CNES plans

>> Meteorology, Climate and atmospheric chemistry

Highlights in 2008-2010 and perspectives

Didier Renaut, DSP/OT

Thierry Phulpin, DCT/SI/IM
The main programmes

- **Next european programmes**
  - Eumetsat Operational programmes: MTG and Post-EPS
  - ESA Earth Explorer missions: ADM-Aeolus and Earthcare
  - ESA Climate change Initiative

- **CNES programmes for meteorology**
  - IASI on Metop (Cnes-Eumetsat)
  - Megha-Tropiques (Cnes-Isro)
  - Priority for the future programmes on IASI-NG and GPM mission

- **CNES programmes for climate**
  - Parasol, Calipso and A-Train (Cnes-Nasa)
  - Foster 3MI on Post EPS
  - Cross cuttings activities
  - CHARM/MERLIN
  - Microcarb

- **Support activities**
  - Safire research aircraft
1. IASI on Metop
Interféromètre atmosphérique de sondage dans l’infrarouge

Schedule
(programme for more than 15 years)

- Launch of Metop-A 19 oct 2006
- Operational distribution of IASI L1c data 19 juil. 2007
- Operational distribution of IASI L2 data 29 sept 2007
- Second international IASI conference janvier 2010
  Ice decontamination coming in Fall 10
- IASI on Metop B : TV test July 10
- Launch of Metop-B avril 2012
- IASI on Metop C
- Launch of Metop-C October 2016
Phase 0 completed. A new concept has been studied. Strong heritage from IASI but also very innovative to allow to have a factor 2 on the spectral resolution (meeting thus also the needs for Sentinel 5) and the radiometric noise.

- Requirements given by MRD Post EPS
- Science plan will be established by the ISSWG
- Meanwhile a french mission group, MENINGE, set up, for short studies needed for trade offs and write a mission rationale and requirements document. Works in relation with PMET and Sentinel 5 MAG + ISSWG
- Competitive Phase A has started in February 2010.
- CNES concept as reference but industry can define its own concept. Several under study by each company (TAS and EADS-Astrium).
- The best concept of each will be selected in June for further studies.
- Phase A completed in January 2011
- CNES decision in April 2011. Meanwhile meetings to inform ESA and Eumetsat
Fully in accordance with NWP and Chemistry MRD-Breakthrough, Except (NWP priority 4) and (NWP priority 2 and Chemistry priority 3 and 4)
### European context

#### 2. ESA Earth Explorere missions

<table>
<thead>
<tr>
<th>ADM-Aeolus (ESA)</th>
<th>Earthcare (ESA-JAXA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doppler lidar for wind profiles (secondary product: aerosols) =&gt; NWP, atmospheric dynamics, climate</td>
<td>Radiative budget, clouds and aerosols (imager, Radiative budget, lidar, cloud radar) =&gt; climate</td>
</tr>
<tr>
<td>Launch: February 2012</td>
<td>Launch: October 2013</td>
</tr>
<tr>
<td>Major technical issues with UV laser</td>
<td>Laser from ADM with lesser constraints</td>
</tr>
<tr>
<td>French teams involved: CNRM, LATMOS, LSCE, LACY Cal/val campaigns</td>
<td>French teams involved: IPSL, LMD, LATMOS...</td>
</tr>
</tbody>
</table>
CNES programmes for meteorology

2. Megha-Tropiques

- **CNES+ISRO project**
  - Marfeq (microwave part of Madras), developed by EADS-Astrium, delivered to ISRO in April 2009. Scarab delivered in March 2010. The last CNES instrument (Saphir) shall be delivered by the end of April 2010.
  - CNES will receive MT data at Kourou (Guyane) and Hartebeesthoek (South Africa) reception stations. This makes possible the distribution of data in NRT (2-3 hours).
  - Complete definition of ground segment in progress.

<table>
<thead>
<tr>
<th>Frequencies</th>
<th>Polarization</th>
<th>Pixel size</th>
<th>Main use</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.7 GHz ± 100 Mhz</td>
<td>H + V</td>
<td>40 km</td>
<td>ocean rain and surface wind</td>
</tr>
<tr>
<td>23.8 GHz ± 200 Mhz</td>
<td>V</td>
<td>40 km</td>
<td>integrated water vapor</td>
</tr>
<tr>
<td>36.5 GHz ± 500 Mhz</td>
<td>H + V</td>
<td>40 km</td>
<td>cloud liquid water</td>
</tr>
<tr>
<td>89 GHz ± 1350 Mhz</td>
<td>H + V</td>
<td>10 km</td>
<td>convective rain areas</td>
</tr>
<tr>
<td>157 GHz ± 1350 Mhz</td>
<td>H + V</td>
<td>6 km</td>
<td>cloud top ice</td>
</tr>
</tbody>
</table>

Table 1: main characteristics of the MADRAS channels
CNES programmes for Climate

1. Parasol

- 5^e anniversay of Parasol on 4 March 2010
  Parasol left the A-Train end 2009 (orbit 4 km lower).
- Mission Parasol extended until end 2011.

4 years of seasonal AOT means for fine mode aerosols
CNES programmes for climate
1. Calipso (NASA-CNES)

- More than 3 years of data (lidar + IR imager + VIS camera)
- Senior review NASA extended the mission (2 more years until end 2011), with CNES support.
- More than 60 publications
- Calipso is now a reference for representation of clouds in climate models (recommendation WRCP for CMIP-5).

Comparaison modèle-Calipso de la couverture nuageuse (© H. Chepfer et al.)
Support 3MI studies

Phase 0 CNES completed.
Meeting with ESA
Meeting to be set up with Eumetsat