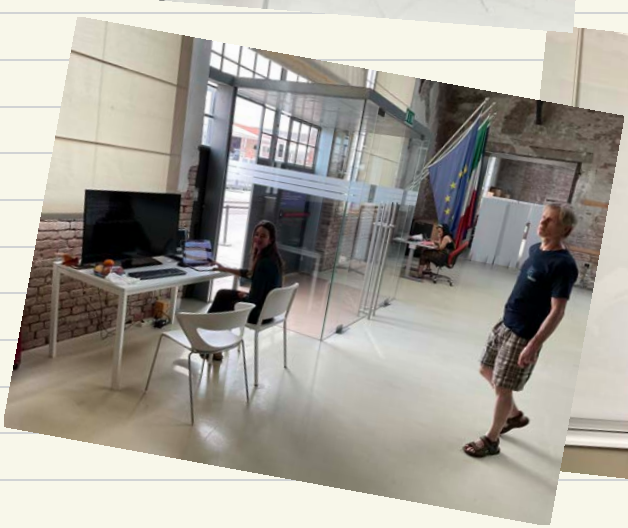
13:09 Final covering of the sensors for a last dark measurement

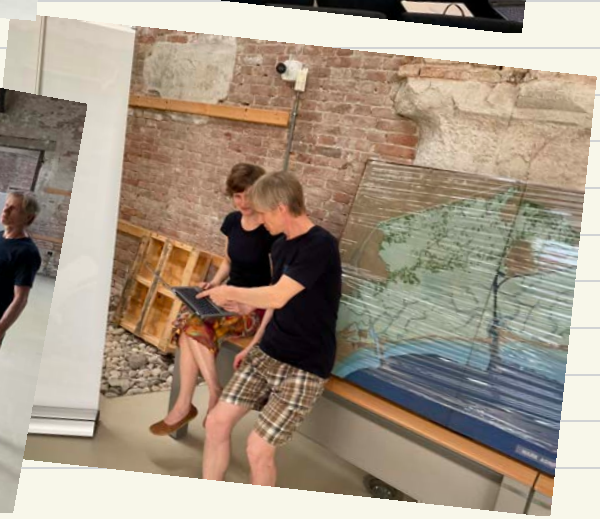
13:15 Comparing the ambient temperature with the one measured inside the steel cylinder: several degrees of difference were found.

13:20 Unmounting the sensors and closing the field work of the day.

~15:30 Shift 1 concluded.

Teams of all shifts working on processing the data acquired during the FICE






MAELSTROM