



CATDS
Centre Aval de Traitement des Données Smos



SMOS CATDS Level 3 products

Soil Moisture and Brightness Temperature

- Presentation and results -

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(1) Centre d'Etudes Spatiales de la Biosphère (CESBIO), Toulouse, France

(2) Centre National de la Recherche Scientifique (CNRS), Toulouse, France

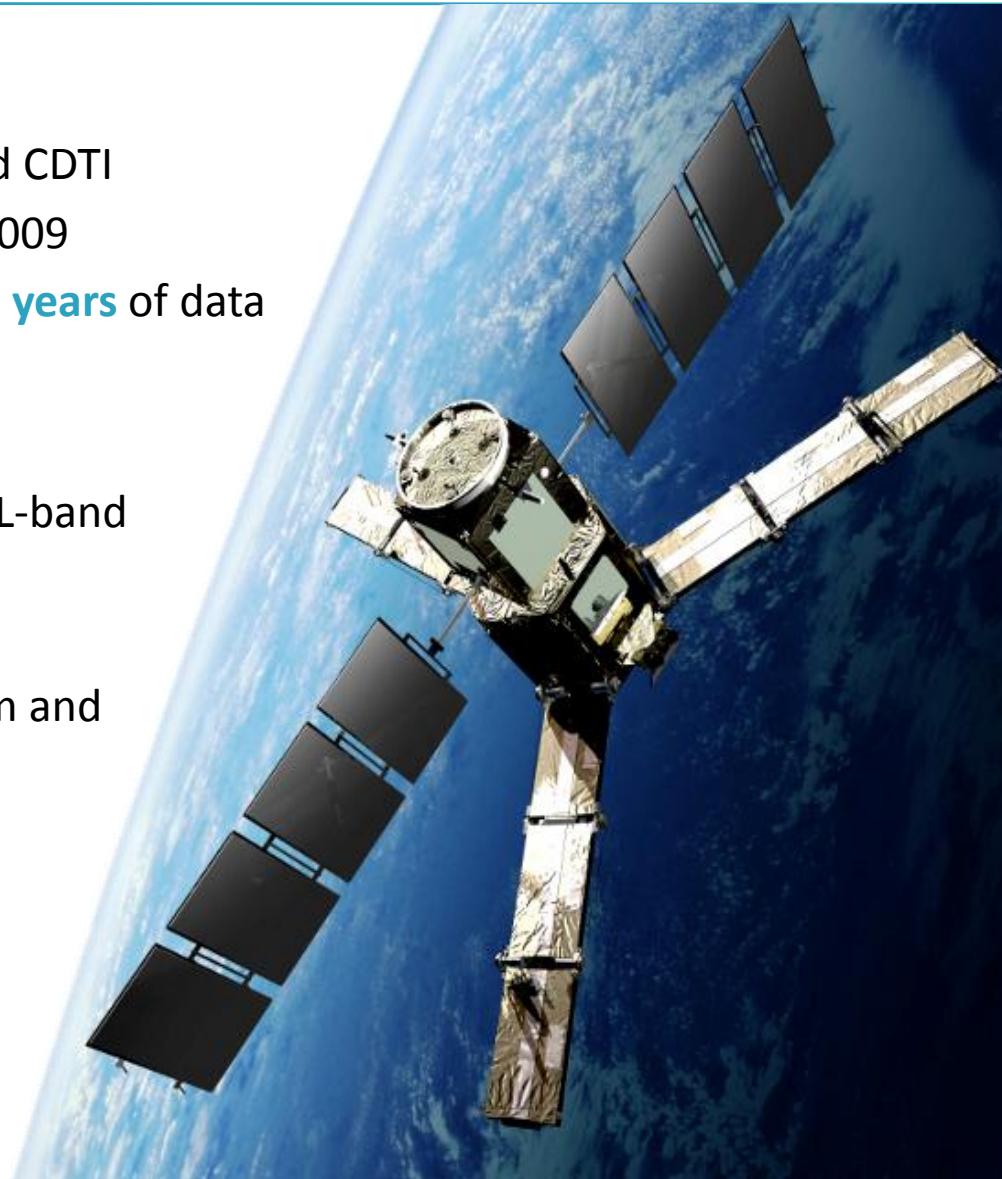
(3) Centre National d'Etudes Spatiales (CNES), Toulouse, France

(4) Capgemini, Toulouse, France

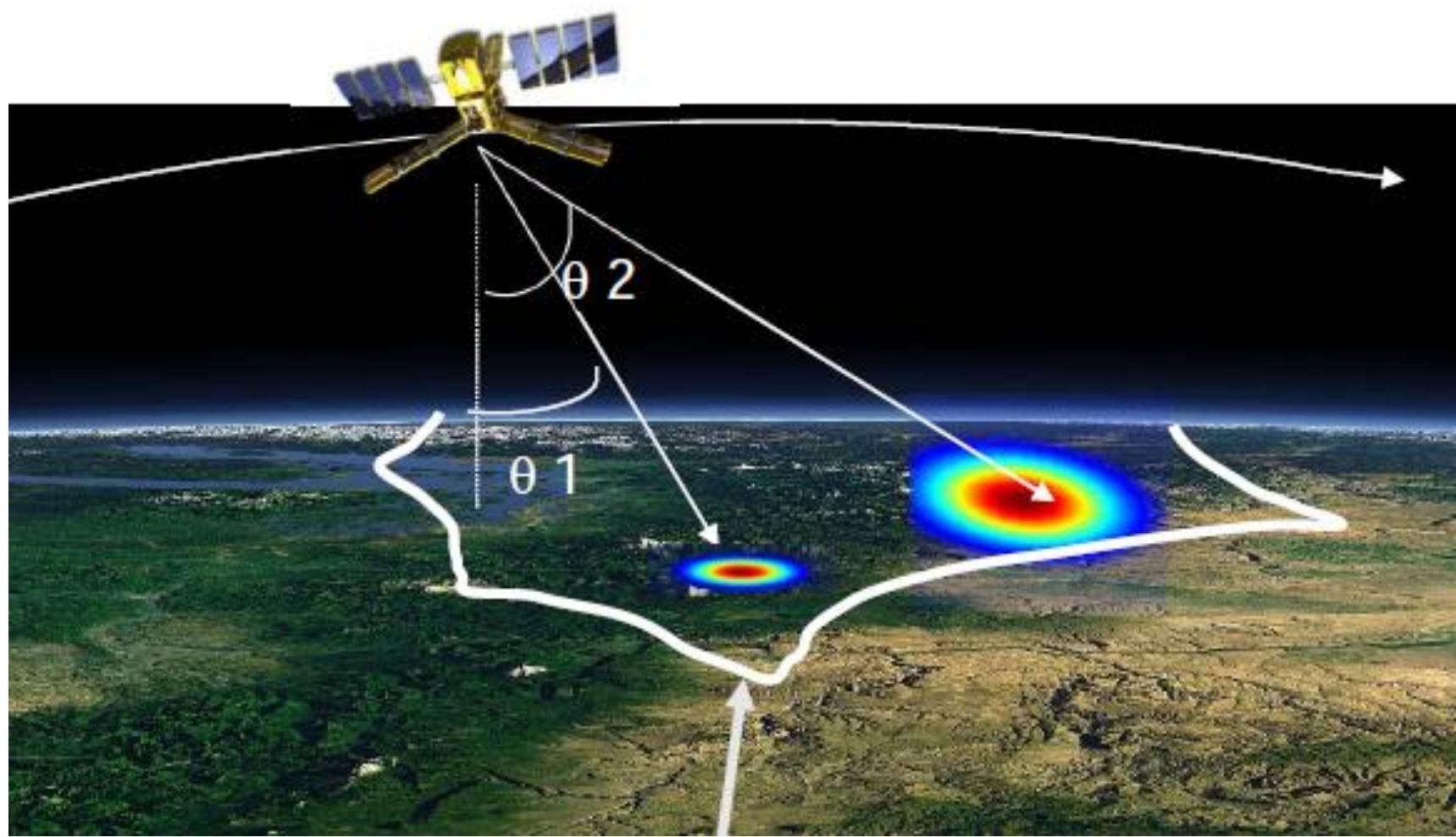
SMOS Mission

» The context

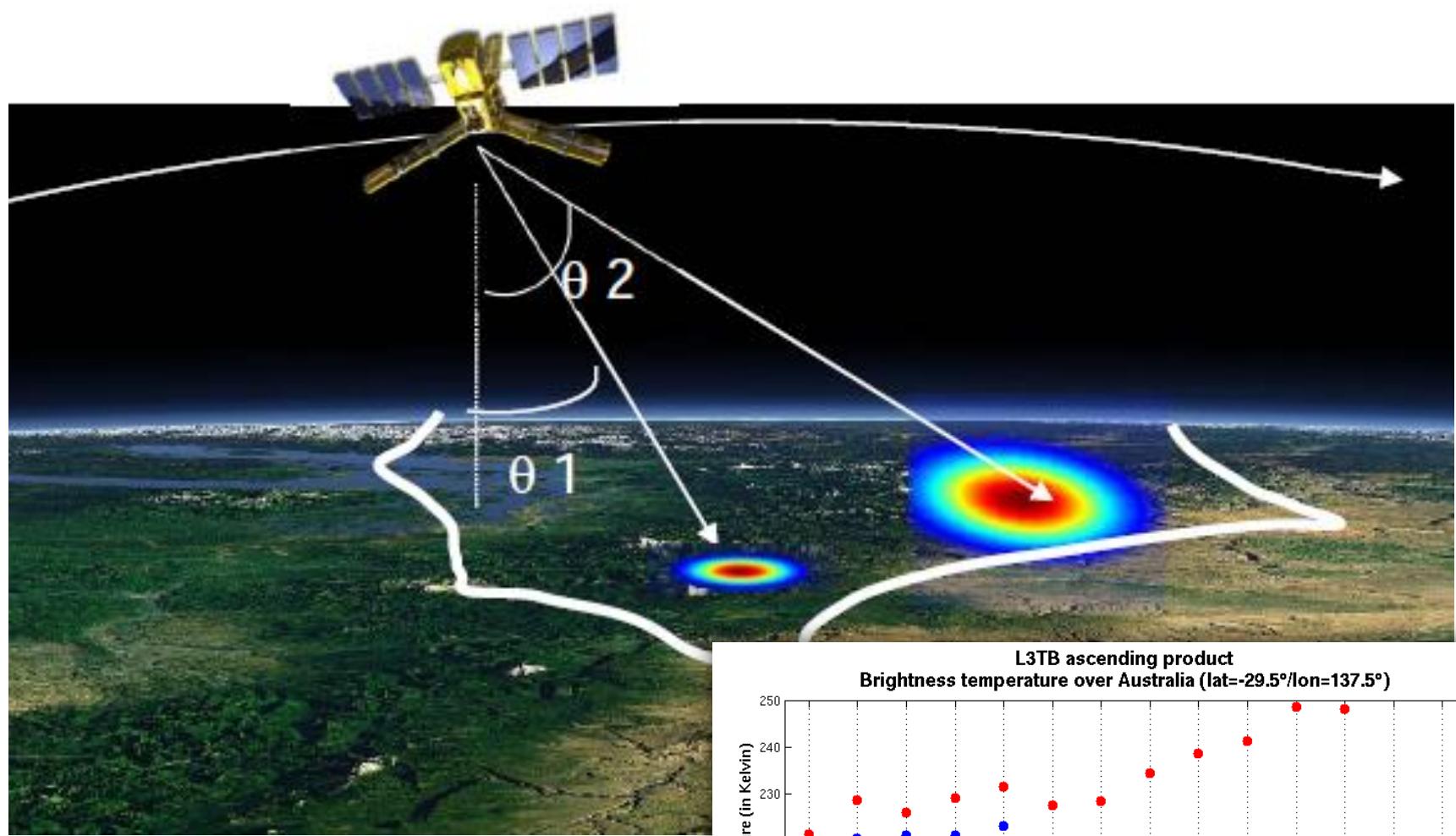
- ▶ Joint program between ESA, CNES and CDTI
 - ▶ Satellite launched on November 2nd 2009
 - ▶ Data since January 2010: more than **3 years** of data
-
- ▶ passive 2D interferometer, protected L-band (1400-1427 MHz)
 - ▶ Sun-synchronous orbit (local time 6am and 6pm)
 - ▶ Revisit time: less than 3 days



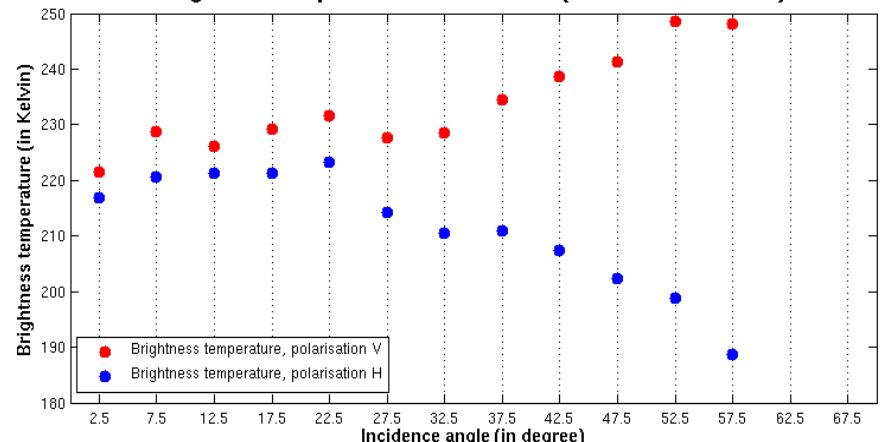
SMOS CATDS Level 3 products: Soil Moisture and Brightness Temperature



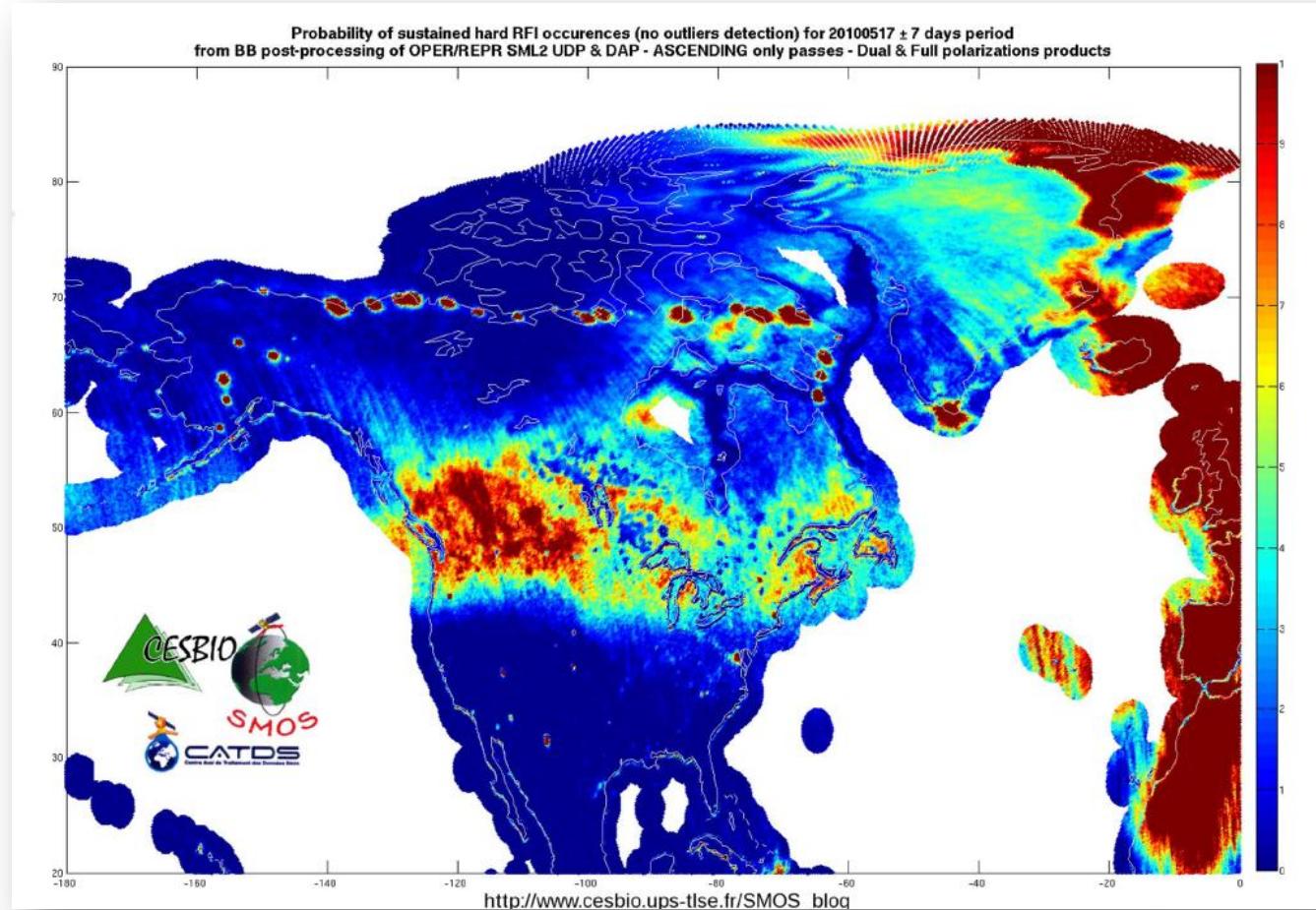
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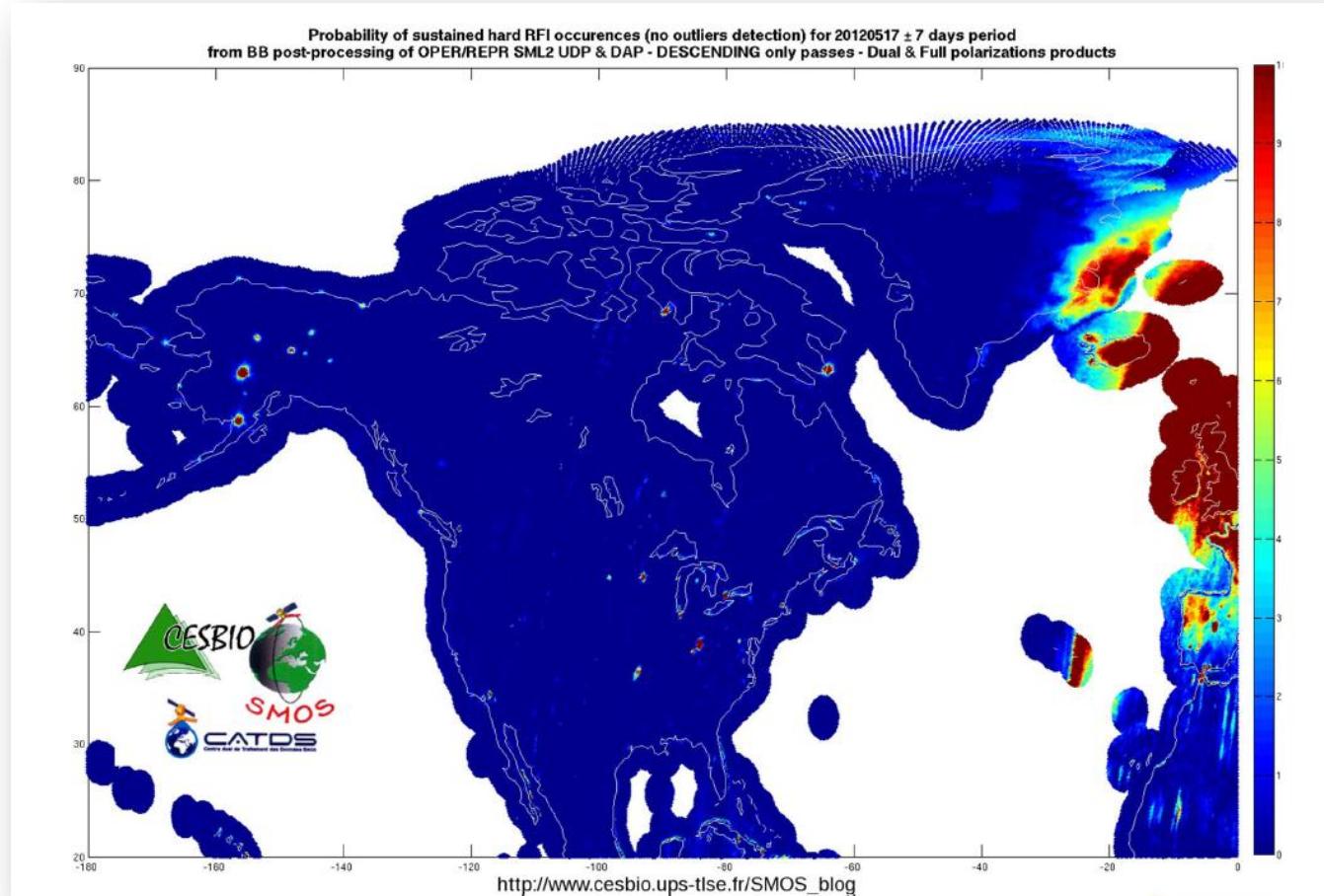
L3TB ascending product
Brightness temperature over Australia (lat=-29.5°/lon=137.5°)



RFI problem



RFI problem



L0 Correlation, Telemetry



L1c Brightness temperatures

Binx
ISEA 15km
semi-orbits



L2 Physical variables
(soil moisture, optical thickness...)



L3SM Global maps of soil moisture
+ enhanced retrievals
+ temporal synthesis (3d, 10d, monthly)

NetCDF
EASE 25km
Global
product



L3TB Global Brightness
angle binned and at ground level (H & V)

L4 High-end product obtained from models and other
sensors



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)



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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

| | Swath product | Aggregated product |
|------------|---------------------------------------|--|
| Known as | ESA SMOS Level 2 | CNES CATDS Level 3 |
| Algorithm | Use of one overpass for the retrieval | Use of 3 overpasses for the retrieval + Correlation of the vegetation optical depth |
| Derived SM | Per $\frac{1}{2}$ orbit | Daily, 3-day, 10-day and monthly products |
| Format | BinX | Netcdf |
| Grid | Isea4h9 ~15km | EASE Grid ~25km |

* 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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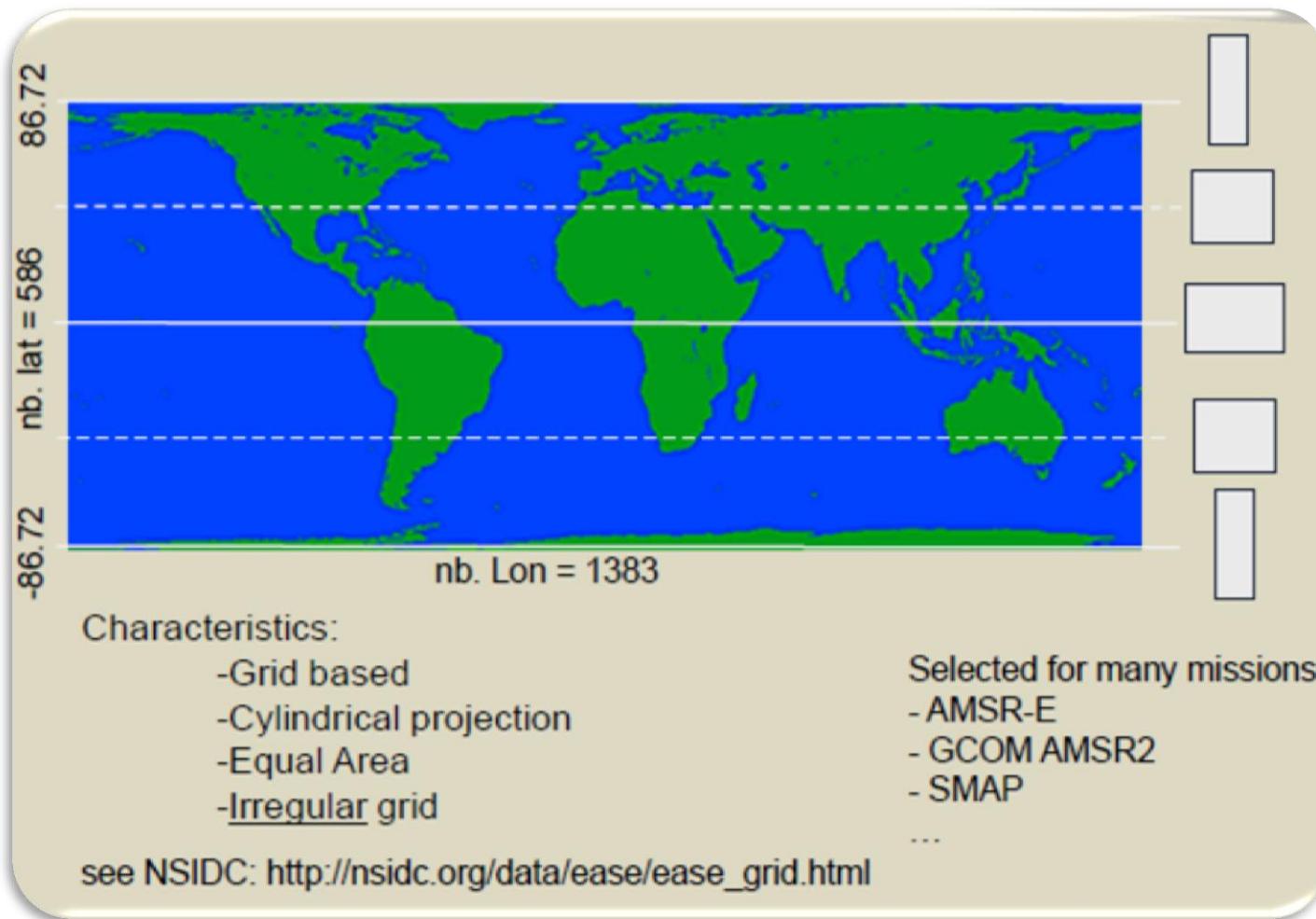
Jacquette E. et al., 2010

Al Bitar A. et al., 2010



Easier to use

The EASE 25km Grid



The products

» From daily to monthly products



Daily
products

Soil Moisture
products

Brightness temperature
products

Temporal
synthesis

3-day
Soil Moisture
products

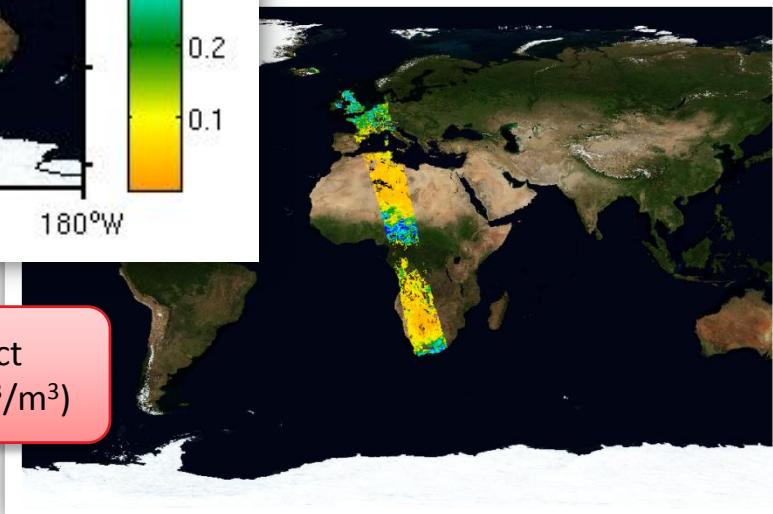
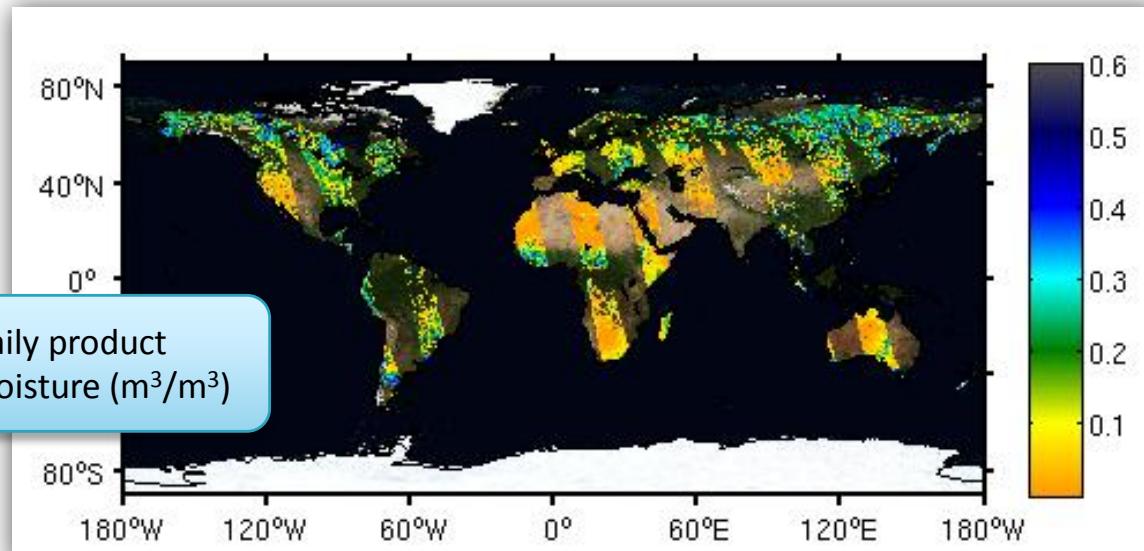
3-day
Dielectric Constant
products

10-day
products

Monthly
products

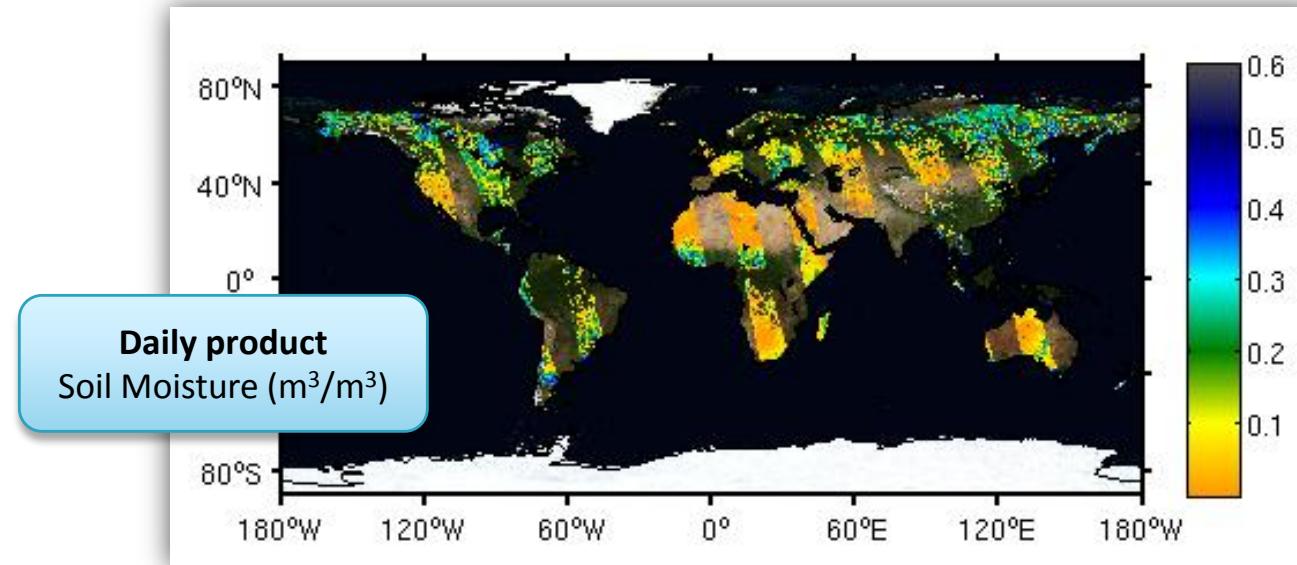
Daily product

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



Daily product

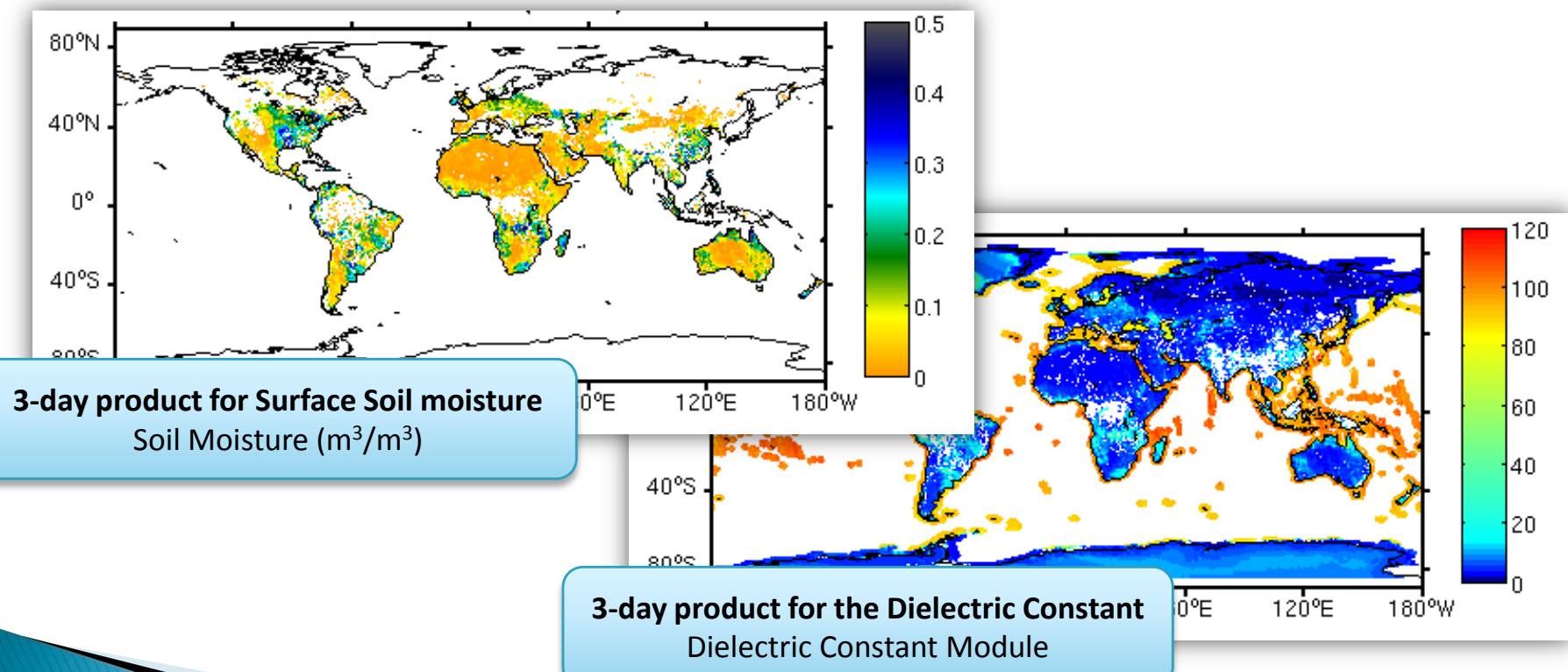
- ▶ This contains filtered geophysical parameters: surface soil moisture, vegetation optical thickness, dielectric constant.



- » 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).

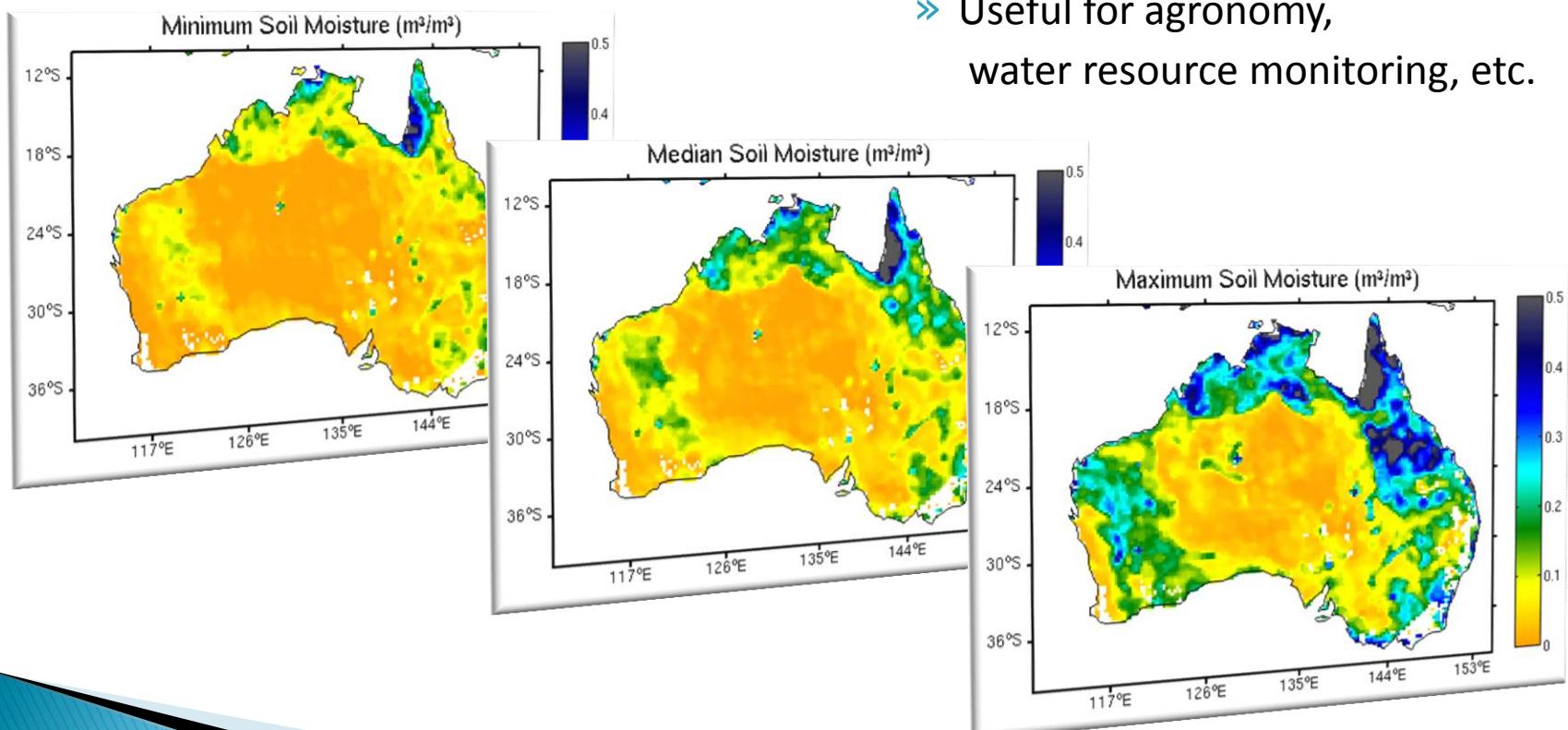
3-day products

- ▶ 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



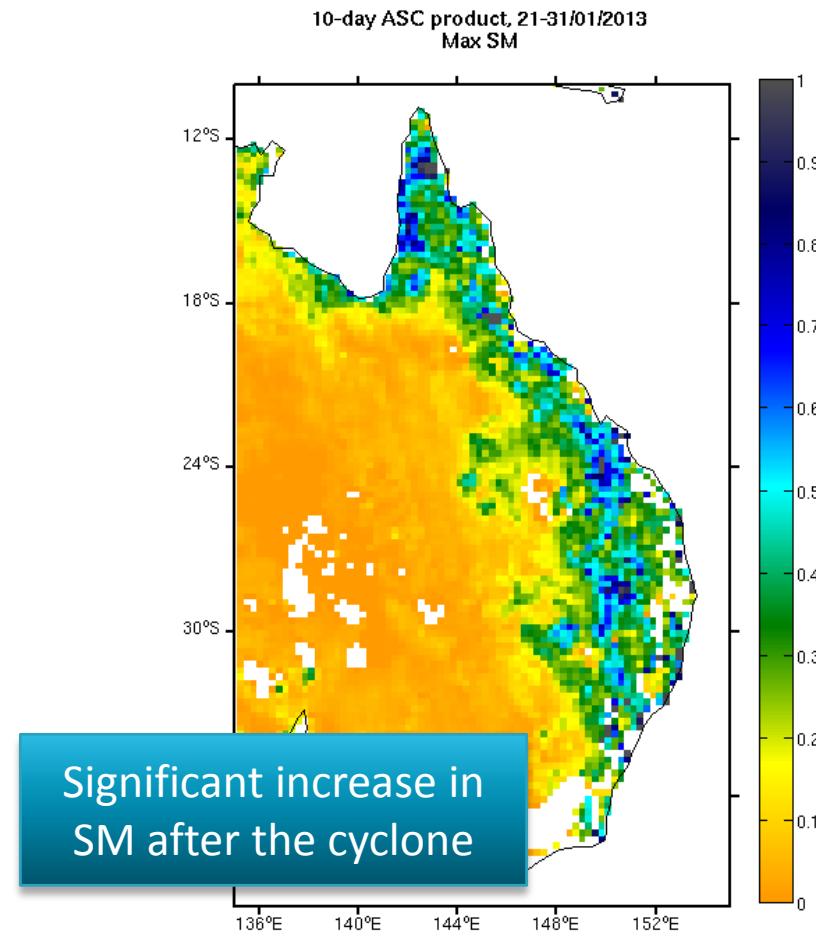
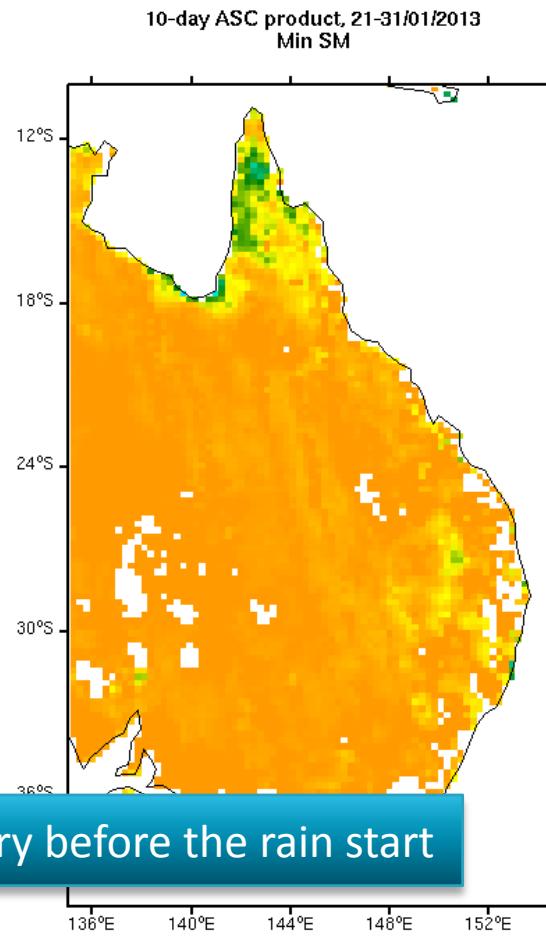
10-day product

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



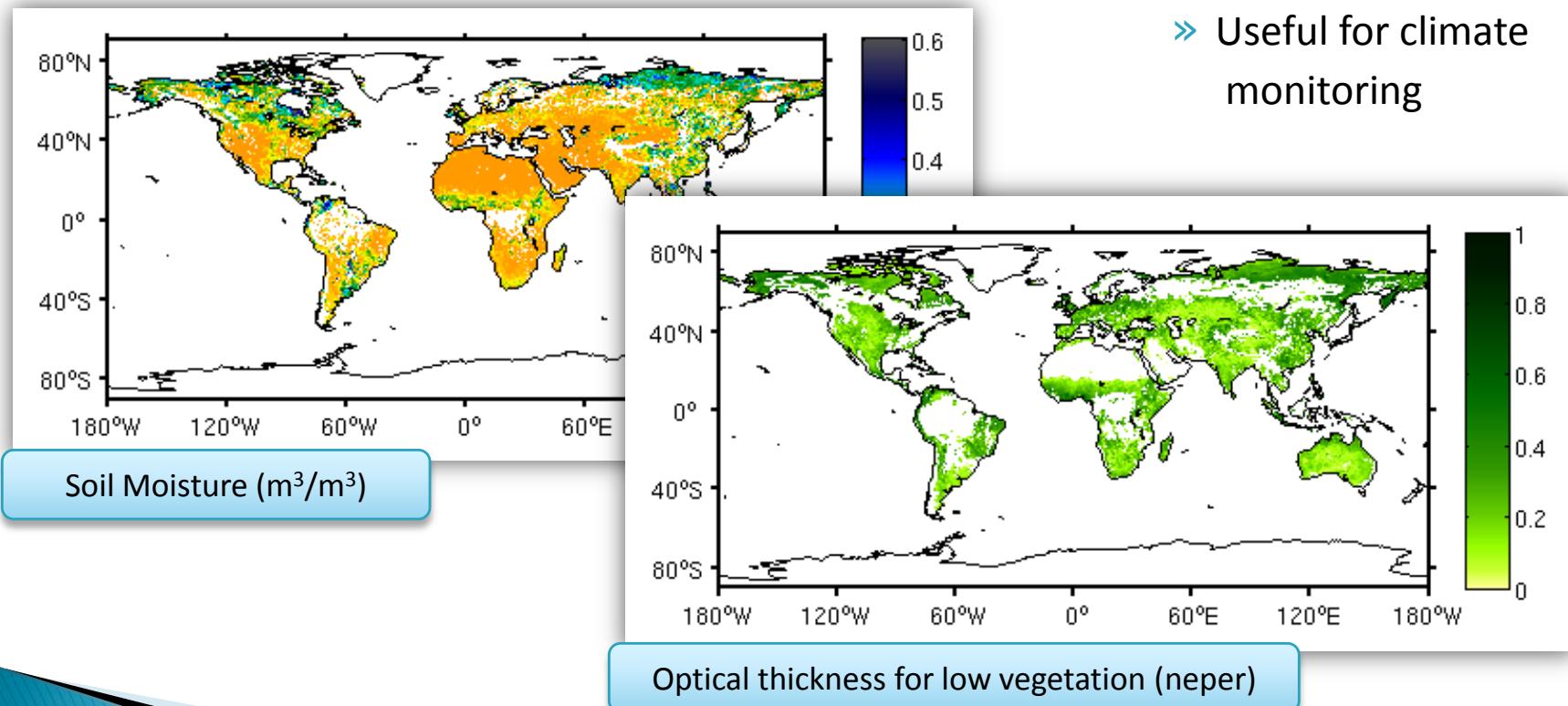
» Useful for agronomy,
water resource monitoring, etc.

Cyclone Oswald over Australia

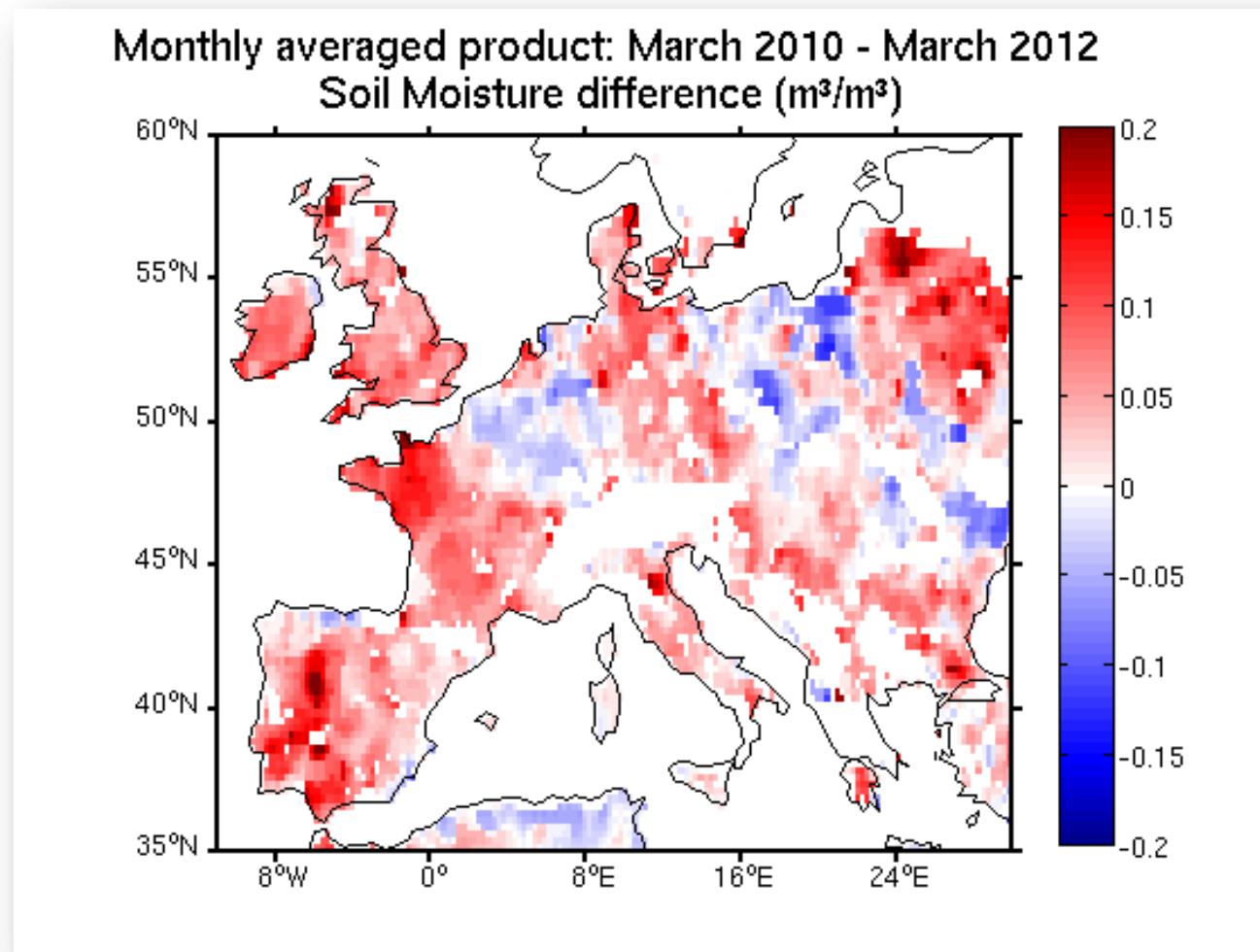


Monthly product

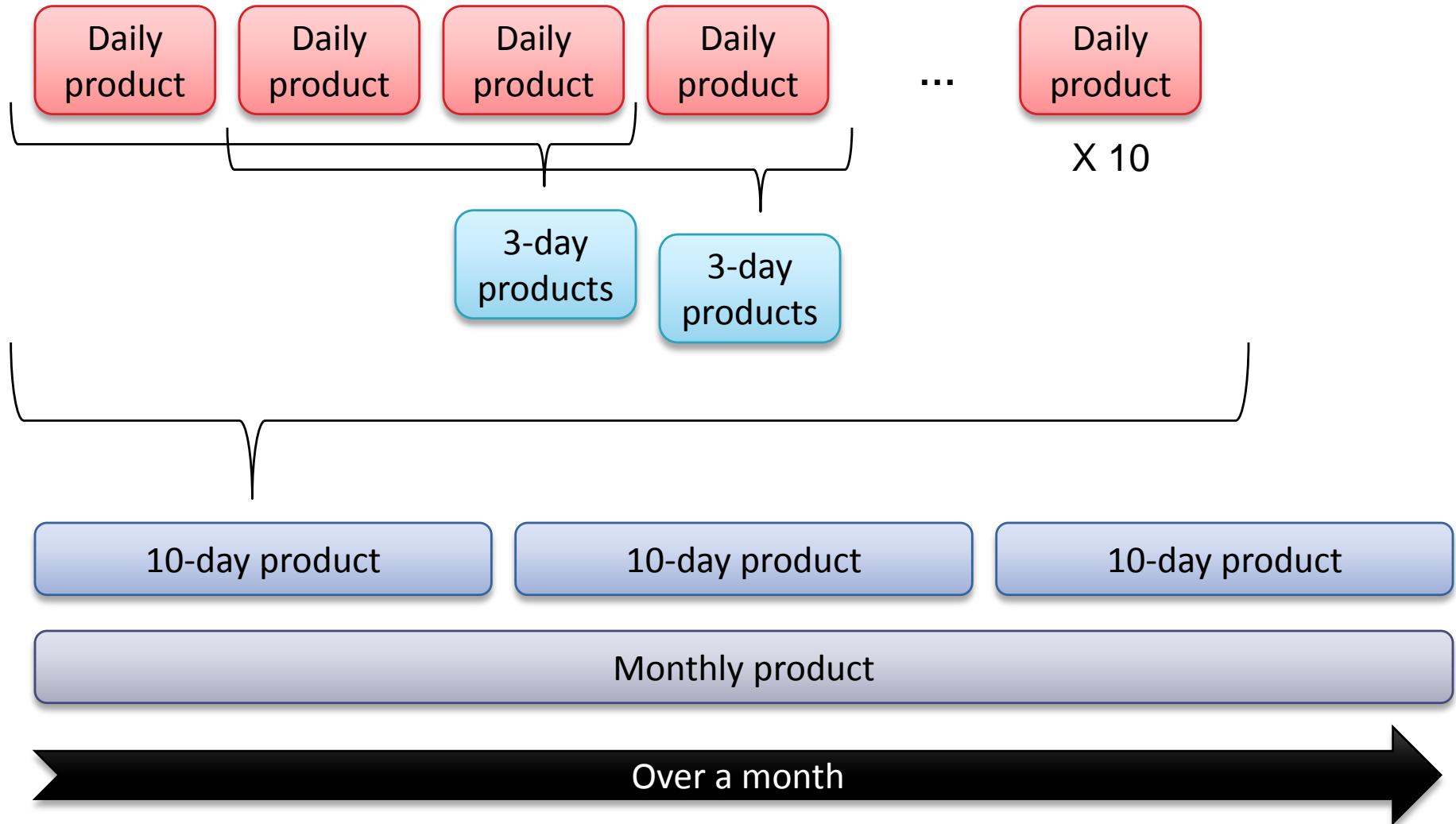
- ▶ It is a monthly aggregation of daily global maps.
- ▶ It provides a weighted mean soil moisture, vegetation optical thickness, RFI statistics over a month.



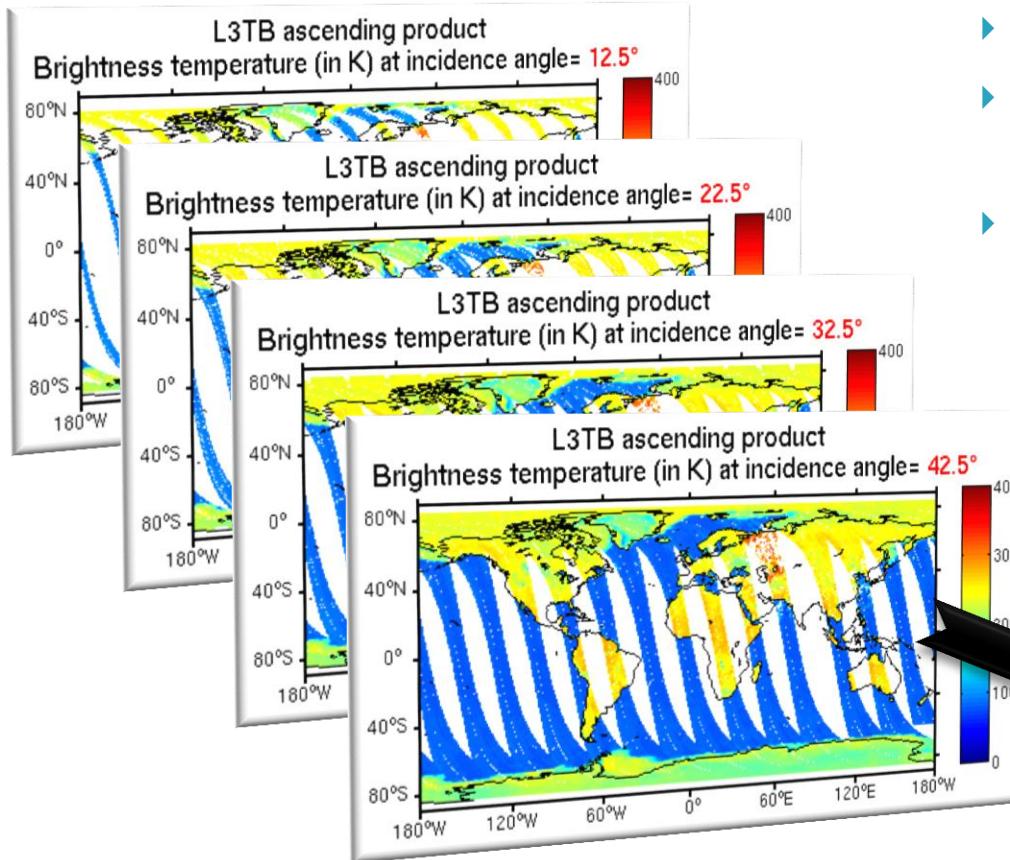
Monthly product



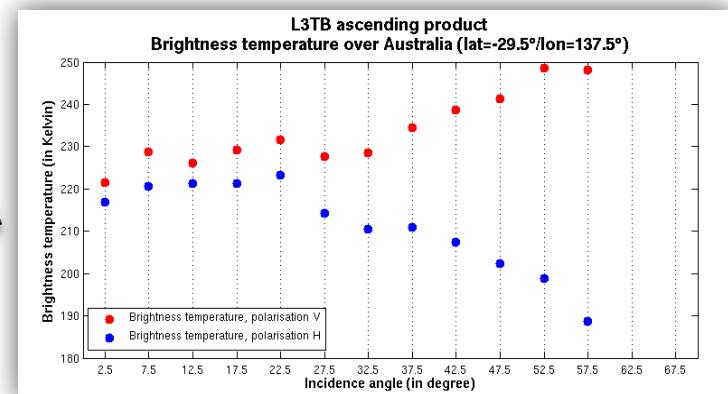
SMOS CATDS Level 3 products: Soil Moisture and Brightness Temperature



Brightness Temperature product

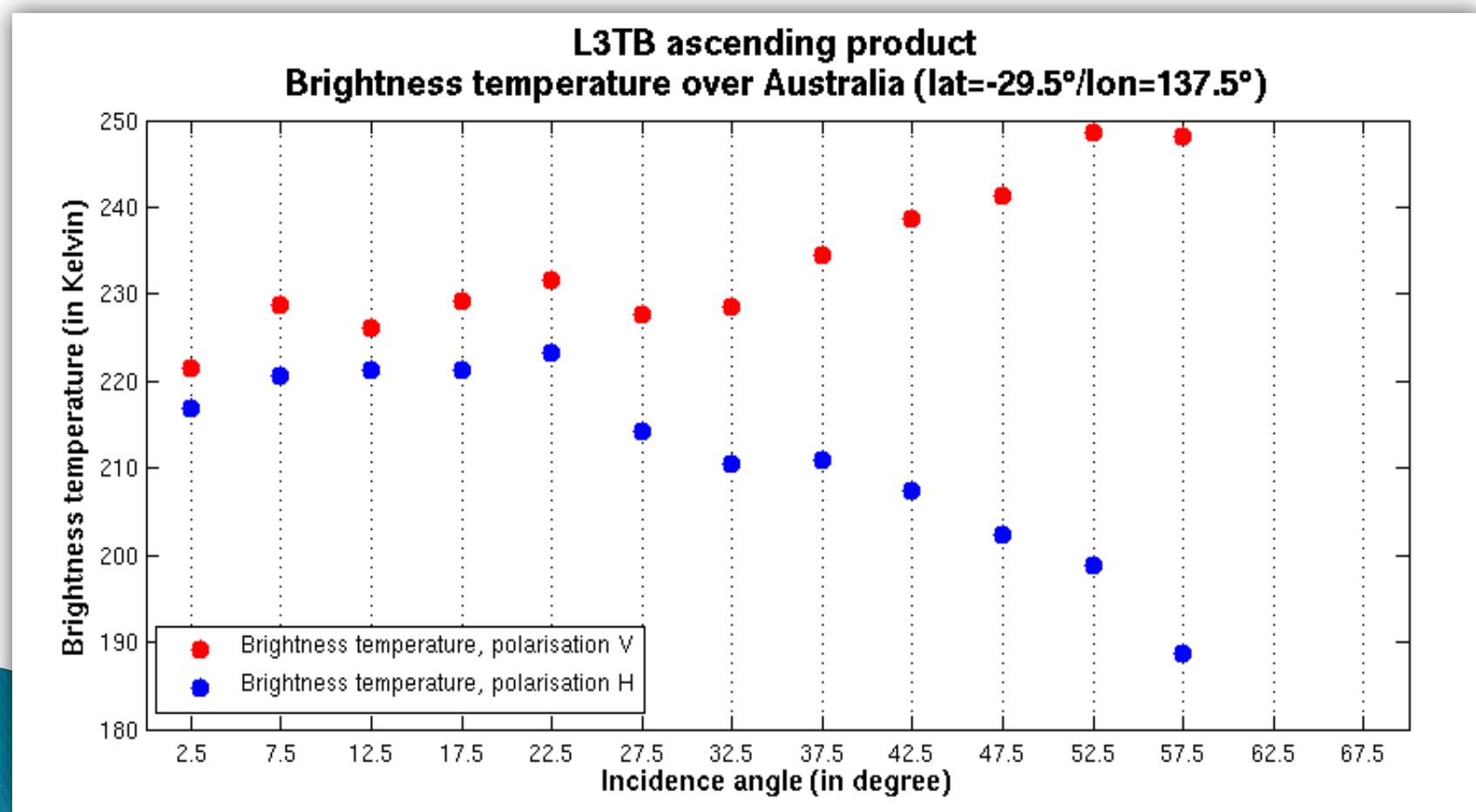


- ▶ daily product
- ▶ includes all brightness temperatures acquired that day
- ▶ **H&V polarisations at fixed angles from 2.5° to 62.5° every 5° , and Stokes 3 and 4 parameters**



Brightness Temperature product

- H&V polarisations at fixed angles from 2.5° to 62.5° every 5° , and Stokes 3 and 4 parameters



Where to find the products?

» On the Internet!

On the CATDS website

The screenshot shows the homepage of the CATDS website. At the top, there is a banner with the text "Centre Aval de Traitement des Données SMOS (CATDS)" and "French ground segment for the SMOS Level 3 and 4 data". Below the banner are logos for CNES, CESBIO, and Ifremer. A navigation bar includes links for "Presentation", "Production Center (CPDC)", "Expertise Centers (CEC)", "News", "Products", "Documentation", and "Help & Support". On the left side, there are sections for "Available products from CPDC", "Available products from CEC-OS", "Products access", and "FAQ". The main content area features a large image of the SMOS satellite in space. Below the image, a yellow bar contains the text "Satellite SMOS" and several small thumbnail images related to the satellite. The footer of the page includes the CATDS logo and the URL "http://catds.ifremer.fr".

<http://catds.ifremer.fr>

SIESTE au CERFACS
Toulouse, France | 3 Juin 2013



On the CATDS website

Centre Aval de Traitement des Données SMOS (CATDS)

French ground segment for the SMOS Level 3 and 4 data

cnes CESBIO Ifremer

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Direct access Zoom

Available products from CPDC

Available products from CEC-OS

Products access

FAQ

CATDS partners

CNES

cnes the Centre National d'Etudes Spatiales (CNES) is the government agency responsible for implementing France's space policy in Europe.

CESBIO

The Center for the Study of the Biosphere from Space (CESBIO) is a laboratory UPS-CNRS-CNES-IRD.

Access

Satellite SMOS

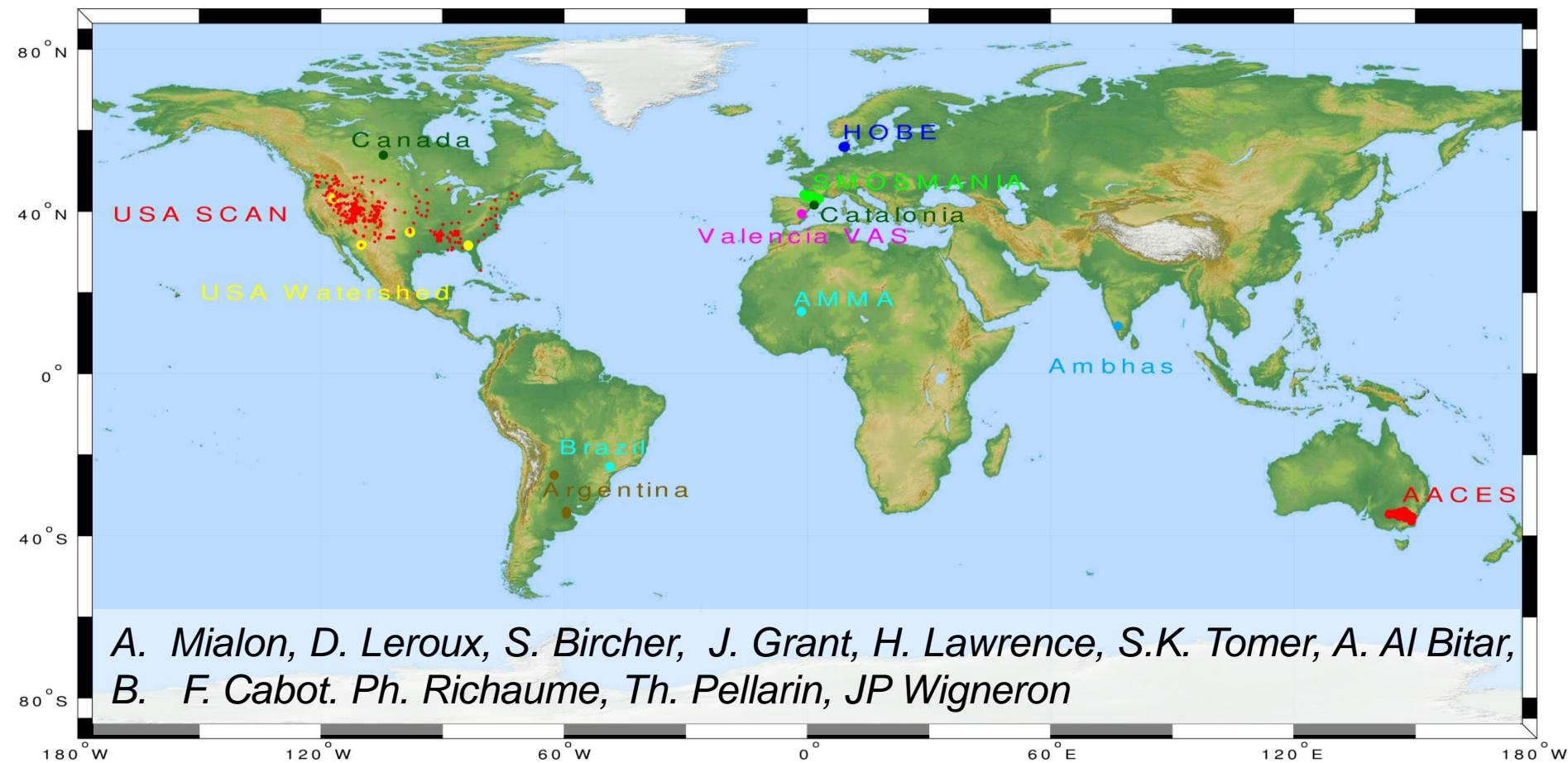
<http://catds.ifremer.fr>



Validation of the data

» Comparison between different datasets

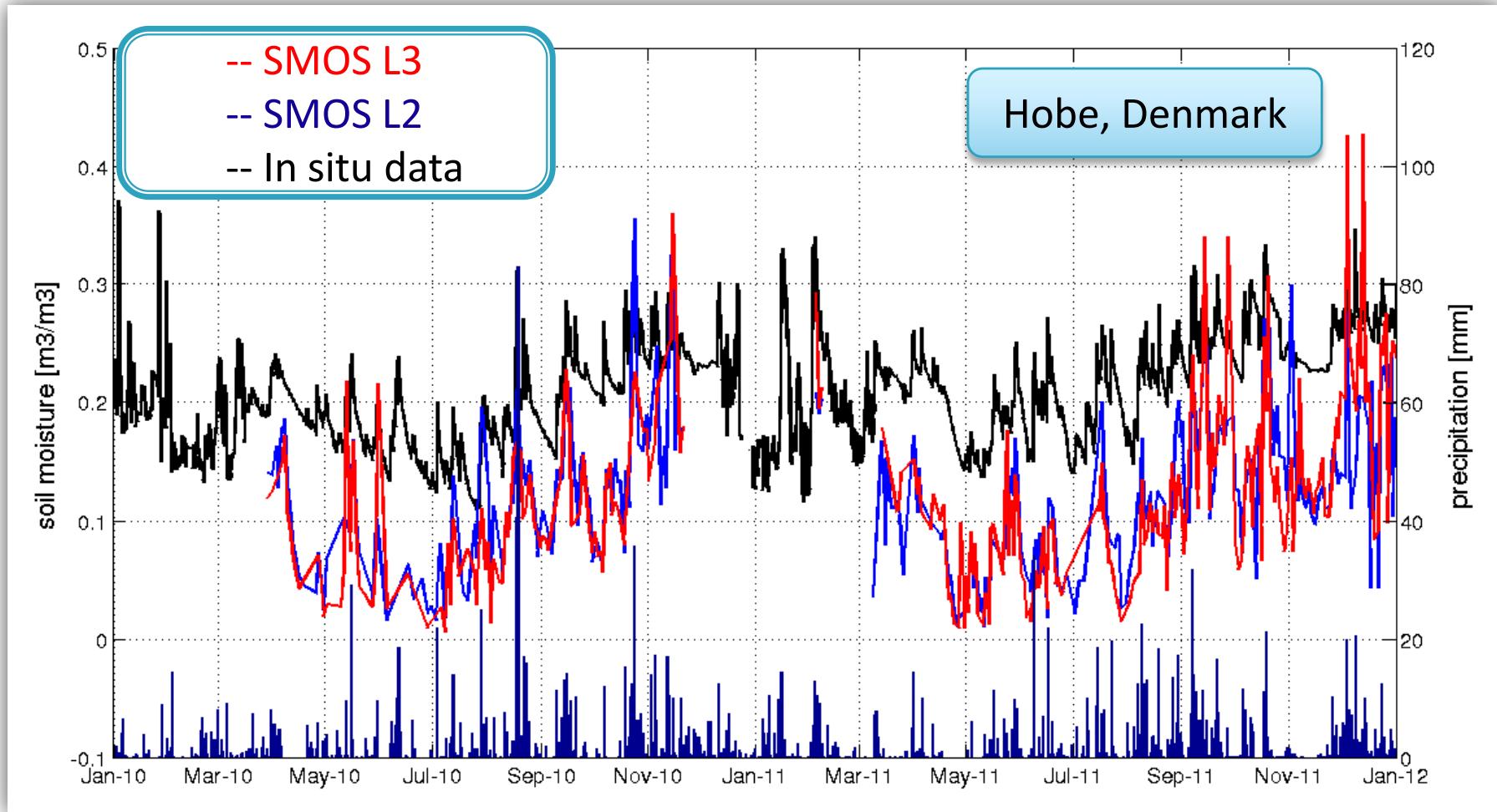
Many in situ datasets



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

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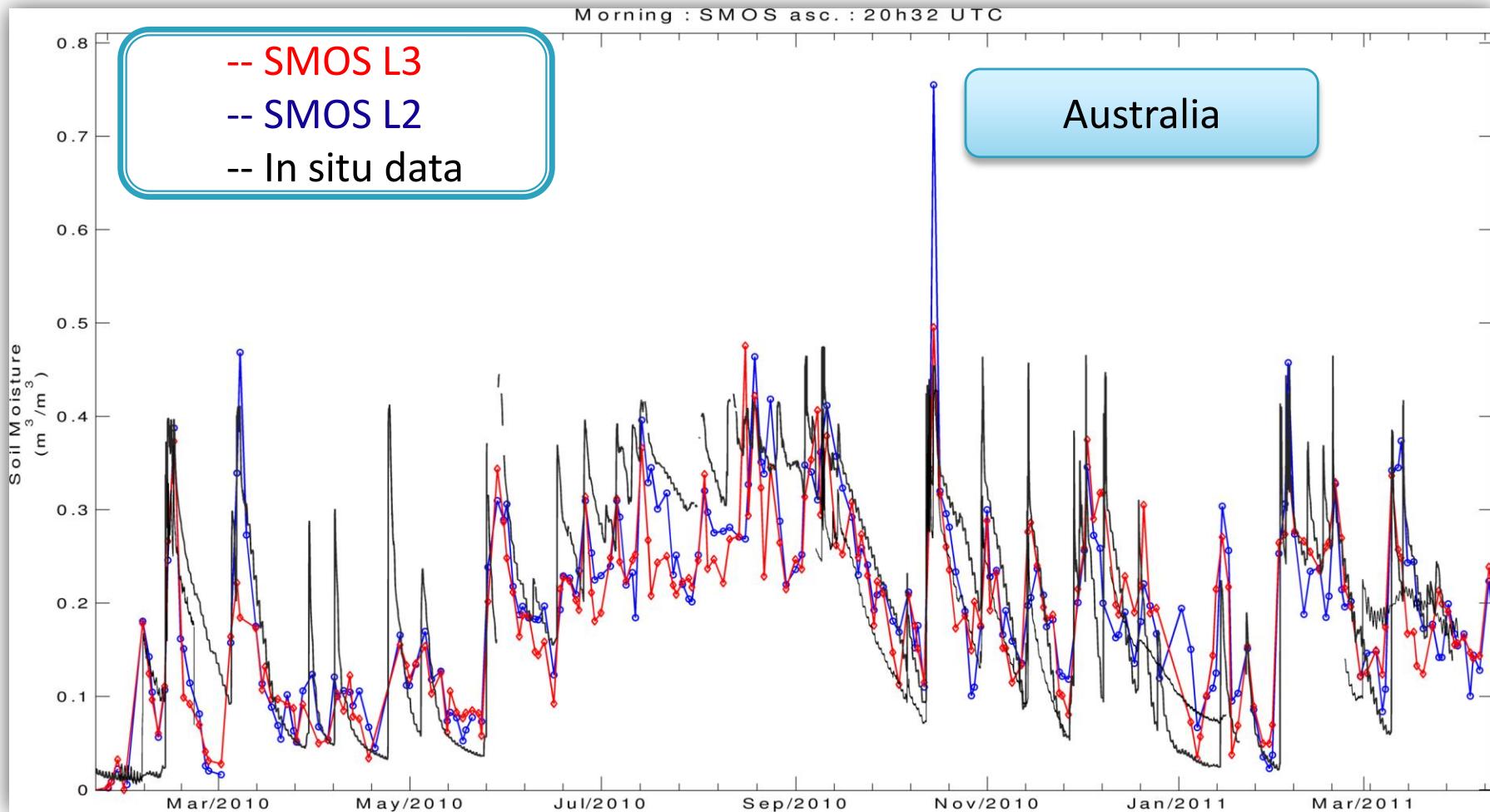


» See also: R349, EGU2013-10201 (Attendance Thu, 11 Apr, 17:30–19:00 / Red Posters)

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

SMOS CATDS Level 3 products: Soil Moisture and Brightness Temperature



» A. Mialon

Thank you for your attention!

» Any question?

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

