Département Recherches et Développements Technologiques

ifremer

Biofouling protection for *in situ* oceanographic sensors by local chlorination

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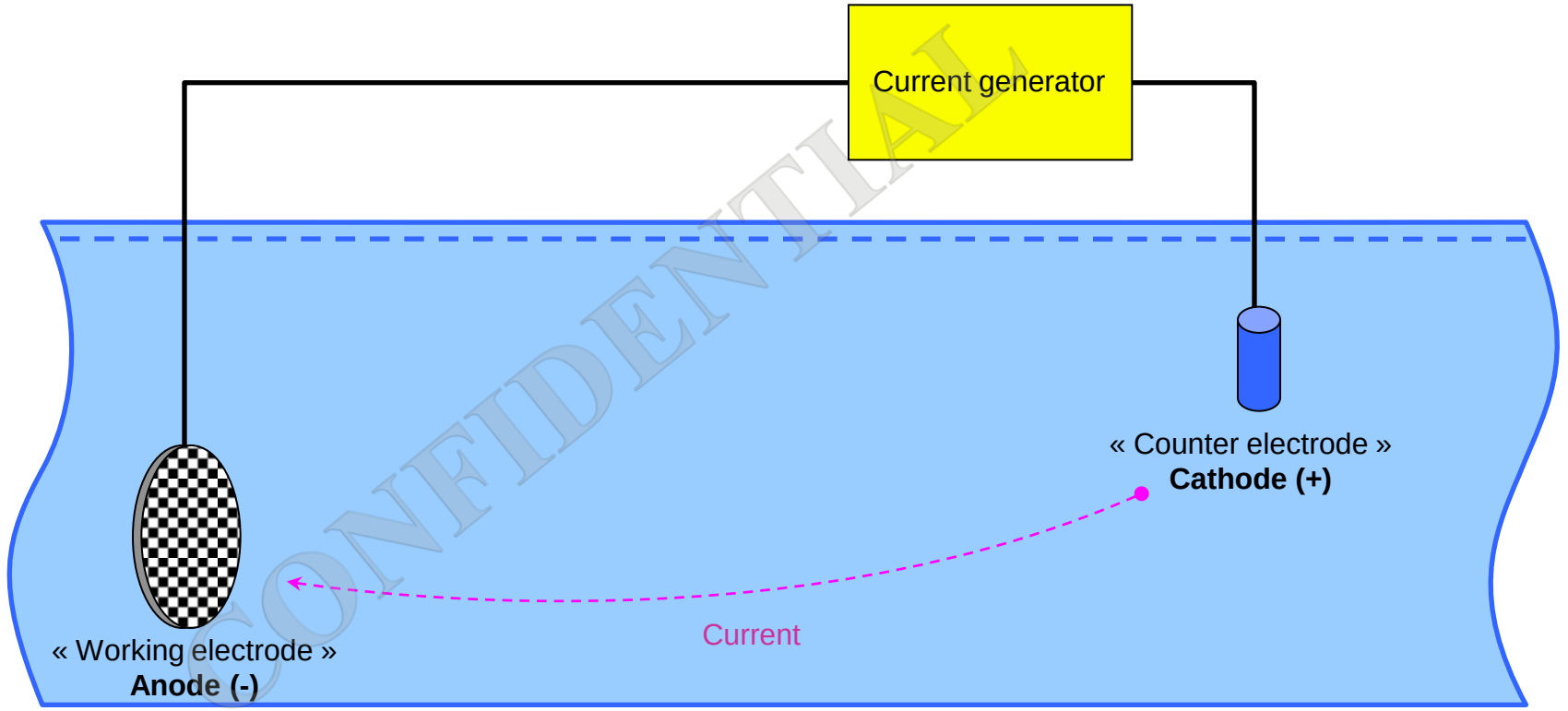
IFREMER (FR) – RDT-EIM
L.Delauney

laurent.delauney@ifremer.fr

Chlorine Generation System In Sea Water

➢ Sea water electrolysis : Hypochlorous Acid generation.



$$2\,Cl^- \longrightarrow Cl_2 + 2\,e^-$$

$$2H_2O + 2\,e^- \longrightarrow 2\,OH^- + H_2$$

Then in function of pH and Temperature : Hypochlorous Acid

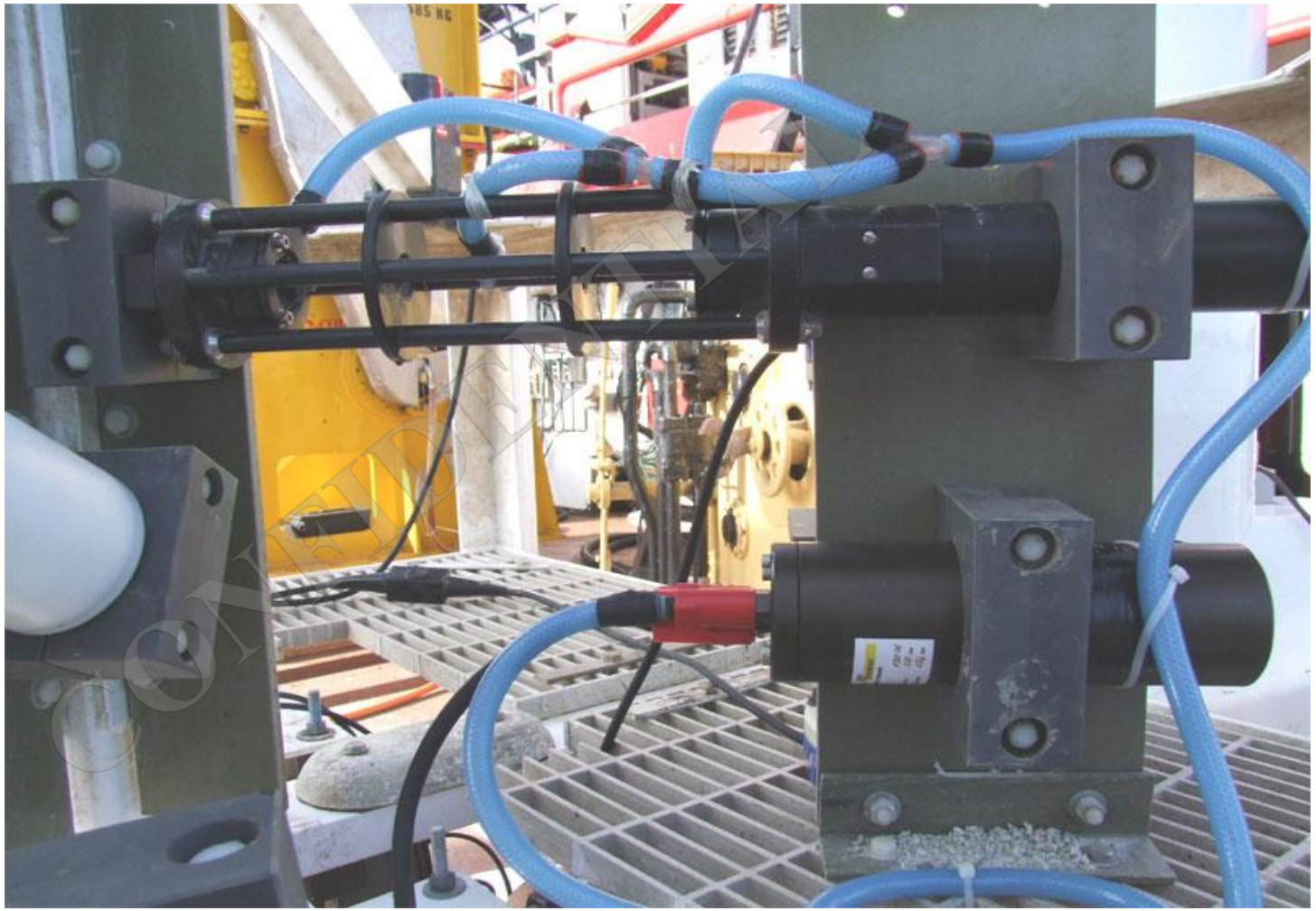
Note : Anode and Cathode naming is electrochemistry convention, electricity convention is the opposite.

Local Window Protection

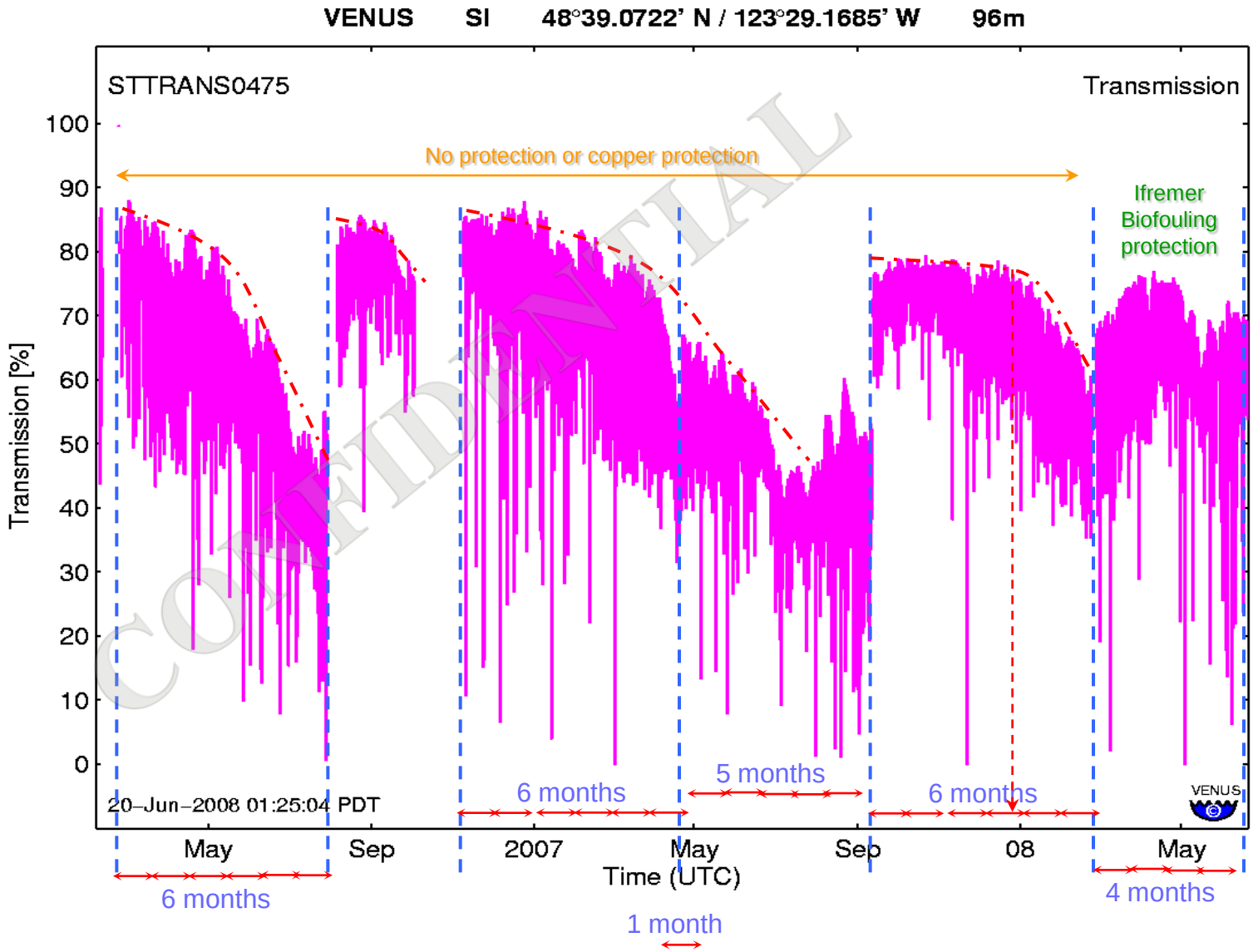
In situ biofouling prevention efficiency test

56 days duration ◆ March - May ◆ Mt St Michel Bay

VENUS TRANSMISSOMETER
Ifremer Biofouling Protection



VENUS TRANSMISSOMETER
Ifremer Biofouling Protection – VENUS Data
Results



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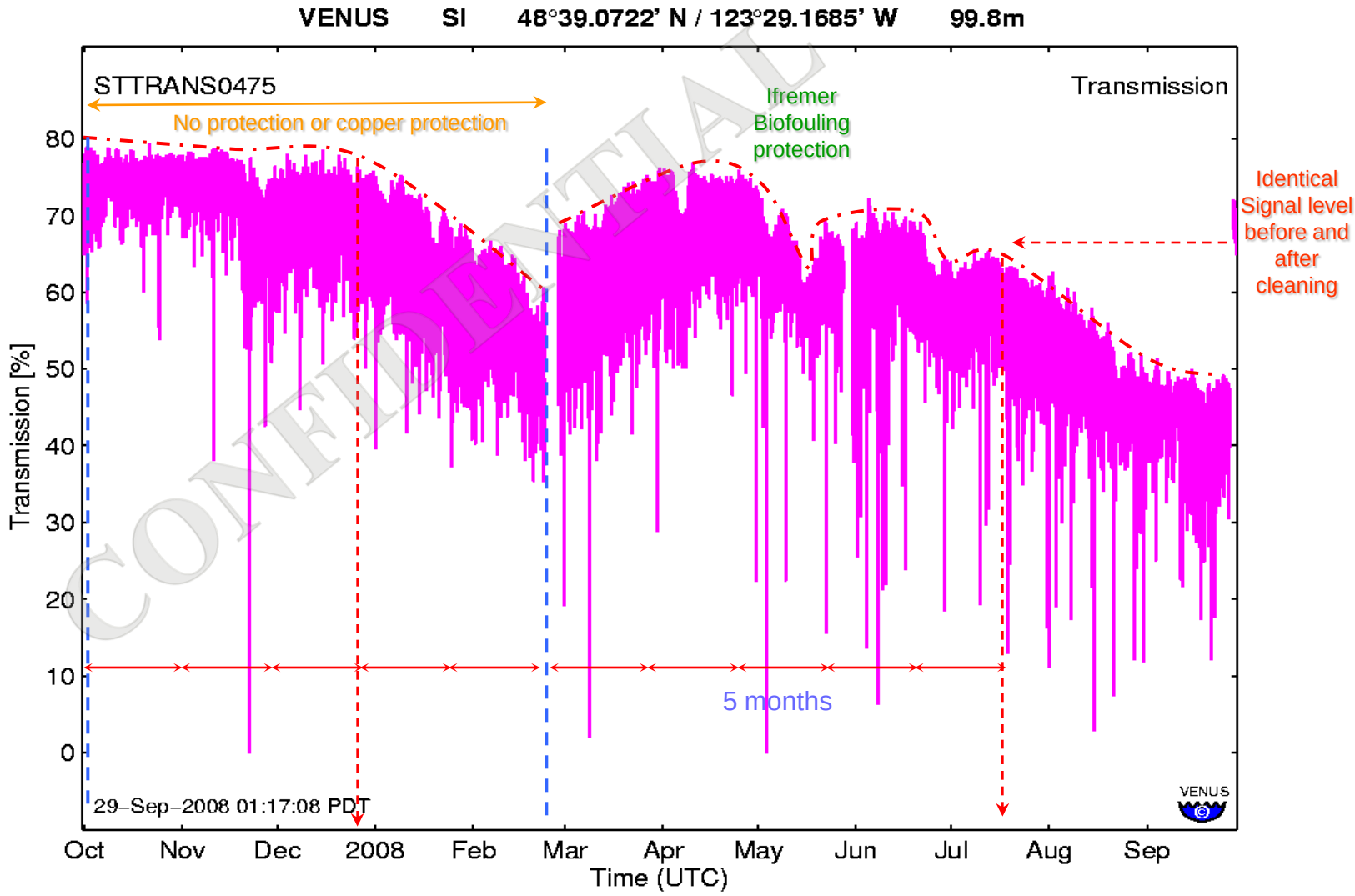


VENUS

Summer/Fall 2008

Victoria Experimental Network Under the Sea

University of Victoria

The Ocean Online, Real-Time, Anytime

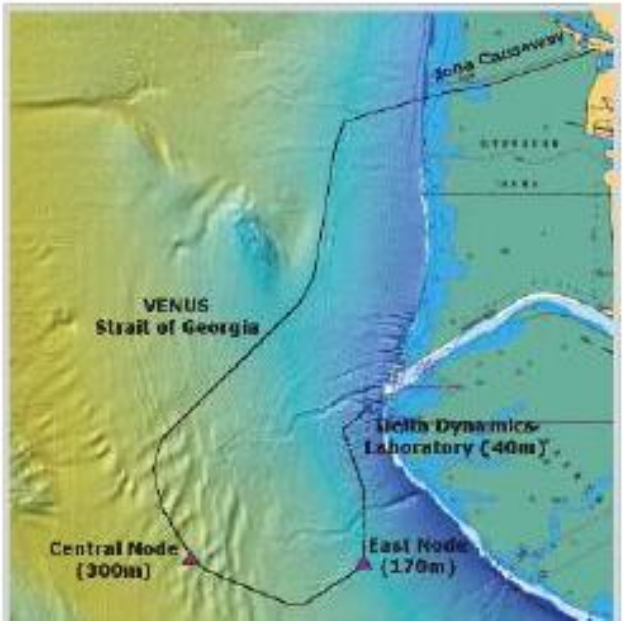
KEEPING CURRENT

Newsletter Contents

VENUS INSTALLATION IS COMPLETE!

Adrian Round (VENUS Project Manager)

Strait of Georgia Central Node being deployed to 300m



Transmissometer Biofouling Protection System

Paul Macoun (VENUS Project Engineer)

Figure 4. INFREMER Biofouling system on VENUS

A customized bio-fouling protection system was installed on the Saanich Inlet SeaTech Transmissometer in February 2008. This local chlorination system was developed by engineers at the French research institute IFREMER.

The system is comprised of 3 electrodes, one adjacent to each optical window on the Transmissometer, and one centrally located between the two windows. The electrodes are supported by a small housing which contains the system controller and several Lithium cells.

The principle used to reduce bio-fouling is the electrolysis of sea water, which produces free chlorine in the vicinity of the optical windows. The controller alternates voltage potential between the central electrode and each window electrode switching every 10 minutes.

Figure 4 shows the IFREMER system mounted on the SeaTech Transmissometer. Figure 5 is a graph of Transmissometer data from March 1—Aug 1 2007 (+ symbol) overlaid with data from the same interval the following year (lines). There is a noticeable difference from before and after the system was mounted to the Transmissometer. The 2007 data indicate progressive fouling and resulting signal attenuation. The 2008 data look reasonable until mid-summer. The engineers at IFREMER believe the Lithium cells had become depleted at this point, and as a result we begin to see signal attenuation in June and July 2008.

In September 2008 the bio-fouling system was redeployed on the Transmissometer. The latest improvement to the system was the inclusion of a cable linkage to a Scientific Instrument

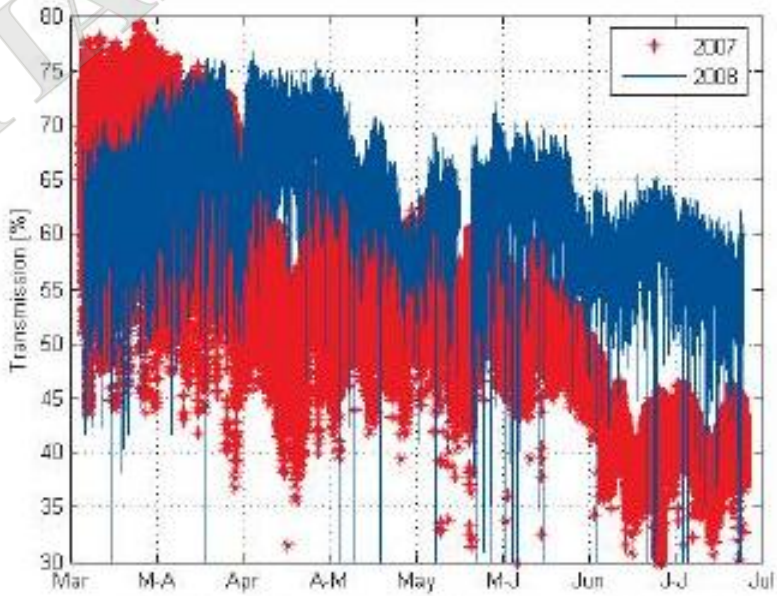


Figure 5. Transmissometer Data Comparison 2007-2008

Interface Module (SIIM). The system is now powered continuously through the VENUS array.

VENUS and IFREMER will continue to collaborate on bio-fouling protection systems. The present plan is to use the local chlorination system to protect other optical instruments on the various observatory platforms.

Conclusion

- Local Protection can be adapted to many kind of instrument quite easily.

- The energy need is compatible with autonomous monitoring (2 D cell for 3 months).

- Good results have been obtained for parameters commonly used for marine monitoring.

- local Protection can be scheduled in order to leave free time interval to perform the measurement (if needed).

- 50 mm diameter windows of optical sensors have been protected with success.

- In some situations, pumping should be kept in order to flush the system to prevent sediment trap or deposit on sensors.