The SMOS Field Campaigns
Status report on 10 May 2006

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6th SMOS Workshop, 15 – 17 May 2006, TUD, Denmark
Earlier campaigns for initial work on SMOS:

- **WISE** experiments at Oil Platform near Barcelona in 2000-2001
- **EuroSTARRS** experiment in 2001, airborne campaign over Atlantic and Barcelona
- **LOSAC** campaign, airborne campaign in 2001-2003 over North Sea

Campaigns performed since 5th SMOS Workshop:
- **DOMEX** Campaign in Antarctica, tower-based measurements December 2004.
- **CoSMOS-2**, Airborne measurements in Australia in Nov. 2005
- **CoSMOS-OS**, Airborne measurements in Norway in April 2006
• **WISE** (Wind and Ocean Exp) in 2000-2001 at Oil drilling platform in Barcelona provide L-band polarimetric radiometer data

• **EuroSTARRS**, based on US instrument STARSS, Flights in Nov 2001 over Gascogne and Oil platform.

• **LOSAC**, airborne campaign in 2001-2003 with L-band rad. from TUD, several flights with variable wind conditions. Interesting data set, discovery of wiggles
• DOMEX Campaign organised with CNR-IFAC, Florence, Italy
• Campaign took place in Dec 2004 at DOME-CONCORDIA in Antarctica.
• Measurements from a tower
• Use of an L-band radiometer and a C-band radiometer
• Data not yet provided. Due shortly.
• Activity concluded in Oct 2005.
DOMEX-2005, DOME-C base

35 m Tower

Protected Area

800 m

Winter base

Summer base
CoSMOS-OS Salinity Campaign

CoSMOS-1
Cancelled

CoSMOS-2
dedicated to SM measurements

CoSMOS-OS
dedicated to OS measurements
CoSMOS-2 in Australia

• Campaign organised at very short notice as a recovery from CoSMOS-2005 campaign, cancelled after unavailability of aircraft.

• Cooperation with Australian Univ. Melbourne, Newcastle in frame of the National Australian Field Experiment (NAFE), coord. Jeff Walker.

• Participation of European Teams (Free Univ. Amsterdam, Univ. Valencia, CESBIO)

• Use of Aero Commander Aircraft from Univ. Flinders, Adelaide.

• TUD had to redesign interfaces of radiometer to aircraft.
CoSMOS-2 Campaign Objectives

Objective of the CoSMOS airborne campaign is to perform a long-term acquisition of data under different geo/bio-physical as well as meteorological and oceanographic conditions to address open issues related to the retrieval and validation of the SMOS products.

Following points need to be addressed:

- Provision of data for validating and testing the assimilation of L-band brightness temperatures in a near-operational context,
- Provision of data for solving retrieval problems over the ocean,
- Detailing and testing of the SMOS validation approach,
- Development of better models relating brightness temperature and wind/wave conditions,
CoSMOS-2, Field Operations, Merriwa area

- Large area of 50 x 50 km²
- 26 SM Stations over 8 farms
CoSMOS-2, Airborne Operations, Scone Airport

- Diamond ECO Dimona (NAFE)
- Aero Commander (CoSMOS-2)
- The L-band radiometer horns (TUD)
CoSMOS-2, Flight Operations

<table>
<thead>
<tr>
<th>Campaign operations and Flights</th>
<th>October 2005</th>
<th>November 2005</th>
<th>December 2005</th>
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<tbody>
<tr>
<td>Assimilation of root zone soil moisture</td>
<td>22 23 24 25 26 27 28 29 30 31</td>
<td>flights delayed due to delays in certification</td>
<td>campaign extension</td>
</tr>
<tr>
<td>Scaling issues, 2000 metres alt. Sun Glint and Topography</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</td>
<td></td>
<td>= end of Campaign</td>
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<tr>
<td>GLINT</td>
<td>1 flight over Roscommon</td>
<td>with NAFE on first day</td>
<td></td>
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<tr>
<td>WATER</td>
<td>second flight during last NAFE vegetation sampling</td>
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Effect of Water and dew on L-band measurements

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CoSMOS-2, Conclusions

• Very successful campaign, organised as a piggy back to Australian NAFE project.
• High temperatures in November, and no airco in plane ➔ Impact on temperature Stability and Characterization of radiometer.

• First radiometer data have been delivered to ESA but need to be re-processed with proper T corrections.
• Ground data available to NAFE/CoSMOS Participants via FTP.
Objective of the CoSMOS-OS airborne campaign is to perform the acquisition of data under different oceanographic conditions to address open issues related to the retrieval and validation of the SMOS products.

Specifically, the following points need to be addressed in this campaign:

- Provision of data for validating and testing the assimilation of L-band brightness temperatures in a near-operational context,
- Provision of data for solving retrieval problems over the ocean,
- Detailing and testing of the SMOS validation approach,
- Development of better models relating brightness temperature and wind/wave conditions,
CoSMOS-2, Campaign organisation

- EMIRAD radiometer from TUD,
- Thermal infrared radiometer in nose of aircraft
- Paris GPS system from IEEC, Barcelona.
- All embarked on Skyvan from HUT/TKK, Finland.
- Campaign based in Stavanger, Norway.
- In-situ measurements provided by NIVA and Oil drilling Platforms
- Campaign 4 weeks in April 2006,
- 12 Flights ➔ 8 OS flights, at night, 4 OS Sun-glint flights in the morning.
- Flights concurrent to ENVISAT ASAR overflight
- Support of BOOST/IFREMER (F) for exploitation of ASAR data and Flight Planning.
CoSMOS-OS, Implementation of EMIRAD radiometer
CoSMOS-OS, Flight patterns

Circle flights

Sun Glint flights
An example of exploitation of ASAR data at BOOST to support the Flight Operations.
CoSMOS-OS, Conclusions

- Flight Operations concluded very recently (end April 2006),
- Successful campaign, accurate flights execution,
- Good cooperation with Norwegian partners at NIVA and met. Office,
- Nominal Data Acquisition with radiometer,
- Large range of sea-surface winds,
- Some flights performed without ASAR data due to ENVISAT shutdown, or conflict with commercial user,
- No L-band data provided yet, but is important to process and provide them rapidly to the Science community,
• **DOMEX-2** RFQ currently in preparation
  • Radiometer will be modified to improve Thermal behavior, and be prepared for Acquisition in Winter.
  • Cooperation between IFAC and ESTEC Thermal experts,
  • Long-duration campaign 12-24 months at Dome-C starting end 2007,
  • ESA to finance radiometer dev.
  • Other funding required for logistics, and data acquisition.
Other Future activities

• Other Campaigns, and supporting Field activities:
  • Announcement of Opportunity:
    • Some 40 Proposals from Scientists Worldwide,
    • No financial support considered from ESA,
      but see directly with SMOS project manager for confirmation.
  • AO not discussed further in this presentation.

  • **NO** other Field campaigns scheduled,

  • **NO** other Airborne campaigns scheduled.