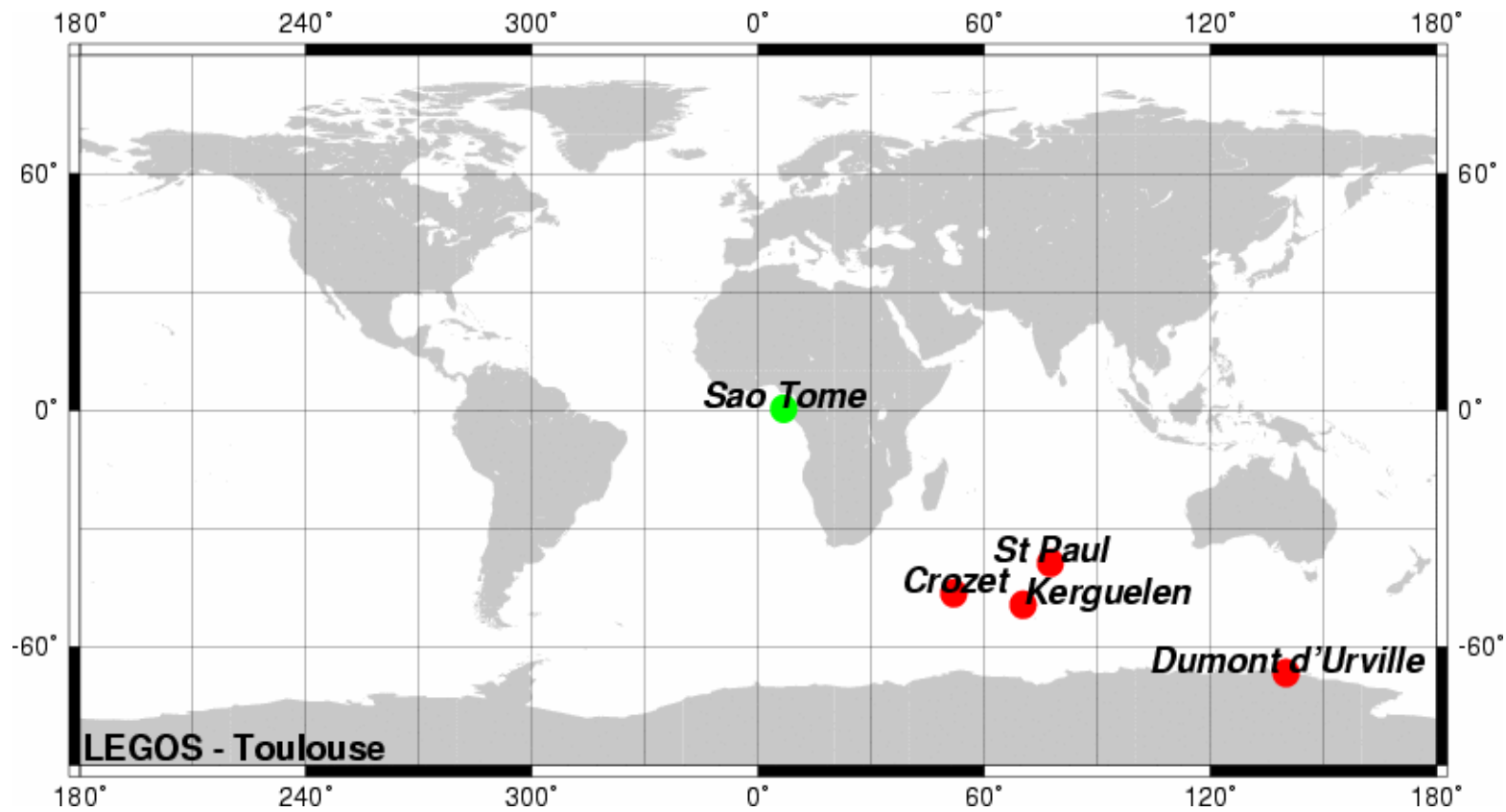


An automatic acquisition/quality
control/fast delivery software for
real time follow-up of the data
coming from a tide gauge network

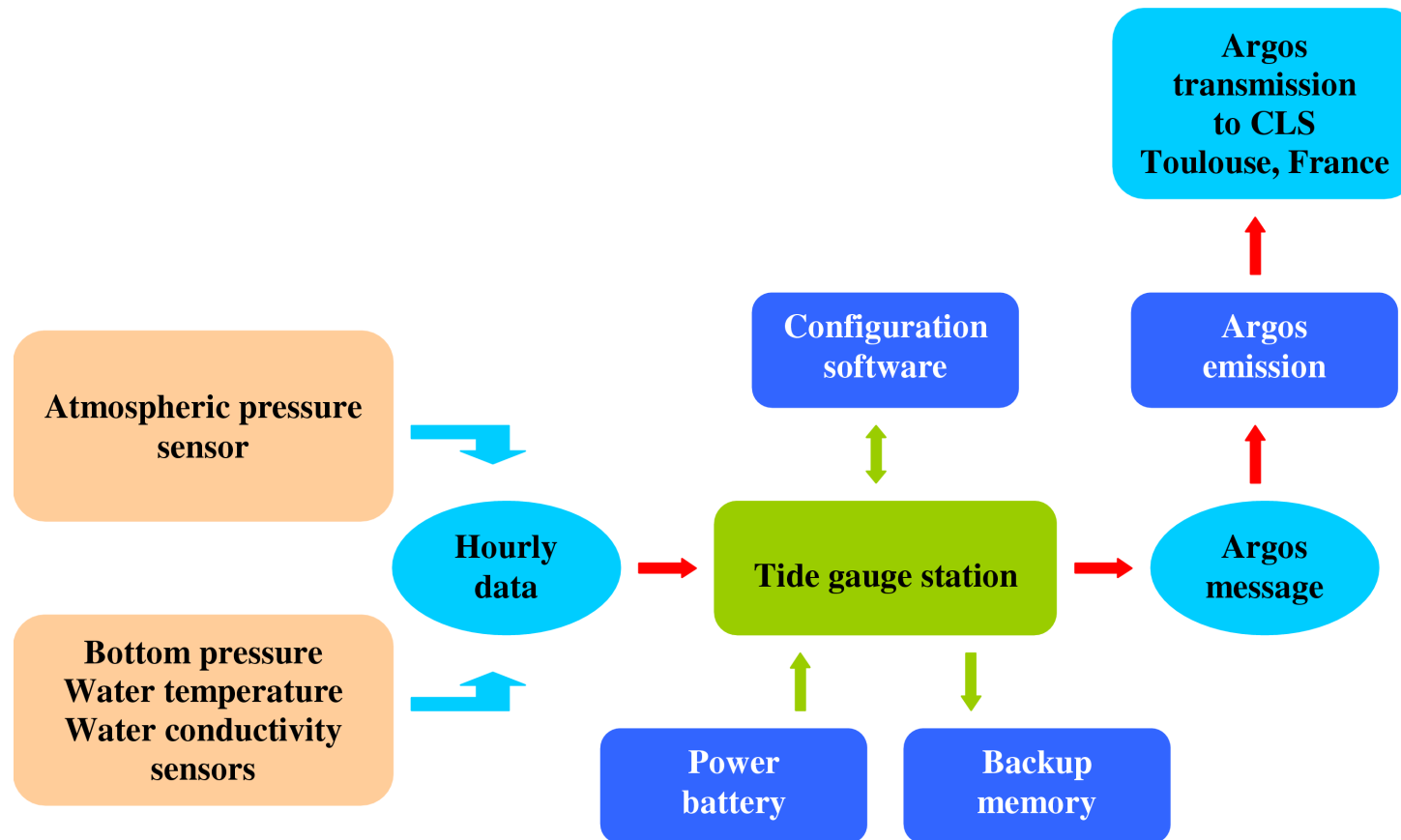
*Philippe Téchiné, Bruno Buisson,
Laurent Testut and Christian Le Provost
LEGOS UMR5566 CNES/CNRS/IRD/UPS
OMP Toulouse - France*



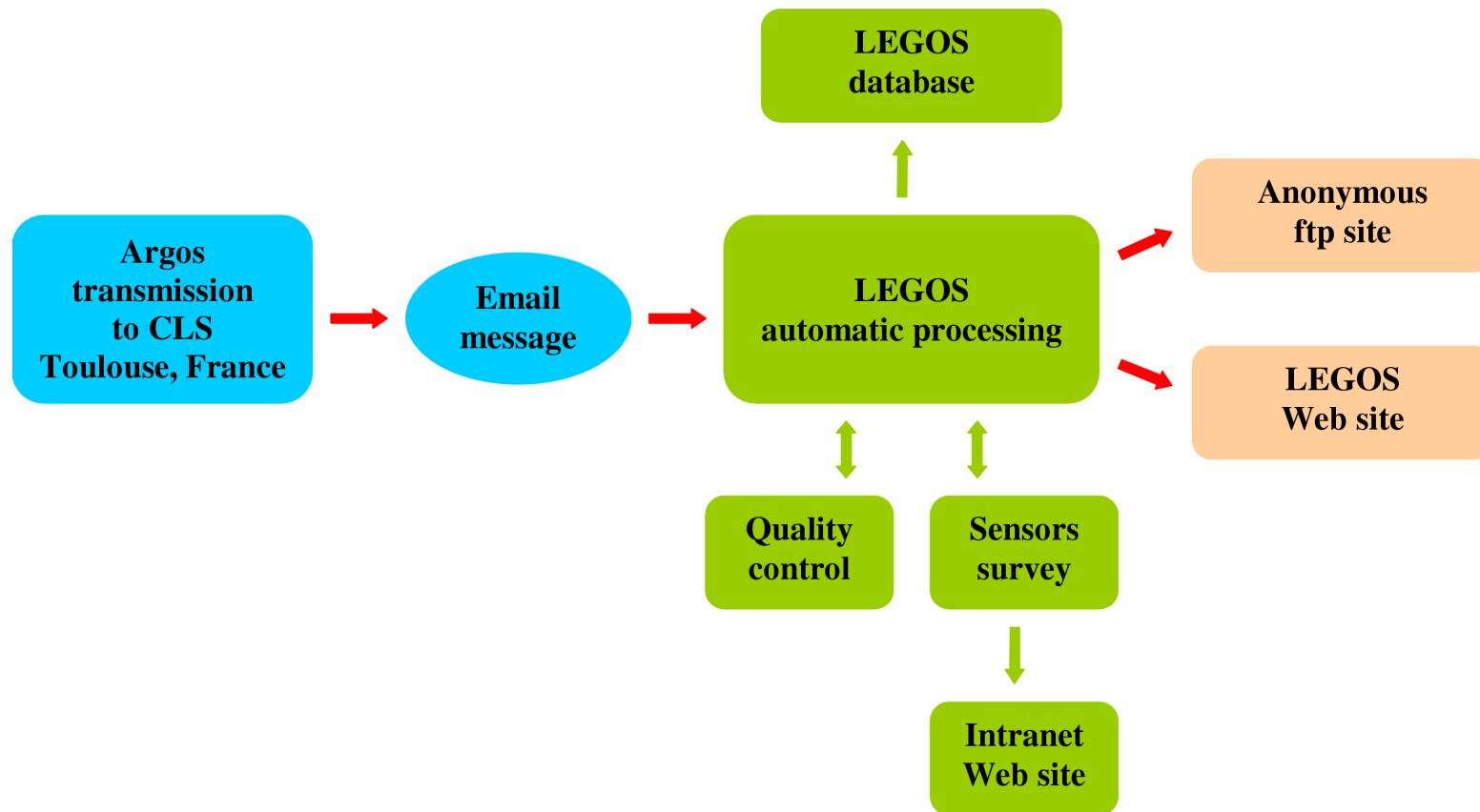
ROSAME network & Sao Tomé



Automatic real time acquisition and transmission of the data



Automatic acquisition/quality control/fast delivery software



Software characteristics

- *The processing program is based on modules written in Perl language.*
- *Graphics are done with GD::Graph Perl module.*
- *Visualization of the data is done on dynamic Web pages, generated by a Perl CGI module.*



Automatic acquisition

- *Argos messages are collected by CLS, then sent towards a dedicated email address to the « Service d'Observations » of the LEGOS.*
- *Each email containing Argos messages automatically activates the processing.*
- *About 60 emails are received a day from 4 tide gauge stations.*



Automatic processing steps 1/2

- *Argos telemetry is decoded and raw data are computed.*
- *Multi transmission of values by Argos system is used to control quality.*
- *For each sensor, the value repeated the biggest number of times is kept.*

```
01009 14719 9 32 K
2003-10-02 22:10:17 1
B0 BA 81 80
83 80 7C 7F
8B 66 C7 B5
9E 70 78 8D
EE 07 F4 A0
F7 4F 60 7D
B2 49 49 48
CA C7 40 80
01009 14719 9 32 L
2003-10-02 23:08:21 1
B8 BA 80 81
80 83 80 7C
8B 72 F7 CF
5E D6 79 C1
E2 37 B8 1F
D2 4F 60 7D
AB 47 49 49
48 CA C7 10
```



Automatic processing steps 2/2

- *Physical values are computed from raw data using sensors calibration values.*
- *As we have simultaneous measures, we can compute the following parameters:*
 - ▶ *Seawater salinity from conductivity, temperature and bottom pressure (UNESCO algorithm).*
 - ▶ *Seawater density from temperature and salinity (UNESCO formula).*
 - ▶ *Sea level from atmospheric pressure, bottom pressure, seawater density and gravity:*
$$h = (P_{\text{bottom}} - P_{\text{atmos}}) / (\rho * g)$$
- *Database is updated.*

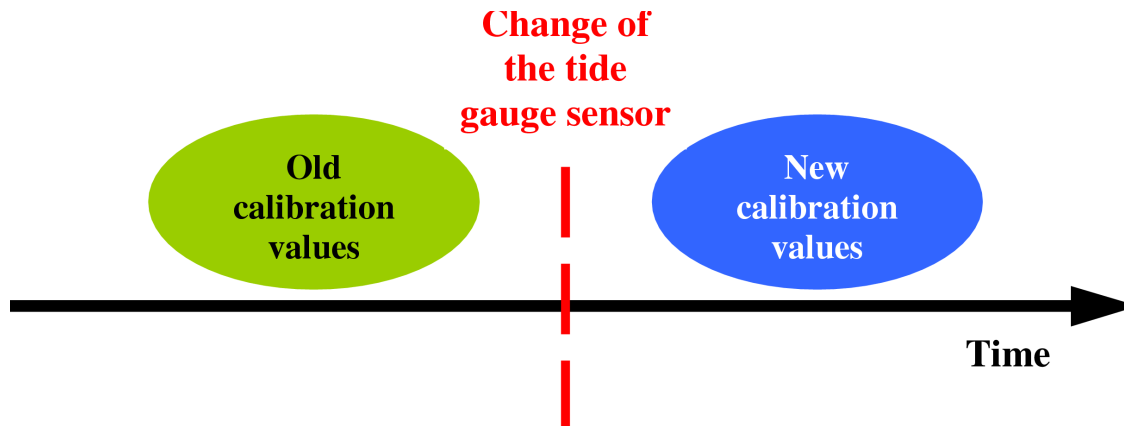


Use of chronograms 1/2

- *To describe the state of the parameters and follow their evolutions according to time.*
- *Examples:*
 - ▶ *Type of tide gauge station: MarArgos 200, Mors, Elta.*
 - ▶ *Type of pressure sensor (Aanderaa, Paroscientific) and atmospheric sensor (Orion, Paroscientific, Vaisala).*
 - ▶ *State of tide gauge stations and sensors.*
 - ▶ *Sensors calibration sheet.*
 - ▶ *Acquisition time step of the data.*



Use of chronograms 2/2



- *Very easy to (re)compute historical data, including all hardware modifications or changes in calibration values.*



Quality control 1/2

- *Electronic mail is used as an alarm system.*
- *An alarm email is sent if the following cases occur:*
 - ▶ *A new initialisation message is sent from the tide gauge station.*
 - ▶ *Same Argos message is always received from a tide gauge station.*
 - ▶ *There was no Argos message received from a tide gauge station for 12 hours.*
 - ▶ *An error arises during the automatic processing steps.*



Quality control 2/2

- *Values exceeding sensors thresholds are removed.*
- *Gaps between successive acquisitions are computed and compared to detection thresholds of measure error: **An alarm email is sent** in case of overtaking the detection thresholds.*
- *A visual control of the data is realized every day on the « Service d'Observations » of the LEGOS intranet Web site.*



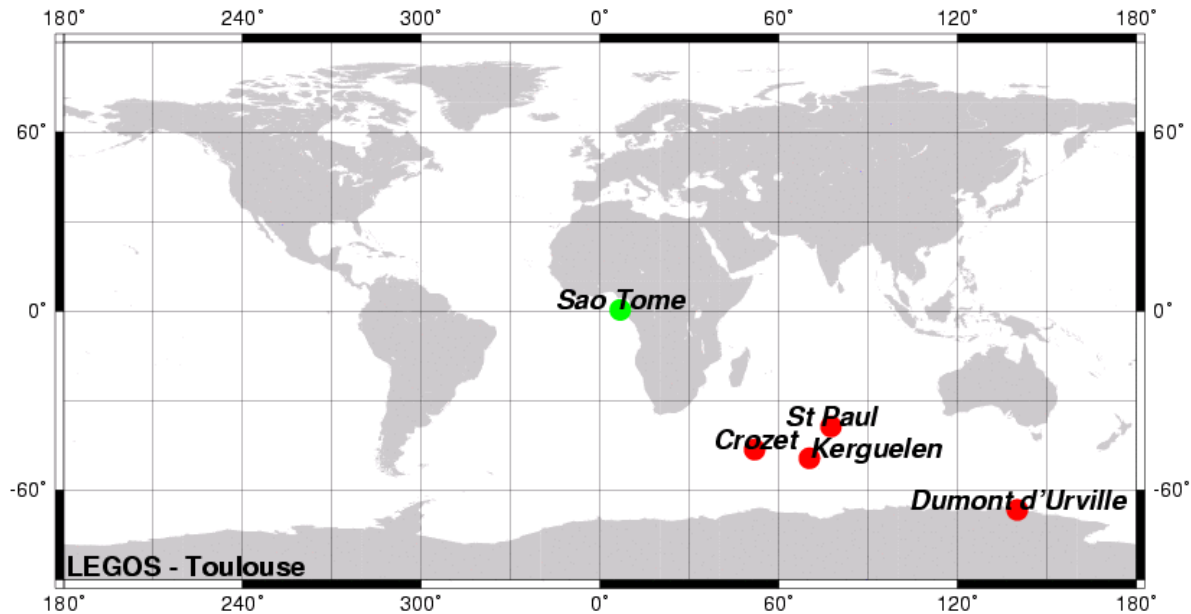
Service d'Observations of the LEGOS

Real time follow-up of the coastal tide gauge stations

Map

ROSAME network: [Kerguelen](#) [St Paul](#) [Crozet](#) [Dumont d'Urville](#)
Other tide gauge stations: [Sao Tome](#)

Map of the locations of the coastal tide gauge stations



Netscape: Service d'Observations

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Location: <http://intranet.legos.cnes.fr/services/observations/getobs/mrg/v0.0/cotier/tps-reel.pl.cgi?site=KER¶metre=AIR>

Members WebMail Connections BizJournal SmartUpdate Mktplace

Real time follow-up of Kerguelen coastal tide gauge station

Last updated processing on 03/10/2003 14:10:01 UT
Latitude = 49 20.7S Longitude = 070 13.2E
[AIR SEA parameters](#) [TECHNO parameters](#)

230 values from 24/09/2003 00:00:00 to 03/10/2003 13:00:00 UT

hPa

days

Atmospheric pressure min=965.9 max=1022.0 last=982.3 hPa

230 values from 24/09/2003 00:00:00 to 03/10/2003 13:00:00 UT

degrees

days

Water temperature min=2.5 max=4.4 last=3.8 degrees

230 values from 24/09/2003 00:00:00 to 03/10/2003 13:00:00 UT

hPa

days

Bottom pressure min=985.4 max=1208.6 last=1146.8 hPa

Fast delivery

- *Today: Sea level data are sent to Hawaii Sea Level Center on a monthly basis.*
- *In 2004, ROSAME & Sao Tomé database will be weekly updated on an anonymous ftp site.*
- *When all steps of the automatic acquisition/quality control software will have been optimized, we will expect to deliver our data on a daily basis.*



In the future

- *Same algorithm will allow to recompute historical data (chronograms).*
- *Sea level data from ROSAME network & Sao Tomé will be accessible in real time on the LEGOS Web site.*
- *This automatic acquisition/quality control/fast delivery software for real time follow-up can be extended to new tide gauges or new transmission systems.*

