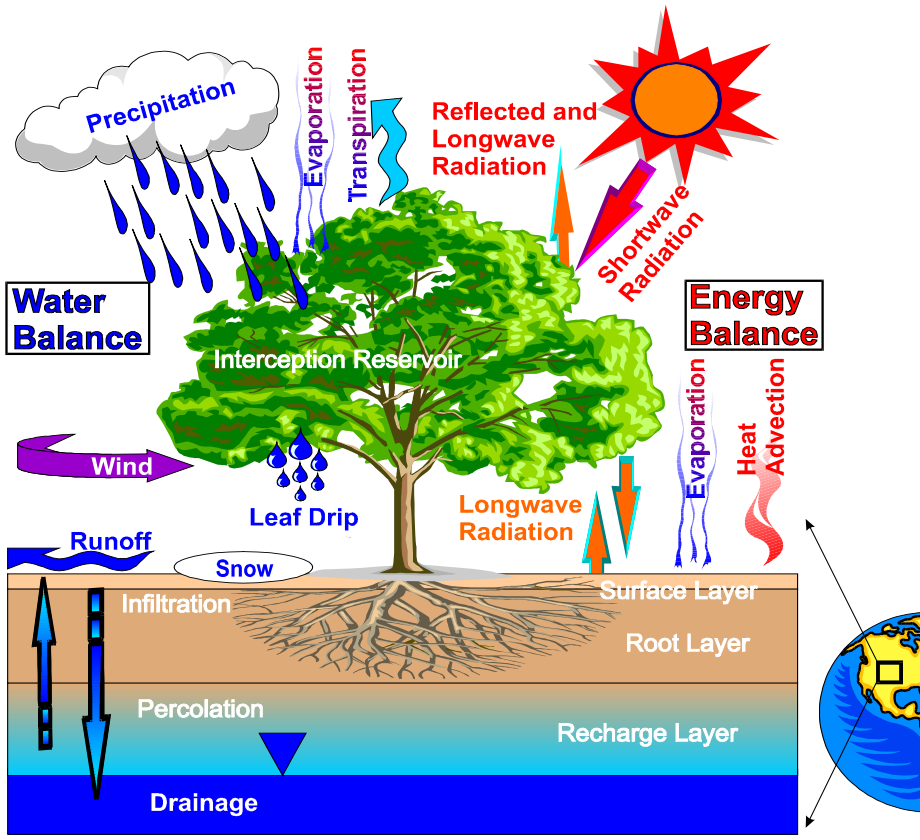
Why measuring Soil moisture?

***Scientific Objectives*:** Improve our understanding of the land component of the global hydrologic cycle, of the spatial and temporal evolution of the water storage, and of the soil atmosphere interactions so as to improve **global water ressources management - globally.**

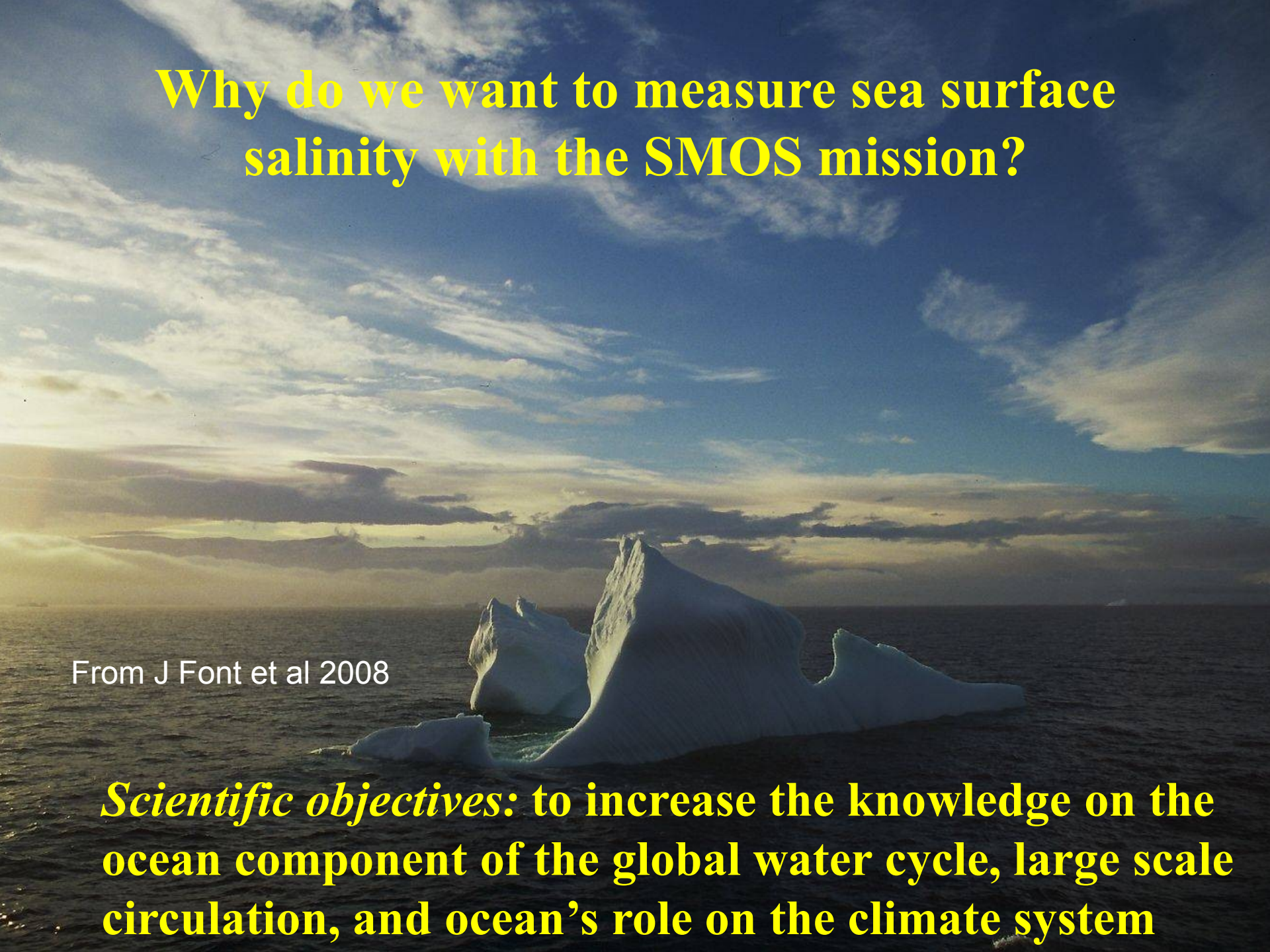
SM Rationale

- Role of Soil moisture in surface atmosphere interactions:
  - storage of water (surface and root zone), water uptake by vegetation (root zone), fluxes at the interface (evaporation), influence on run-off
- Implies relevance for
  - Weather Forecasts
  - Climatic studies
  - Water resources
  - Crop management
  - Forecast of extreme events



P. Houser

Why do we want to measure sea surface salinity with the SMOS mission?



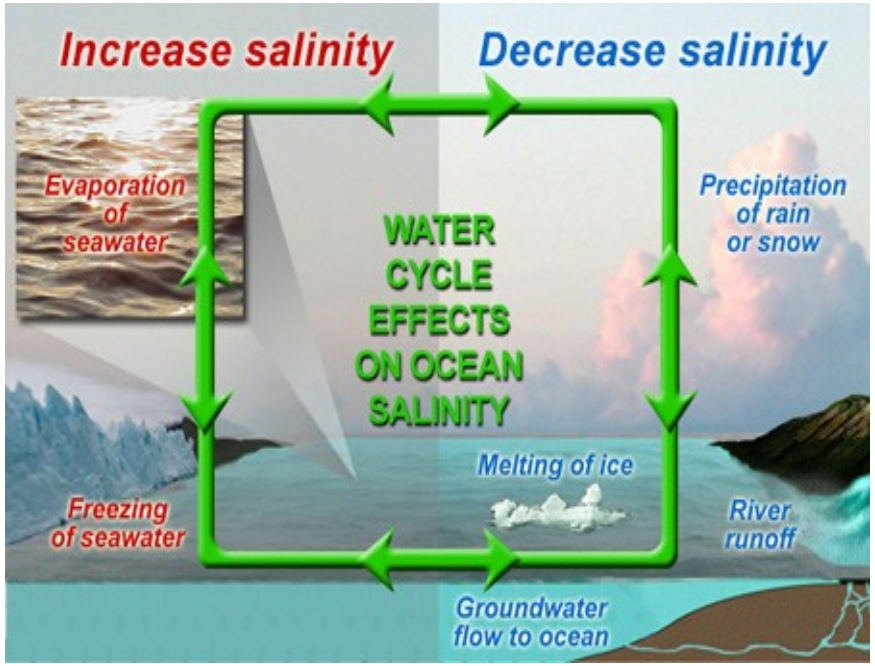
From J Font et al 2008

Scientific objectives: **to increase the knowledge on the ocean component of the global water cycle, large scale circulation, and ocean's role on the climate system**

Ocean Salinity and Climate

Salinity links the climatic variations of the global water cycle and ocean circulation

- Salinity is required to determine seawater density, which in turn governs ocean circulation.
- Salinity variations are governed by freshwater fluxes due to precipitation, evaporation, runoff and the freezing and melting of ice.



Air-Sea Water Flux accounts for

- *86% of global evaporation*
- *78% of global precipitation*

Importance

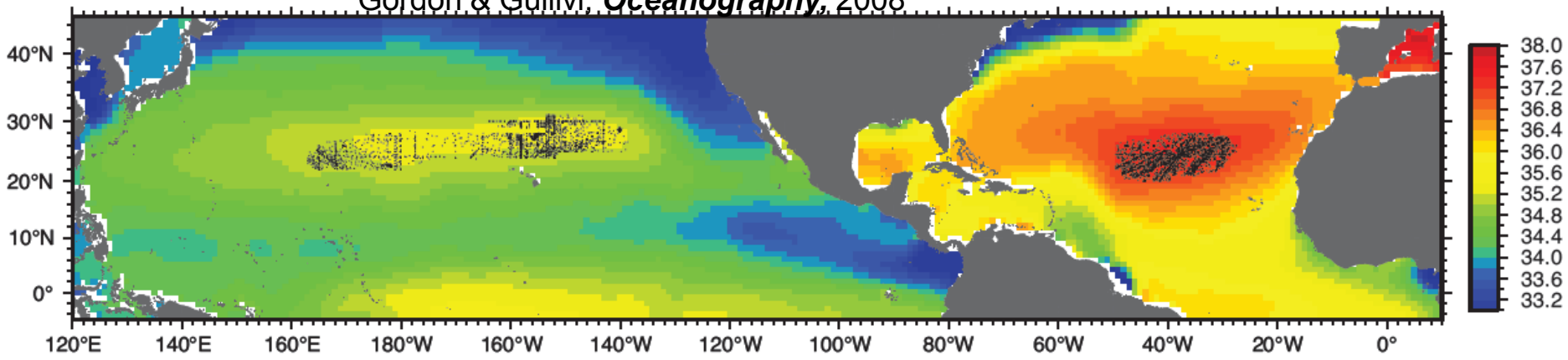
- *Climate prediction*
- *El Niño forecasts*
- *Global Water budget*

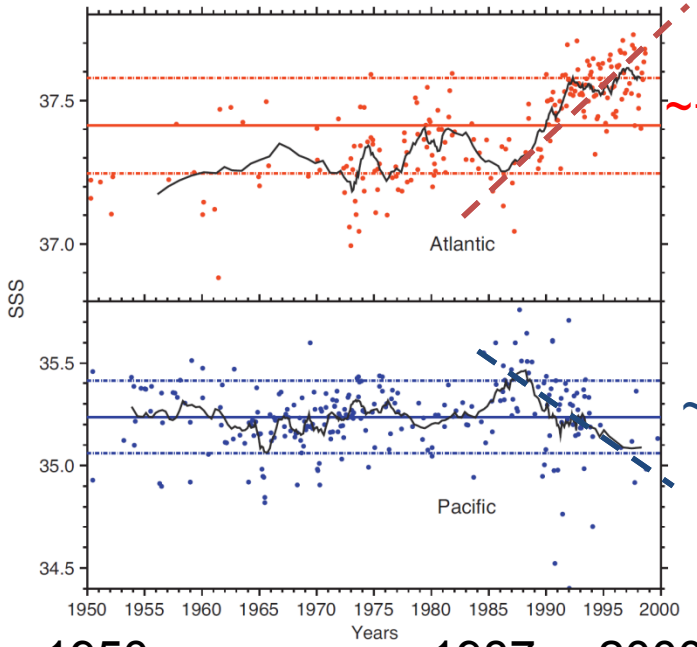
From J Font et al 2007

Sea surface salinity: a climate tracer

Sea Surface salinity trends for Pacific and Atlantic

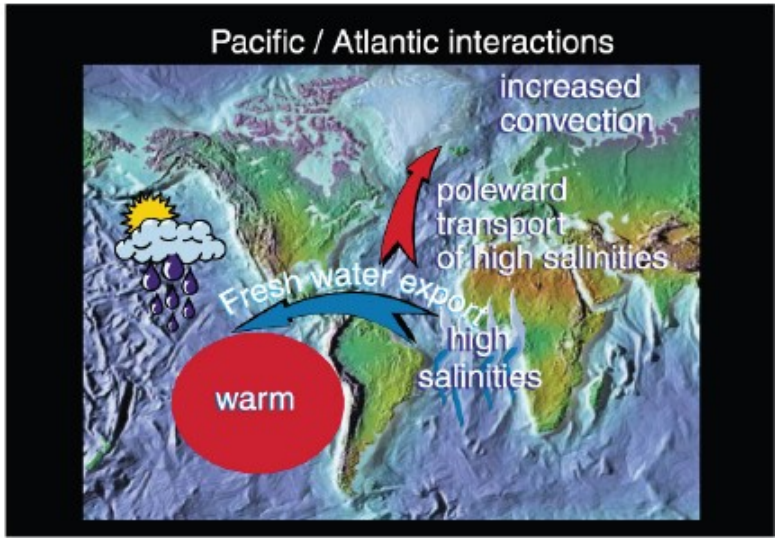
Gordon & Guilivi, ***Oceanography,*** 2008





~+0.03 psu/an

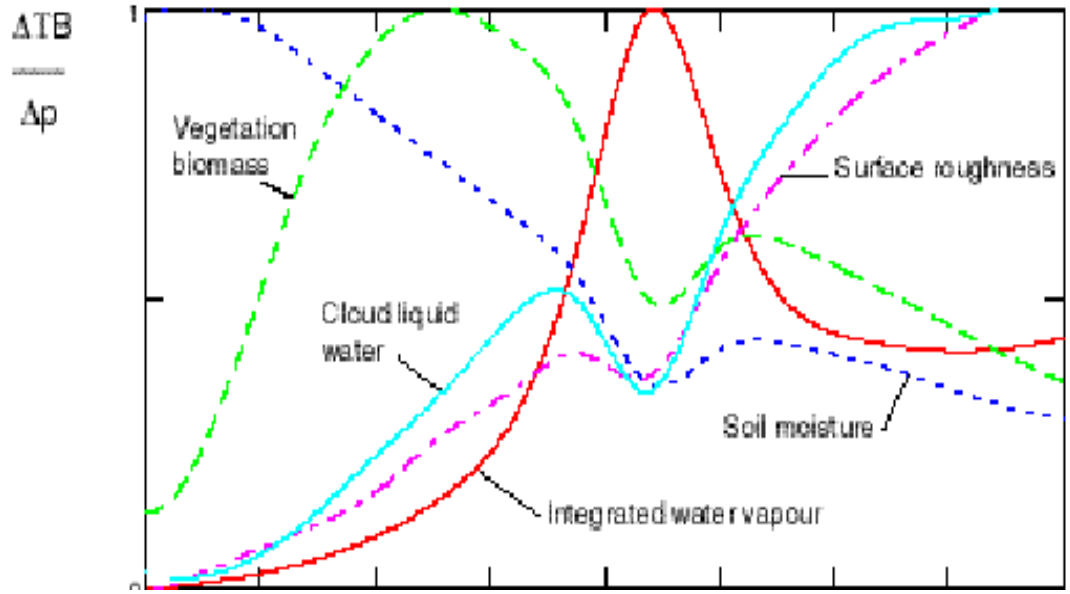
~-0.03 psu/an

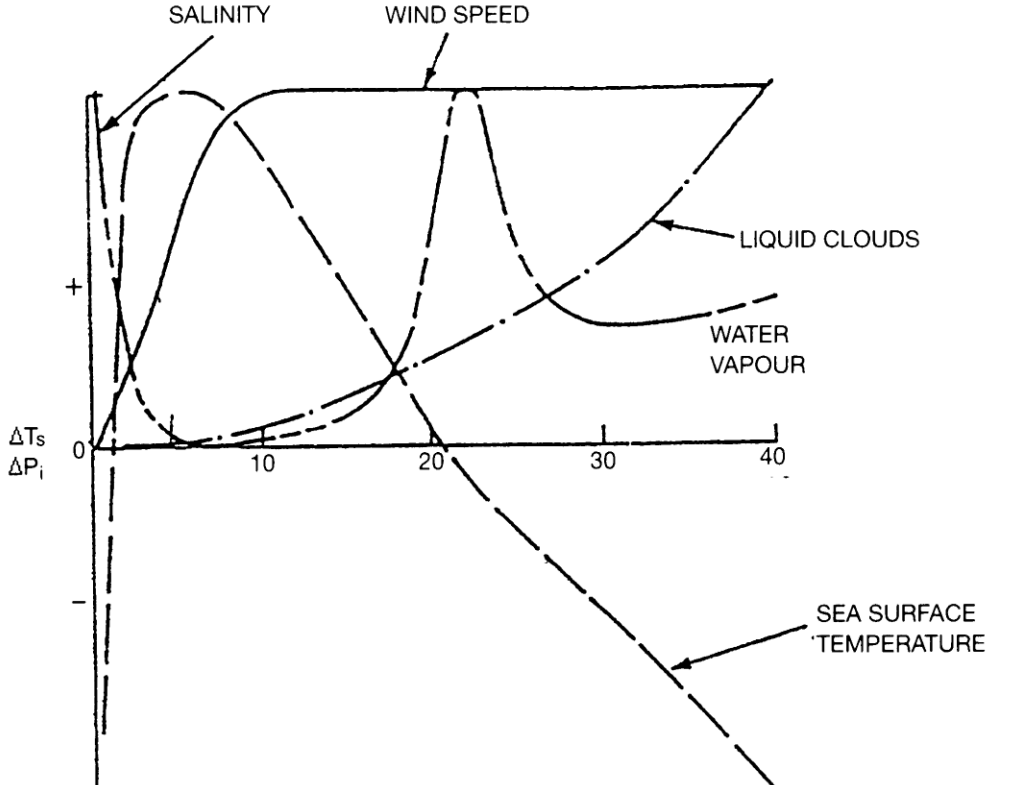


1950 1987 2000

N. Reul

- Passive microwaves
- L Band
- Antenna size →Two concepts
  - Aquarius/ SMAP
  - SMOS

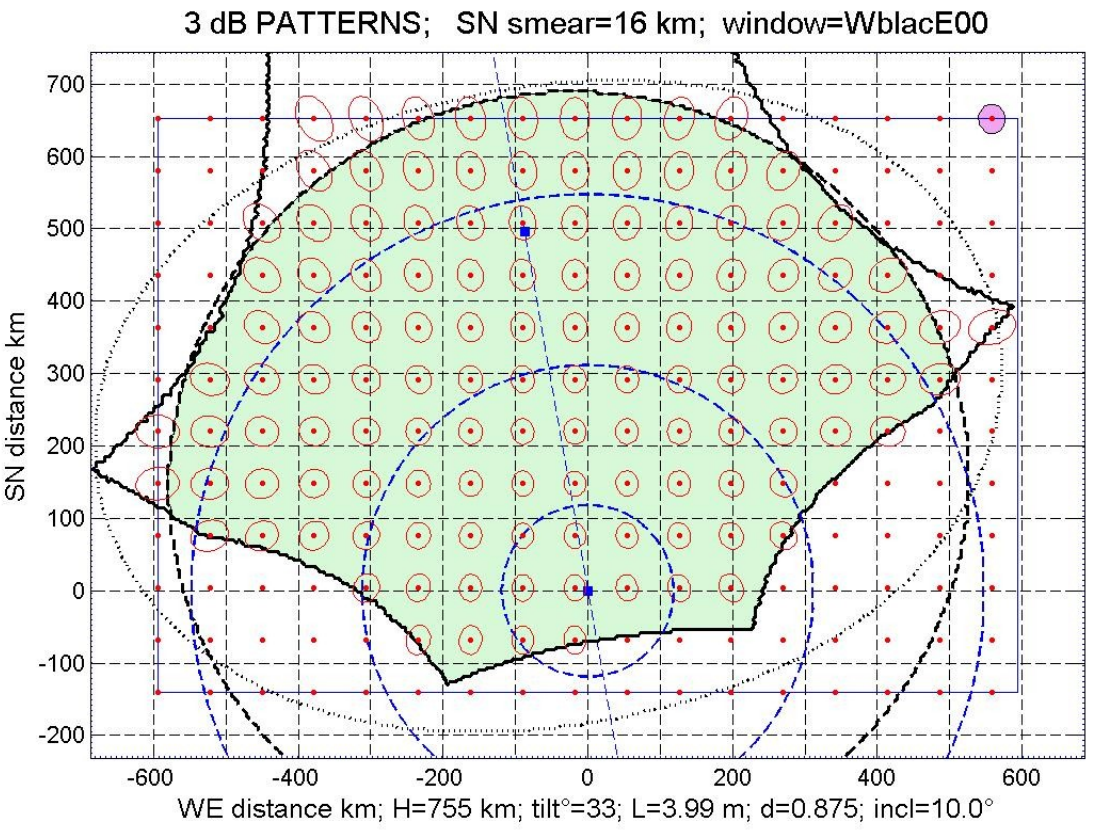




Principle of operations

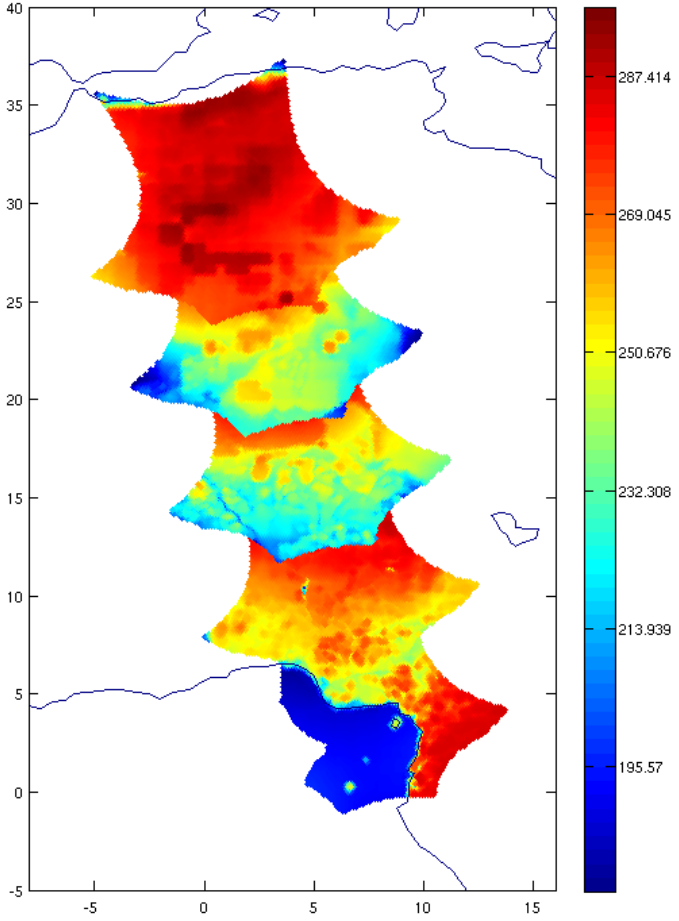
SMOS FOV; 755 km, 3x6, 33°, 0.875λ,

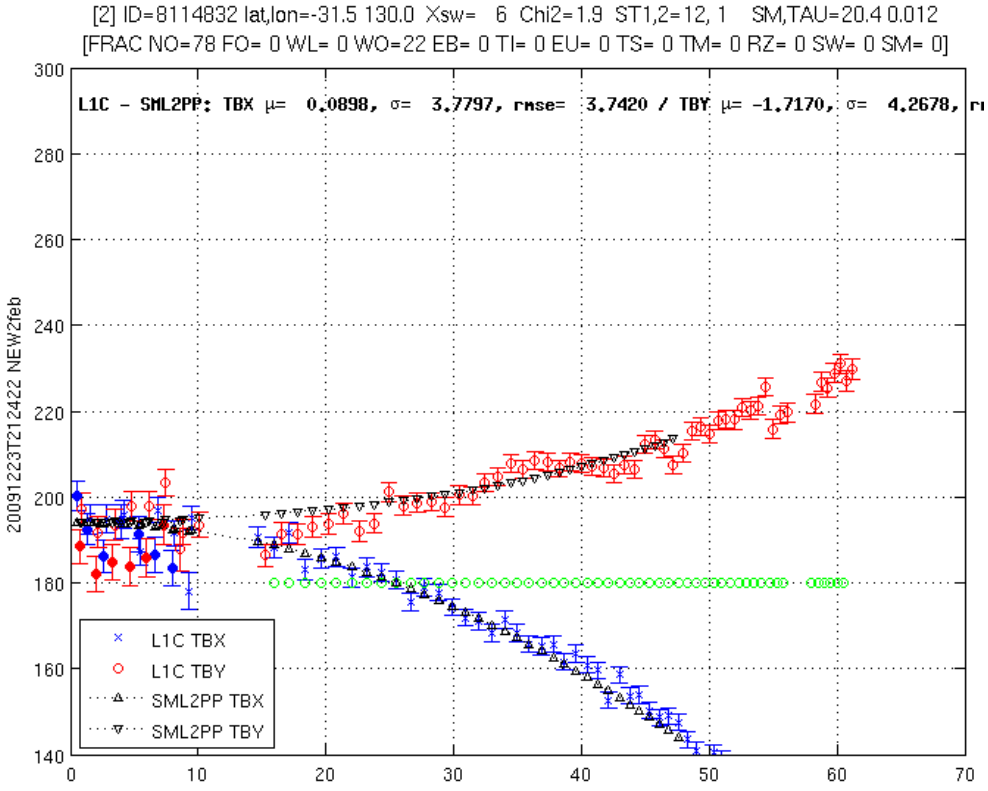
- Each integration time, (2.4 s) a full scene is acquired (dual or full pol)
- Average resolution 43 km, global coverage
- A given point of the surface is thus seen with several angles
- Maximum time (equator) between two acquisitions 3 days



P. Waldteufel, 2003

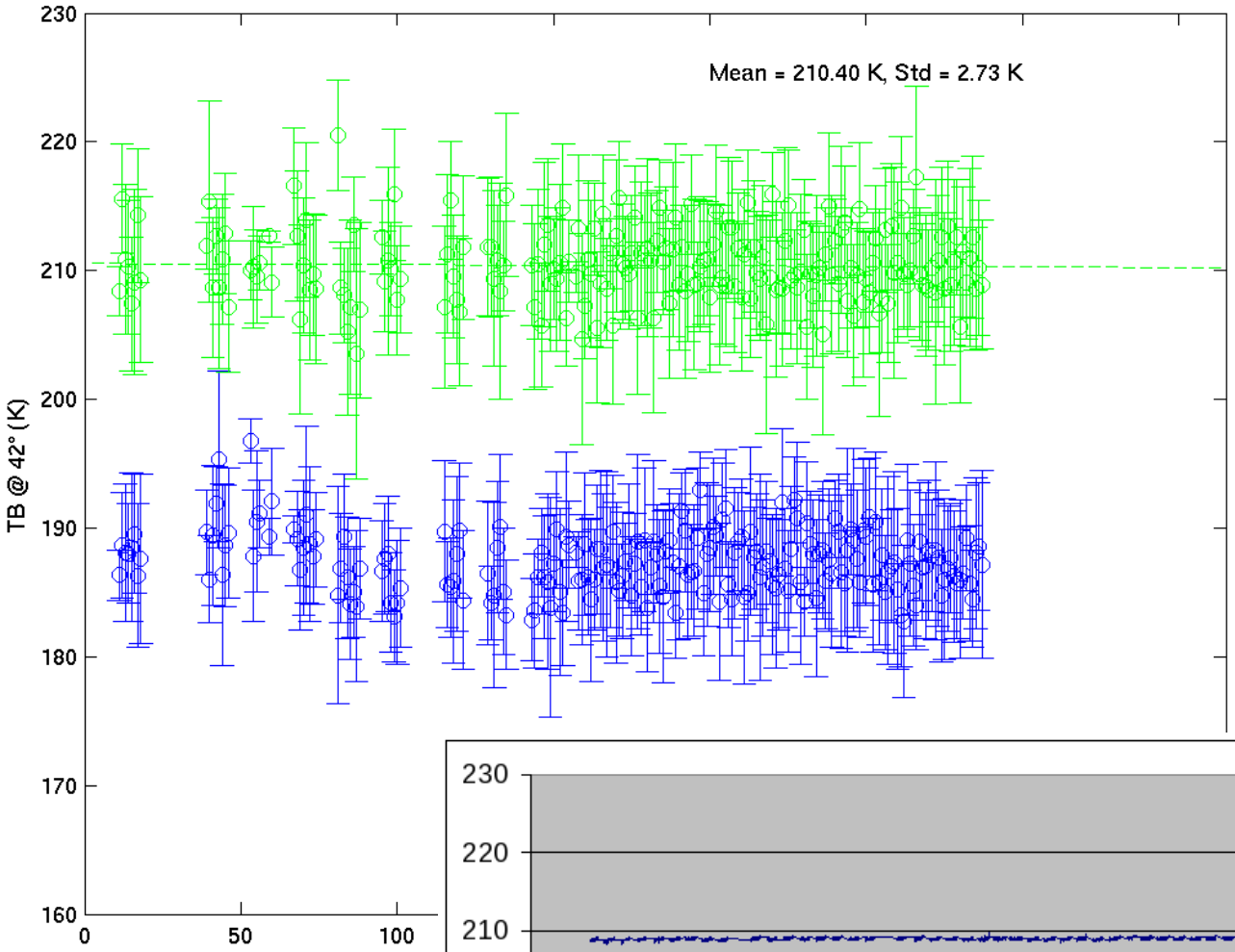
Data Acquistion

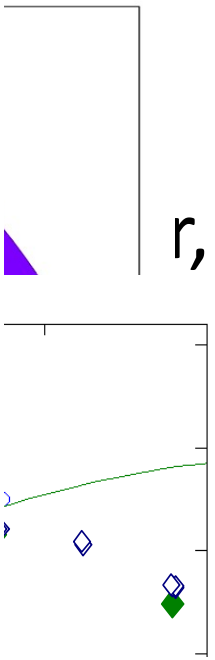


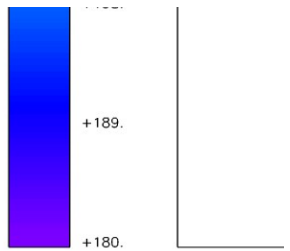


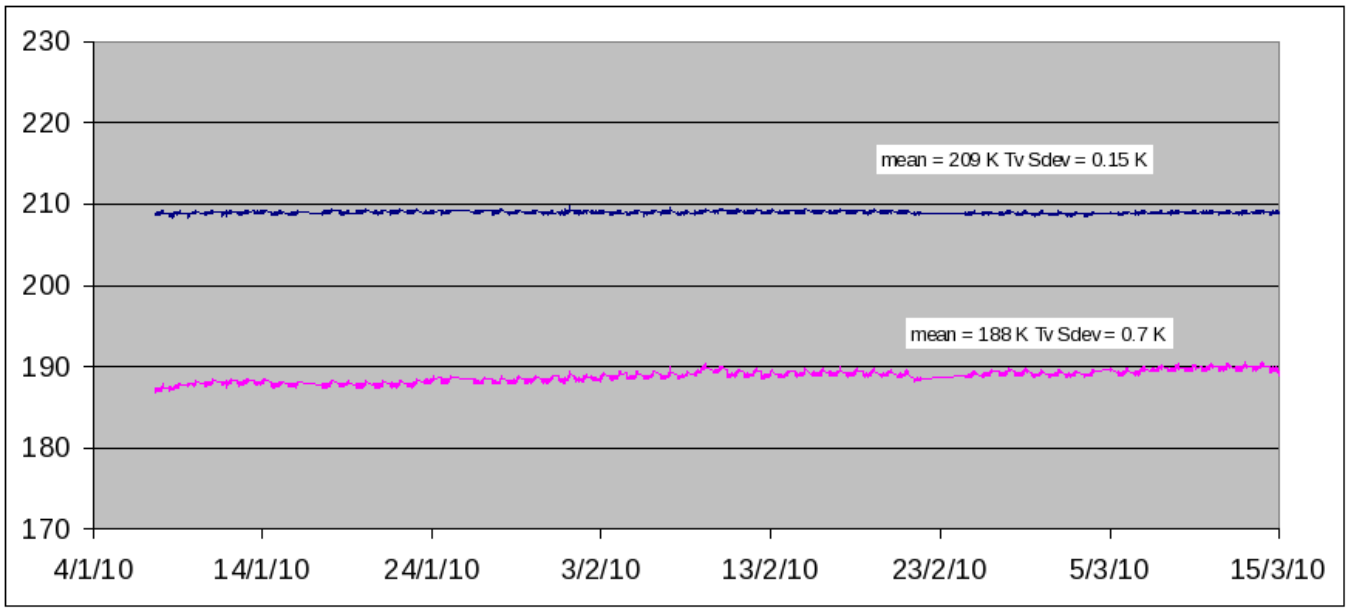
A few dates

- November 2nd SMOS launch
- November 17 SODAP
- Start of data flow a few days after (piecewise) → calibration tests
- End of January 2010 start to full data acquistion (1 week DP - 1 week FP etc)
- Cal val Activities still on going (see 2nd presentation)
- Mid May 2010 end of commissionning phase
- Since → routine operations
- September data available to all
- Start of reprocessing October
- Dissemination issues
- Repreocessing issues


Drift TB$_V$ @ 42° = -0.33K/yr
Mean = 210.40 K, Std = 2.73 K
TB @ 42° (K)
230
220
210
200
190
180
170
160
0
50
100



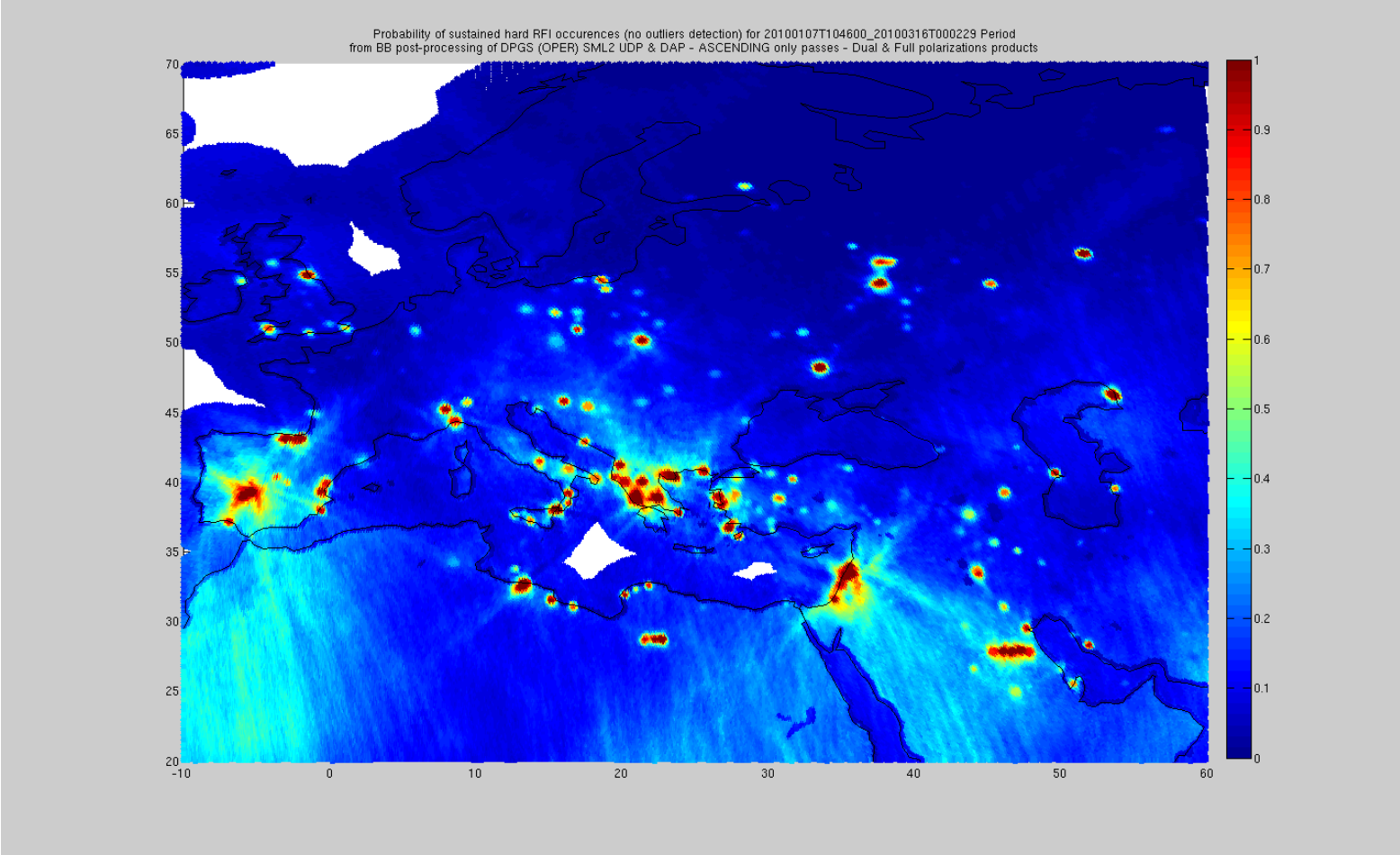

+189.
+180.


mean = 209 K Tv Sdev = 0.15 K
mean = 188 K Tv Sdev = 0.7 K
230
220
210
200
190
180
170
4/1/10
14/1/10
24/1/10
3/2/10
13/2/10
23/2/10
5/3/10
15/3/10

THE problem

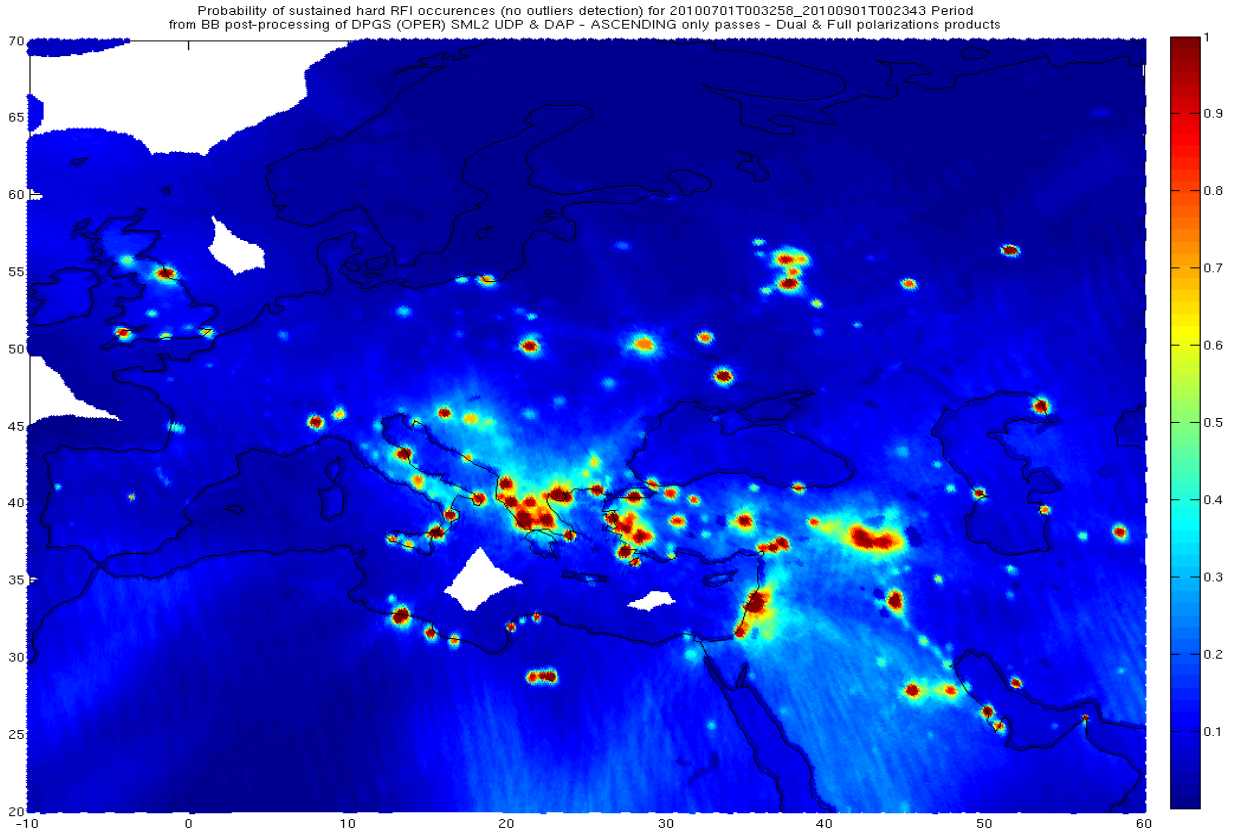
RFI

Issue of RFI → Europe

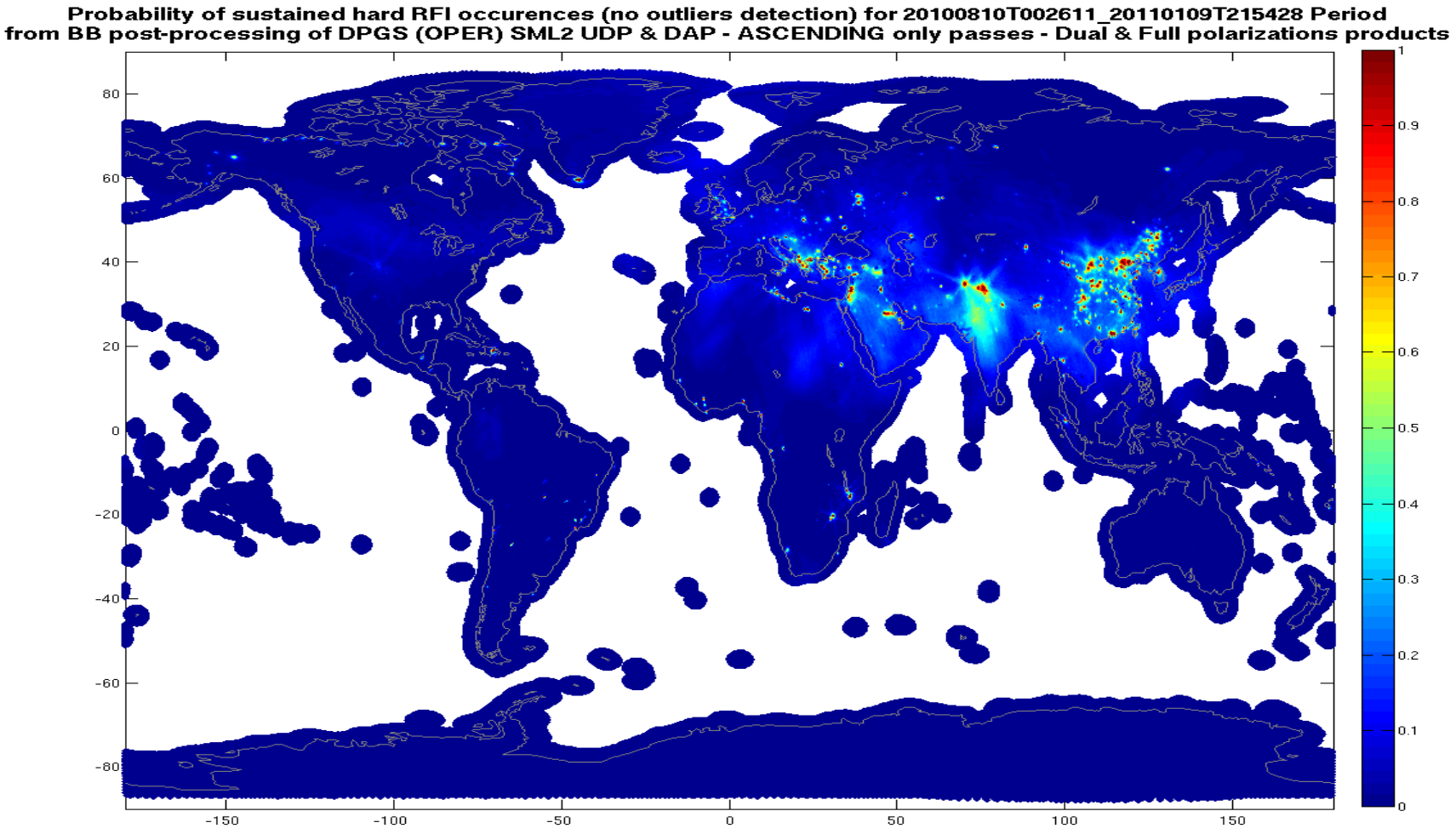


P. Richaume

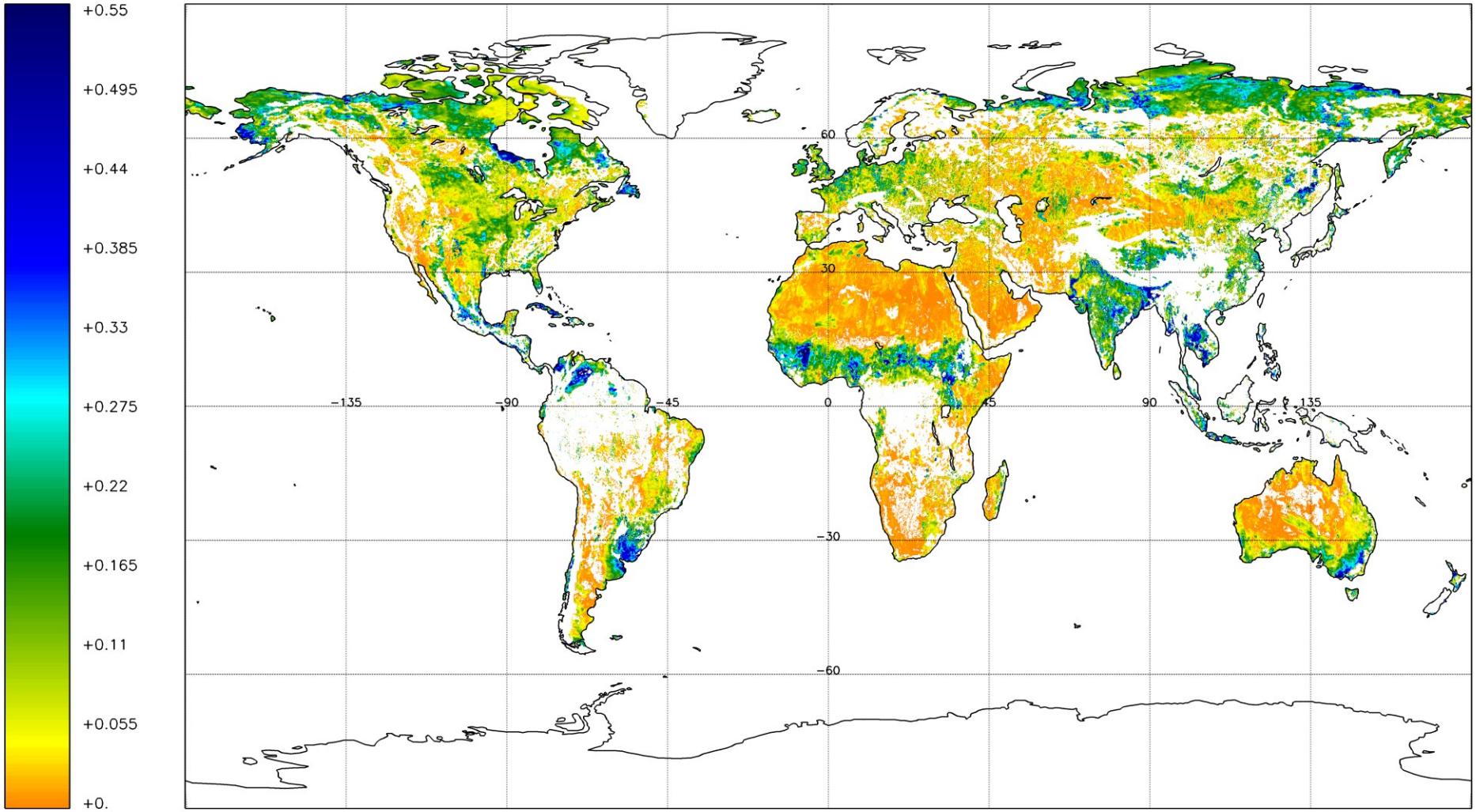
But Progresses are made !



And Australia is (almost) clean



Soil Moisture 3 Days Synthesis
August 14/15/16 2010

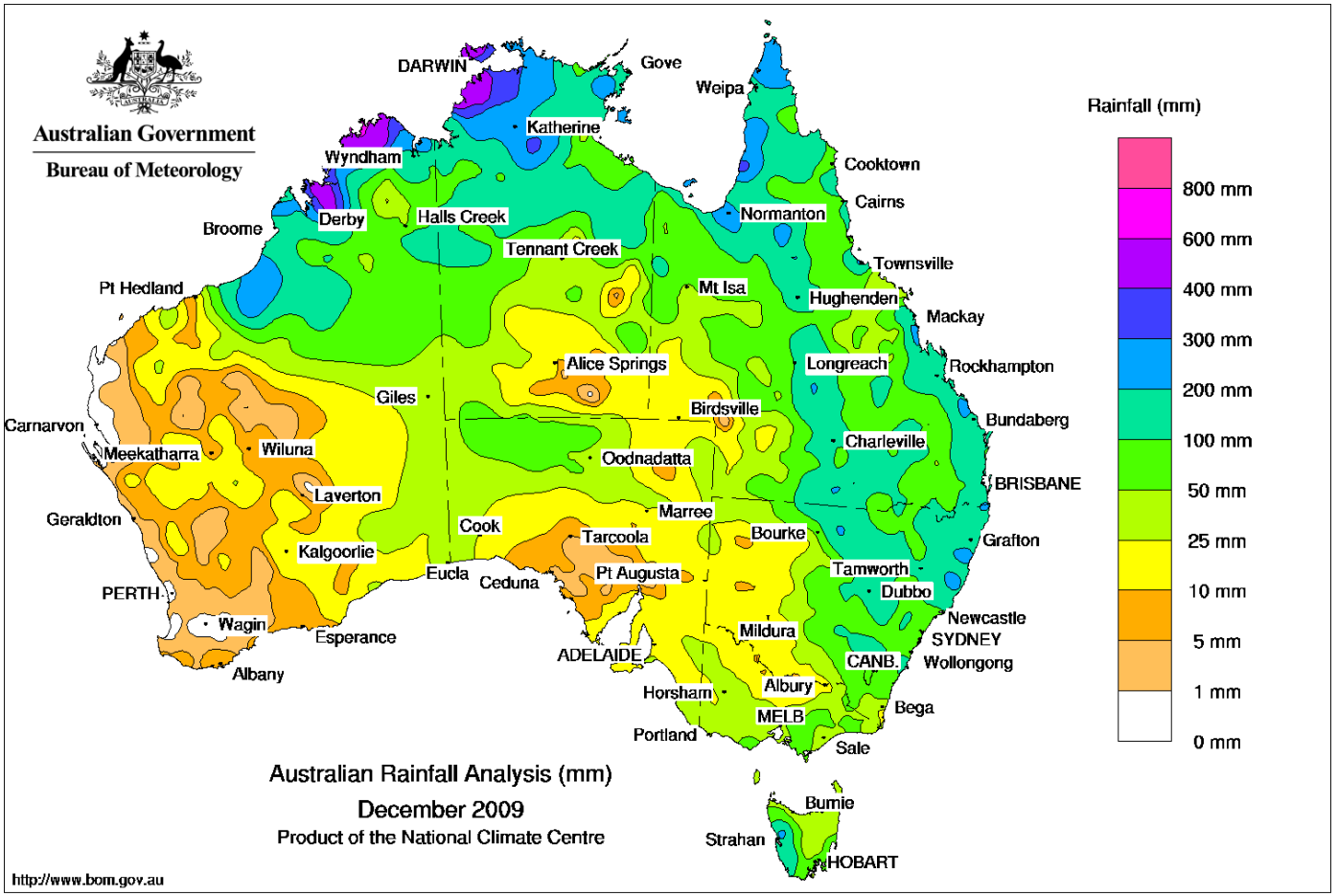


Monitoring land

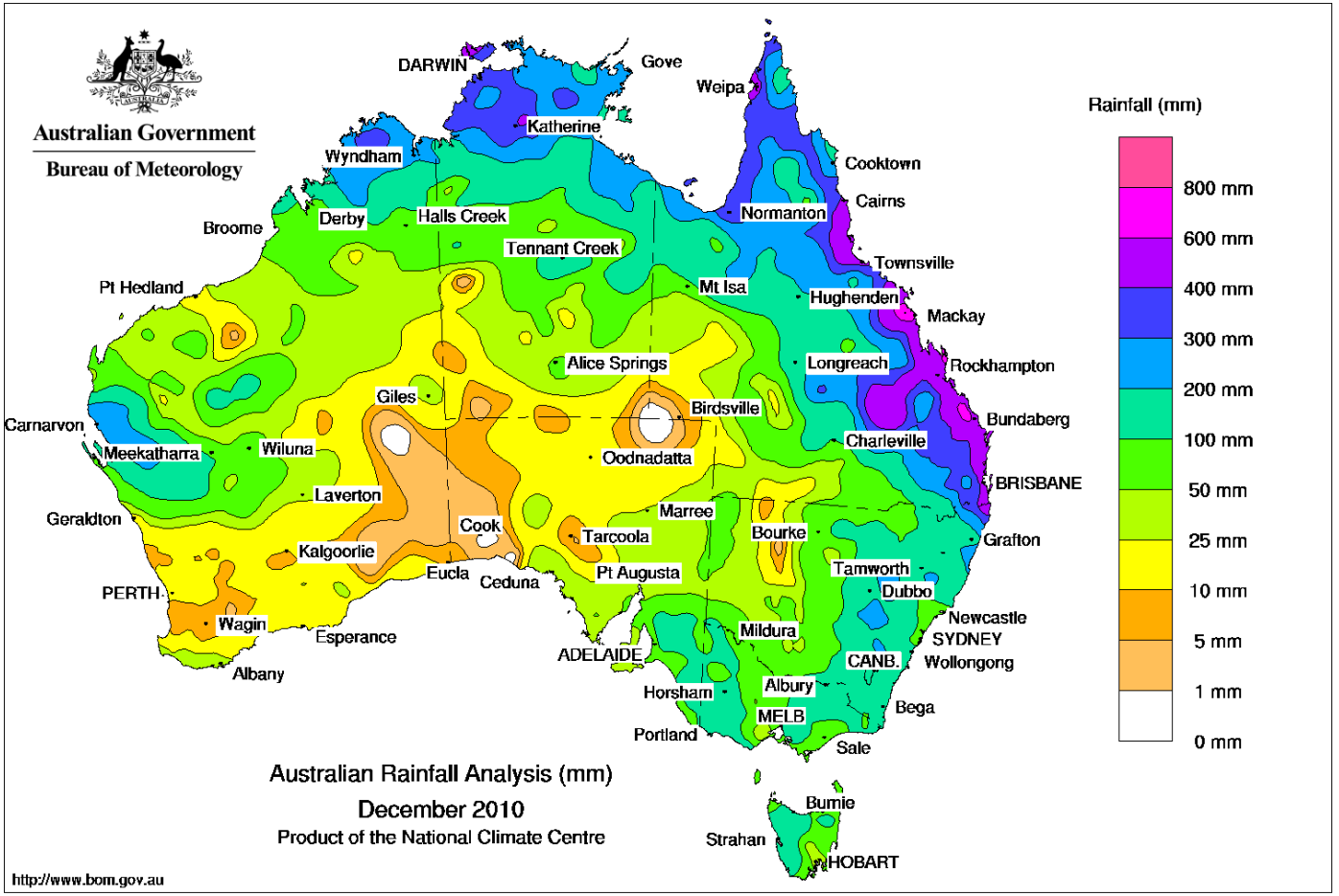
Temporal behaviour

E. Jacquette, A. Quesney

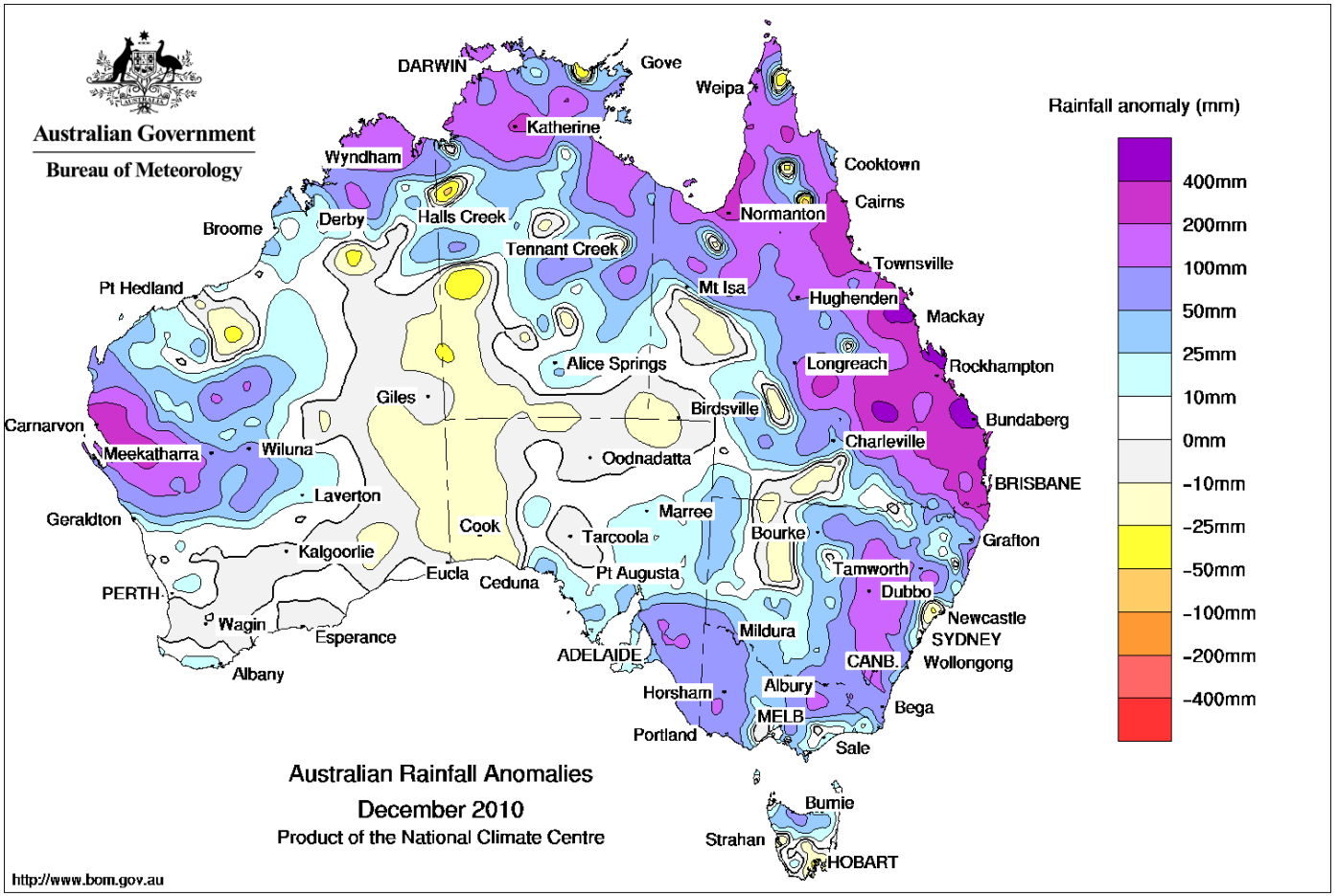
An Example Floods in Australia



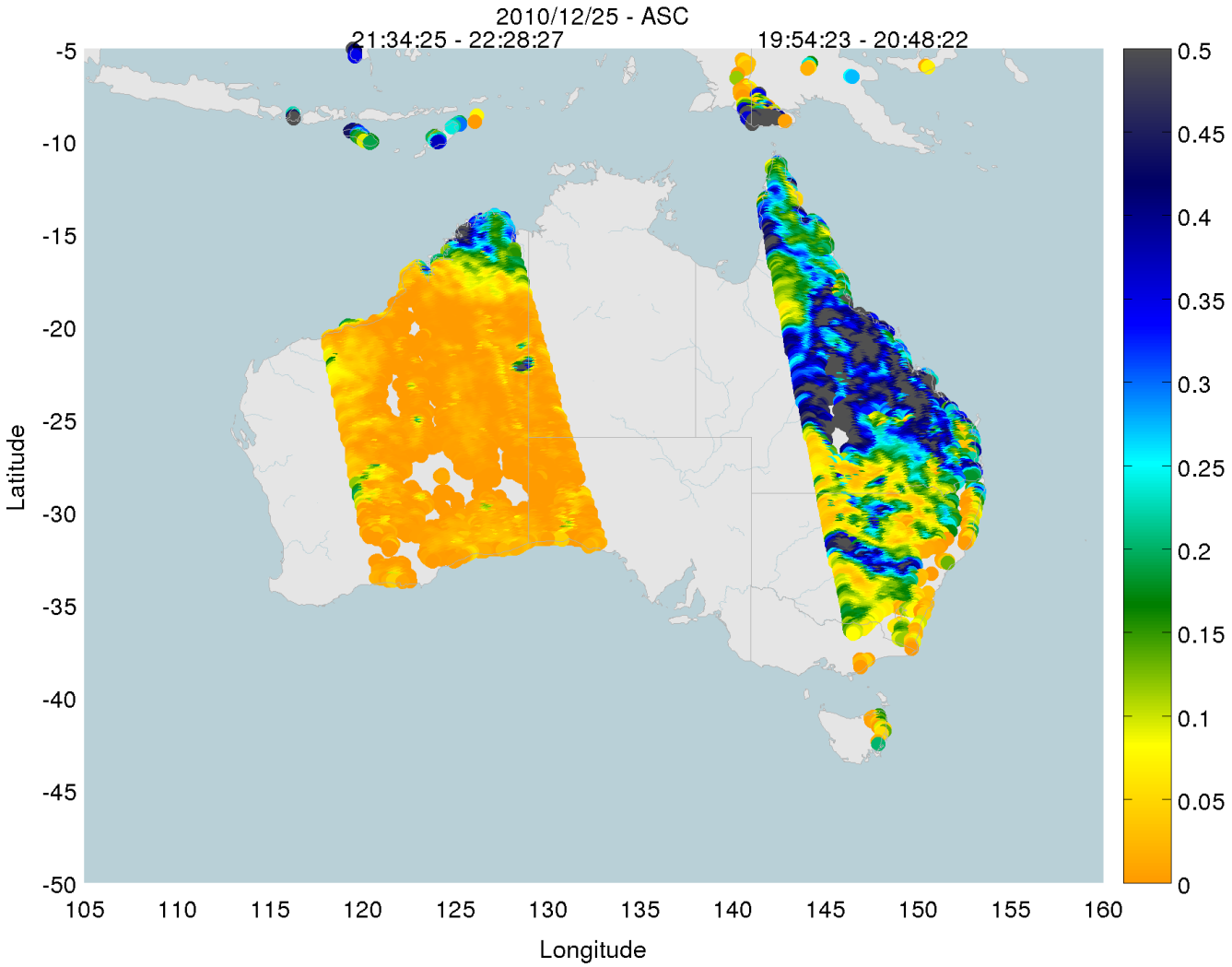
An Example Floods in Australia



An Example Floods in Australia

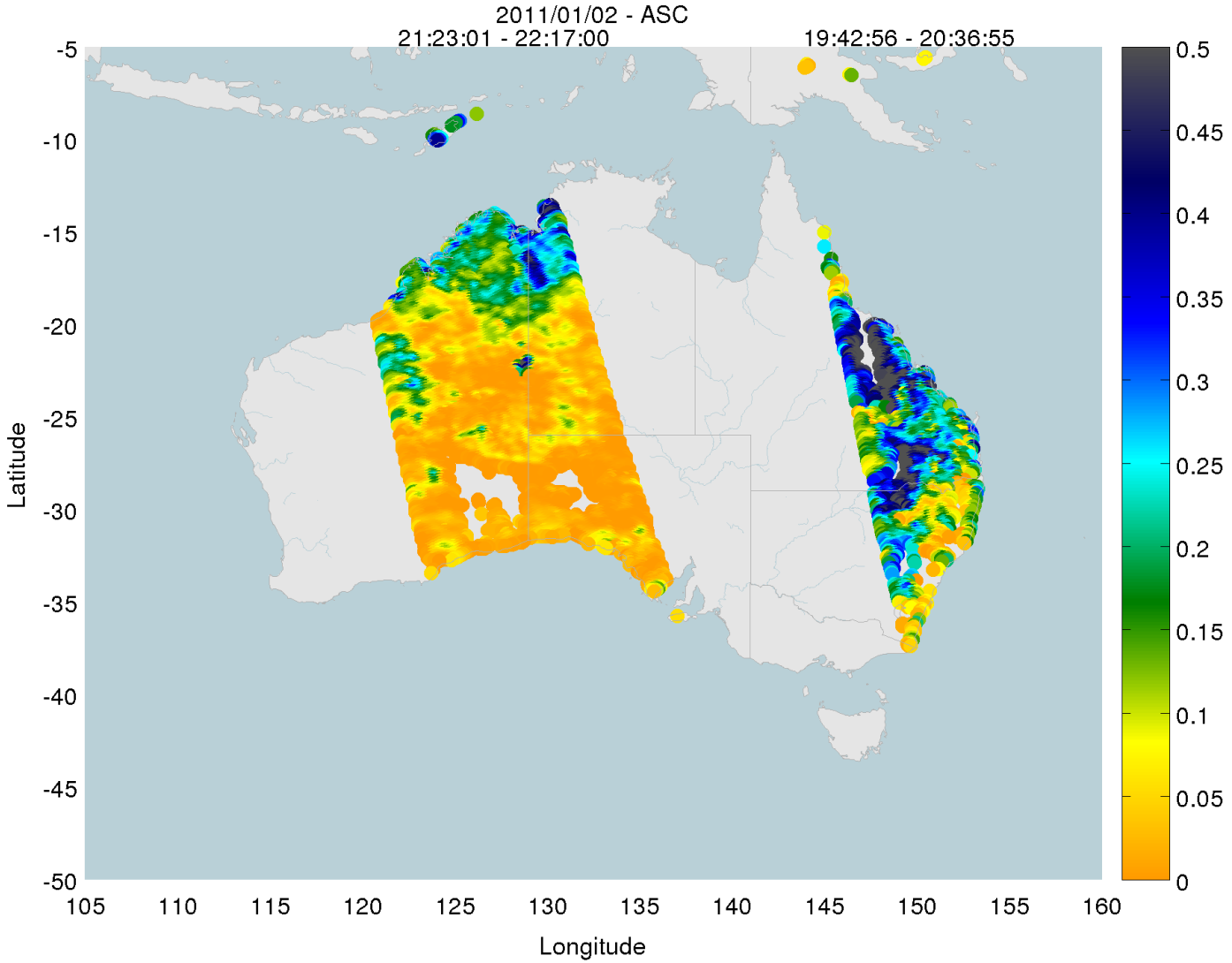


An Example Floods in Australia



Time provided in UTC Time

An Example Floods in Australia



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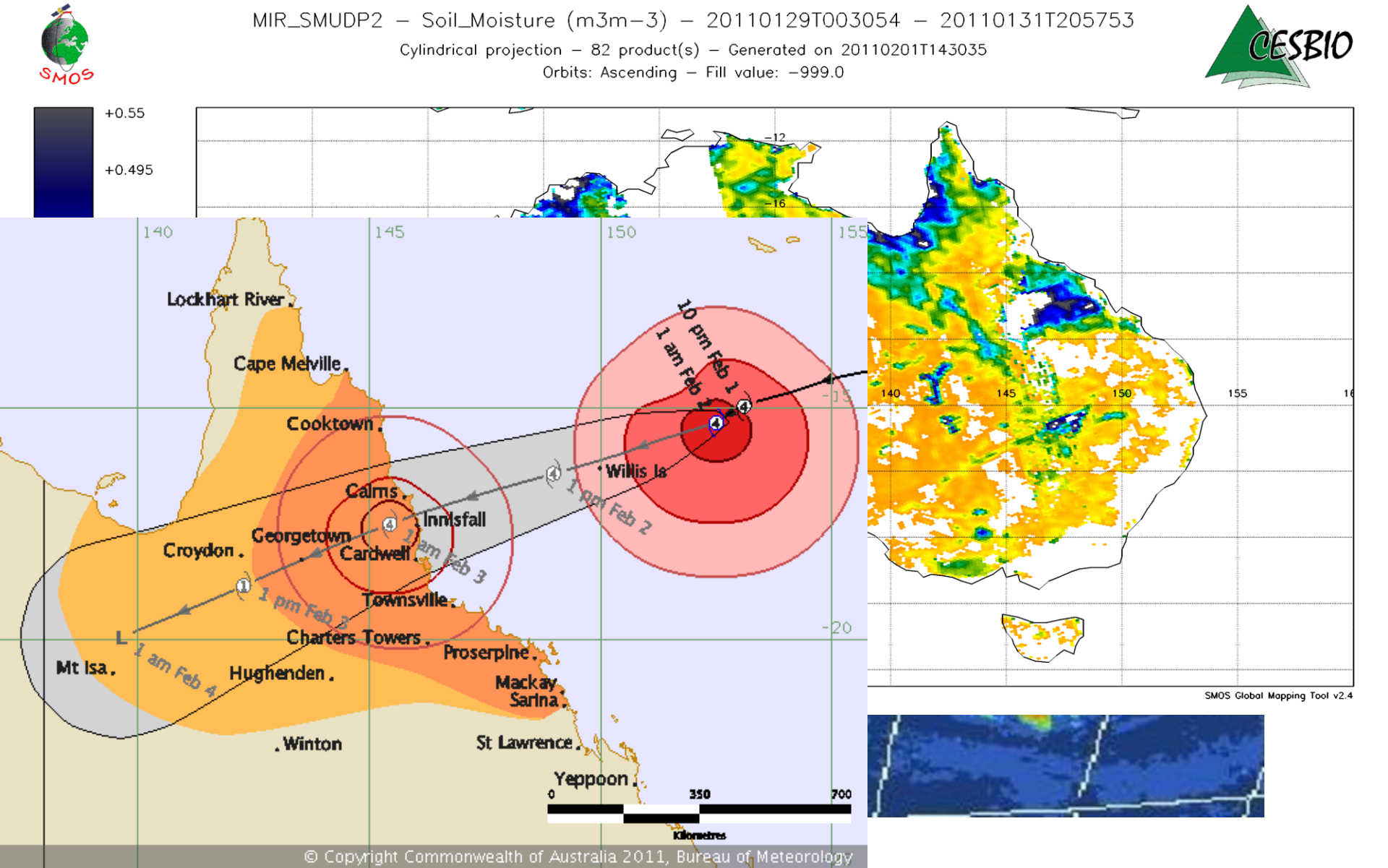
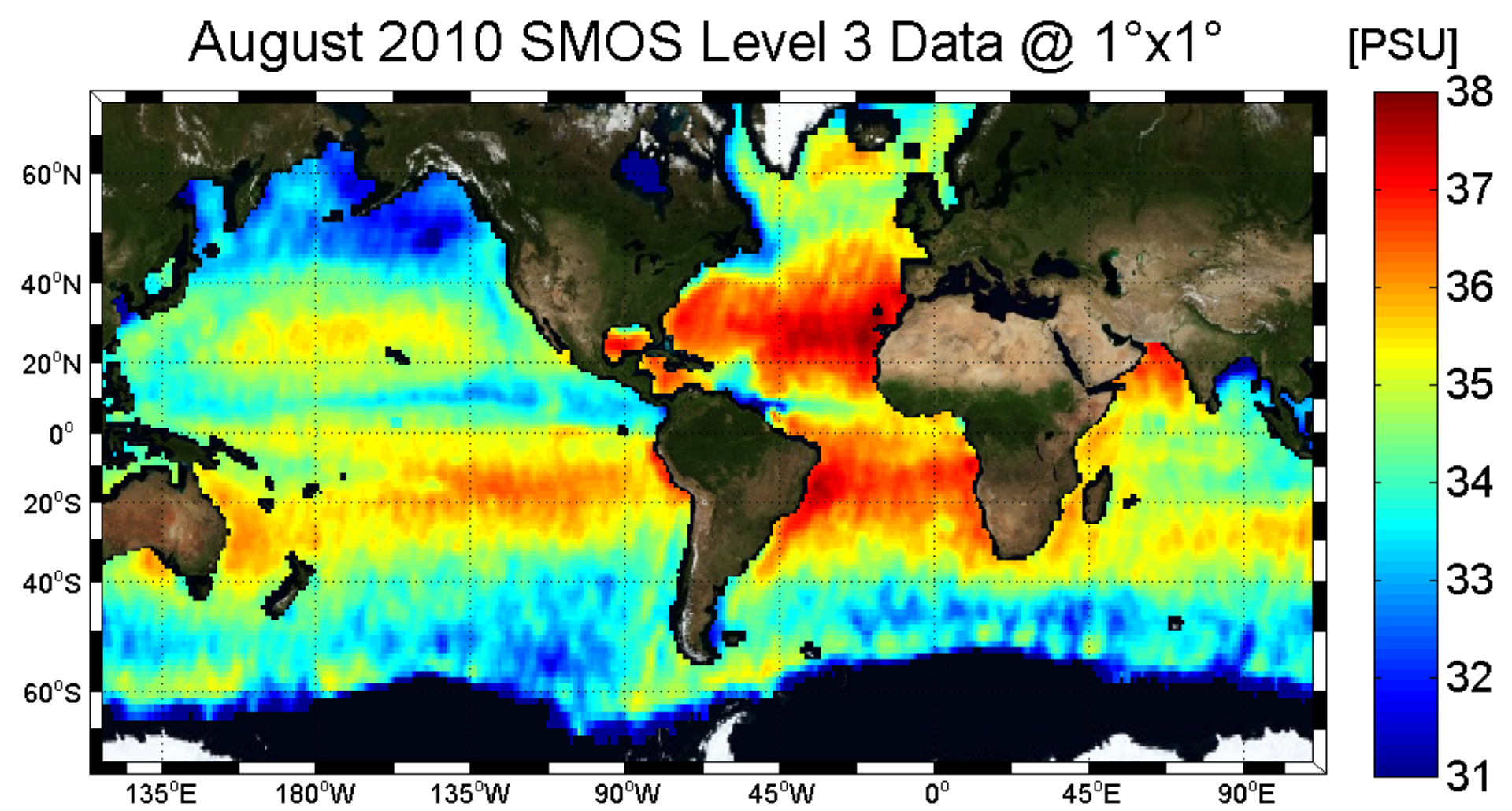
An Example Floods in Australia



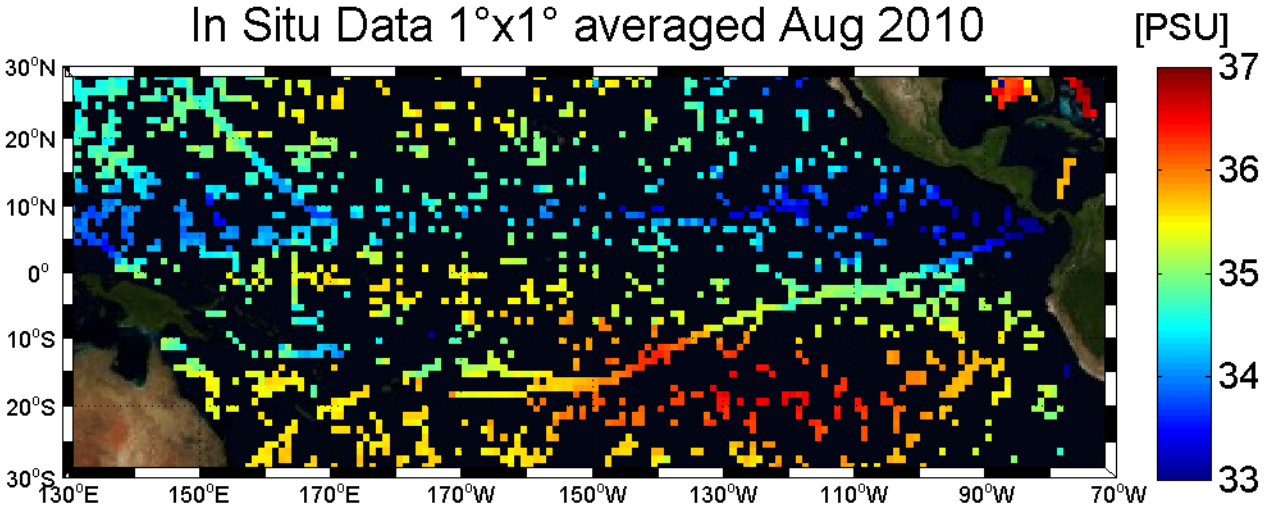
Sea Surface salinity et al…

SMOS Level 3 SSS products

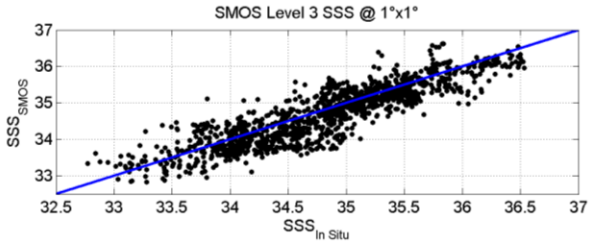


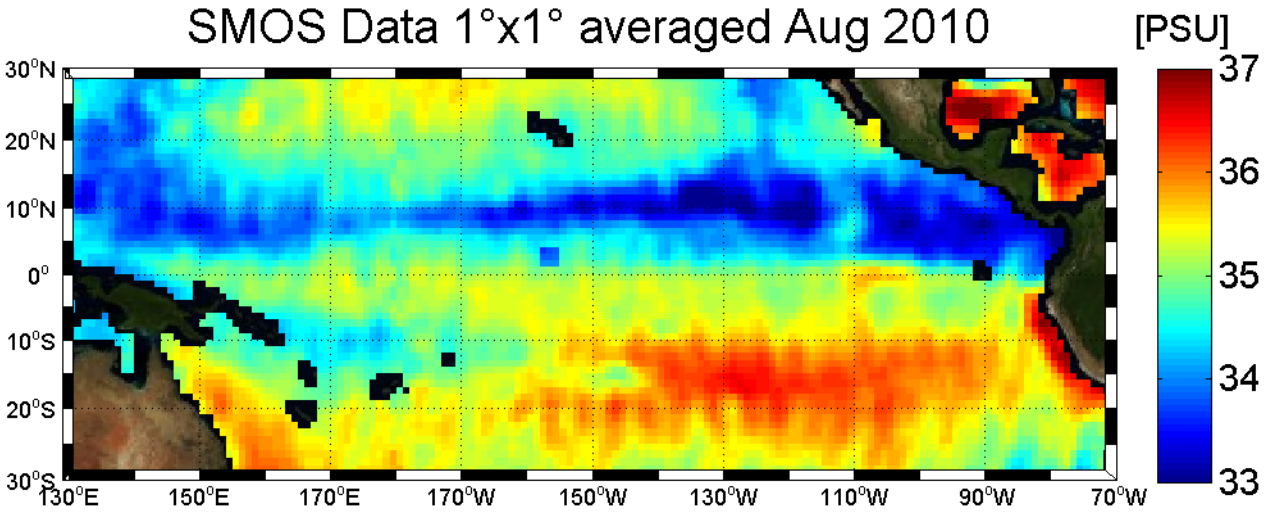
N. Reul

Zoom on South Tropical Pacific
Moyennes mensuelles à 1° de résolution spatiale



Erreur SMOS: 0.3 psu





N. Reul

Amazon Film

N. Reul

Summary

- SMOS Successfully launched and in operation

- Provides very good data → earlier and better than expected
- Soil moisture retrievals are looking very good even though still preliminary and still in Cal Val
- Salinity maps are produced !
- But still several hurdles and issues to be solved
- Aquarius, SMAP, SMOS FO and SMOS NEXT!

- See also

→Our Blog http://www.cesbio.ups-tlse.fr/SMOS_blog/