

# The Antarctic Sorsdal Glacier Experiment

**Ramesh GOVIND, Jean-Jacques VALETTE  
and John DAWSON**

**National Mapping Division  
Geoscience Australia  
PO Box 2  
Belconnen, ACT, 2616  
Australia**

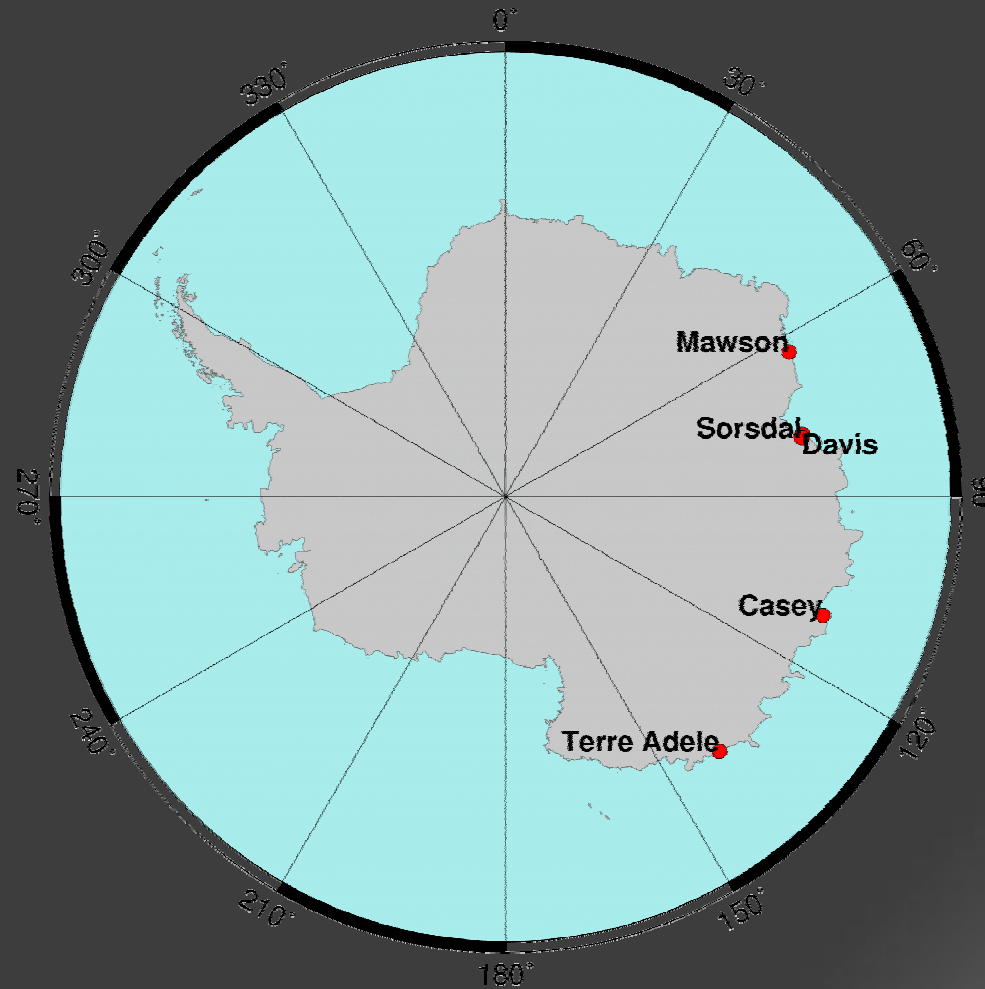
**Geoscience Australia**  
[www.ga.gov.au](http://www.ga.gov.au)



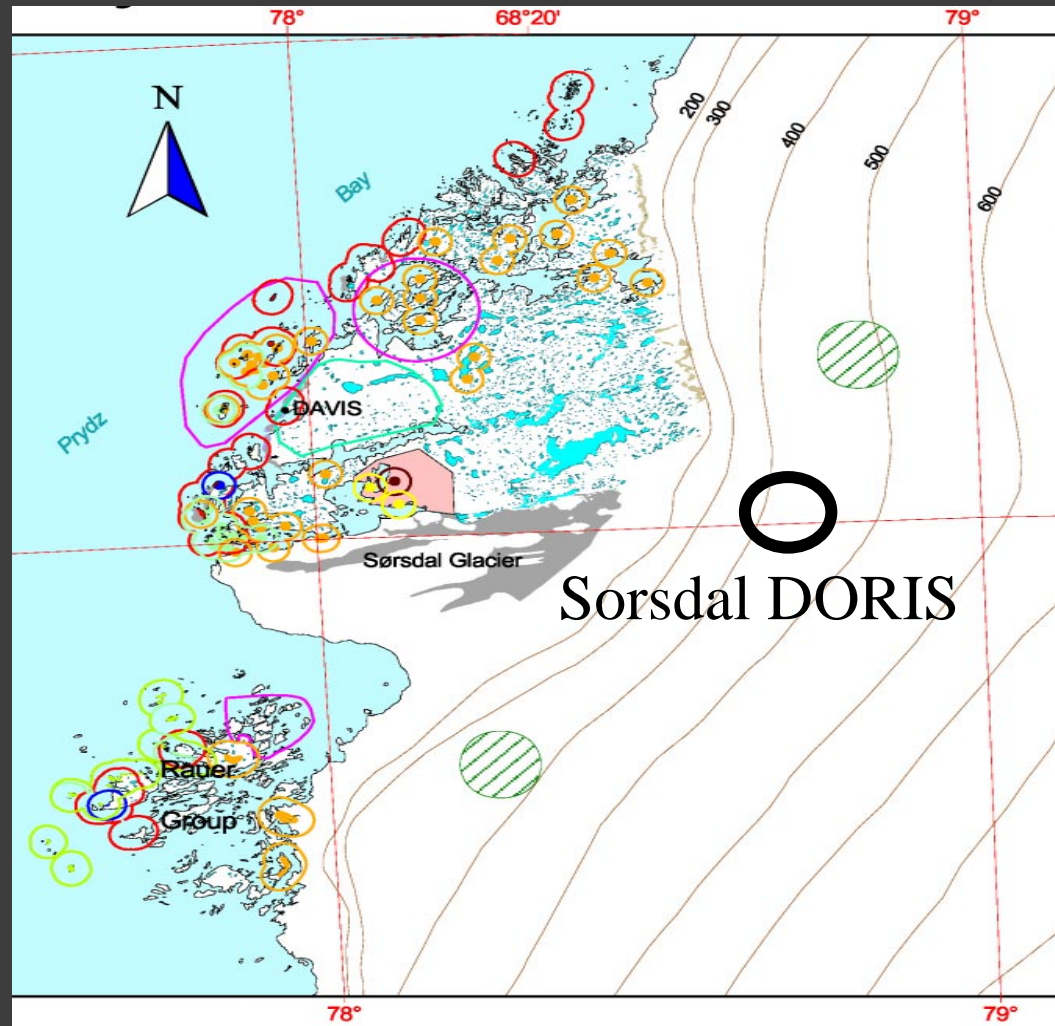
01/0000

# The Antarctic Sorsdal Glacier Experiment

## Glacier Location



# The Antarctic Sørsdal Glacier Experiment Glacier Location



## The Antarctic Sorsdal Glacier Experiment

- During the period 12<sup>th</sup> December 2001 to 5<sup>th</sup> February 2002, Geoscience Australia deployed a DORIS beacon on the Sorsdal Glacier, located in the vicinity of the Davis Station (68°S-78°E), Australian Antarctic Territory.
- It is the first site selected for the IDS DORIS Pilot Experiment



## The Antarctic Sorsdal Glacier Experiment Rationale

- **DORIS provides an ideal technique for determining the high temporal resolution of the ice movement in a remote location.**
- **Approximately 23-25 passes per day**
  - 8-10 SPOT-2 passes/day
  - 8-10 SPOT-4 passes/day
  - 5 TOPEX/Poseidon passes/day



## The Antarctic Sorsdal Glacier Experiment Rationale

- **The Sorsdal Glacier is one of the key polar outlet glaciers that contribute to the drainage of the East Antarctic ice sheet.**
- **The objective of the investigation is to identify and monitor zones of fast flowing ice.**



## The Antarctic Sorsdal Glacier Experiment Rationale

- **The measurement of ice movement provides the basic data to compute the strain and strain rates across the ice mass and advance our understanding of glacier dynamics.**
- **The Sorsdal Glacier and its drainage basin offer an ideal region to study.**

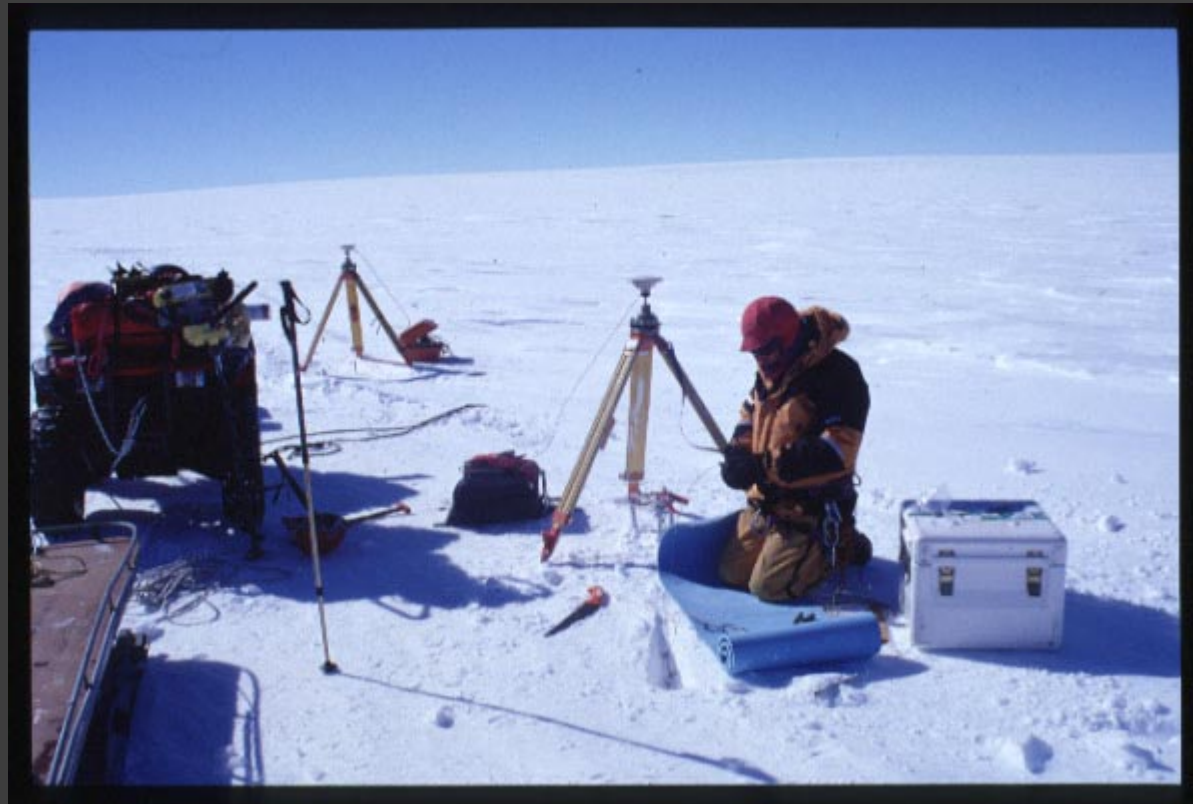


# The Antarctic Sorsdal Glacier Experiment Setting Up

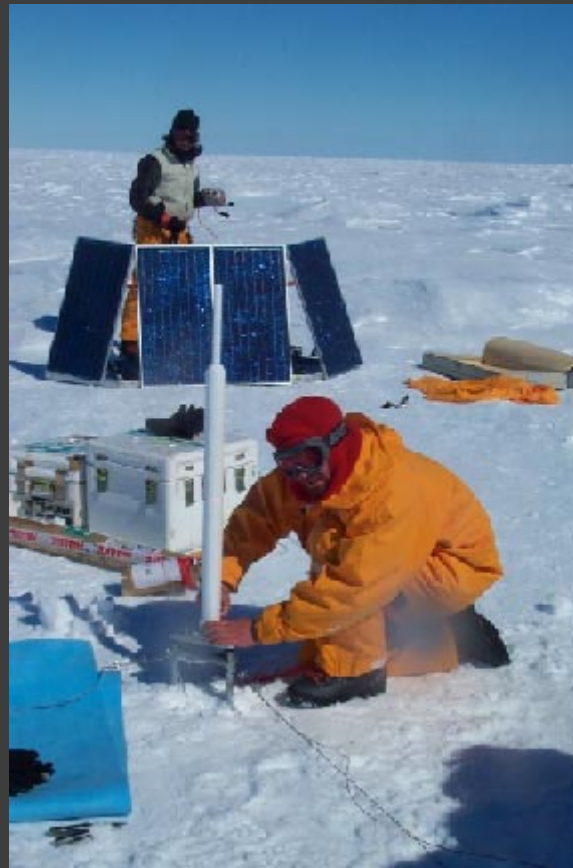




# The Antarctic Sorsdal Glacier Experiment Setting Up



# The Antarctic Sorsdal Glacier Experiment Setting Up



# The Antarctic Sorsdal Glacier Experiment Final Set Up



# The Antarctic Sorsdal Glacier Experiment Visit



# The Antarctic Sorsdal Glacier Experiment Visit



The Antarctic Sorsdal Glacier Experiment  
Data Acquisition

- **Programmed to track SPOT and TOPEX**
- **Significant number of measurements lost**
- **Low power supply**
- **Programmed for 20 passes per day --  
overload.**
- **Schedule changed to track SPOT only**



## The Antarctic Sorsdal Glacier Experiment Data Acquisition

13/12/01 to 13/01/02	SPOT-2	SPOT-4	TOPEX
# passes observed	11	59	3
# passes possible	30	163	10

The Antarctic Sorsdal Glacier Experiment  
Data Processing

- **Computations performed at CNES**
- **Valid passes tracked at Sorsdal**
- **48 hour MOE/CNES orbit**
- **Solutions computed**
  - **successive passes**
  - **at least 2 successive passes**
  - **one-day solutions**



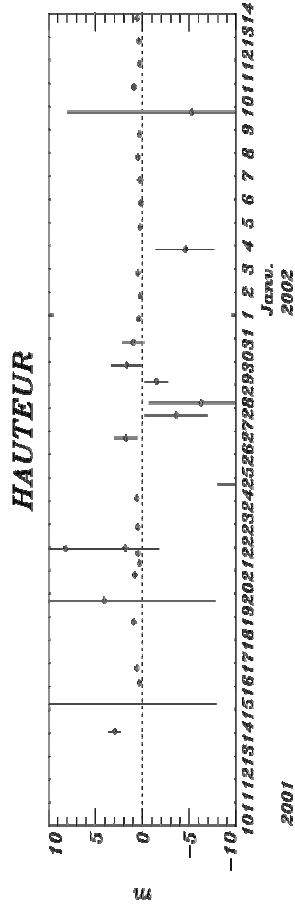
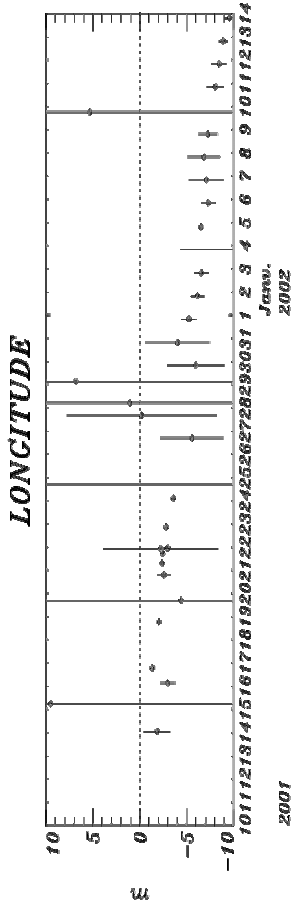
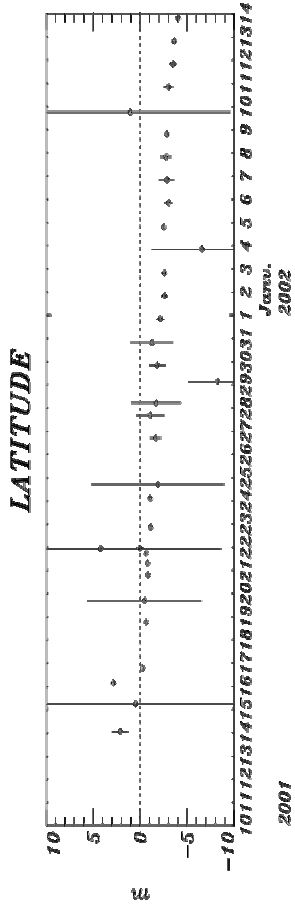


DORIS-SSALTO OPERATIONAL ABSOLUTE POSITIONING

SORSDAL

05-06-2002

Spot2/4 & Topex



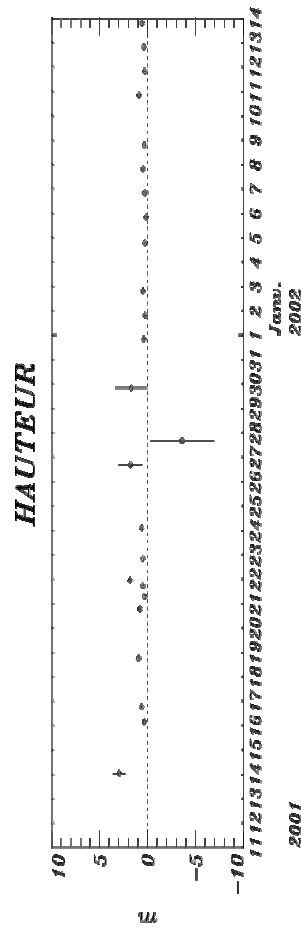
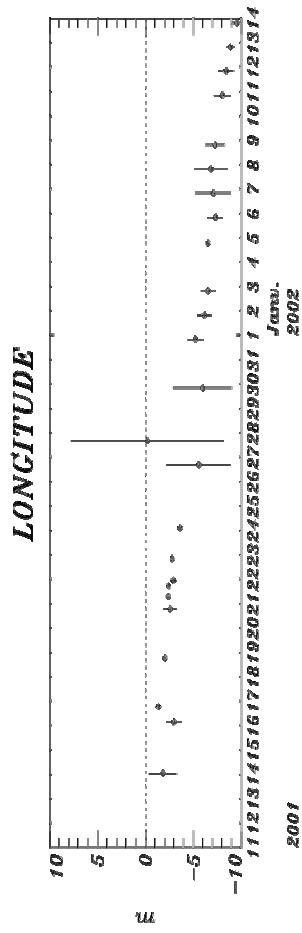
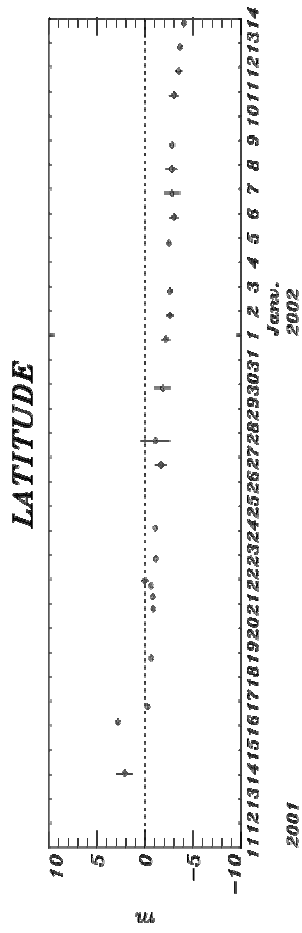
solutions with successive satellite passes, 48h MOE/CNES orbit

DORIS-SSALTO OPERATIONAL ABSOLUTE POSITIONING

SORSDAL

05-06-2002

Spot2/4 & Topex



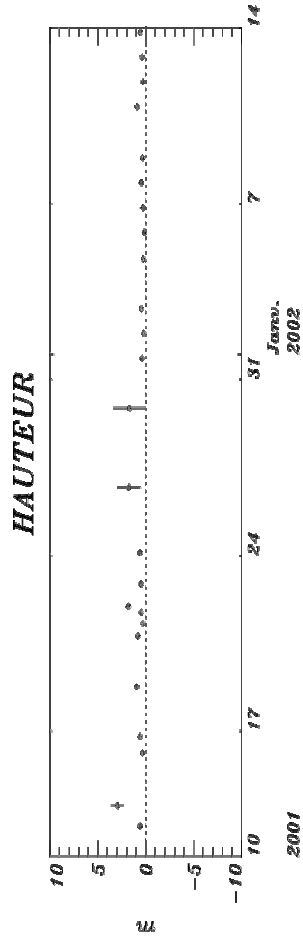
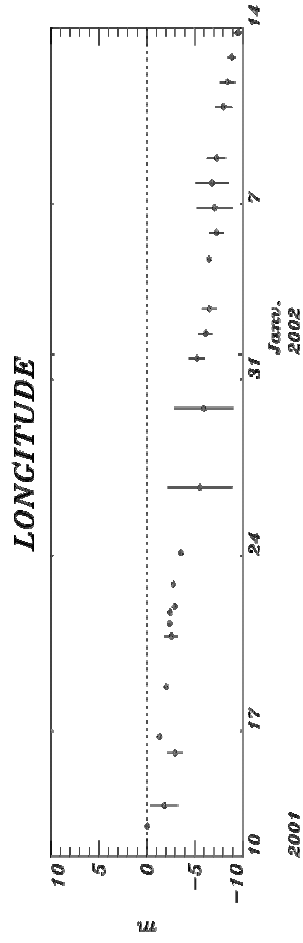
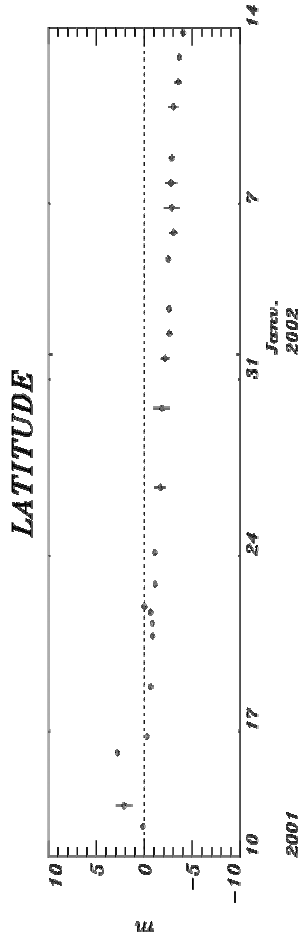
solutions with at least 2 successive satellite passes, 48h MOE/CNES orbit

# DORIS ABSOLUTE POSITIONING

SORSDAL

05-06-2002

Spot2/4 & Topex



solutions with at least 2 successive satellite passes, 48h MOE/CNES orbit

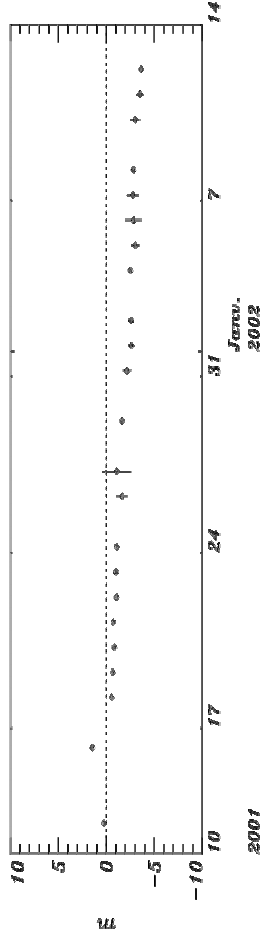
# DORIS ABSOLUTE POSITIONING

SORSDAL

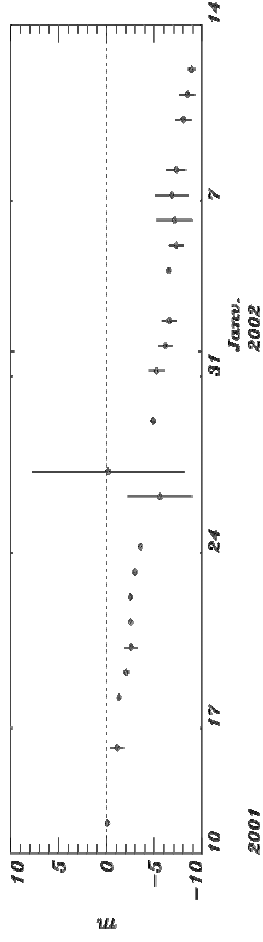
05-06-2002

Spot2/4 & Topex

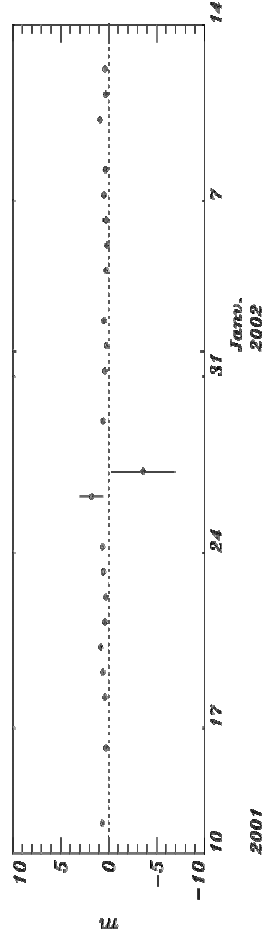
## LATITUDE



## LONGITUDE



## HAUTEUR



1 day solutions, 48h MOE/CNES orbit

The Antarctic Sorsdal Glacier Experiment  
Conclusions/Problems/Lessons Learnt

- **Can achieve high temporal resolution of a glacier in Antarctica in 3-D**
- **Limiting factor -- maintaining power to the transmitter**
- **Necessary to use a “warm box” to store the beacon and batteries**