NETWORK STATUS AND ENHANCEMENT GOALS FOR EXTENSION

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The current network (June 2002)

- Lowest orbit coverage (SPOT-2 & 4): 86 % (visibility circles on the map)
- Highest orbit coverage (Jason): 98 %
- 54 stations, 30 countries
Distribution of the DORIS equipment

Version 1.0 or 1.1 beacon

- Alcatel antenna
- Starec antenna
- 10 stations
- 28 stations

Version 2 beacon

- Alcatel antenna
- Starec antenna
- 1 station
- 13 stations

Version 3 beacon

- Alcatel antenna
- Starec antenna
- 1 station
- 1 station
The third generation stations

- Beacon
- Charger
- Battery
- Antenna
- Meteorological station
The third generation beacons: deployment schedule

- Third generation beacons already installed:
  - Toulouse (master beacon)
  - Tristan da Cunha

- Currently shipping:
  - Mahe
  - St-Helena
  - Cibinong

- Planned upgrades in 2002:
  - French Southern Indian Ocean territories
  - Included in next stations renovations, availability permitting
Maintenance statistics

• IGN’s maintenance service handles around 130 intervention requests per year (of which 12 beacon exchanges)
• Failure causes (model 1.0):
  – Power supply : 80 % (not solved with the 1.1 upgrade)
  – Oscillator : 10 %
  – Amplifier : 10 %
• Second generation beacons:
  – 6 failures in three years, out of 14 installed beacons
  – All failures : amplifier problems
• Third generation beacons:
  – Deployment has just started, due to delayed delivery by the manufacturer
• Average operation rate : 85 % (--> Jason coverage > 90 %)
Collocations with other IERS techniques (1)

35 DORIS stations out of 54 are collocated with other techniques:

- With GPS: 34 sites
- With SLR: 12 sites (of which 6 permanent lasers)
- With VLBI: 13 sites (of which 7 permanent VLBIs)

Detailed distribution:
- GPS only: 16 sites
- GPS + SLR: 5 sites
- GPS + VLBI: 7 sites
- GPS + VLBI + SLR: 6 sites
- SLR only: 1 site
Collocations with other IERS techniques (2)
17 DORIS stations are less than 10 km from a GLOSS tide gauge
Evolution of the network

Year:
- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001

Number of stations (end of the year):

Renovations:

Satellites:
- SPOT-2
- SPOT-3
- SPOT-4
- TOPEX
- JASON

Legend:
- Yellow bars: Number of stations (end of the year)
- Green bars: Renovations
The network renovation action

- Global network renovation action decided at the end of 1999
- Main objective: improve the antenna long term stability, to make it compatible with the current and future positioning accuracy of the DORIS system
- Progress:
  - 6 stations in 2000
  - 11 stations in 2001
  - 3 stations (of which 2 very remote ones) so far in 2002
  - Several under way…
- Results to date: more than half of the stations meet the new stability requirement (vs 1/6 two years ago)
The antennas estimated stability has been classified into four categories:

- **The first two categories are regarded as meeting the new stability requirements:**
  - **Excellent (24 stations):**
    - Concrete pillar deeply anchored into the ground (design varies according to ground nature)
    - Rigid tower (30 cm sided, no guy-wires necessary) on a deeply founded concrete footing
  - **Good (4 stations):**
    - Rigid tower on a not-so-deep footing
    - Rigid tower (30 cm sided, or very short 15 cm sided) on a stable part of a low-elevation building: the only option in some « difficult » cases.
The other two categories are not satisfactory and a station renovation is necessary:

Dubious (17 stations):
- Guyed tower installed as of 1990, at ground level or on the stable part of a low-elevation building

Poor (9 stations):
- Guyed tower installed before 1990
- Guyed or rigid tower on a building not considered stable enough
Warning: the above classification is only an estimation!

- Some antennas on guyed towers still centered within 1 mm after several years

- Antenna on a concrete pillar tilted by several cm due to corrosion of the supporting plate
Antennas estimated stability (June 2002)
Examples of DORIS antenna layouts

Concrete pillar  
Tower on the ground  
Low-elevation building
Examples of pillar designs

Bedrock at or near ground level

No bedrock, but hard soil

Soft soil
Network renovation progress

- Poor
- Dubious
- Good
- Excellent

June 2000: 40 Poor, 10 Dubious, 5 Good, 15 Excellent
June 2001: 30 Poor, 20 Dubious, 10 Good, 10 Excellent
June 2002: 20 Poor, 30 Dubious, 5 Good, 10 Excellent
The network extension aims at achieving the following goals:

- Improve the global orbit coverage
- Improve the number of collocations with tide gauges (CNES/GRGS/LEGOS research proposal)
- Follow up the IDS proposals for new stations
Goal 1: orbit coverage improvement

Note: visibility circles for SPOT-2 and SPOT-4 altitude and cut-off angle
Goal 2: new tide gauge collocations
Goal 3: IDS stations proposals
Review by Frank Lemoine (NASA/GSFC), chairman of the group:

- 23 proposals received (14 of which recently confirmed)
- 2 experiments already completed:
  - Sorsdal: moving ice field monitoring by AUSLIG (Dec’01 - Jan’02)
  - Ajaccio: altimeter calibration site in Corsica, DORIS installed Feb’02
- Selected proposals in 2002:
  - Gavdos (Crete): altimeter calibration and replacement of Dionysos
  - Burnie (Australia): supports long-standing altimeter calibration site in Bass Strait.
  - TIGO: will provide a long term tie in the Southern hemisphere between four geodetic techniques (SLR, DORIS, GPS, VLBI).

Criteria for selection:
- The stations should have a solid scientific justification.
- Local configuration OK for DORIS installation
- More information needed on some proposals
- More proposals should be encouraged in other areas, provided beacons can be made available in a timely manner.