



CENTRE NATIONAL D'ÉTUDES SPATIALES

CONCORDIASI

Balloon systems development Overview of T-PARC balloon flights

Presentation outline

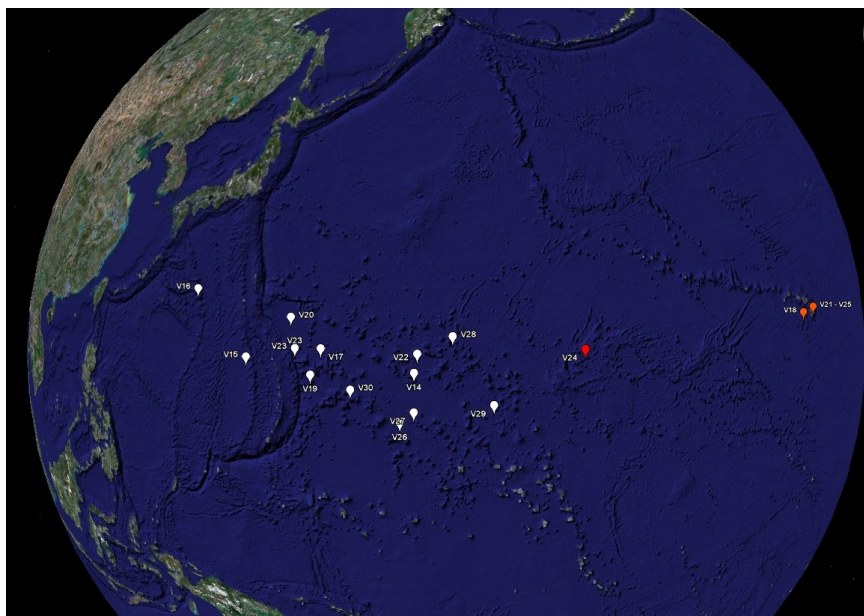
- **Overview of T-PARC flights**
- **Concordiasi Mission**
- **Concordiasi progress**

T-PARC flights overview

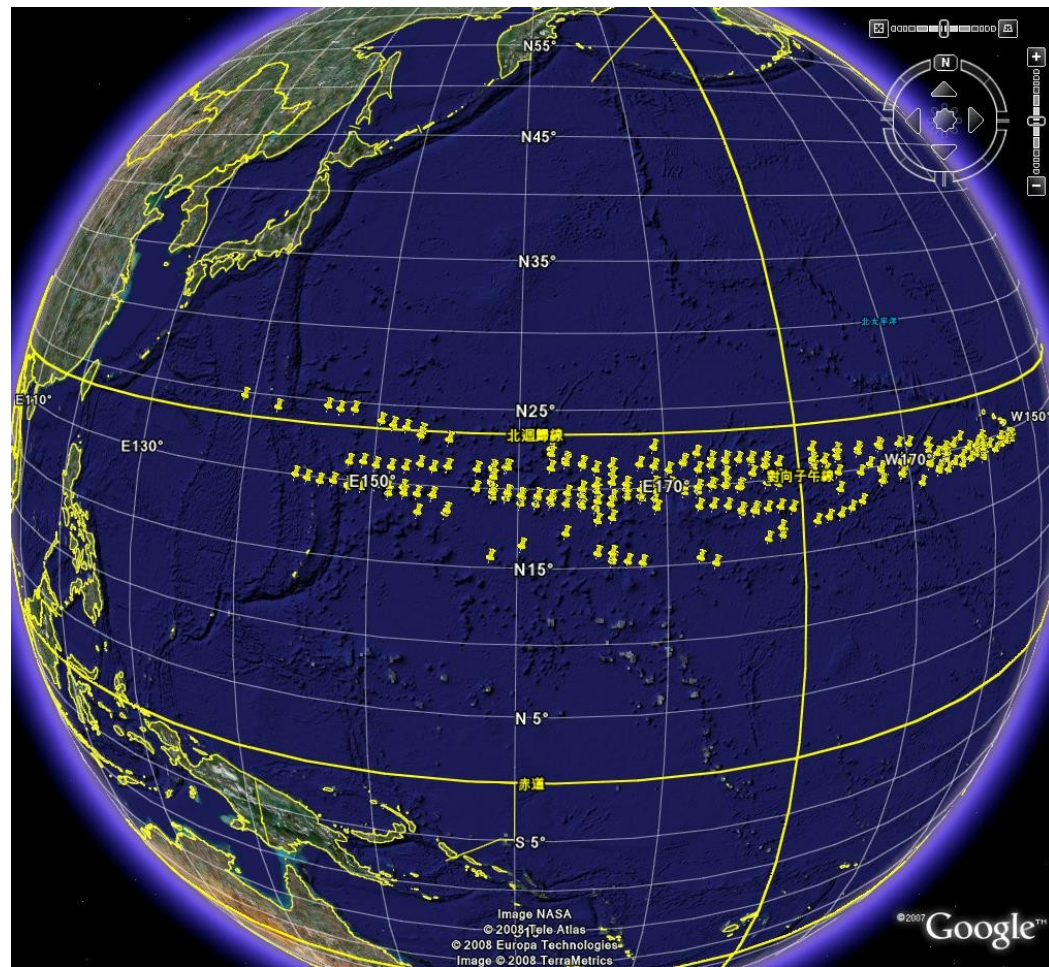
Vol CNES N°	Vol PARC N°	Dritsonde N°	Lest	Lâcher	Durée	Longitude max (1)	remarque
14	1	10	72	19-août	~ 4 jours	158.3	Fuite sensible
15	2	11	72	21-août	~ 5 jours	142	
16	3	12	72	22-août	~ 5 jours	136	Arrêt sur demande ATC J
17	4	13	72	24-août	~ 5 jours	150	
18	5	16	72	26-août	-	-	Fuite majeure
19	6	17	36	28-août	~ 4 jours	149	
20	7	14	36	30-août	4.5 jours	146	Dritsonde en panne
21	8	18	36	01-sept	-	-	déchirure au lâcher, ballon instrumenté
22	9	20	36	03-sept	~ 4 jours	159	
23	10	21	36	06-sept	~ 4 jours	147	
24	11	22	36	08-sept	~ 4 jours	157.1	panne NSO: blocage automate
26	12	23	~ 40 ?	16-sept	~ 5 jours	157.1	
27	13	24	~ 40 ?	18-sept	~ 5.5 jours	158.4	
28	14	25	~ 40 ?	20-sept	~ 5 jours	161.9	
29	15	26	~ 40 ?	22-sept	~ 5 jours	165.4	
30	16	27	~ 40 ?	23-sept	~ 6 jours	152.6	

T-PARC flights overview

Balloon final positions



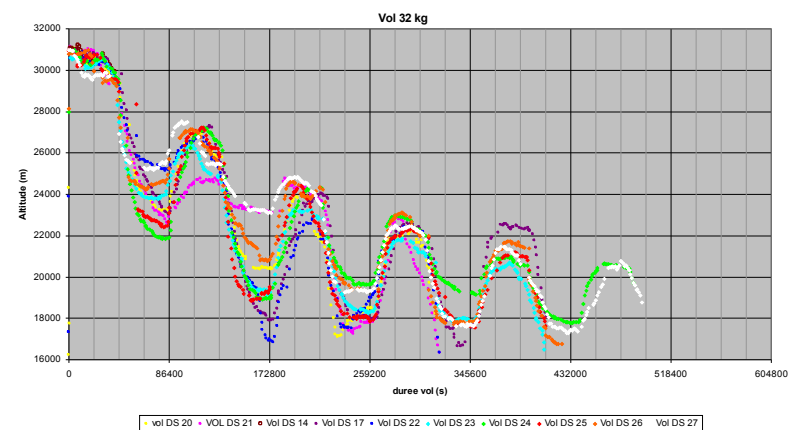
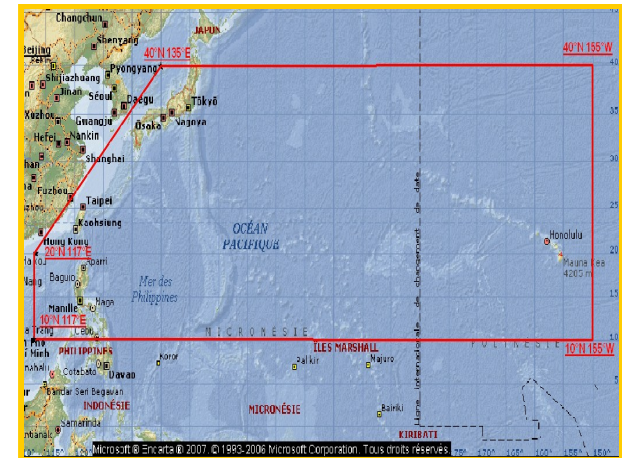
Drop-soundings



Courtesy of NCAR

T-PARC flights overview

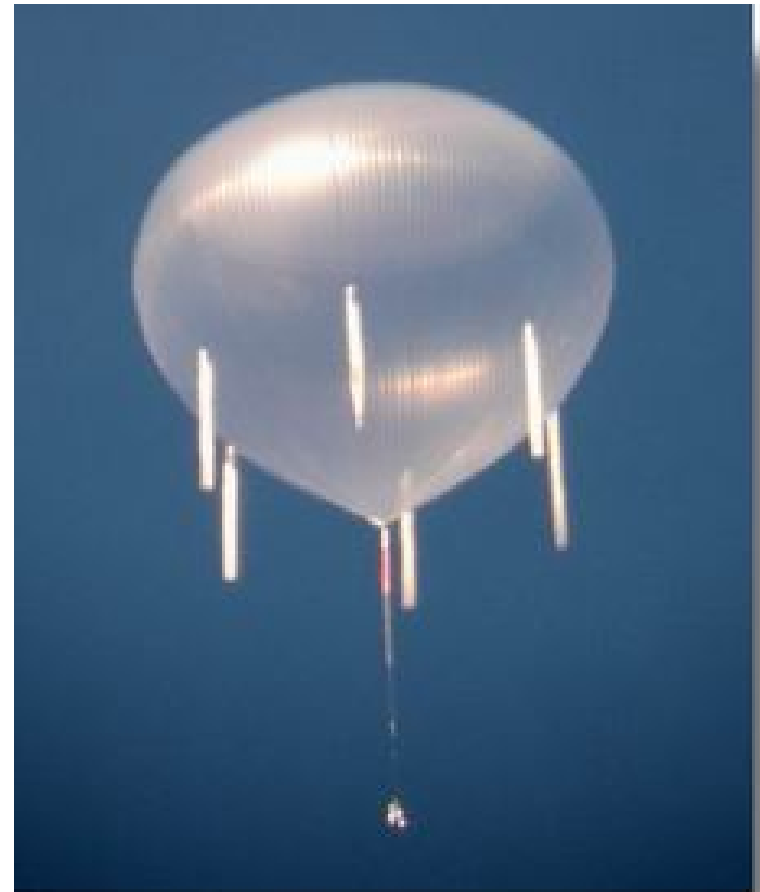
- Flight length as expected (4-5 days)
- But only partial geographical coverage
- Due to altitude profile
 - ◆ Unexpected daily loss of altitude
 - ◆ Induced slow and therefore short trajectories
- Most likely reason:
 - ◆ Air intake during evening natural descent of the balloon
 - ◆ Balloon filled progressively with a mixture of helium and air, enriched at every descent with air,
- Correction for future flights:
 - ◆ Improve the design (geometry) of the exhaust tubes, to make them play properly their stop-valve function



T-PARC flights overview

■ Zero Pressure balloon:

- ◆ Very likely air intake through venting ducts
- ◆ Not behaving as stop-valves



Courtesy J. Fox

■ Mission specification

◆ Open issue:

- Ozone photometer from U. Colorado, still pending approval by NSF,

◆ 18 balloon flights 12 MSD + 6 PSC

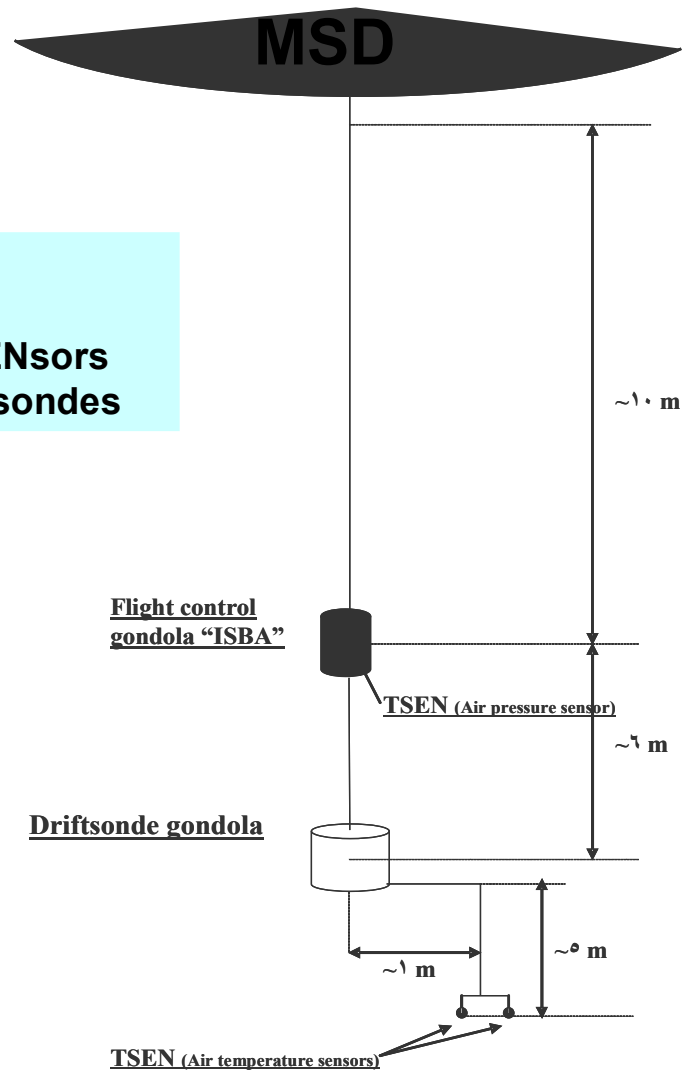
◆ Organisation:

- Flight operation center CNES Toulouse
- Scientific Mission center Météo-France

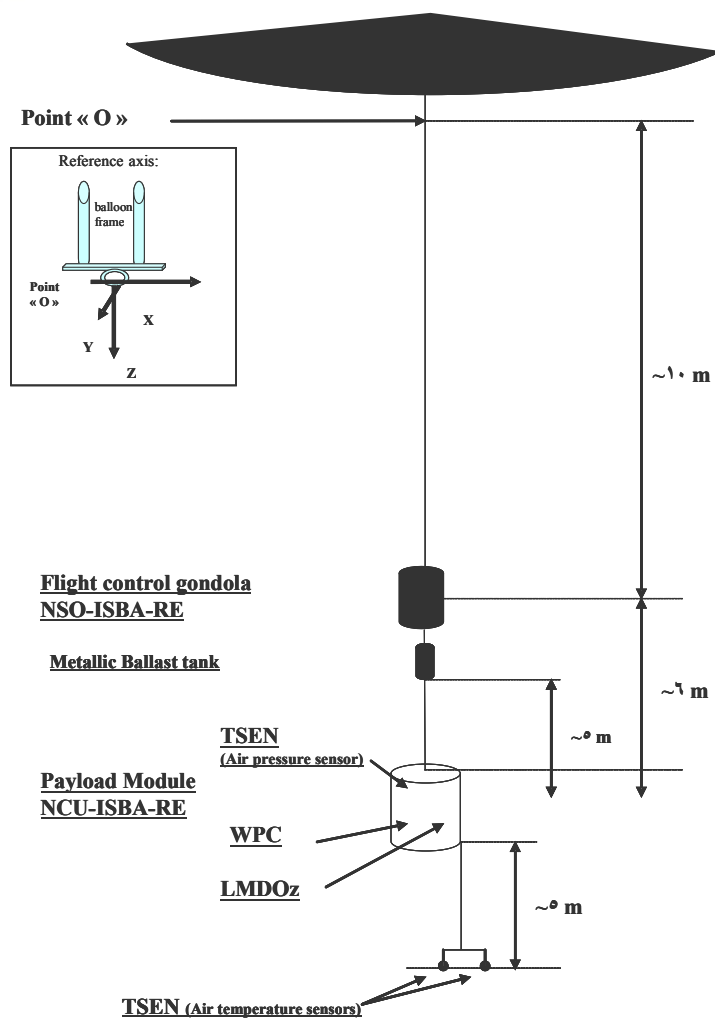
12 “MSD” flights

TSEN + DS

- Thermodynamic SENSors
- Driftsonde 50 Dropsondes



6 “PSC” flights: 2 of each type



Payload module with 3 combinations of instruments:

PSC-1: Ta, Pa, Ozone, Particles

PSC-2: Ta, Pa, Ozone, GPS Rad.Occ. Profiles

PSC-3: Ta, PA, Ozone, Particles

Concordiasi

- **Heavy or hazardous hardware already shipped to McMurdo:**
 - ◆ **Balloons,**
 - ◆ **ground means,**
 - ◆ **Pyrotechnical devices**

- **Flight trains still under development**
 - ◆ **Development delayed because of poor technical coverage of the 2008 pre-Concordiasi campaign,**
 - ◆ **Some delay added when restoring funding and reprogramming from 2008 to 2009,**
 - ◆ **Technical issues:**
 - Renewable energy has to be flight proven,
 - Two in flight failures of the main flight system are still under investigation/ correction. including one during T-PARC campaign,

- **Validation through ground test until late January**

- **Validation flight tests required:**

- ◆ **Validation flights from Seychelles**

- Renewable energy, Driftsonde gondola for Concordiasi mission, management of scientific instruments onboard payload module, scientific instruments

- Up to 2 MSD flights,
 - 1 PSC-1 flight

- ◆ **Launch campaign in April from Seychelles**

- ◆ **Decisive for Concordiasi**

