

# 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



Version 2 beacon

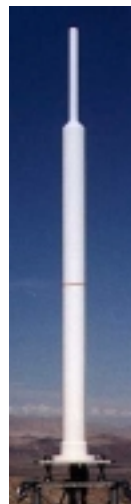


Version 3 beacon



Alcatel antenna

10 stations



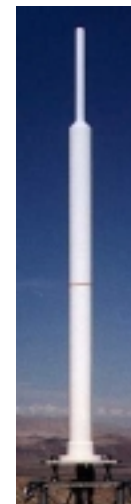
Starec antenna

28 stations



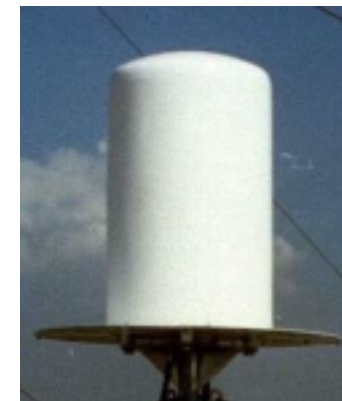
Alcatel antenna

1 station



Starec antenna

13 stations



Alcatel antenna

1 station

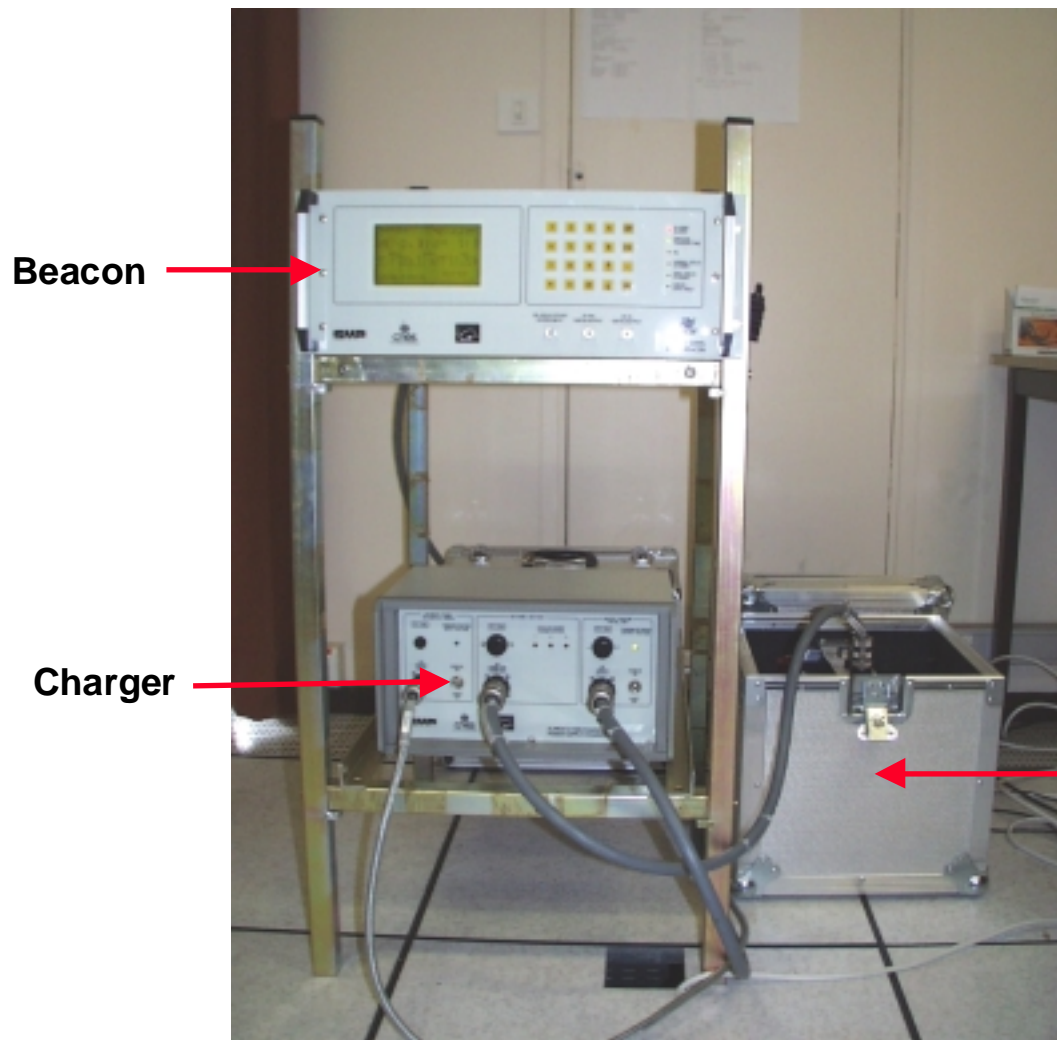


Starec antenna

1 station



# The third generation stations



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

- **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 %)**

**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 VLBI)**

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)



■ 3 other techniques (6 stations)

● 1 other technique (17 stations)

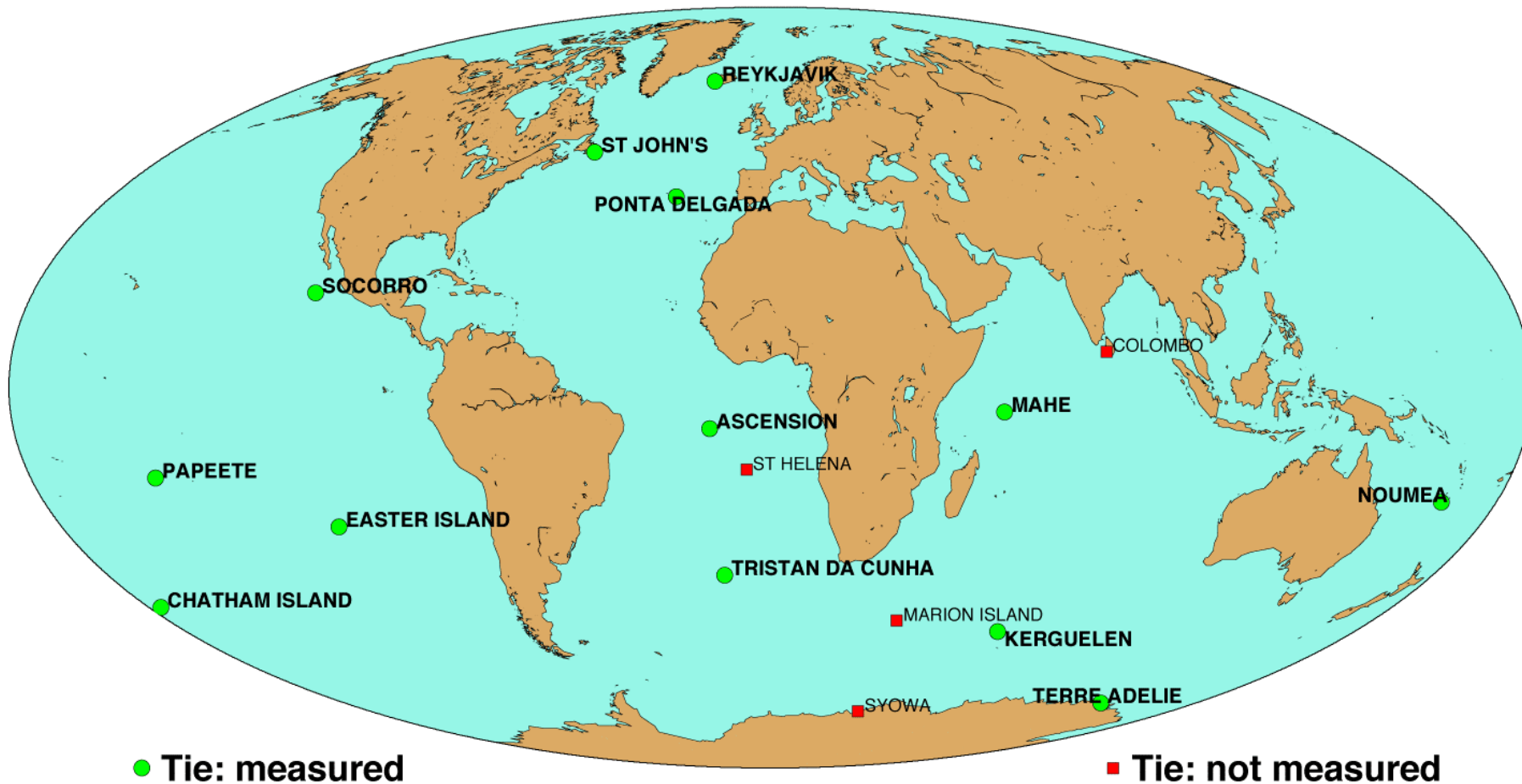
◆ 2 other techniques (12 stations)

○ No collocation (19 stations)

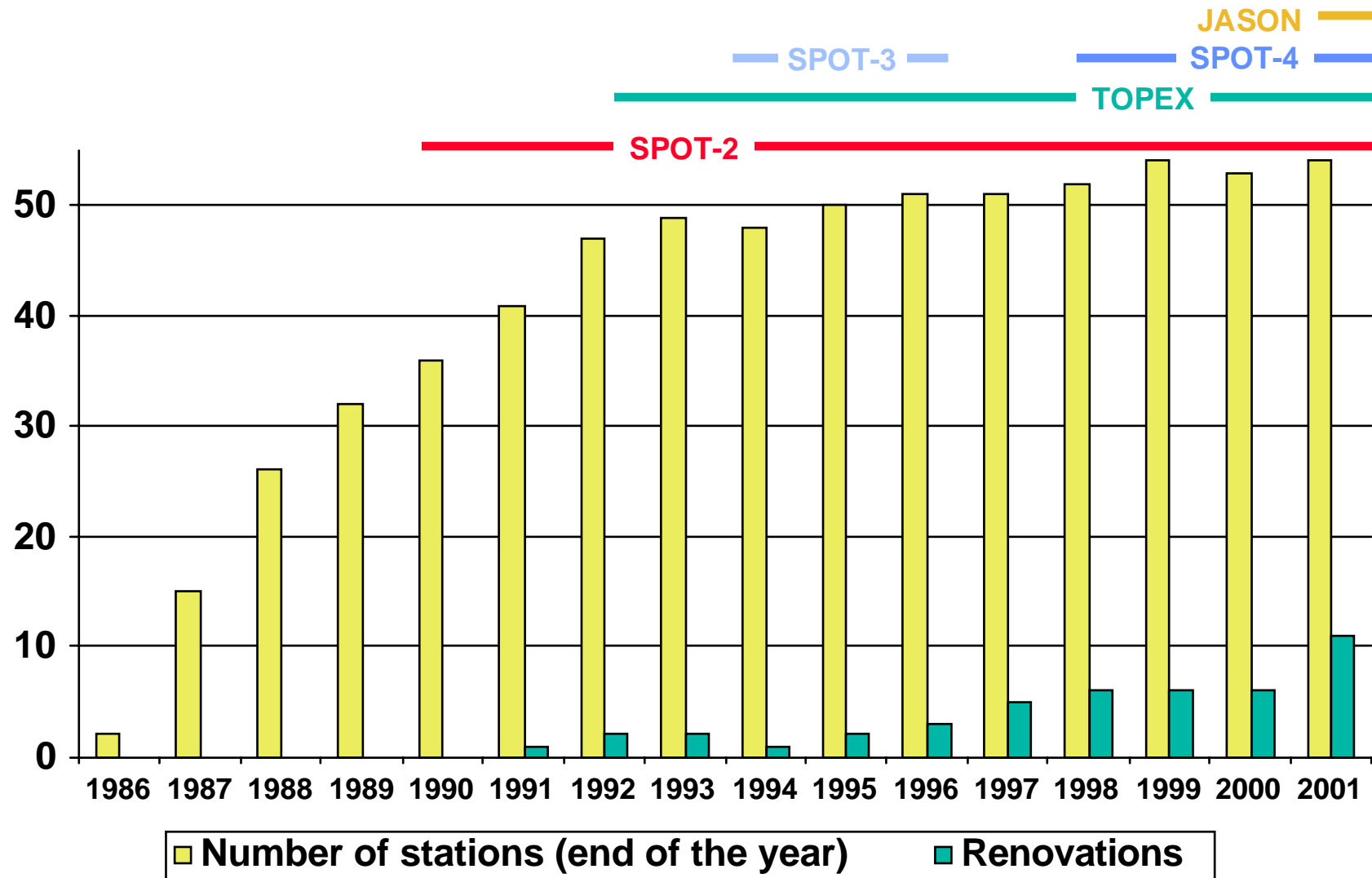


## Collocations with GLOSS tide gauges

17 DORIS stations are less than 10 km from a GLOSS tide gauge



# Evolution of the network



## 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)



○ excellent      ■ good      ▼ dubious      ◆ poor

## Examples of DORIS antenna layouts

**Concrete pillar**



**Tower on the ground**

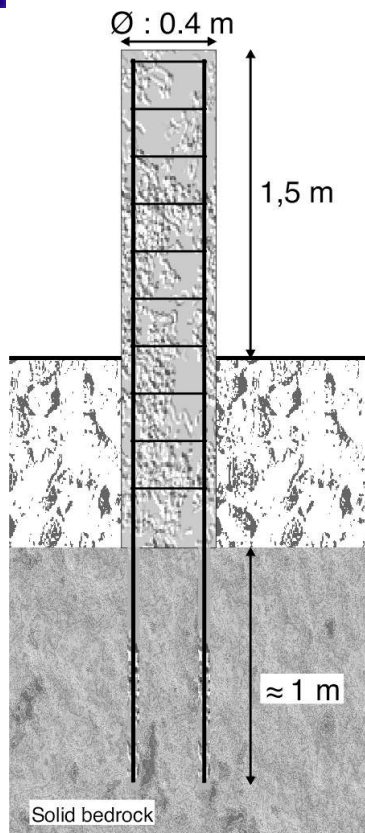


**Low-elevation building**

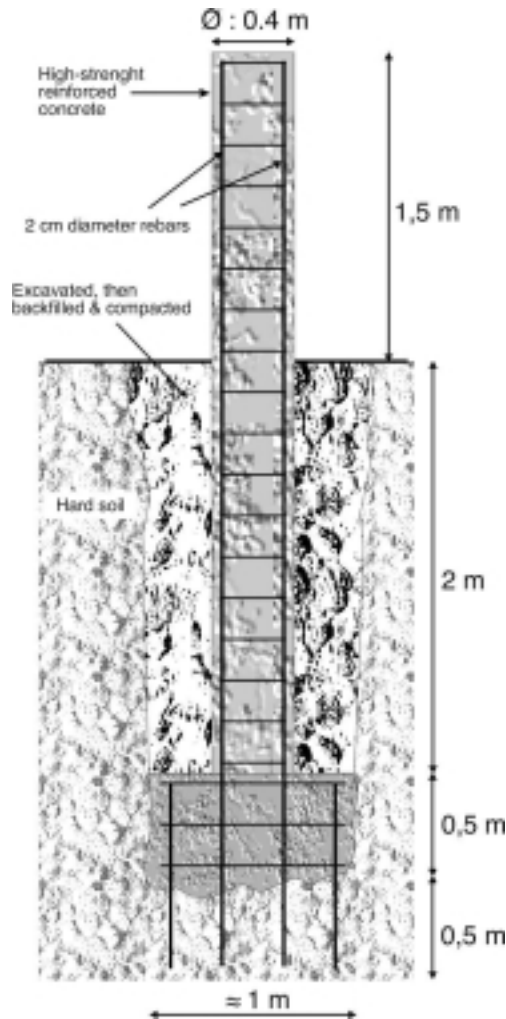




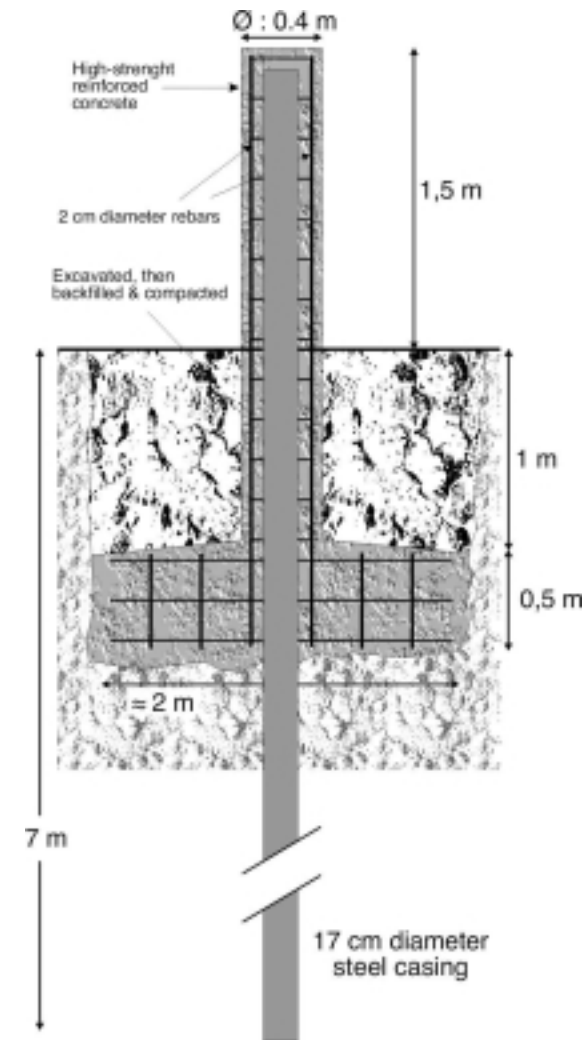
# Examples of pillar designs



**Bedrock at or near ground level**

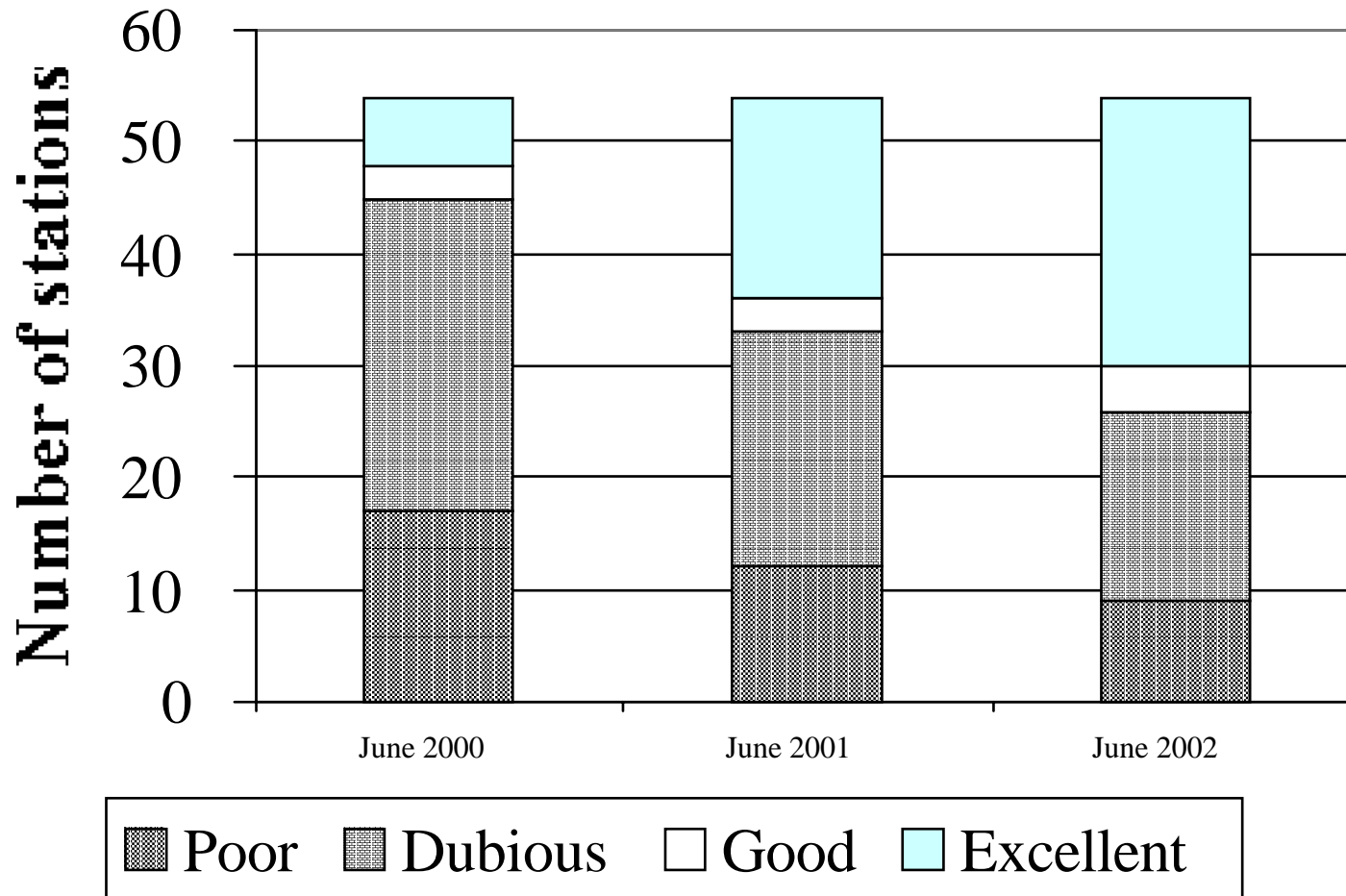


**No bedrock, but hard soil**



**Soft soil**

## Network renovation progress

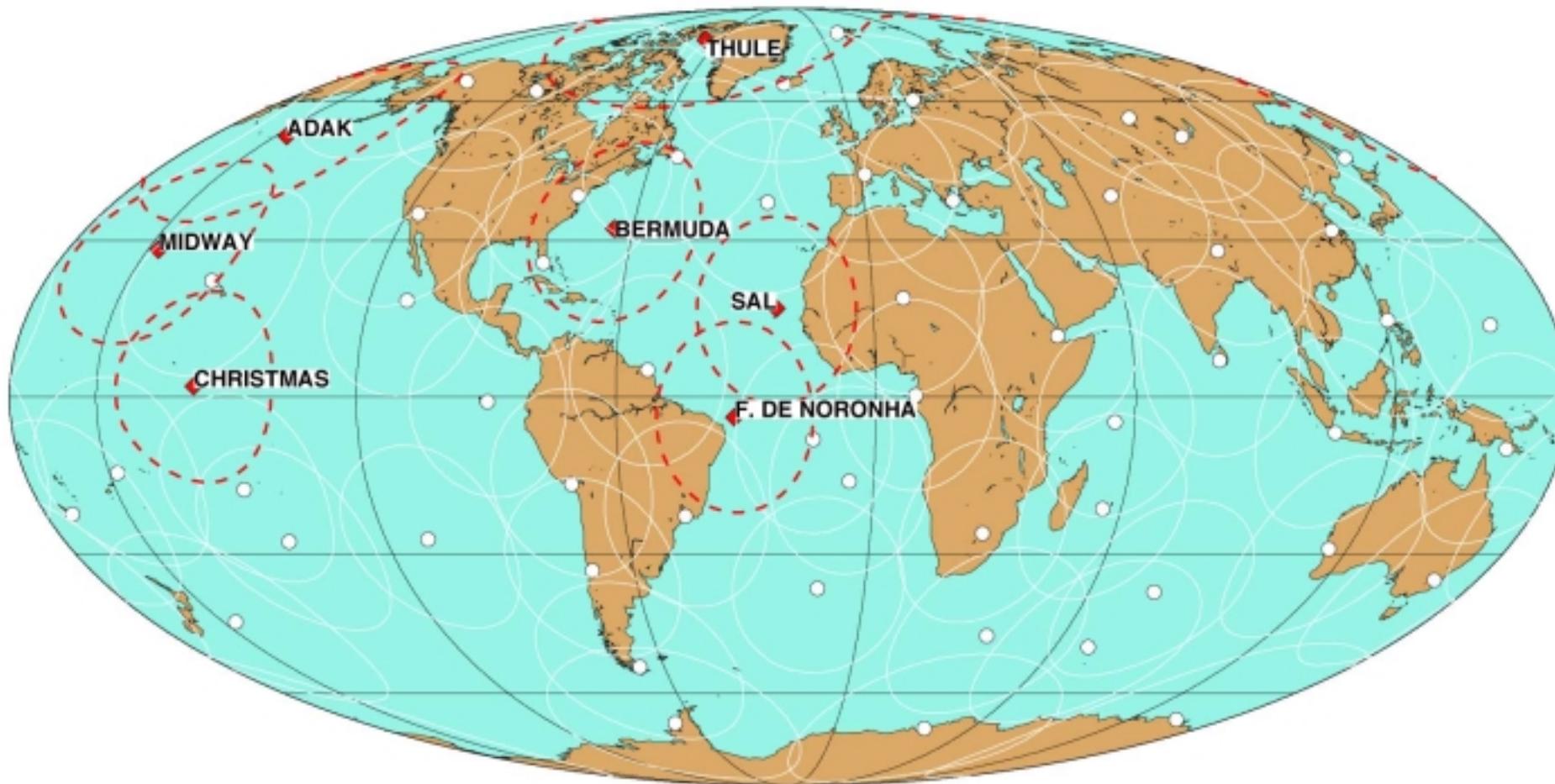




**The network extension aims at achieving the following goals:**

- **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



○ Current DORIS station

▲ Planned new station

▼ Planned station move

## Goal 3: IDS stations proposals



● **Realized**

▲ **Confirmed**

▼ **Not confirmed**

### **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.**