



Christian Le Provost aboard the Marion Dufresne ship during its first mission to French Austral Islands

All the work presented here would have not been possible without the work and the tenacity of Christian Le Provost. Indeed, Christian built the ROSAME tide gauge network in the beginning of the 1990s within the framework of the WOCE and GLOSS programmes. Well-known for his theoretical work on tides and for his hydrodynamic tidal model, Christian Le Provost also actively participated to the collection of in situ data. ROSAME is a good example of this participation.

During the spring of 1992, Christian Le Provost went to the French Austral and Antarctic Islands to install the permanent tide gauge of Kerguelen. He returned there in 1994 to install the Saint-Paul station and to prepare the installation of the Crozet station. All of these stations are still operating today. We will endeavour to continue the work initiate by Christian Le Provost and to maintain this network on a long term basis.

Perfecting of an automatic sea level gauge combining radar and pressure gauges

Laurent Testut⁽¹⁾, Philippe Téchéné⁽¹⁾, Michel Calzas⁽²⁾, Antoine Guillot⁽²⁾

(1) LEGOS, 18 Av. Edouard Belin 31401 Toulouse Cedex e-mail: Laurent.Testut@cnes.fr

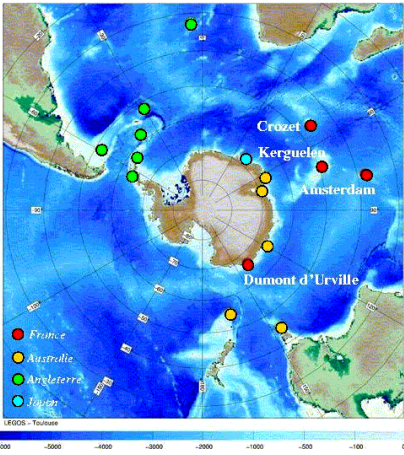
(2) INSU Division Technique, Bât IPEV 29280 Plouzané

The ROSAME Network

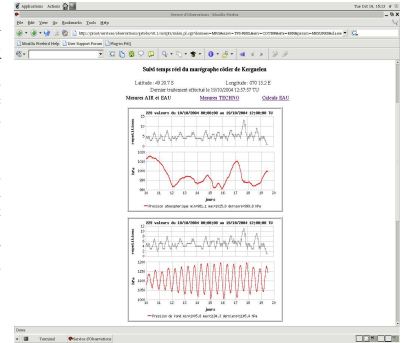
ROSAME (Réseau d'Observation Sub-antarctique et Antarctique du niveau de la MER) is a French tide gauge network complementing several national research programmes using sea level variation observations, in the peri-antarctic area of the Indian Ocean. The scientific objectives of this network are to study the variability of the sea level, with the aim to identify and understand its seasonal, interannual, decennial and secular variability and trends, in relation with the Antarctic Circumpolar Current. This programme is closely linked to the altimetric satellite missions TOPEX/POSEIDON, ERS1/2, JASON and ENVISAT.

Today four coastal pressure gauges are maintained in Kerguelen, Amsterdam/St Paul, Crozet, and Dumont d'Urville and two associated moorings are deployed near Crozet and Amsterdam Islands every year. The coastal data are delivered on a monthly basis to the fast delivery Sea Level Centre of Hawaii. The other data are archived, after validation, by the GLOSS Data Acquisition Centre of Bidston (U.K). An automatic acquisition/quality control/fast delivery software for real time follow-up of the data is at the moment in development a LEGOS. This software will soon allow the data to be transmitted to Hawaii centre on a weekly basis.

<http://www.obs-mip.fr/umr5566/english/obs/rosame/index.htm>



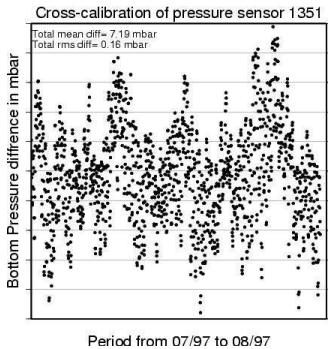
Location of some of the tide gauges maintained by different countries in the Austral Ocean. The four red dots constitutes the core of the ROSAME tide gauge network.



Available hourly data of ROSAME Tide Gauge Network

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ker_argos	■	■	■	■	■	■	■	■	■	■	■	■
spa_argos												
cro_argos												
ddu_argos												

Pressure sensor drift

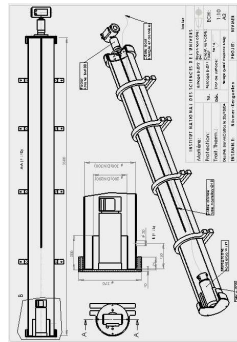


The pressure sensor used at the moment for our tide gauges are Aanderra WLR7 based on Paroscientific Digiquartz. Even if these sensors are very accurate in measuring the pressure they are subject to strong drift in comparison to those sought in the sea level trend (i.e mm/yr). The computing of the last part of the raw data of a pressure sensor, stayed more than 50 months under few meters of water at Kerguelen, with its new calibration coefficients leads to a mean difference of about 7 mbar (cf. Figure on the left). It means a drift of about 17 mm a year.

That is one of the reason why we have decided to developed a new automatic tide gauge station which is able to

- ✓ estimate the shape of the pressure sensor drift
- ✓ look into the potential of radar sensor
- ✓ compare both technologies

Characteristics of the new station



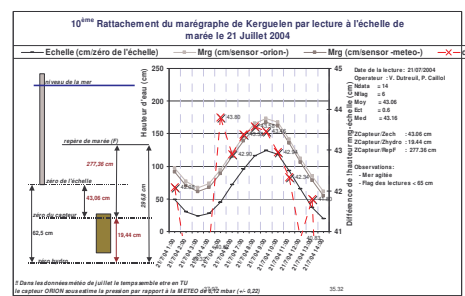
This automatic tide gauge combines along the same stiling well two sensors (cf. Figure on the left).

- Aanderra WLR7 instrument which measures the bottom pressure, temperature and conductivity
- Krohne BM100A radar sensor with an rigid wave-guide

Both instruments are piloted and alimented by the same station. The station can work with batteries or solar panel. The station enable the two instruments to synchronize their measurements with the same sampling period and integration time in order to compare exactly the same thing. All data are archived in memo card, and the pressure sensor data are transmitted in real time by ARGOS.

This bi-sensor station will be in test at Brest for few months and will be definitely installed in Kerguelen in December 2005.

Absolute reference



Great efforts have been done during the last few years to reference our tide gauges. In Kerguelen a GPS station has been installed at 50 m of the tide gauge for few months in 2004. In a near future this GPS will become a permanent GPS station. In December 2004 a complete levelling have been done between the tide gauge, the GPS antenna and the tide pole (already referenced to the local hydrographic zero). In between these levelling programme, a monthly tide pole lecture programme is now running at Kerguelen site for quite a year now. We will hope with this programme to estimate more accurately the shape of the sensor drift.

Many scientific objectives underlie our determination to pursue sensor drifts and crust movements. It is of course to have a more reliable estimation of the long term sea level trend or for absolute calibration of altimetric data but more generally to improve by the way our knowledge of sea level variability.

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