CENTRE NATIONAL D'ÉTUDES SPATIALES

CONCORDIASI

Pre-Concordiasi campaign and results as of March 29th

Sous-Direction Ballons - DCT/BL/PR, Ph Cocquerez

Outline

- Development required for CIASI
- Pre-Concordiasi main goals
- Main reasons for campaign schedule change
- Pre-Concordiasi main campaign
- Pre-Concordiasi flights
- Conclusion
- Acknowledgments

Development required for CIASI (wrt AMMA 2006)

- **Balloon lift-off capability increased to 50/55kg (+ 10kg)**
  - **Validated in 2007, Kiruna, Sweden campaign**
- **Onboard energy: more power, on longer duration, late polar winter**
  - **Through renewable energy: solar panels and Li-On rechargeable batteries,**
- **Control of 3 scientific instruments per flight**
- **Improved thermal control of the gondola**
  - **Increase confidence level, mission and safety critical**
  - **Optimise the warming strategy for a better mission management**

Development required for CIASI (wrt AMMA 2006)

- **Control Centre**
  - **Develop the two main components (Launch Control Center, and Central Control Center). Make it as less as possible dependant on a reliable Internet link**
  - **Develop flight management tools and associated procedures consistent with the flight safety rules (air traffic and population)**
  - **Develop the scientific data collection and dispatching systems, meeting the time requirements for placing them on the GTS for Operational meteorological models.**

Pre-Concordiasi main goals

Complete the validation of the flight system

On board systems :

- Energy in real environment and situation (temperature / illumination cycles, low pressure, charge / discharge…)
- Thermal models
- Availability of the Iridium link, check of the end to end performance with the additional peripheral systems (energy and scientific instrument management)
- Performance of the helium gas valve, vehicle mass management of the MSD flight (Driftsonde)

Operability and performance on the control centres: CCL et CCT

Pre-Concordiasi main goals

- **Complete the validation of the scientific instruments**
  - **LMDOZ : 1st flight test of this ozone photometer,**
  - **WPC : 1st Long Duration flight of this particle counter,**
  - **Driftsonde : 1st LD flight after**
    - Upgrading of the drop-sonde release system,
    - Adaptation of the gondola to long duration (6 weeks)
    - Upgrading of the WEB based dropsonde command system (activation by Meteo-France)
- **Validation of the data transmission loop to the GTS**
  - **TSEN data and balloon position, automatically collected and made available on the Web in Toulouse at the CCT, then transferred to the GTS by LMD**
  - **Dropsondes data through Driftsonde control center (Boulder), made available on the Web in Boulder at the DS Control Centre, then transferred to the GTS**
- **Opportunity scientific goals (IASI et Stratéole-2 mission type demonstration)**

Pré-Concordiasi
main reasons for campaign schedule change

- **Onboard software**
  - Stability of the main gondola management software
  - Compatibility between main and peripheral software (MER and PSB)
- **Ground software**
  - Stability of the automatic calling software
- **Li-On management system (retrofits have been necessary)**
- **Management of the Iridium communication link (adapt to late global system evolution)**

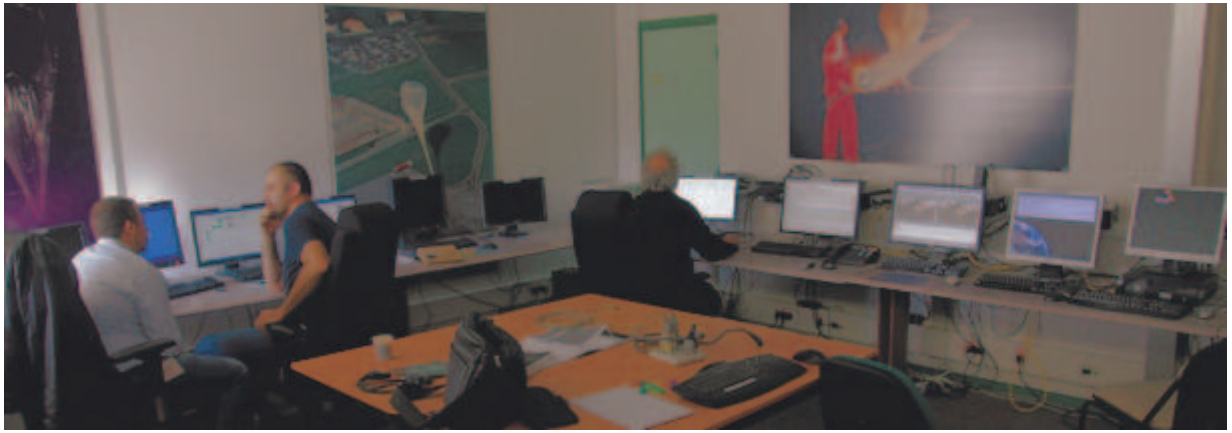
Pre-Concordiasi
from Victoria Intl. Airport

Pré-Concordiasi campaign
Installations

Pré-Concordiasi flight control

First phase: flight controlled through the CCL at launch base

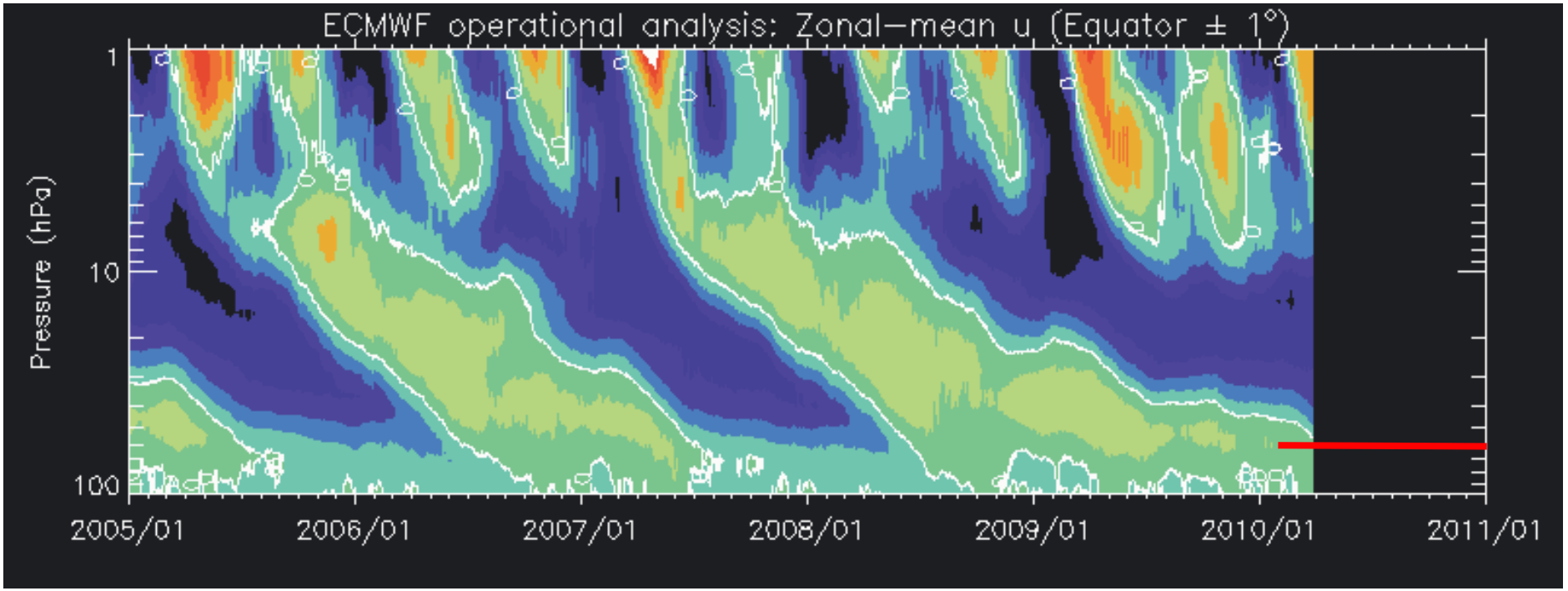
- lasts 2 to 3 days
- limited data on the WEB



Then : flight controlled through the CCT at Toulouse Space Centre

- up to flight termination
- Full data on the WEB

Pré-Concordiasi
QBO



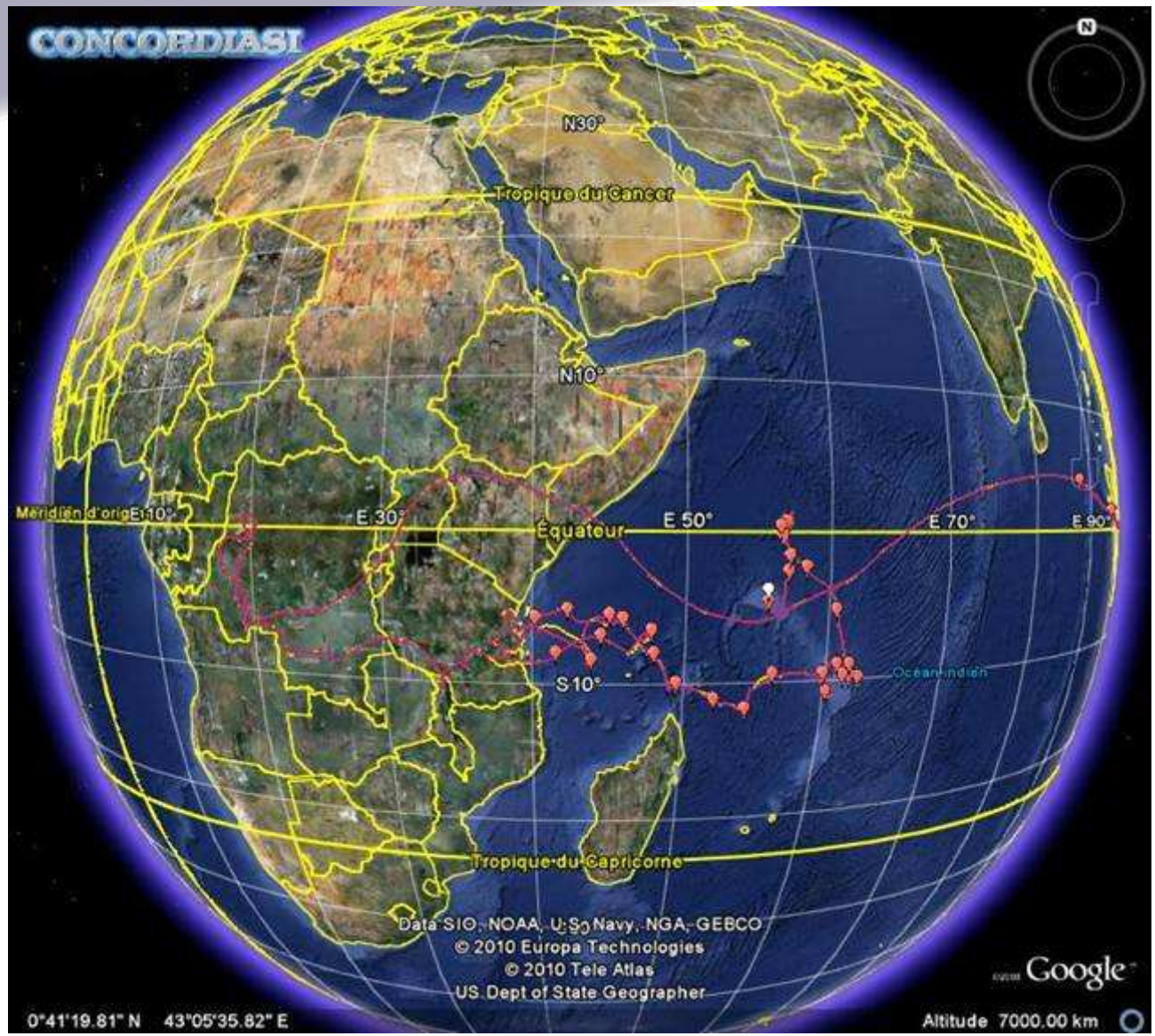
- Not a optimal situation for circumnavigation, given the long duration of the current phase. But pre-Concordiasi schedule driven by Concordiasi schedule
- We enter now the turnover period, wait and see...

MSD-1 launch: Driftsonde + TSEN February 8th

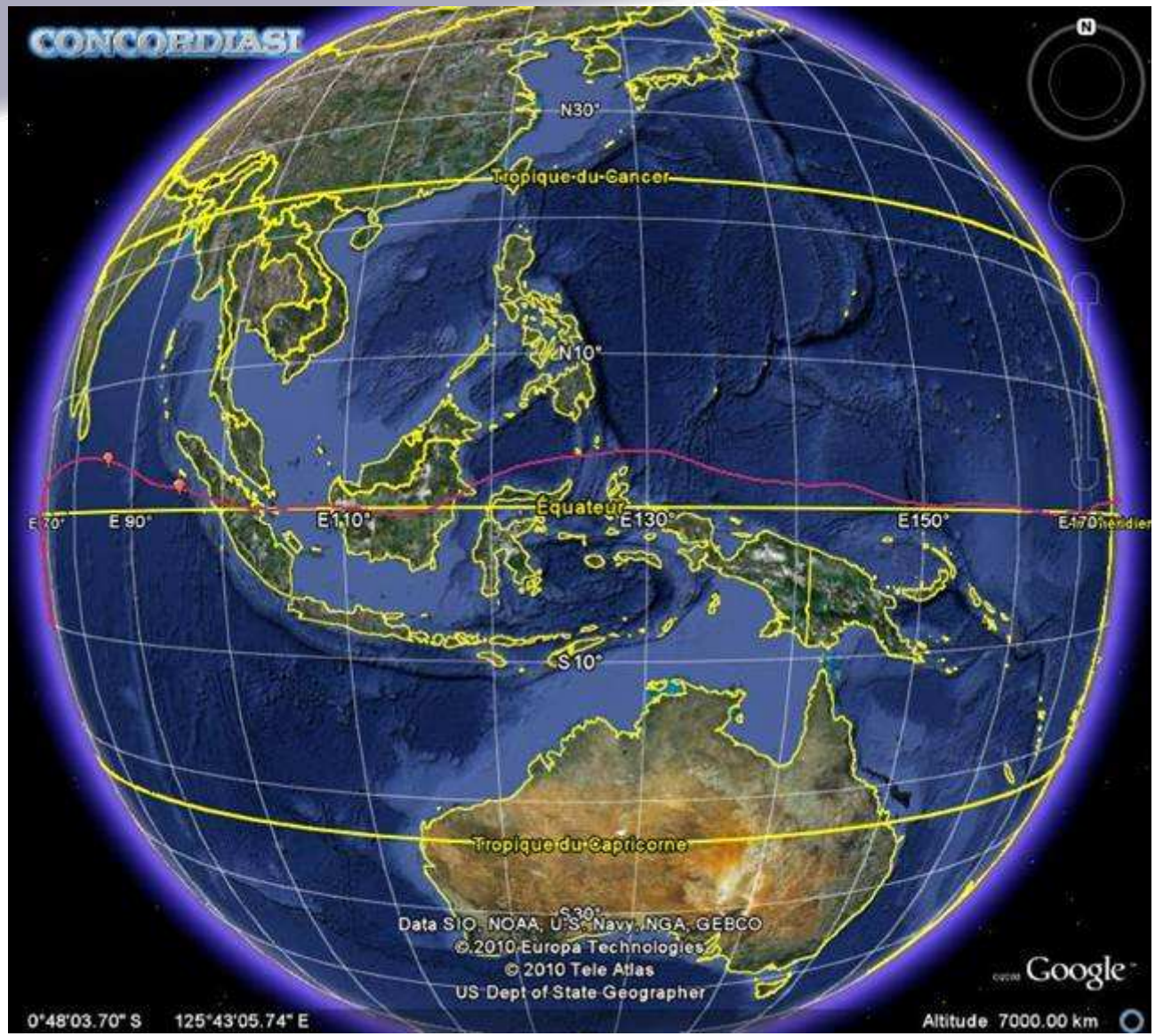
Reduced mass allocated by CNES to Driftsonde for this flight test

- 32 drop-sondes

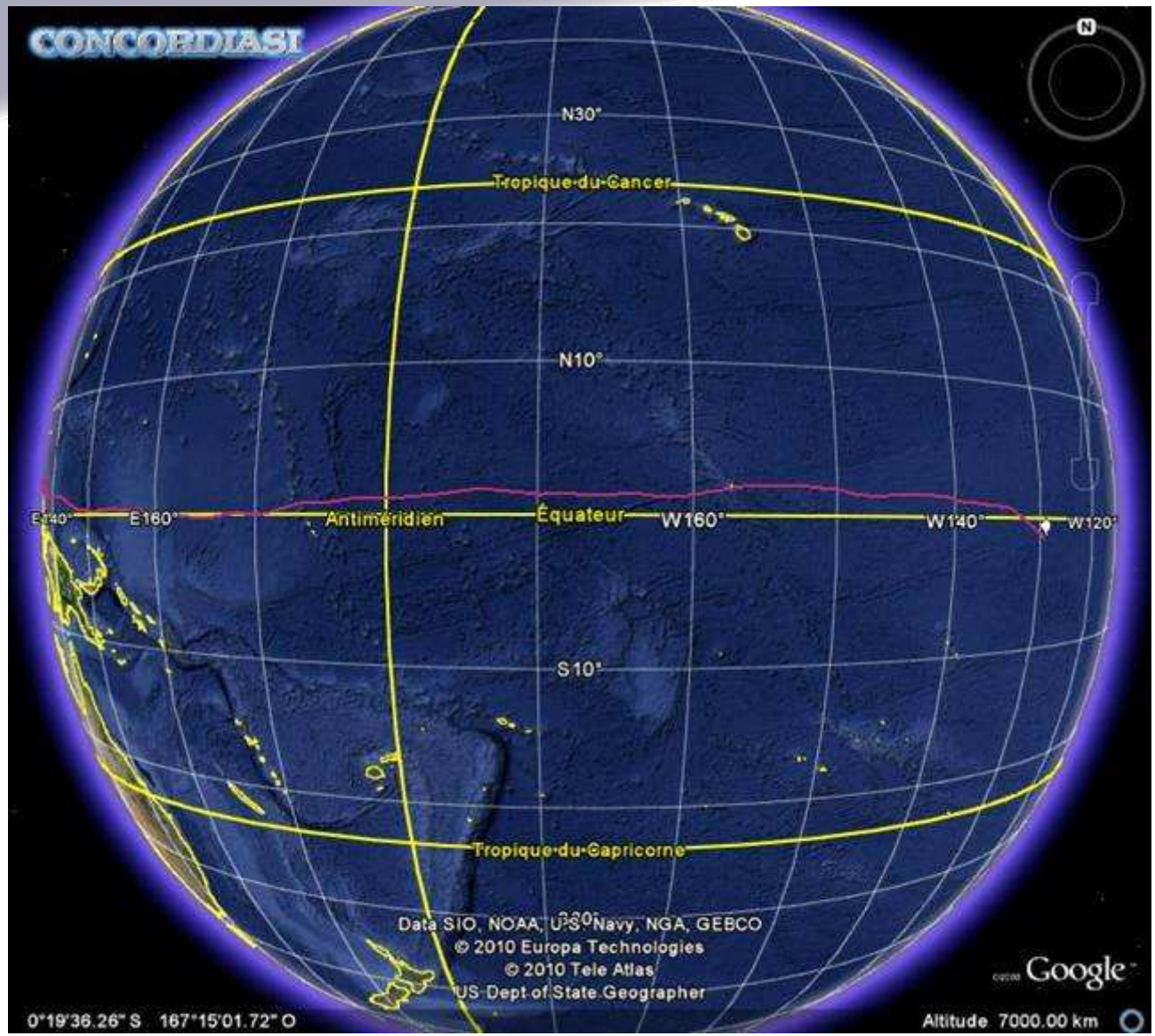
MSD-1 flight trajectory 1/3



MSD-1 flight trajectory 2/3



MSD-1 flight trajectory 3/3



as of March 28

Flight duration : 49 days

Driftsonde:
- Operations exceeds already Concordiasi requirement (6 weeks)
- One dropsonde still available for lifetime validation

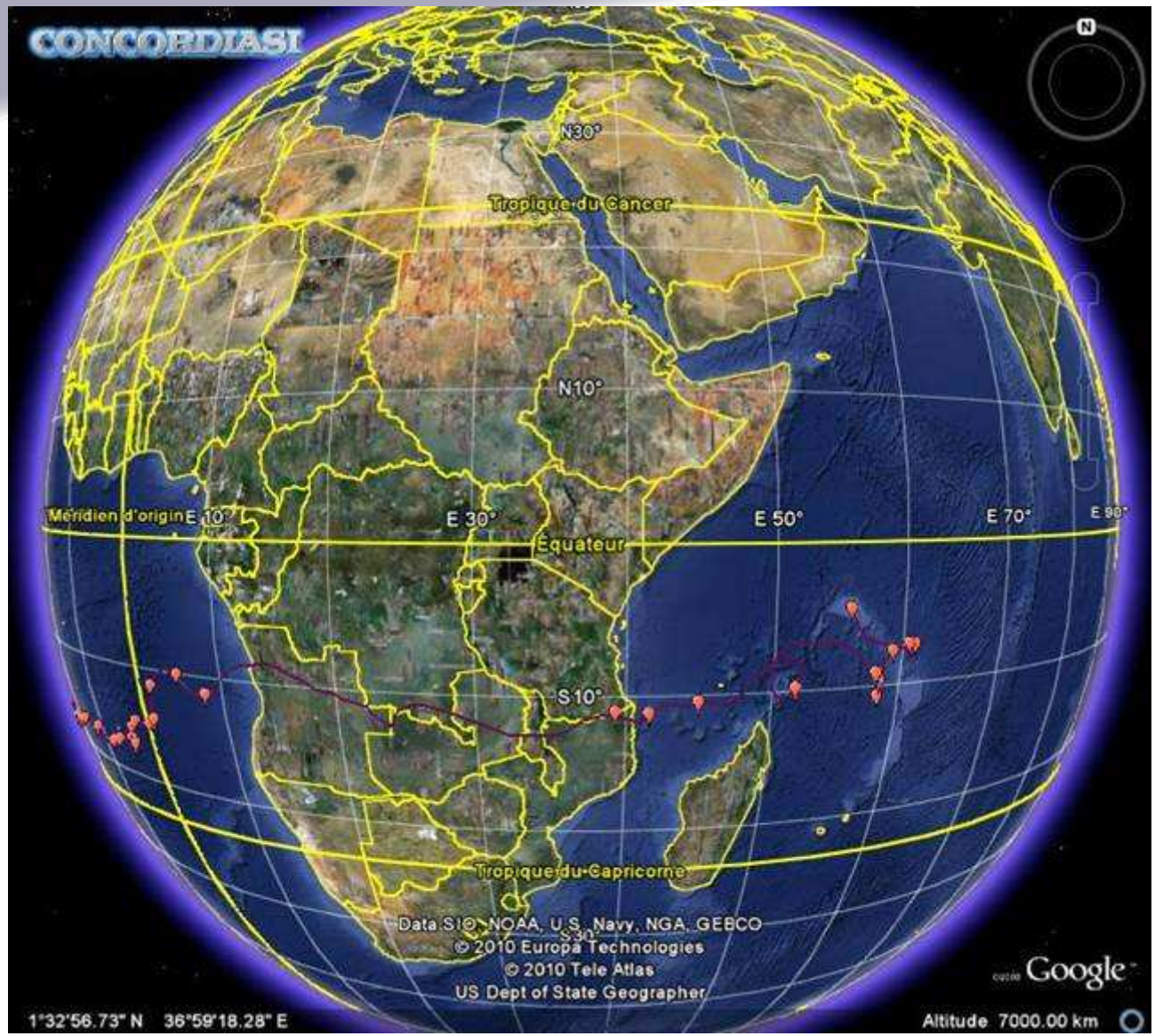
TSEN:
- Instrument and data collection works fine
- But temperature sensors lost during balloon launch

MSD-2 launch: Driftsonde + TSEN
February 21st

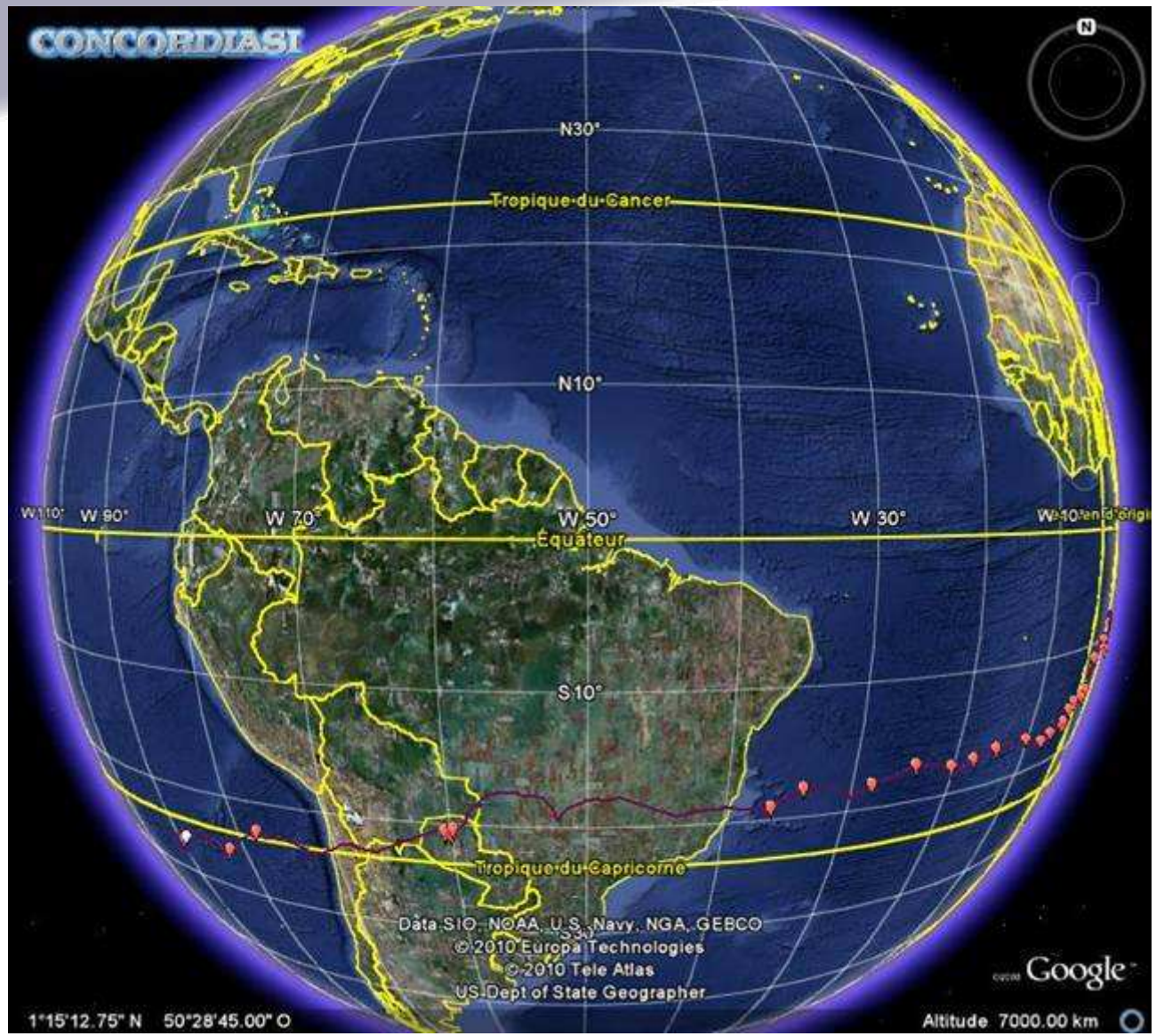
Reduced mass allocated by CNES to Driftsonde for this flight test

- 49 drop-sondes
- 33% battery savings

MSD-2 flight trajectory 1/2



MSD-2 flight trajectory 2/2



as of March 28

Flight duration : 35 days

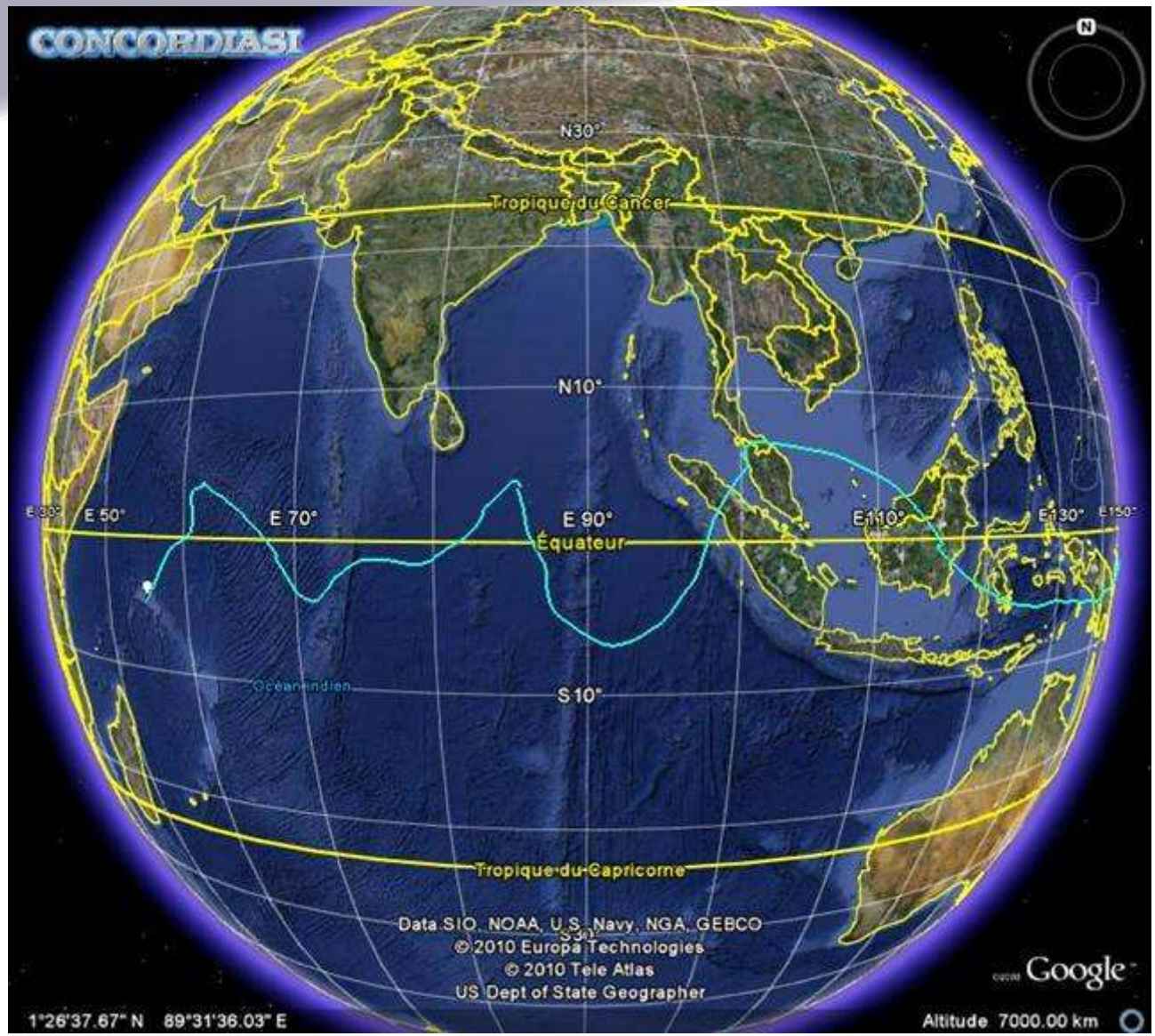
CNES systems:
- Nominal except one secondary positionning system out of order

Driftsonde:
- Operations duration expected to meet Concordiasi requirement despite the battery reduction
- 10 dropsondes still available

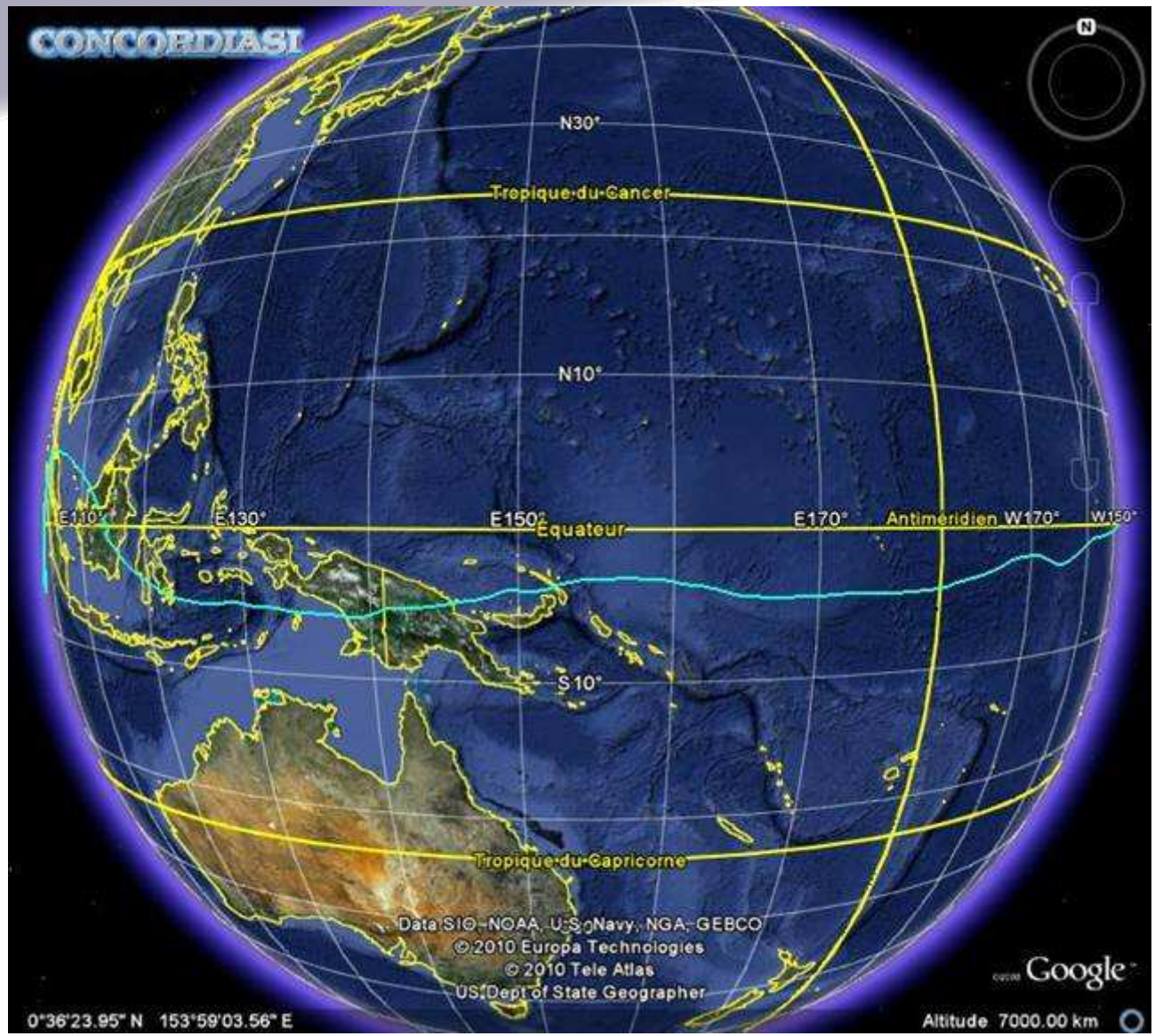
TSEN:
- Instrument and data collection works fine

PSC-1 launch: WPC + B-BOP (LMDOZ) + TSEN
February 19th

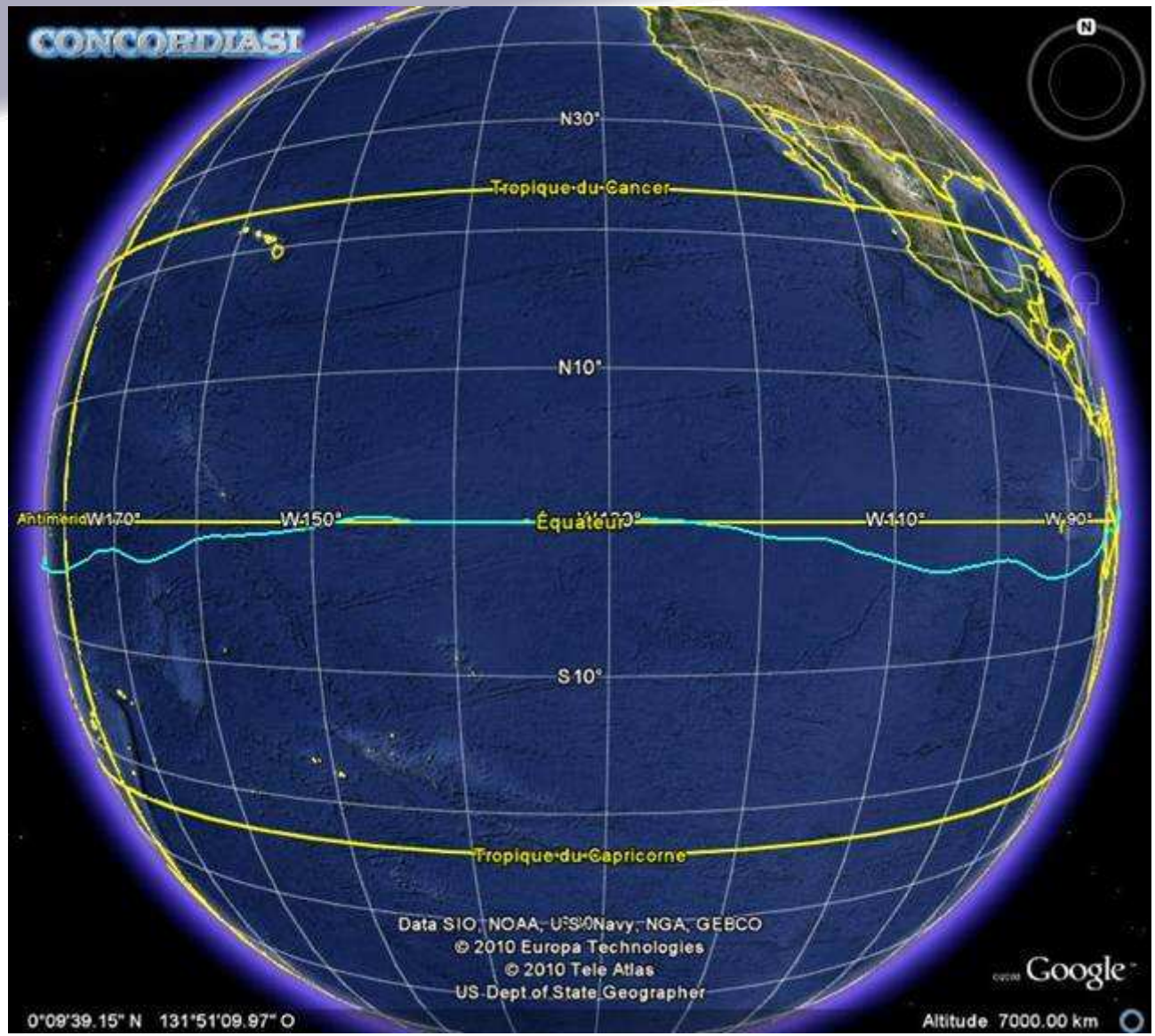
PSC-1 flight trajectory 1/5



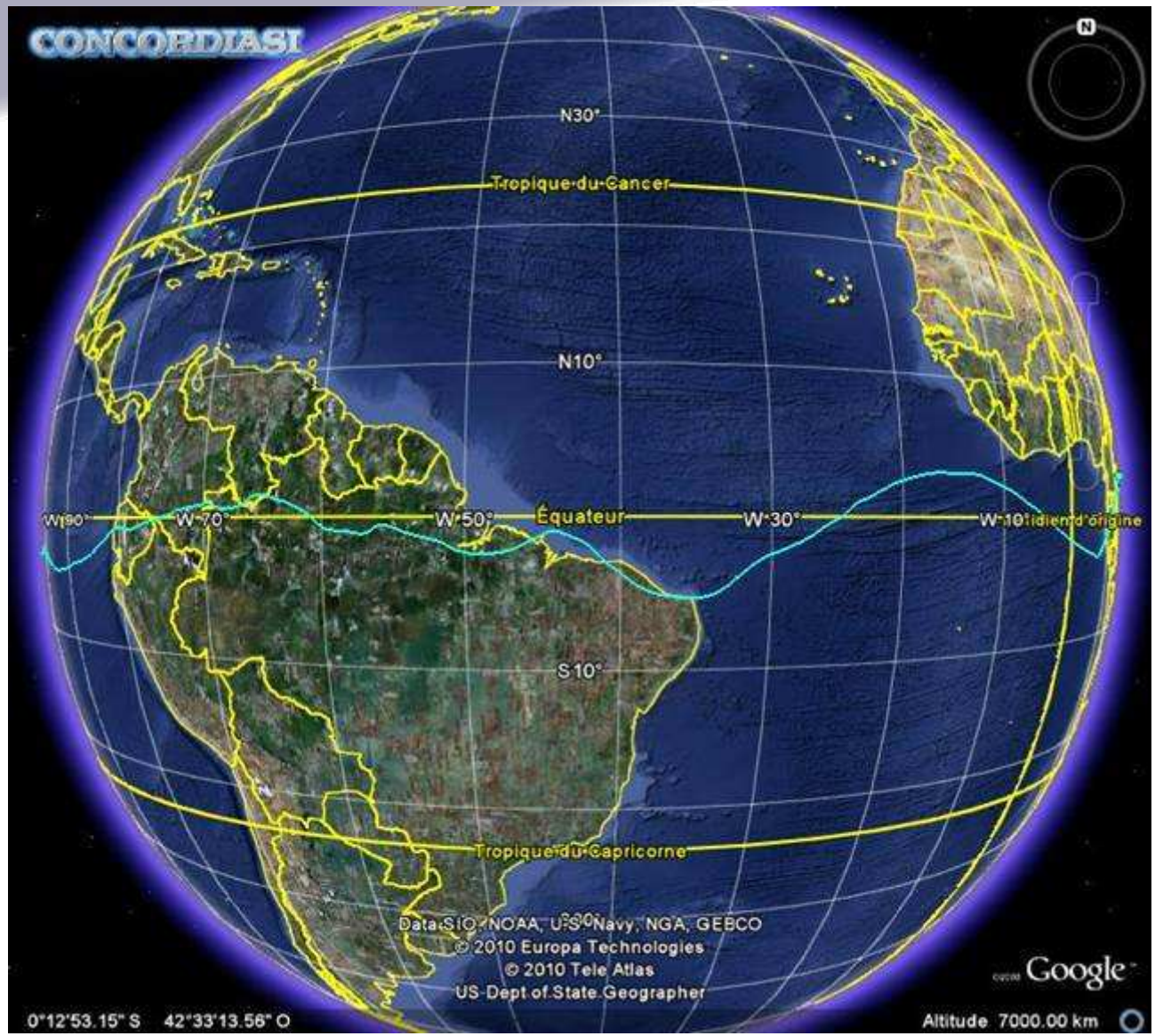
PSC-1 flight trajectory 2/5



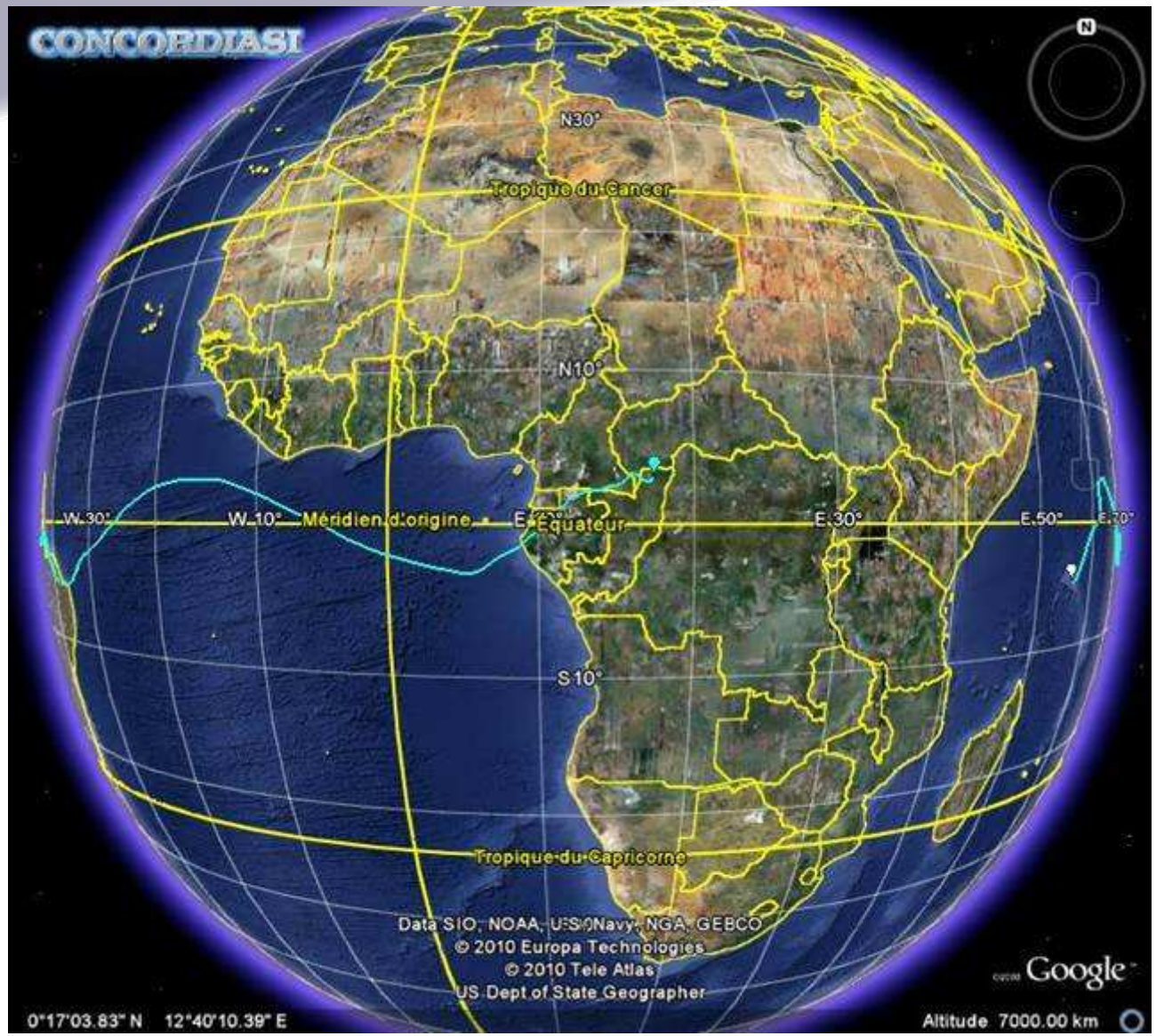
PSC-1 flight trajectory 3/5



PSC-1 flight trajectory 4/5



PSC-1 flight trajectory 5/5



as of March 28

Flight duration : 37 days

CNES systems:
- Nominal

WPC:
- Cf. Terry Deshler presentation

LMDOZ:
- Cf. Albert Hertzog presentation

TSEN:
- Instrument and data collection works fine

- **Conclusion**

We can proceed to the final phase of the preparation of Concordiasi

Pré-Concordiasi

Acknowledgements

Pre-Concordiasi campaign was possible thanks to an excellent and sustained support from

National Meteorology of Seychelles
Seychelles Civil Aviation and Victoria Airport Authority
Seychelles Air Traffic Control

The **French Foreign Office** for the diplomatic actions to obtain authorization to fly above the territory of the many countries located in the flight domain of the balloons

Selvan Pillay, Director of Meteorology of Seychelles and MNS team