CENTRE NATIONAL D'ÉTUDES SPATIALES

Can we achieve Grace data continuity? French contributions

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Outline

- Context
- Mission selection at CNES
- Historical view
- CNES Future Missions workshop – March 2009
- Micromega Phase 0 study
- Conclusions

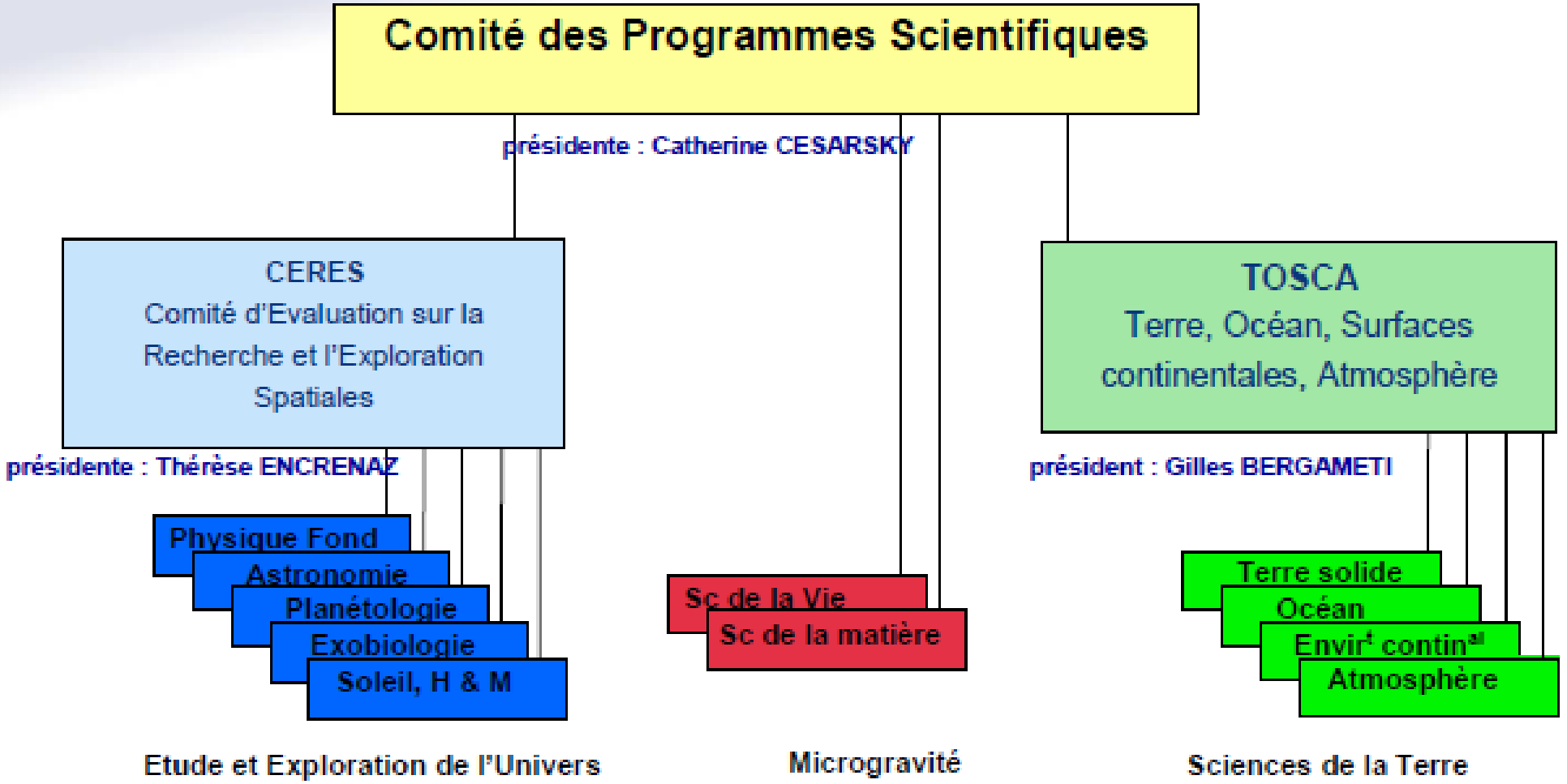
Context

- CNES historically one of the pioneer space agencies, established in 1961
- Development of major Earth observation programmes from the 80s (SPOT, TOPEX - JASON, …)
- Annual budget of around 1700 million Euros of which around 40% goes to ESA
- CNES contributed instruments directly to several geophysics missions (Oersted, Champ, Swarm)
- These missions have also been supported indirectly through instrumental developments in France which have given us Grace and GOCE accelerometers and Oersted and Swarm magnetometres

Science mission selection at CNES

- CNES provides Earth observation satellites to its “client” the French scientific community
- For Earth science, it consults this community on their needs through the TOSCA committee
- The TOSCA is made up of four expert groups – Terre, Ocean, Surfaces Continentales, Atmosphere
- This committee is responsible for
  - providing CNES with scientific advice on projects submitted to the annual call for projects and
  - carrying out a (approx.) 4 yearly scientific evaluation of future science missions

Science mission selection at CNES



Historical view

Some missions from past Future Science Missions Workshops (séminaires de prospective) :

- **Les Arcs (1981)**
- **Deauville (1985)**
- **Cap d'Agde (1989)**
- **Saint-Malo (1993)** — **Jason, Corot**
- **Arcachon (1998)** — **Déméter, Picard, Microscope, Pharao, MeghaTropiques, Calipso, Parasol**
- **Paris (2002/2004)** — **Simbol X, Eclairs, Taranis, Swarm, Altika**
- **Biarritz 2009**

Historical view

- These 4 yearly workshops define a science «Roadmap » used to establish French science missions developed by CNES
- Roadmap guides the development of collaborative projects with international partners (near prerequisite for mission development)
- Implementation of the roadmap is regulated and supervised by the Scientific Programmes Committee (CPS)

Outputs from Biarritz – Mars 2009

- Biomass
- SWOT
- IASI-NG
- MISTIGRI
- **MICROMEGA**
- OCAPI
- 3MI
- GPM
- MiniCarb
- Lidar
- GEO

High spatio-temporelle variations of the gravity field

MICROMEGA

Mission aims :

- GRACE data continuity
- Improved performance to follow seasonal water mass variations

Study objectives:

- Identify scenarios vs performances for instruments and configurations of «n» satellites:
  - RF/laser mesurement of inter satellites distance
  - Accelerometre performances / gradiomètre 3 axes
  - Precise orbitography GPS receivers
  - Reuse of formation flying technologies
- First estimation of cost
- Identify key technologies

Conclusions

- The French scientific community have asked CNES to work on a Grace-type continuity mission
- A phase 0 study looking broadly at a range of mission scenarios will start in the autumn
- We envisage this mission in an international collaborative context
- CNES HQ has begun to consult international partners (NASA, DLR) on their willingness to participate in this mission
- CNES is looking for a collaboration and would be pleased to intiate this now – in phase 0 (joint phase 0 study?)
- Looking also for other mechanisms – ESA EE8? Other?