SMOS CATDS Level 3 products

Soil Moisture and Brightness Temperature

- Presentation and results -

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(4) Capgemini, Toulouse, France
SMOS Mission

The context
Joint program between ESA, CNES and CDTI
Satellite launched on November 2\textsuperscript{nd} 2009
Data since January 2010: more than 3 years of data

- passive 2D interferometer, protected L-band (1400-1427 MHz)
- Sun-synchronous orbit (local time 6am and 6pm)
- Revisit time: less than 3 days
RFI problem
RFI problem
### SMOS CATDS Level 3 products: Soil Moisture and Brightness Temperature

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>L0</td>
<td>Correlation, Telemetry</td>
</tr>
<tr>
<td>L1c</td>
<td>Brightness temperatures</td>
</tr>
<tr>
<td></td>
<td>Binx ISEA 15km semi-orbits</td>
</tr>
<tr>
<td>L2</td>
<td>Physical variables (soil moisture, optical thickness...)</td>
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</tbody>
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### L3SM Global maps of soil moisture
- Enhanced retrievals
- Temporal synthesis (3d, 10d, monthly)

### L3TB Global Brightness
- Angle binned and at ground level (H & V)

### L4 High-end product obtained from models and other sensors

**NetCDF**
- EASE 25km Global product

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Toulouse, France | 3 Juin 2013
3 ground segments

- ESA (European Space Agency) for Level 1 and 2

- 2 national centers for Level 3 and 4
  - BEC (Barcelona Expert Center)
  - CATDS (Centre Aval de Traitement des Données SMOS)
3 ground segments

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The CATDS

Centre Aval de Traitements des Données SMOS
CATDS

- The Level 3 and 4 data processing ground segment of the SMOS mission developed by the CNES (Centre National d’Etudes Spatiales), the French space agency

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* Isea: Icosahedral Snyder Equal Area
* EASE: Equal Area Scalable of the Earth

Jacquette E. et al., 2010
Al Bitar A. et al., 2010
CATDS

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Easier to use
The EASE 25km Grid

Characteristics:
- Grid based
- Cylindrical projection
- Equal Area
- Irregular grid

Selected for many missions:
- AMSR-E
- GCOM AMSR2
- SMAP
...

see NSIDC: http://nsidc.org/data/ease/ease_grid.html
The products

From daily to monthly products
SMOS CATDS Level 3 products: Soil Moisture and Brightness Temperature

- Daily products
- Soil Moisture products
- Brightness temperature products
- Temporal synthesis
  - 3-day Soil Moisture products
  - 3-day Dielectric Constant products
  - 10-day products
  - Monthly products
Daily product

- This contains filtered geophysical parameters: surface soil moisture, vegetation optical thickness, dielectric constant.
Daily product

- This contains filtered geophysical parameters: surface soil moisture, vegetation optical thickness, dielectric constant.

» At high latitudes, when several retrievals are available for a given day, the nearest from the subtrack is chosen.

» The data is flagged when particular events occur (freezing for example).
3-day products

- Corresponds to the aggregation of daily maps over a 3-day moving window: the best retrieval is chosen.
- One product for surface soil moisture, another for the dielectric constant
10-day product

- It is a 10-day aggregation of daily global maps.
- It contains minimum, maximum and median values of soil moisture and its associated parameters.

» Useful for agronomy, water resource monitoring, etc.
Cyclone Oswald over Australia

Very dry before the rain start

Significant increase in SM after the cyclone
Monthly product

- It is a monthly aggregation of daily global maps.
- It provides a weighted mean soil moisture, vegetation optical thickness, RFI statistics over a month.

» Useful for climate monitoring

![Soil Moisture (m^3/m^3)]

![Optical thickness for low vegetation (neper)]
Monthly product

Monthly averaged product: March 2010 - March 2012
Soil Moisture difference (m³/m³)
SMOS CATDS Level 3 products: Soil Moisture and Brightness Temperature

- Daily product
- Daily product
- Daily product
- Daily product
- ... Daily product

- 3-day products
- 3-day products

- 10-day product
- 10-day product
- 10-day product

- Monthly product

Over a month

X 10
Brightness Temperature product

- daily product
- includes all brightness temperatures acquired that day
- H&V polarisations at fixed angles from 2.5° to 62.5° every 5°, and Stockes 3 and 4 parameters
Brightness Temperature product

- H&V polarisations at fixed angles from 2.5° to 62.5° every 5°, and Stockes 3 and 4 parameters
Where to find the products?

On the Internet!
On the CATDS website

http://catds.ifremer.fr
On the CATDS website

Request your access by sending an email to support@catds.fr

http://catds.ifremer.fr
Validation of the data

Comparison between different datasets
Many in situ datasets

A. Mialon, D. Leroux, S. Bircher, J. Grant, H. Lawrence, S.K. Tomer, A. Al Bitar, B. F. Cabot, Ph. Richaume, Th. Pellarin, JP Wigneron

Collaborations: T. Jackson, E. Lopez, M. Sekhar, J. Walker, E. Wood

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A roundup of SMOS validation activities at the HOBE site in the Skjern River Catchment, Denmark

S. Bircher, P. Richaume, A. Mialon, L. Berthon, Y.H. Kerr, and K.H. Jensen

See also: R349, EGU2013-10201 (Attendance Thu, 11 Apr, 17:30–19:00 / Red Posters)
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-- SMOS L3
-- SMOS L2
-- In situ data

Australia

A. Mialon
Thank you for your attention!

Any question?

Latest news on the SMOS Blog:
http://www.cesbio.ups-tlse.fr/SMOS_blog