

De la missió SMOS a la missió FSSCAT

Adriano CAMPS, Full Professor

adriano.jose.camps@upc.edu

<https://futur.upc.edu/AdrianoJoseCampsCarmona>

CommSensLab-UPC, Dept Signal Theory and Communications, Universitat Politècnica Catalunya
Institut d'Estudis Espacials de Catalunya, and Visiting Professor at UAE University – Al Ain

From SMOS and GNSS-R ... (i)



SMOS activities (1993-today)

2000 Start of GNSS-R activities

2007 Start of CubeSat activities

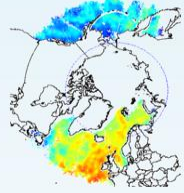
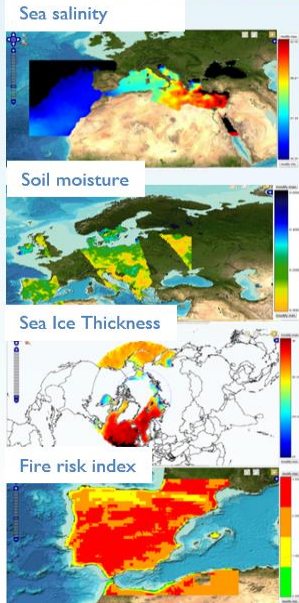
1993 Instrument concept and performance

2001 Image reconstruction, calibration, simulator
Field experiments: sea and land emissivity

2007 RFI mitigation in SMOS
L3/L4 products (SMOS BEC)

2022

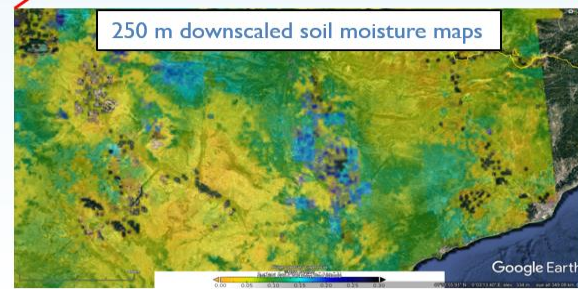
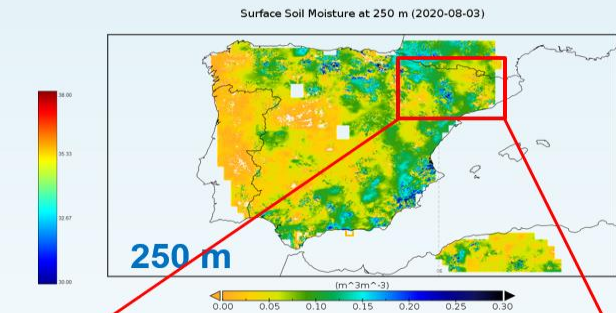
SMOS activities (1993-today): from the MIRAS instrument concept to novel applications...



Downscaled 1 km, daily European coverage

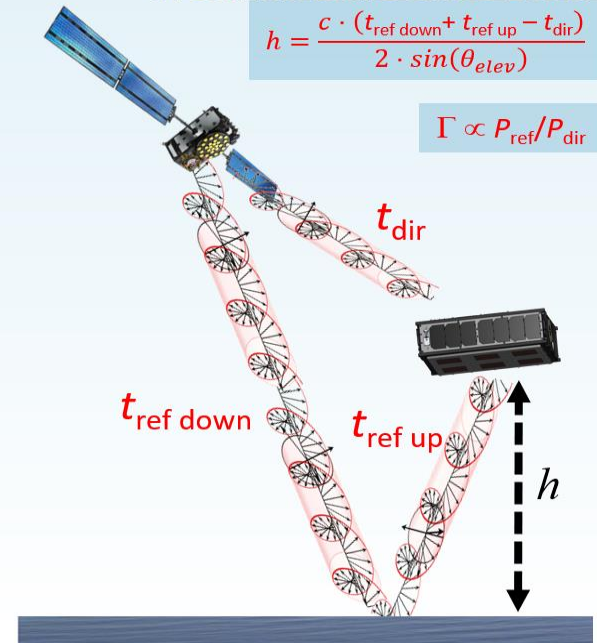
Up to ~60 cm, complementary to CryoSat-2

Delivered daily to regional authorities



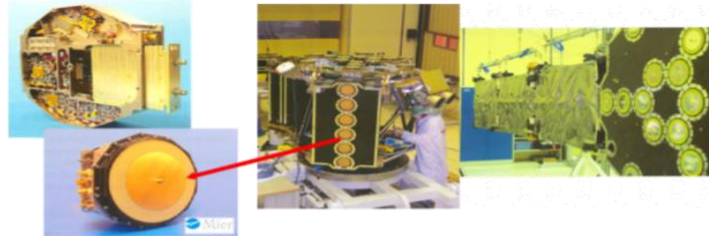
Credits: Miriam Pablos, BEC

GNSS-R (2000-today): instruments development and applications, in soil moisture since 2008.



SMOS activities (1993-today)

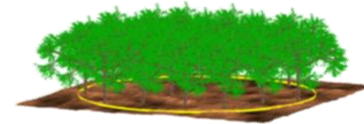
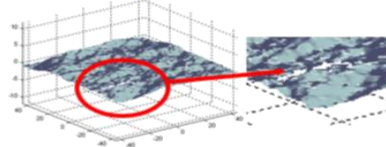
1. Instrument: Analysis, performance, calibration, imaging...
 → Subsystem especificacions (EADS-CASA, MIER, YLINEN...)



SEPS:
 SMOS End-to-end
 Perf. Simulator



2. Numerical Emission models: sea and vegetation-covered land



3. Field experiments: sea and land emissivity

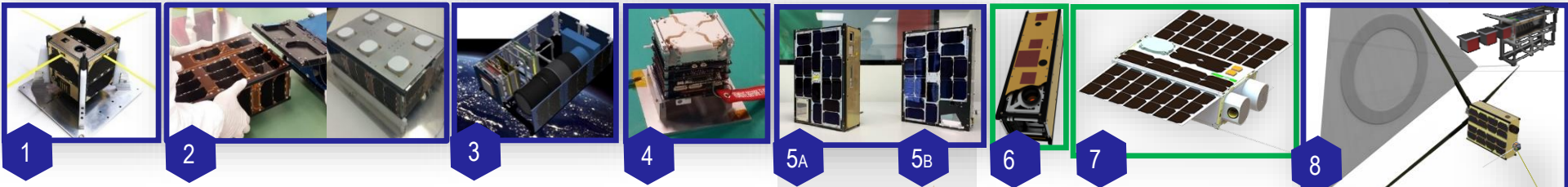
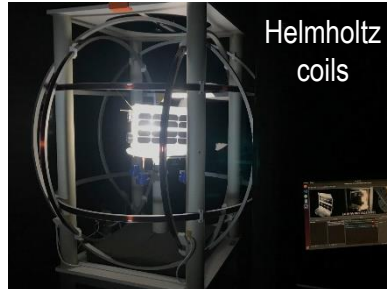


4. Development of sea surface salinity and soil moisture retrieval algorithms
 from multi-angular radiometric measurements

... to CubeSats: 1st four Catalan Satellites in Orbit !



UPC NanoSat Lab



- 1³Cat-1
[Nov 2013]

2nd Catalan Satellite in Space
- 2³Cat-2
[Aug 2015]

1st Catalan Satellite in Space
- 3³Cat-3
[cancelled]

Optical MS
- 4³Cat-4
[ESA FyS Q2 2023]

GNSS R1
MWR
AIS
- 5A³Cat-5/A & B
(FSSCat)
[Sep 2020]

1st ESA Third Party mission based on CubeSats, contributing to Copernicus
- 6³Cat-6/RITA

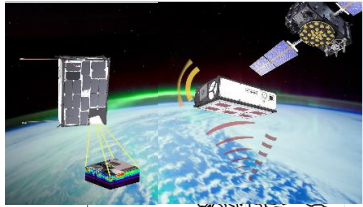
Optical HS
eRa data log
- 7³Cat-7/FMPL-3

roads in UAE NSSTC's & GNSSaS
GNSS-R L5
Ionospheric scintillation exp
- 8³Cat-8 + PoCat-1 & PoCat-2
[TBC]

Techdemos + 2 picosats
Ionospheric scintillation & polarimetric MS imaging



FSSCat: Soil Moisture, Sea Salinity, and Ice Mapping Using L-band Microwave Radiometry, GNSS-R and data fusion with VNIR imagery, with RFI detection/mitigation

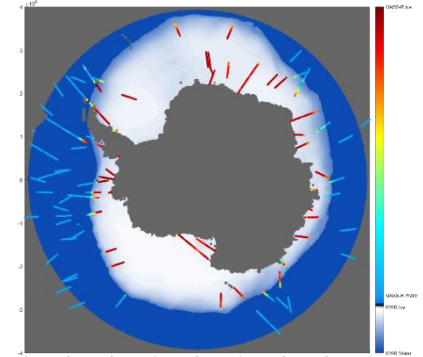
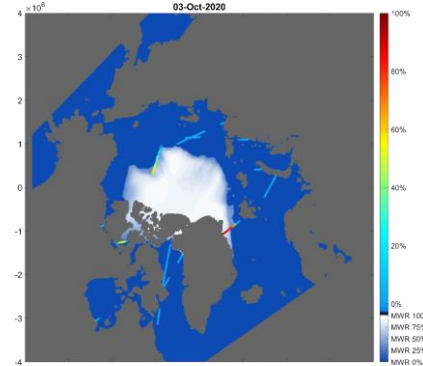
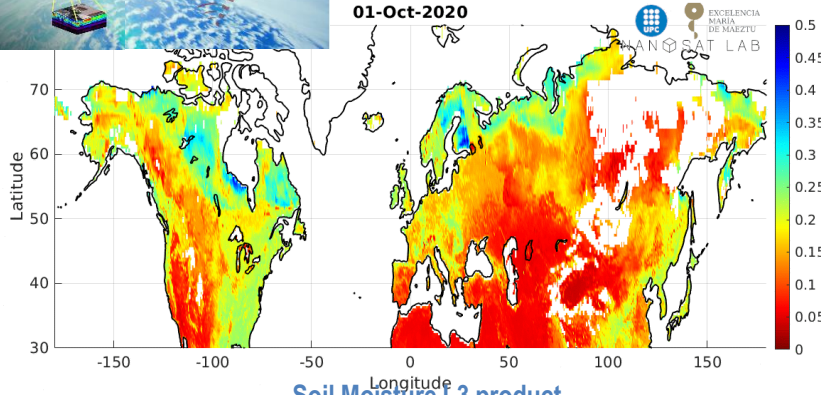


First CubeSat-based mission contributing to the Copernicus program:

➤ <https://earth.esa.int/eogateway/news/introducing-the-newest-esa-third-party-missions>
 Data freely available at: <https://catalogue.nextgeoss.eu/>



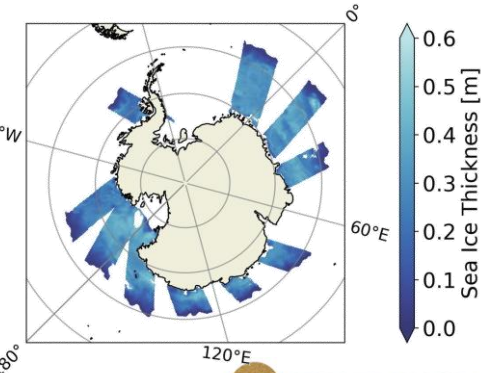
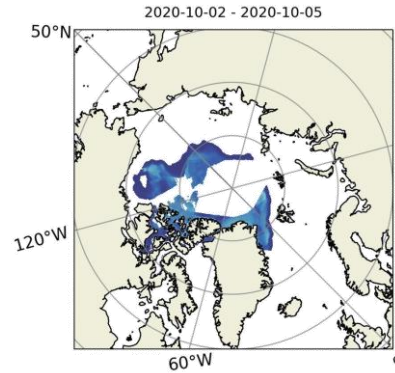
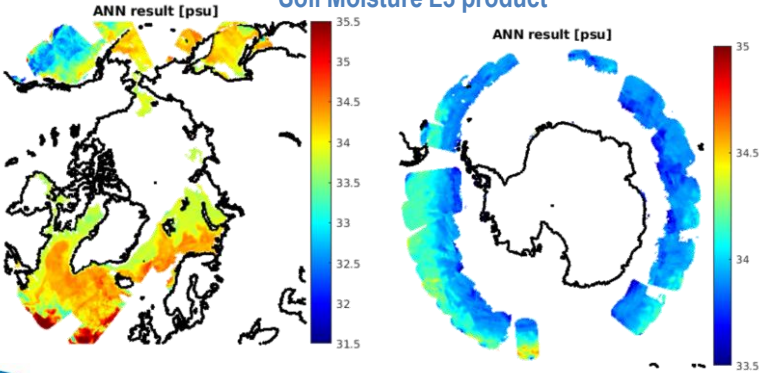
01-Oct-2020



Sea Ice Extent/Coverage L4 product using GNSS-R and MWR maps
 2020-10-02 - 2020-10-05

[<https://youtu.be/IQAaoYUPluA>]

Soil Moisture L3 product



Sea Surface Salinity L4 product using GNSS-R and MWR maps

Sea Ice Thickness L4 product using MWR maps

