

FIRST TRANSATLANTIC FLIGHT

KIRUNA, SWEDEN

JUNE 2024



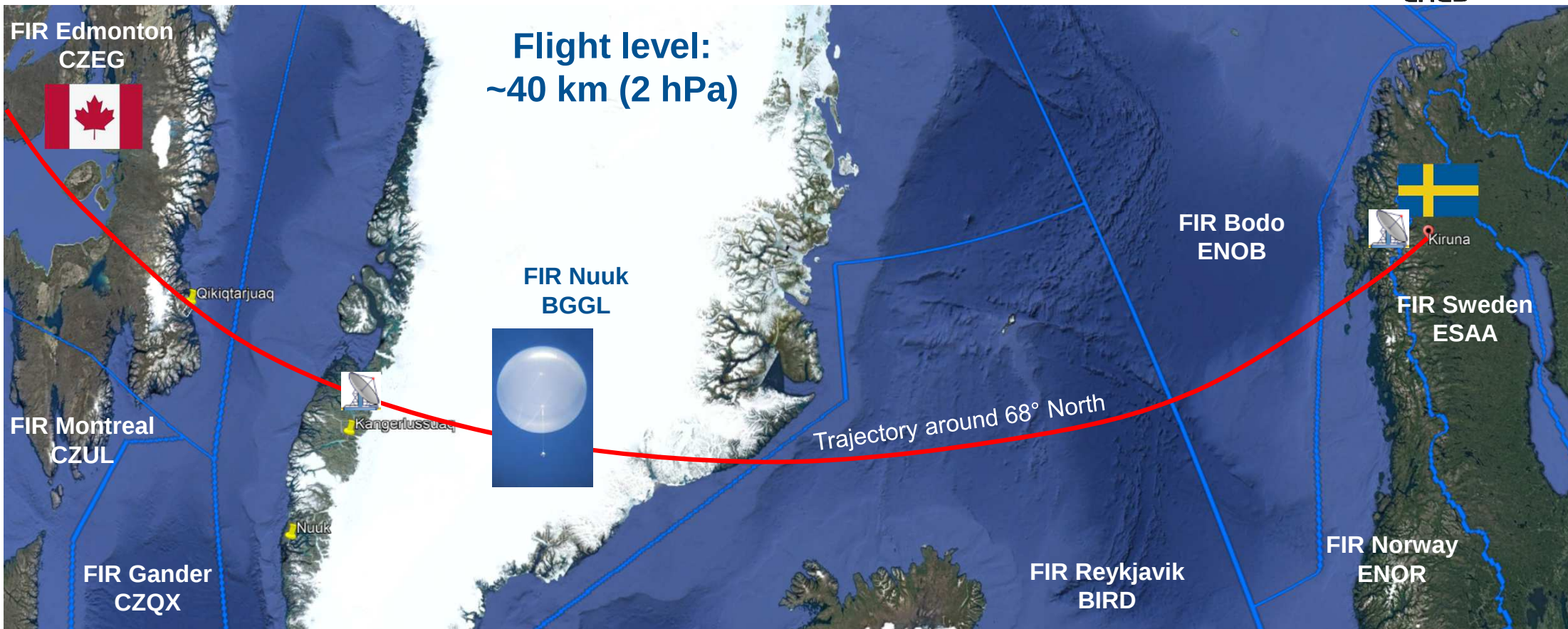
1. Présentation du vol, des instruments et des opérations
2. Film de la campagne (3 min)
3. Intervention de Vincent Tatischeff (PI expérience COMCUBE)
4. La récupération dans le grand Nord Canadien



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TRANSAT flight → Overflight of Sweden / Norway / Greenland / Canada



Concerned Air Traffic Control Regions:

FIR Sweden → FIR Norway → FIR Bodo → FIR Reykjavik → FIR Nuuk → FIR Edmonton

Esrange base, Kiruna, Sweden

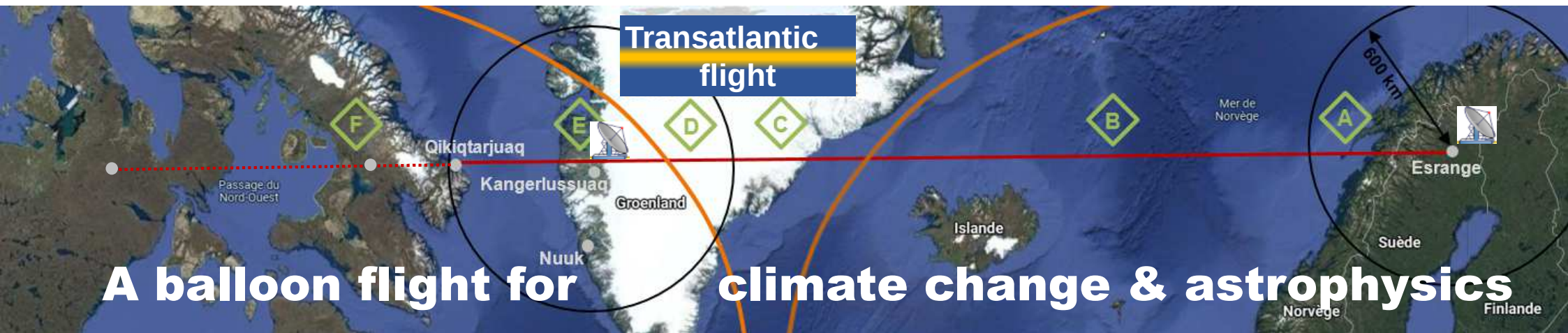
Esrange base dedicated to rockets, balloons and now small launchers
The base is managed by Swedish Space Corporation (SSC)



ESA PAC Agreement (France, Germany, Norway, Swiss, Sweden)
Access to the main infrastructures and to the Esrange services



Agreement CSA/CNES since 2012
Timmins balloon base, Ontario
Shared scientific balloon flights
34 flights already performed
Specific agreement for recovery

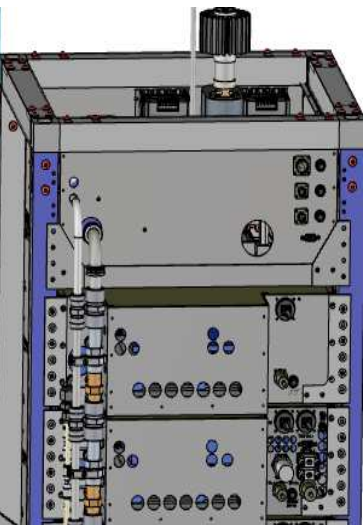


A balloon flight for climate change & astrophysics

Mini-SPECIES

(124 kg / 300 W)

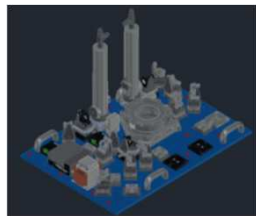
Absorption spectrometer
for GH effect



CALASET-NG

(19 kg / 30 W)

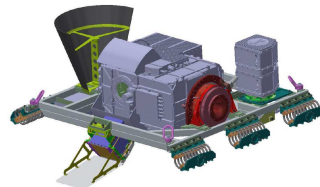
Laser spectrometer



GLORIA lite

(40 kg / 100 W)

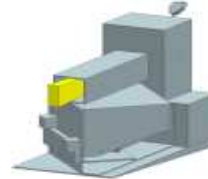
Fourier transform
spectrometer



OSIRIS

(18 kg / 150 W)

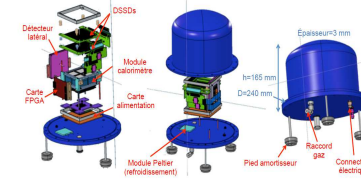
Optical
spectrometer



COMCUBE

(33 kg, 10 W)

Compton telescope
(γ -ray bursts)



NLC & IFS

(9 kg / 10 W)

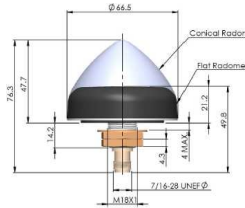
Noctilucent clouds
and Infrasounds



GNSS

(2 kg / 3 W)

GNSS
receiver



Flight configuration:



Balloon : 800.000 m³

Payload gondola : ~900 kg

Pointing system: Yes

Power : Solar panels + batteries

TM/TC HK : S-band + 2 Iridium + Inmarsat

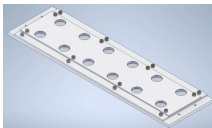
TM/TC science : S-band & Certus (Iridium)

Summer solstice : 15 to 30th of June

CERBUS

(1,4 kg)

Radiation test
on substrates



Some figures for balloon



803 Z

Volume of the balloon: **800.000 m³**

- Diameter: **120 m**
- Height: **100 m**

Material: **polyethylene 15 µm**

Envelop mass: **1280 kg**

Scientifique gondola mass: **900 kg**

Total mass: **3 T**

Total lenght: **300 m**

Flight altitude: **40 km**

Helium bubble at ground: **3500 m³**



Lenght at ground : 180 m



TRANSAT
payload gondola ➤



What is a balloon campaign ?



Operational team

Launch base with scientific payloads

Containers (~100 T)

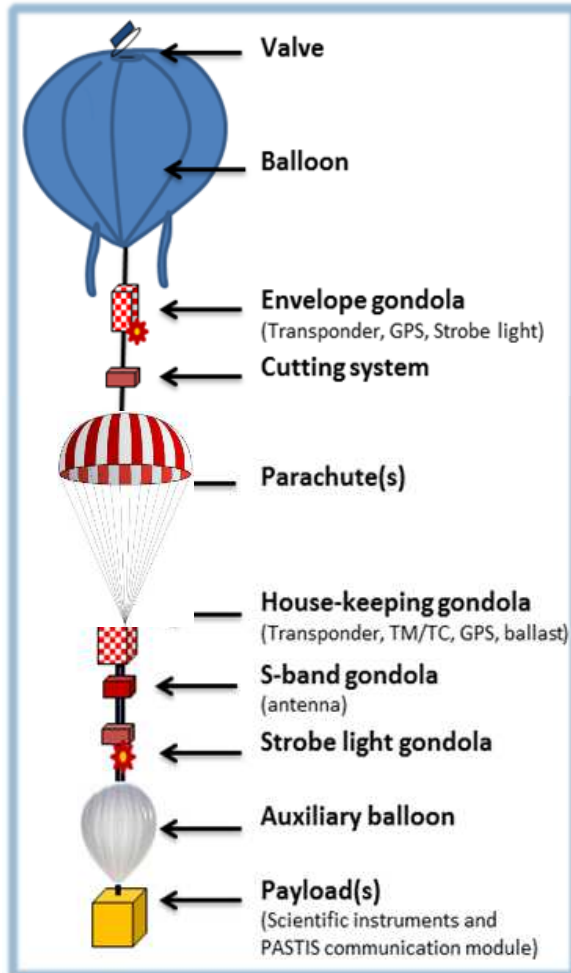


Flight train

Control center



ZPB flight train



Valve: to release helium gas and go to a lower level

Balloon: Zero Pressure Balloon (sleeves at bottom)

Envelope gondola: Radar transponder, Argos beacon and strobe light attached at the balloon's hook

Cutting system: Fail Safe pyrotechnic device to split balloon and flight train at the end of the flight.

Parachute(s): Large unique parachute for heavy payloads (around 1 Ton) or clusters of 3 smalls.

House-keeping gondola: Main operational gondola for communication with the ground control center (includes ballast tank to adapt the flight level).

S-band gondola: Antenna ensuring the link with ground stations for remote control and science TM.

Strobe light gondola: Dedicated to air traffic.

BAX: Balloon integrated in the flight train for raising the scientific payload during take-off phase.

Payload gondola: Scientific experiments

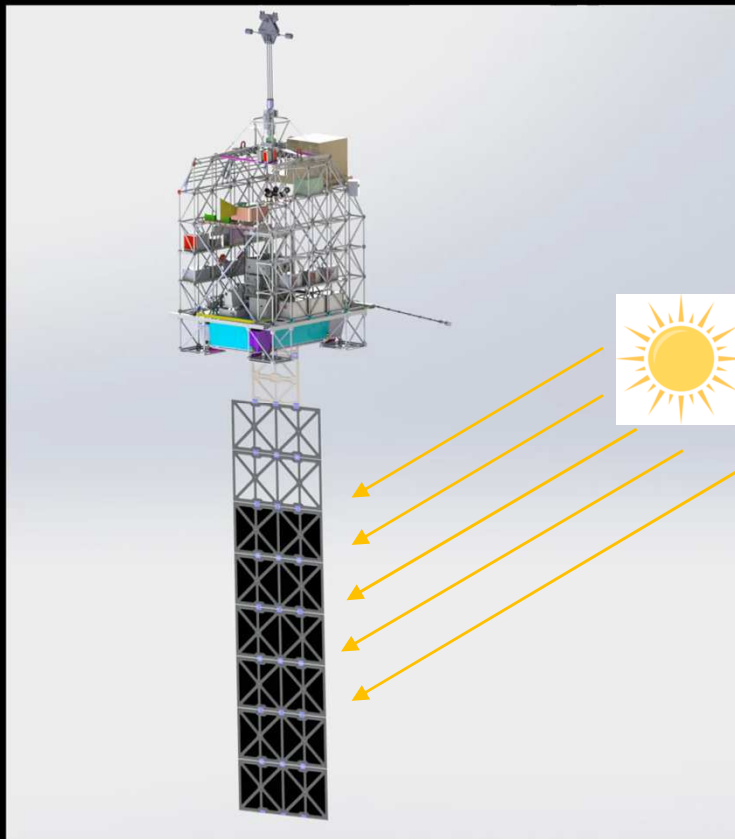


Specificity for the Transat flight



2 independant pointing systems: 1 for the payload gondola (*azimuth accuracy: 0.2°*)
1 for the solar pannels (*solar azimuth accuracy: 1°*)

Unfolded
solar panels
under the
payload gondola



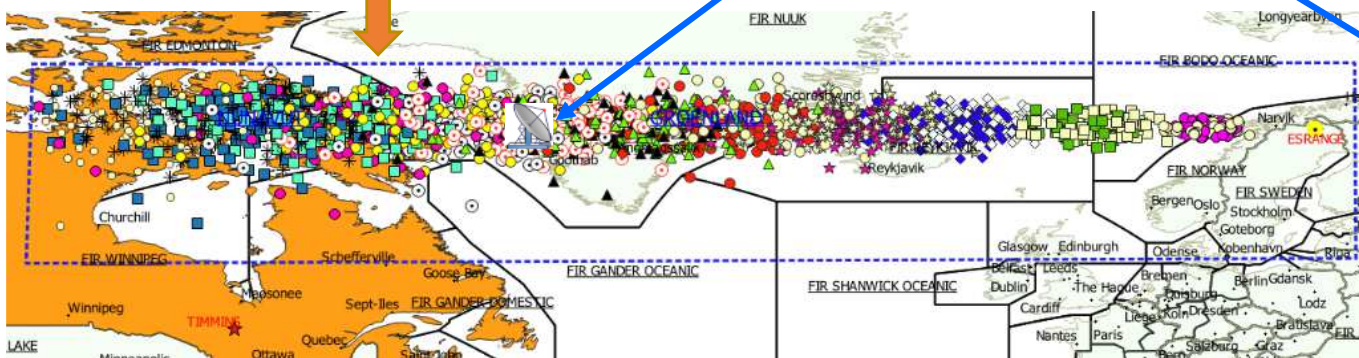
Mission analysis and statistical spreading

Minimum spreading
for transatlantic trajectories
in June

Location of the stations:

Kangerlussuaq

Esrangle



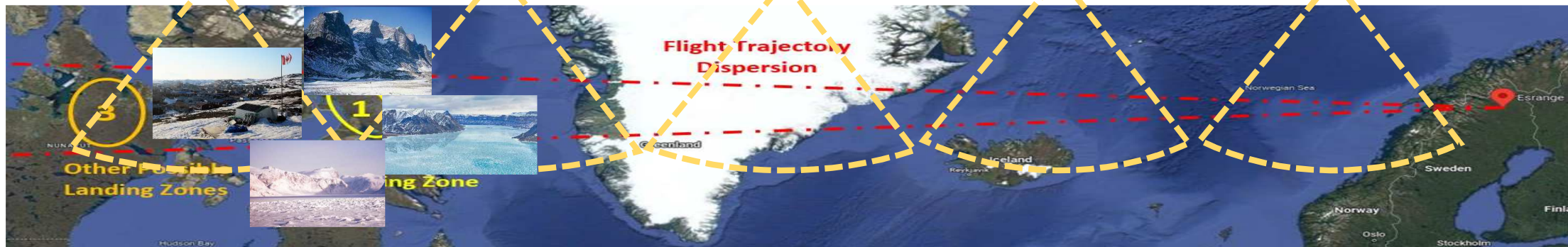
Day 5

Day 4

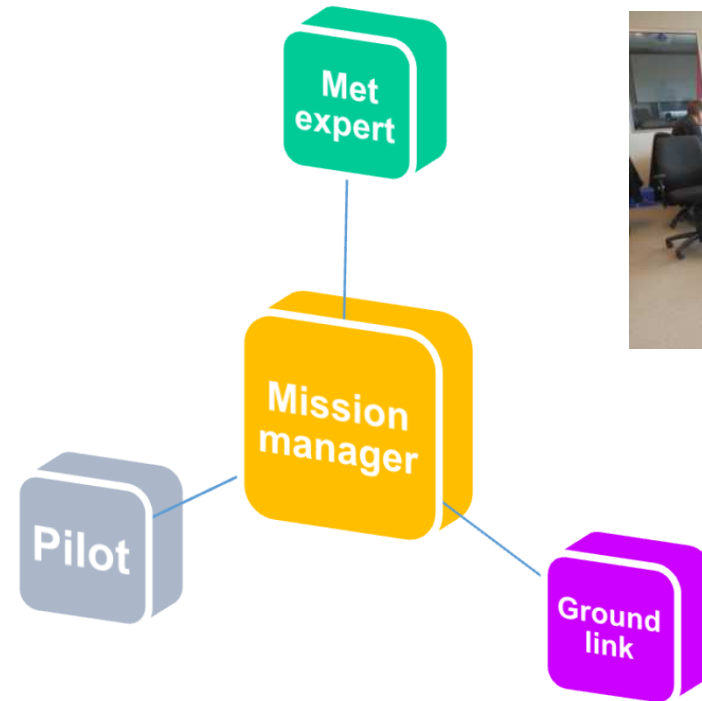
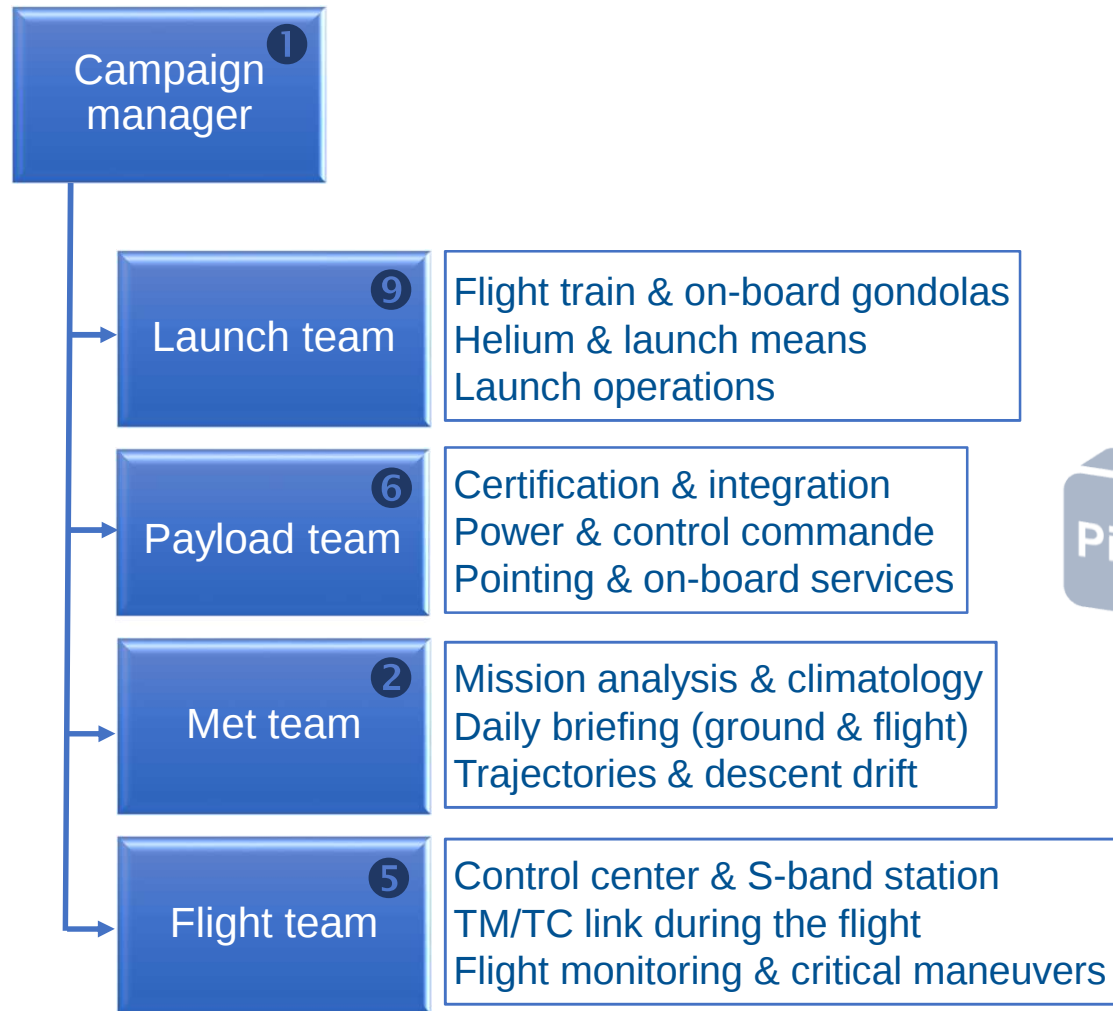
Day 3

Day 2

Day 1



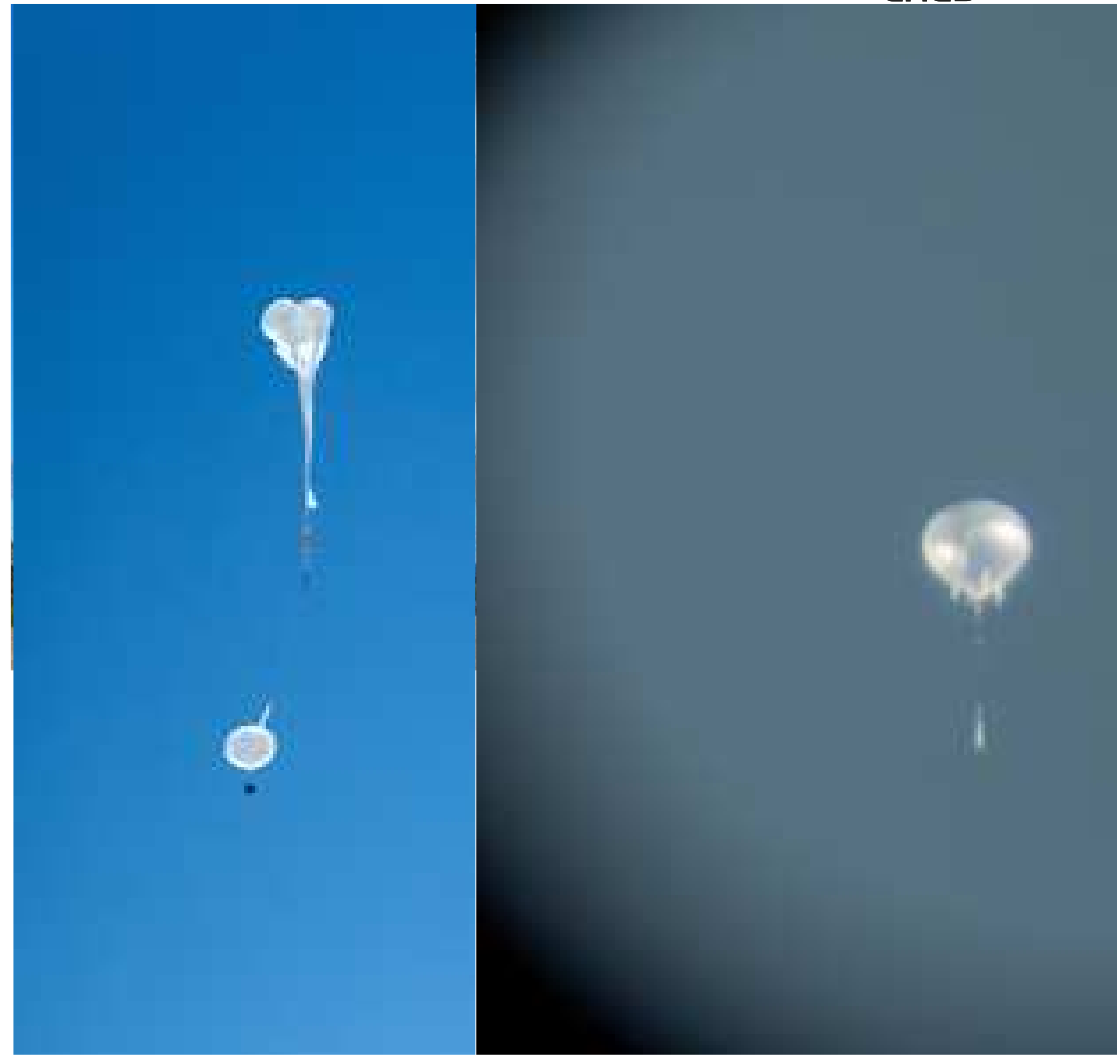
The operational team



**4 people
in the
control room**



Ready to go !





First CNES Transatlantic flight



Balloon : 800.000 m³ / Total mass : 2,9 T / Duration : 4 days

