



CENTRE NATIONAL D'ÉTUDES SPATIALES

CONCORDIASI

The balloon campaign

Presentation outline

- **Balloon flight characteristics**

- **Season**

- **McMurdo Station**

- **Flight program**

- **Monitoring and control**

- **Schedule**

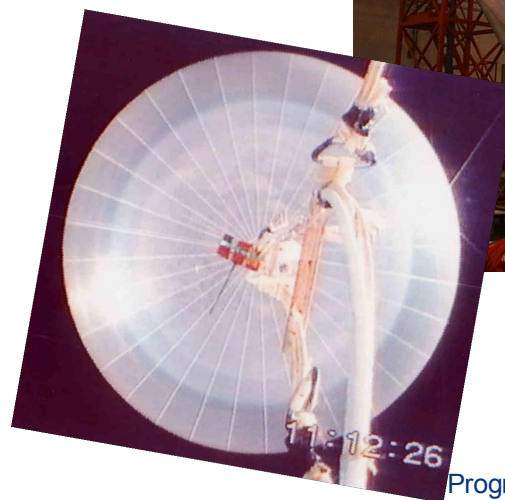
- **Development milestones**

- **Mission specification**

Balloon flight characteristics

■ Superpressure balloons

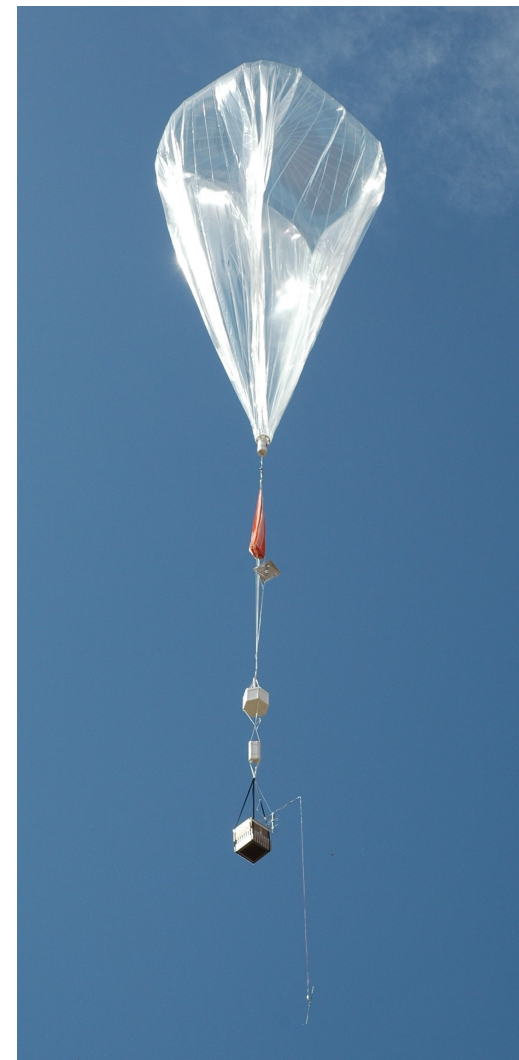
- ◆ closed balloon, constant volume (overfilled with helium to keep it stiff all along the flight)
- ◆ Up to 50 kg suspended weight
- ◆ Several months at float
- ◆ Float at constant air density
- ➡ A “quasi-Lagrangian” observer
- ◆ Lower Stratosphere (altitude range [70 – 140] g/m³)



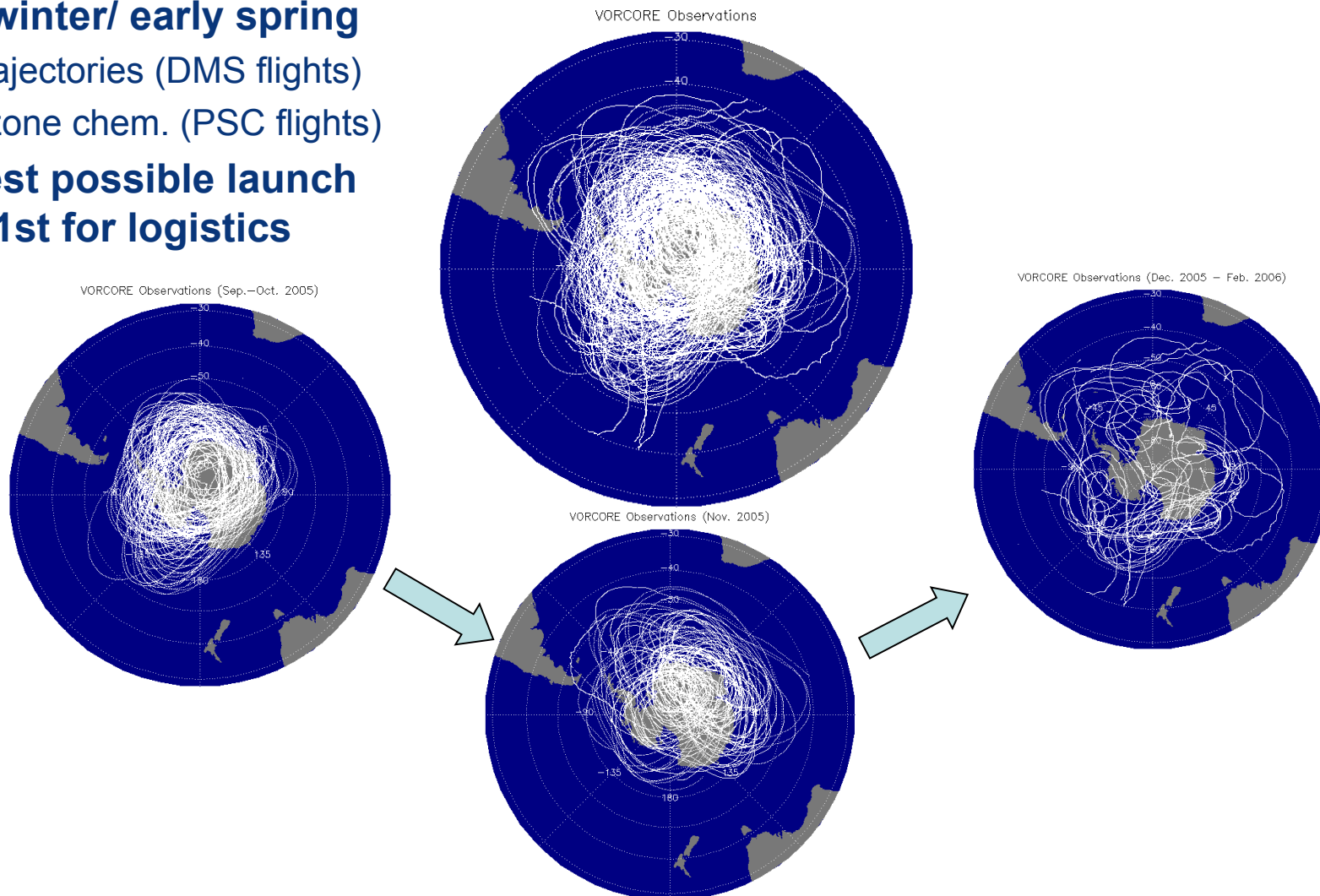
Balloon system characteristics

■ Main evolutions since Stratéole-Vorcore

	Stratéole-Vorcore	Concordiasi
Balloon Dia. / Vol.	8.5 m / 320 m ³ 10 m / 530 m ³	12 m / 930 m ³
Max Susp. weight	25 kg	50 kg
Electrical power	Li batteries 1 W, 4 months	Solar cells and Lion accumulators 10 W > 6 months
Telecommand	No	yes
Telemetry (Science)	3 kBytes / day	~600 kBytes / day
Payload Module	1 instrument	3 instruments



- ◆ **Late winter/ early spring**
 - Trajectories (DMS flights)
 - Ozone chem. (PSC flights)
- ◆ **Earliest possible launch Sept 1st for logistics**

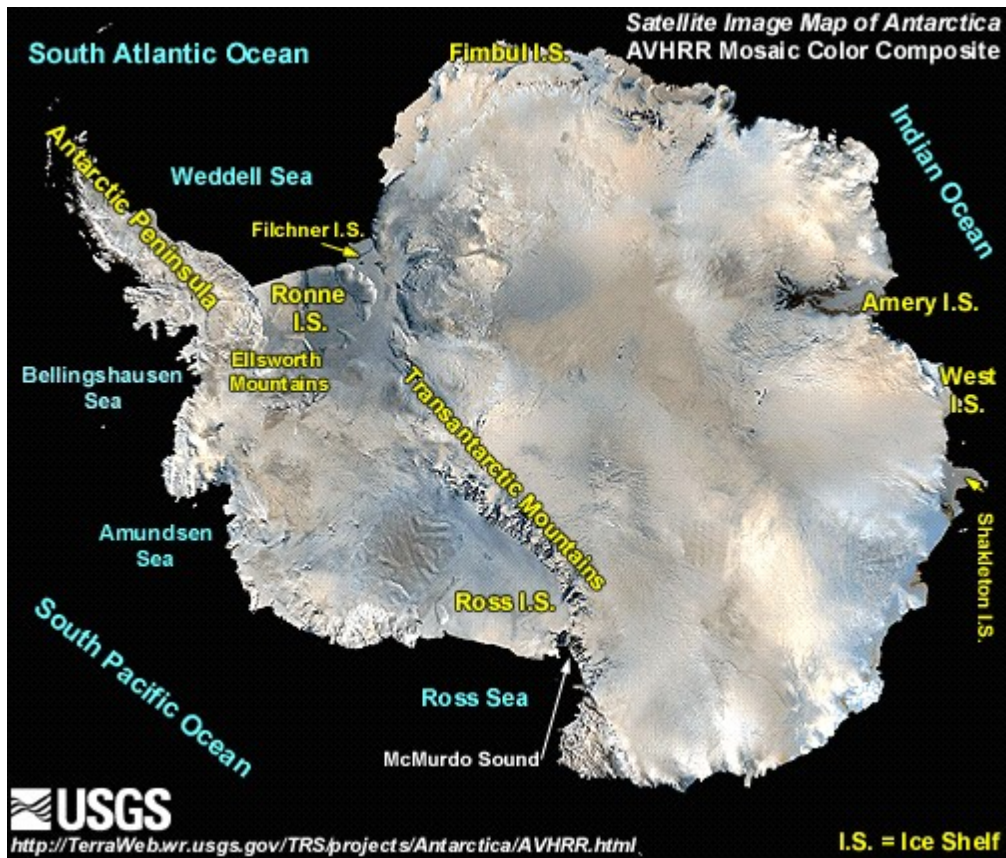


- Proximity to the South Pole
- Frequently enough low surface winds
- Unique logistic capabilities
 - ◆ Can ship heavy hardware (Summer)
 - ◆ Can transport light hardware and personnel late Winter

McMurdo Station



McMurdo Station



logistics at the Station

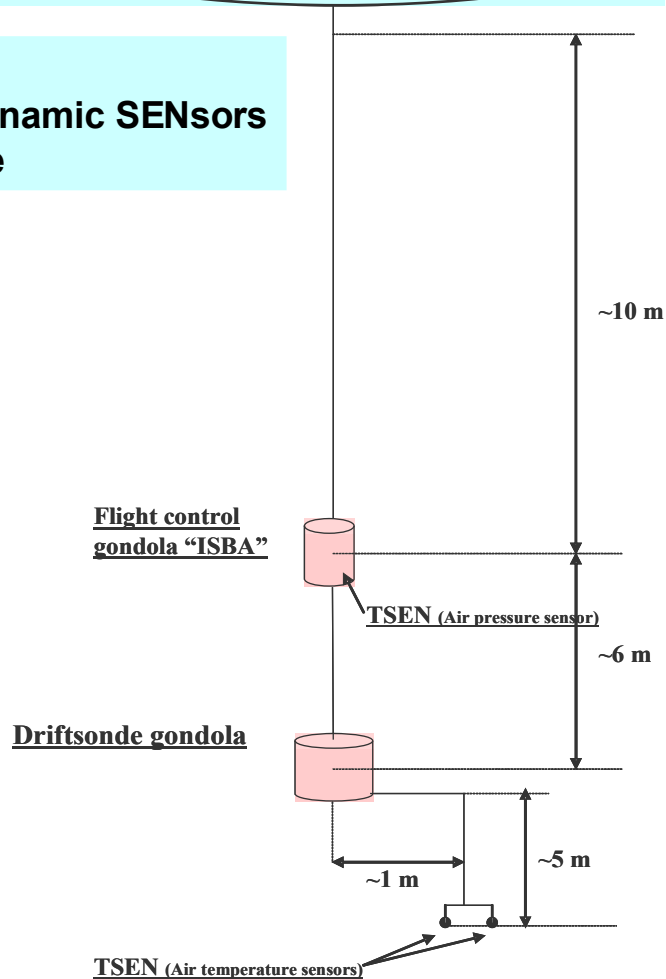
- Launch site:
 - ◆ Flattened area,
 - ◆ 2 Jamesways with power, and some heating
 - ◆ Helium gas racks,
- Offices and regular lab space



“Meteorology and Stratospheric Dynamics” flights

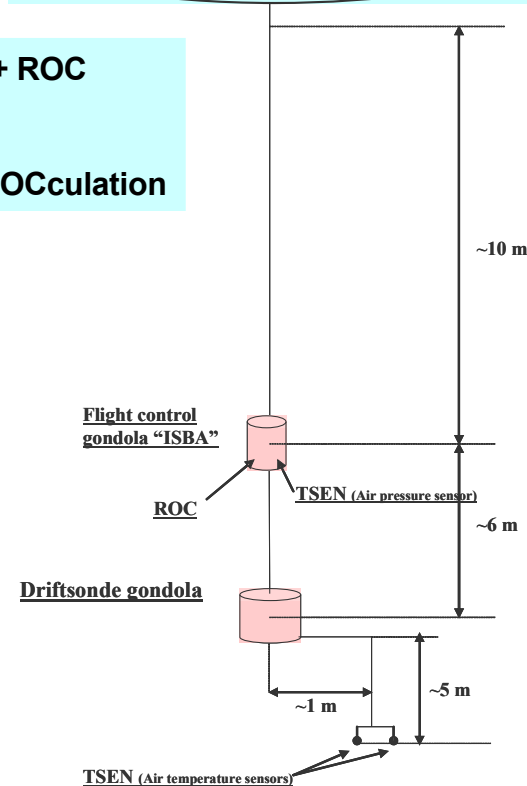
MSD

TSEN + DS
 • Thermodynamic SENSors
 • Driftsonde

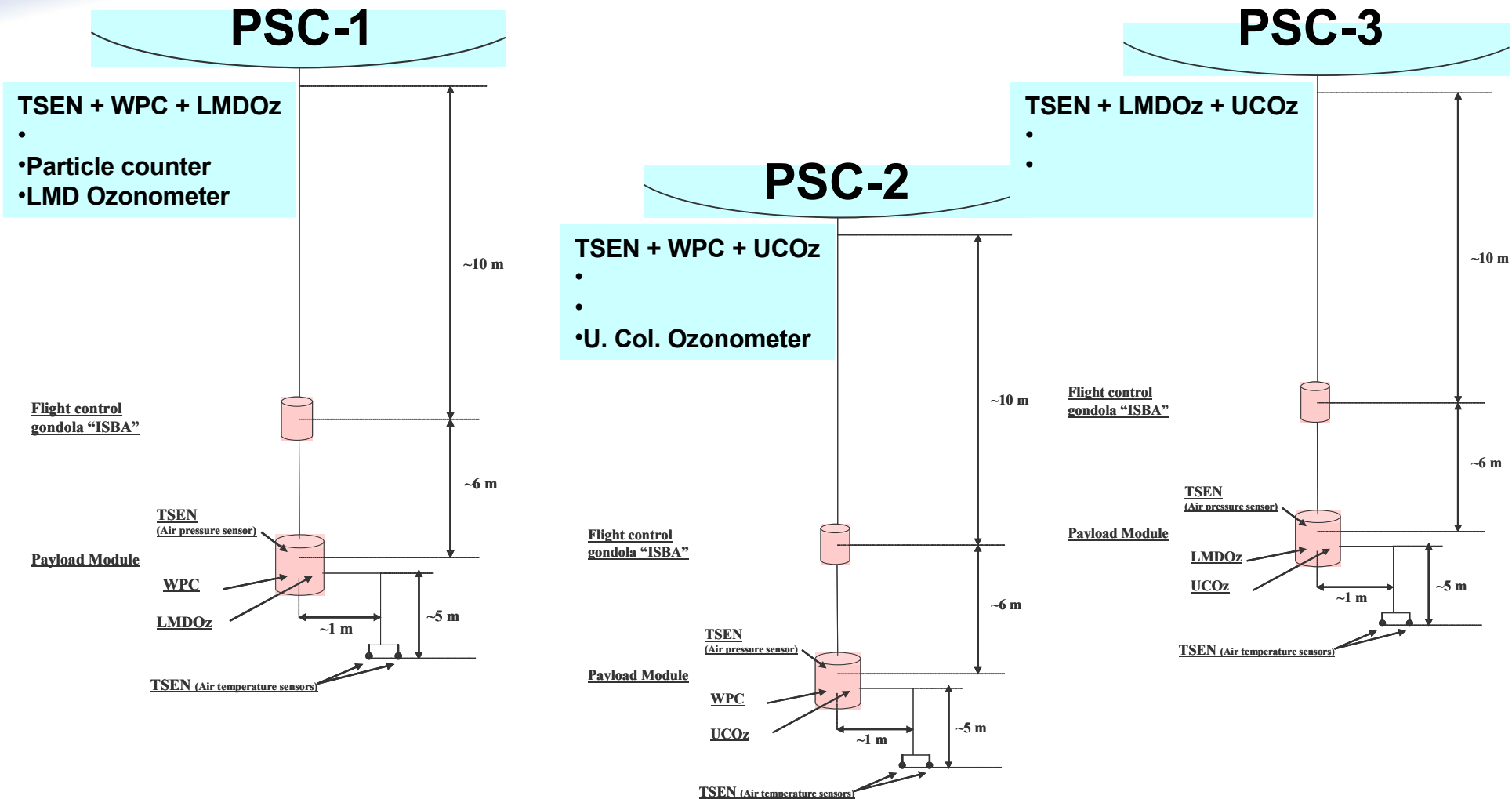


MSD-E

TSEN + DS + ROC
 •
 •
 • GPS Radio OCculation



“Physics-stratospheric Dynamics and Chemistry” flights



Flight plan

- **6 PSC flights, 2 of each kind**
 - ◆ Launched tentatively during the 1st half of September
 - ◆ Particle detection mainly during the first 6 weeks, what about ozone
 - ◆ Continuation of the flights for meteorological and dynamic measurements
- **12 MSD flights, including 2 MSD-E**
 - ◆ Launched ASAP from mid September to possibly late October
 - ◆ 600 dropsoundings over October / November
 - ◆ Dropsoundings strategy to be confirmed, impacts the dimensioning of the DS system
 - Mostly at synoptic times?
 - Maximum duration for releasing all Dropsondes of a single gondola?
 - ◆ Continuation of the flights after all dropsondes have been released for meteorological and dynamic measurements
- **2 Spare flights**

Monitoring and control

	Monitoring and definition of control actions	Control actions implementation	Location of the Command center
Balloon and flight systems	CNES	CNES	McMurdo And CST (1)
Scientific instruments	Instrument PI (McM or Internet)	CNES	McMurdo And CST
Dritsonde gondola	NCAR	NCAR	NCAR in Boulder
Dropsounding	Meteo-F + ...	Météo-F (to NCAR through the Internet)	Météo-F ?

(1) CST: Centre Spatial de Toulouse

Schedule

■ Shipments

- ◆ **Heavy hardware already shipped to CC New Zealand will be transferred in February 08 to McMurdo (NSF surface vessel)**
 - Balloons, ground equipment (launch tables, inflation benches, power units, ...)
 - 4 20ft Marine containers
- ◆ **“light” hardware will be air-shipped to CC early July, to be transferred to McM aboard the Winfly flights**
 - Flight trains, gondolas with instruments, ground equipment
 - Expected ~4500 Lbs

■ Personnel

- Departure ~15 of August for an arrival to McM ~20th of August
- Return late October or early November

■ Launch campaign

- ◆ **Tentatively: 1st launch 1st of September**
- ◆ **Priority to PSC flights**
- ◆ **All launches expected completed late October**

Development milestones

- **Driftsonde** ([...Présentations, congrés et publications diverses\ASA le 14 novembre\driftsonde_anim_fichiers\driftsonde.swf](#))
 - ◆ **Improved design wrt AMMA 06**
 - Dropsondes (Pressure sensor, cold start, ...)
 - Gondola (reception antenna, thermal, ...)
 - Ground system (Internet)
 - ◆ **Short duration flight test in Oregon this week**
 - ◆ **2 long duration flight tests at pre-Concordiasi (Seychelles 08)**
- **CNES systems**
 - ◆ **Renewable energy**
 - ◆ **Payload Module**
 - Instruments accomodation, command and control, ...
 - ◆ **Ground system**
 - Automated call and data management
- **Instruments / Integration with flight systems**

Pre-Concordiasi campaign Feb/Mar 2008, from Seychelles Island is a major milestone

Scientific instruments integration to the Payoad Module is a second main milestone

Balloon campaign mission specification

- **To have a common understanding of the campaign and of its implementation:**
 - ◆ **Technical objectives**
 - ◆ **Main commitments from each participants**
 - ◆ **Schedule**
 - ◆ **Etc**

- **Present status is Draft 2**