SMAP CAL VAL Oxnard May 3-5 2011

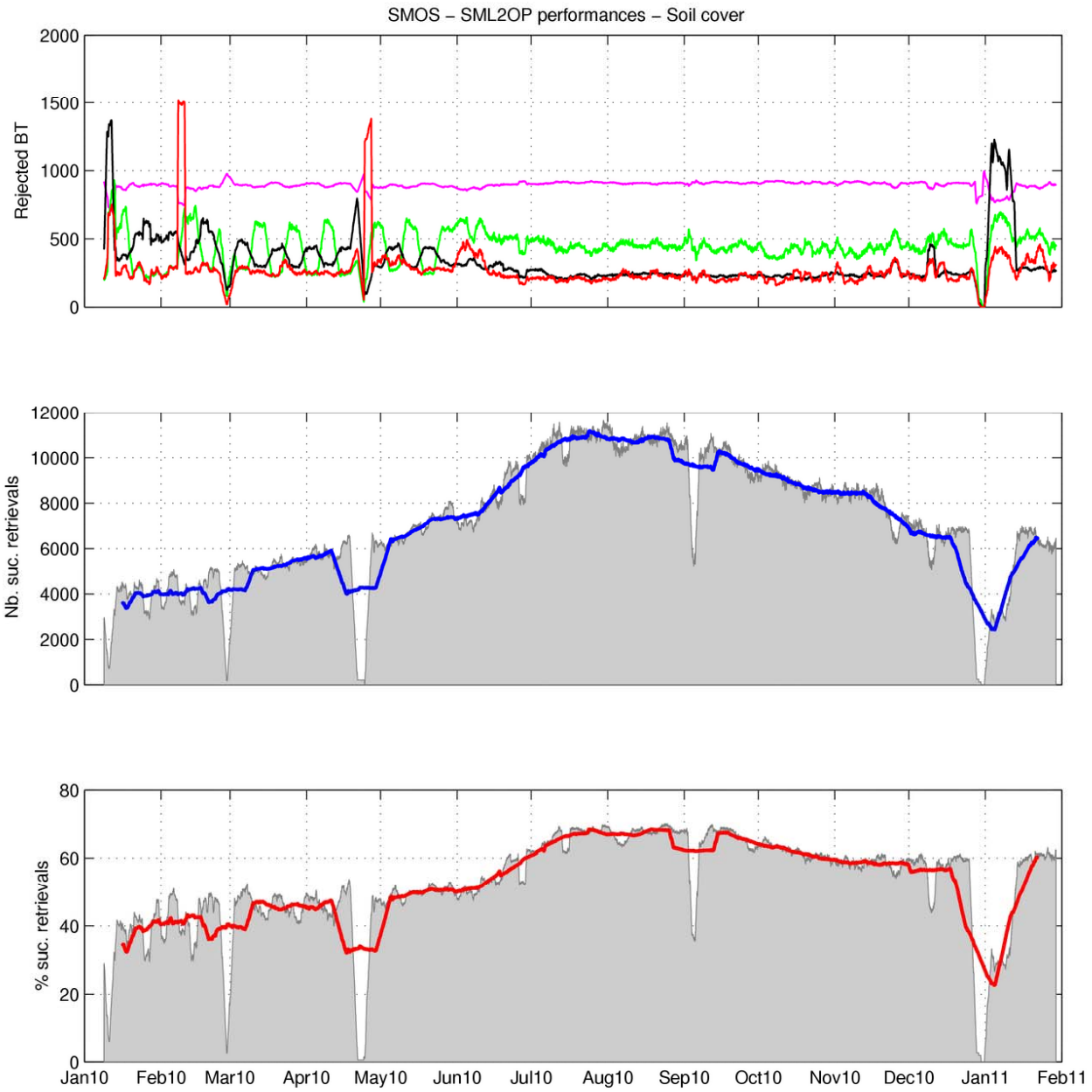
Preliminary remarks

- 15 months is Short!
- Important to prepare before launch but
- surprises may happen…. so be prepared
  - Launch delay
    - Planned campaigns
    - Change of season
  - Political unrest, RFI, ….
- And, of course all the classical question
  - Representativity
  - Temporal sampling
  - Etc…

Lessons learnt and Approach taken after launch

- Disappointed with some features
  - RFI to name one
  - Launch in Winter
- Use of Australia and Argentina
- Issue: difficulties to access in a timely fashion to some data sets → rely on your existing sets / collaboration and even this could prove not to work efficiently (i.e. Mali or Valencia)!
- Need for many different sites
- Issue: validate for all surface types / land use
- Brightness temp vs SM validation

Bas
ir



AlBitar

Some examples

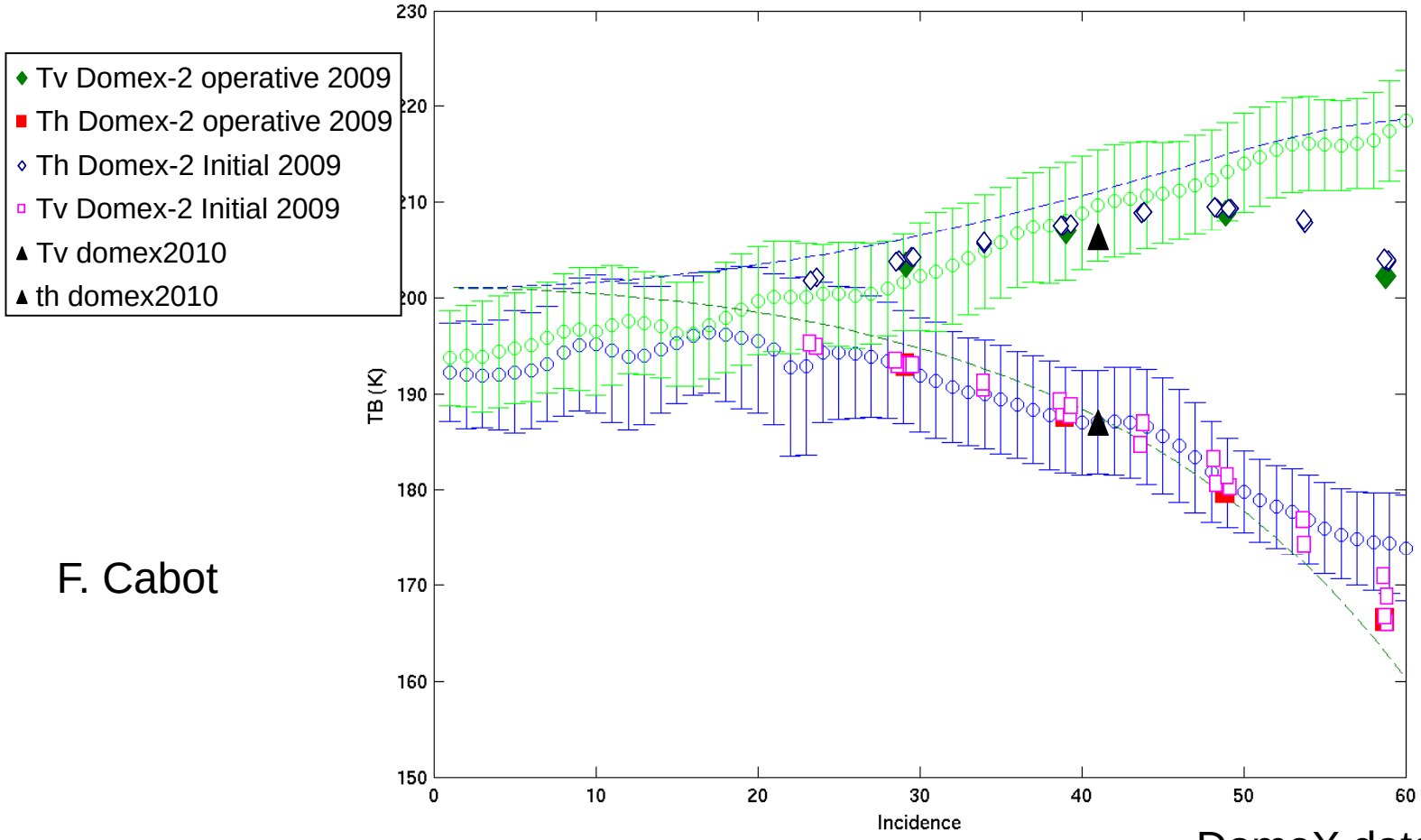
- Point validation
  - TB
  - SM
  - Modelling / spatial extent → forcing data
- Network validation
- Satellite data product validation

Tb Validation

- Dome C
- Well known ocean surfaces
- Cold space (but flat)
- So called Match ups (Valencia Anchor station)
- Issues:
  - Temperature range
  - Backlobes
  - Degree of knowledge of emission itself
  - RFI
- SM is becoming an ECV → need for good absolute monitoring
  - Dome C is stable but changes slowly ➔ monitor

Polarisation signature

Dome C only, Hallikainen model (one layer, Tsnow=-54)



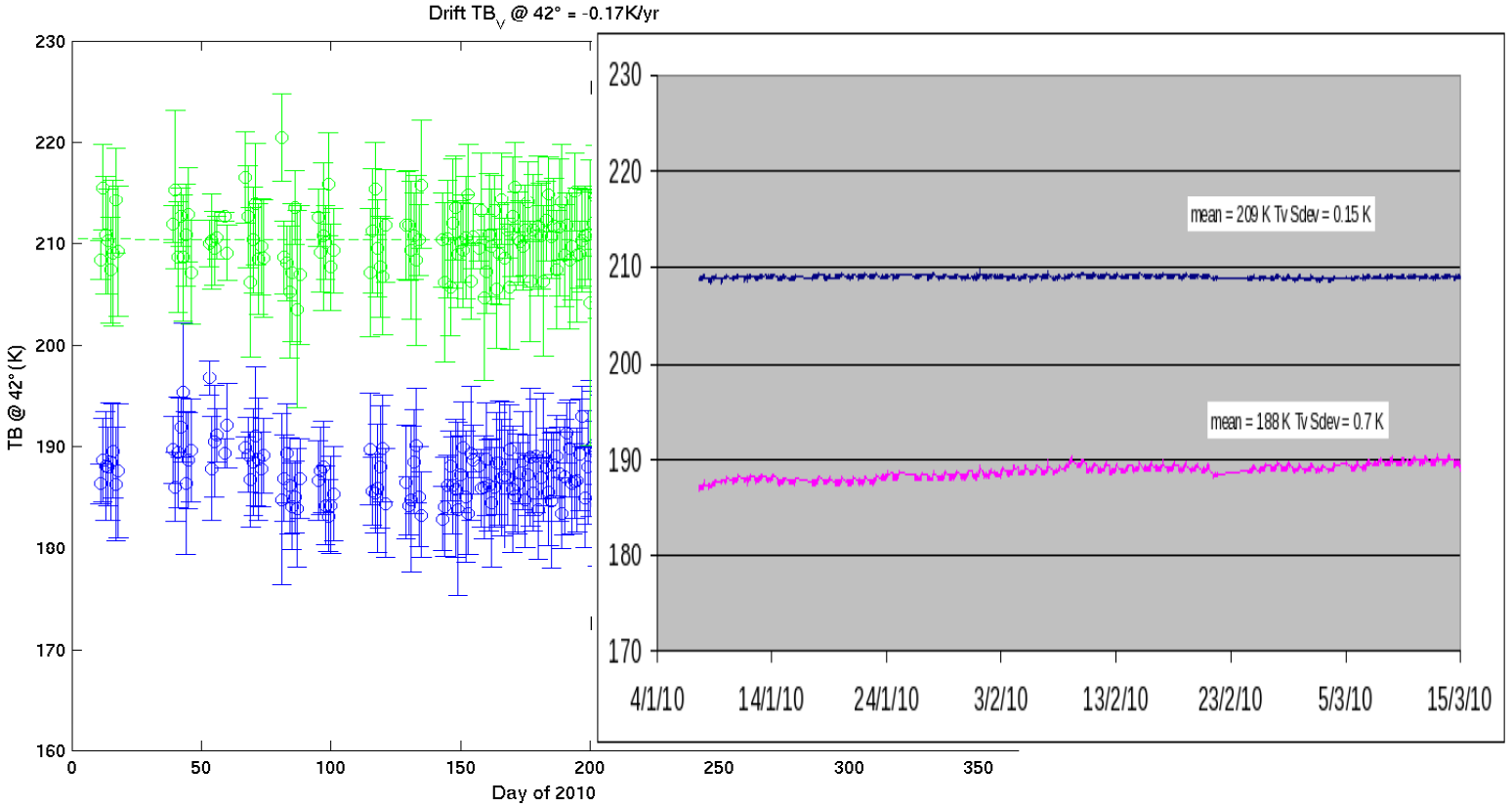
F. Cabot

DomeX data, G. Macelloni

Absolute brightness temperature accuracy

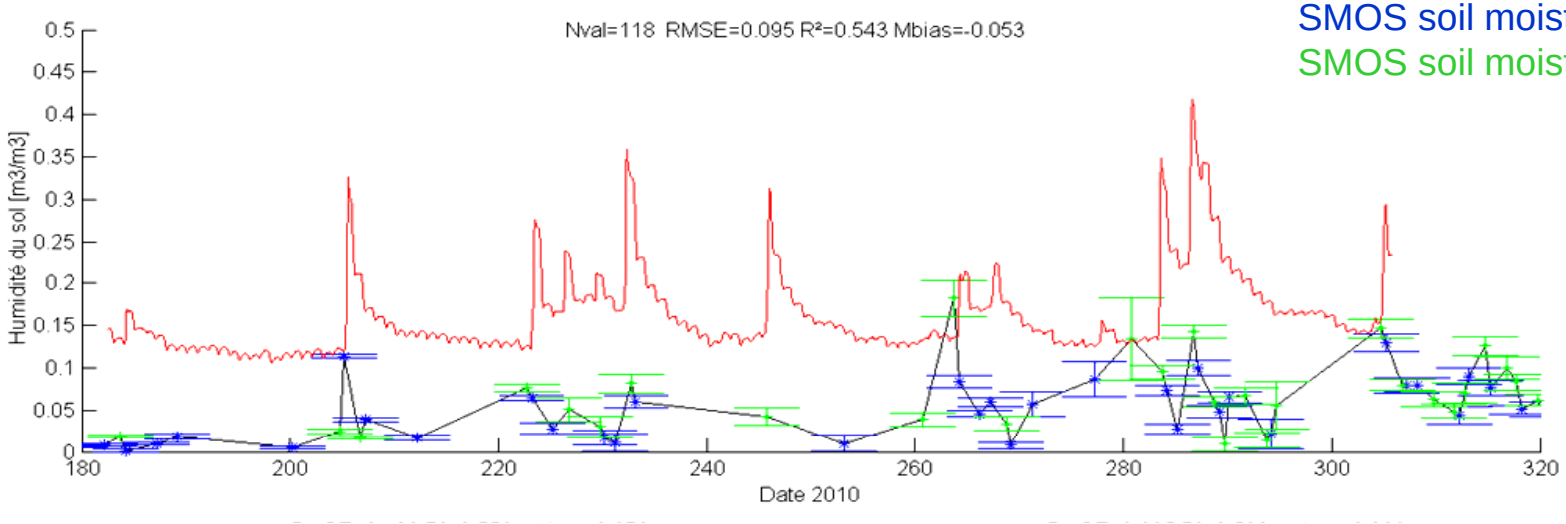
SMOS estimates of TB over Dome C although somewhat noisier, compare well with on-ground measurements

F. Cabot



Preliminary study

Spatialized soil moisture VAS
SMOS soil moisture 18h
SMOS soil moisture 6h

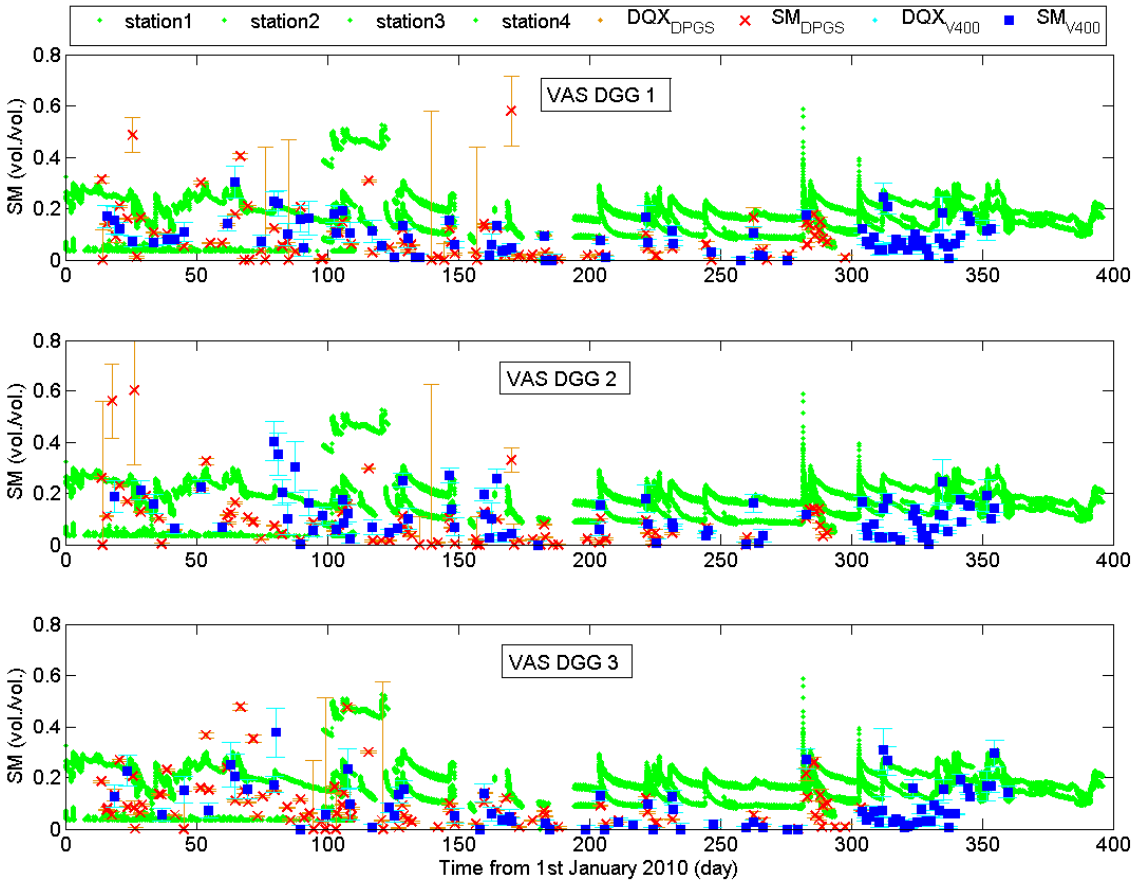


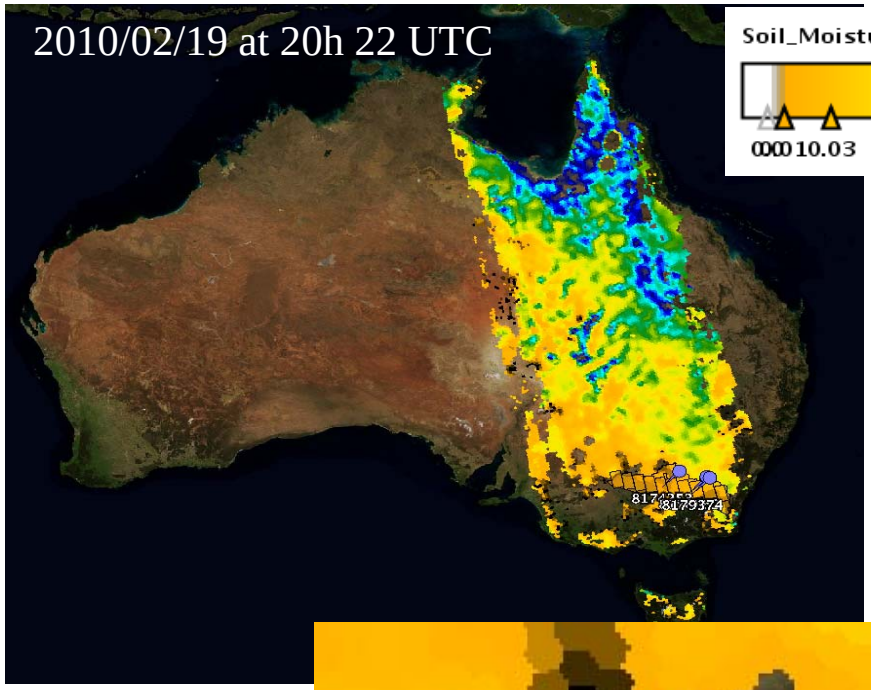
- soil moisture variations are well reproduced by the SMOS products
- absolute values: lower SMOS soil moistures values than those measured in situ and those simulated using SURFEX
- the overestimated brightness temperature ⟹ soil moisture underestimated
- **To be done with the reprocessed data**

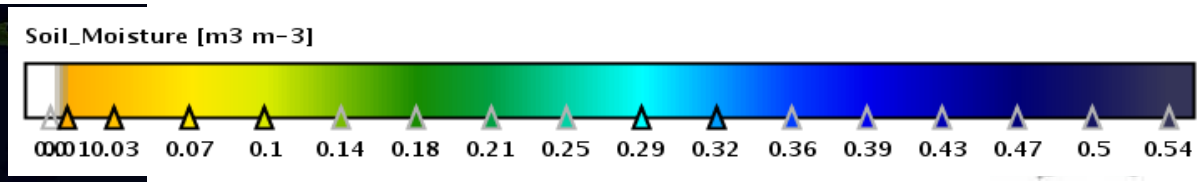
- **Requires the right forcings!!**

S. Juglea

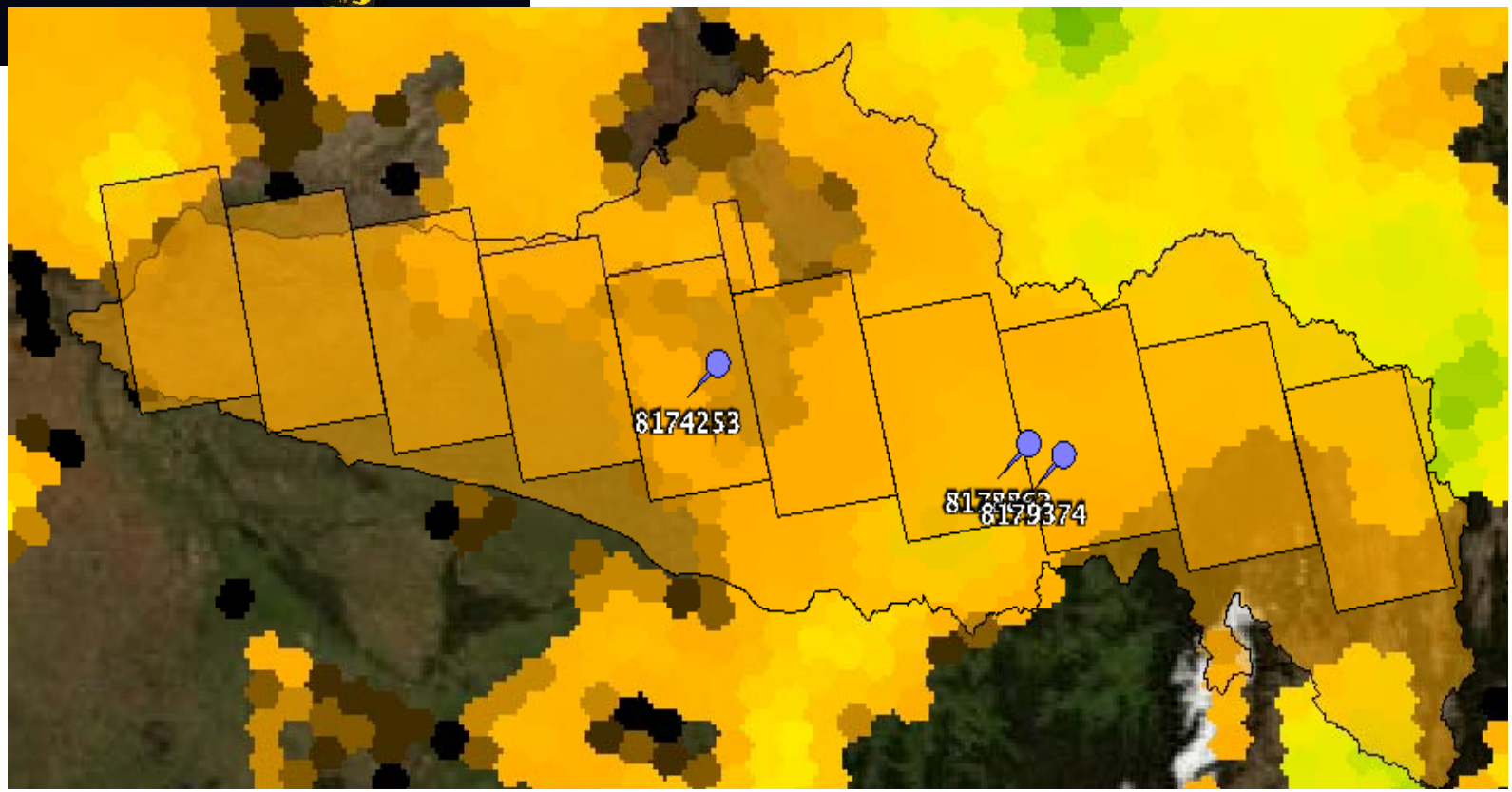
VAS


station1
station2
station3
station4
DQX_DPGS
SM_DPGS
DQX_V400
SM_V400
VAS DGG 1
VAS DGG 2
VAS DGG 3
SM (vol./vol.)
0.8
0.6
0.4
0.2
0
0
50
100
150
200
250
300
350
400
Time from 1st January 2010 (day)





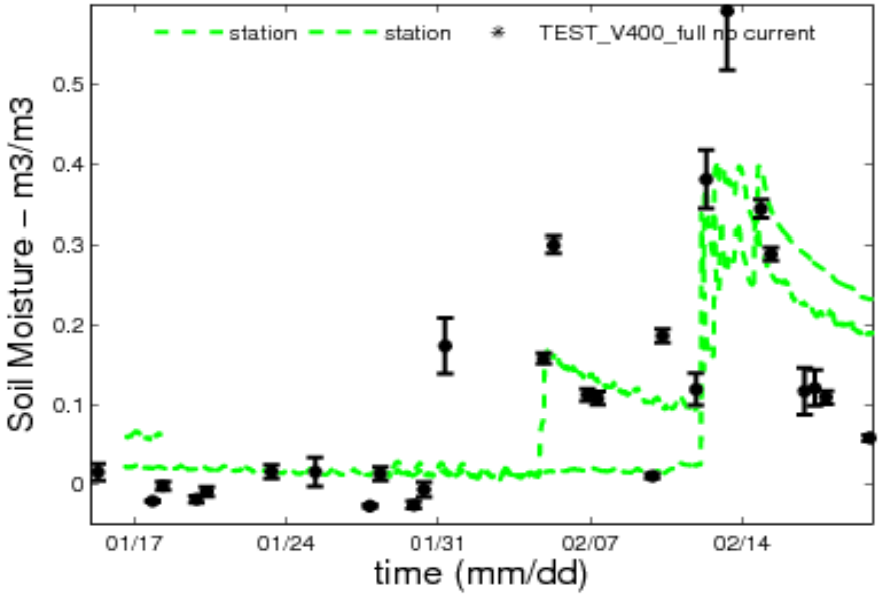
AACES data
Jeff Walker, C Rüdiger (and Cesbio)

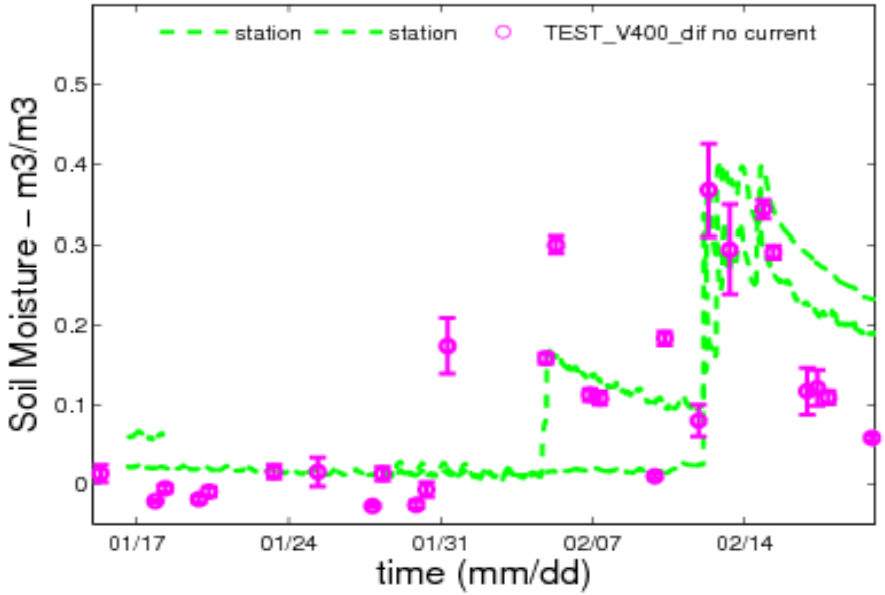


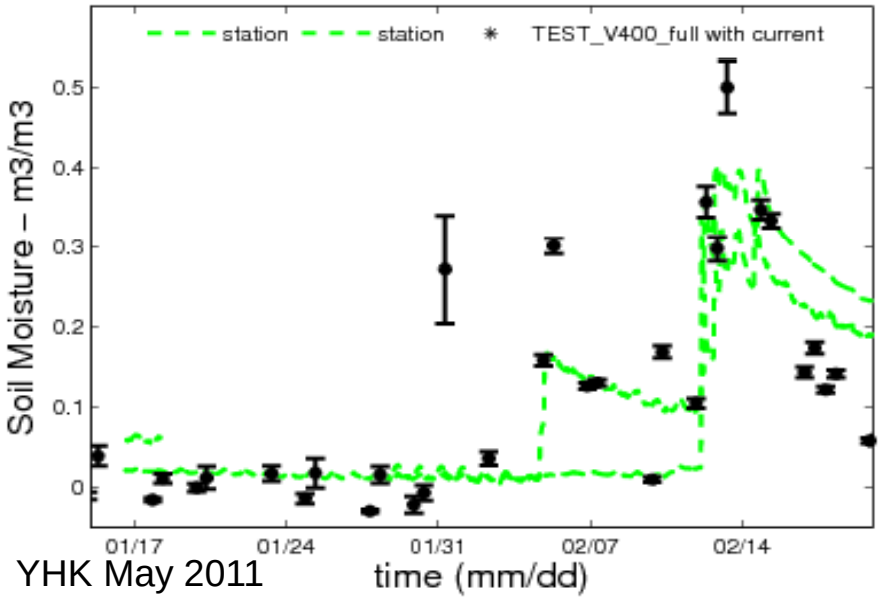
Example of Use to intercompare algorithm versions etc

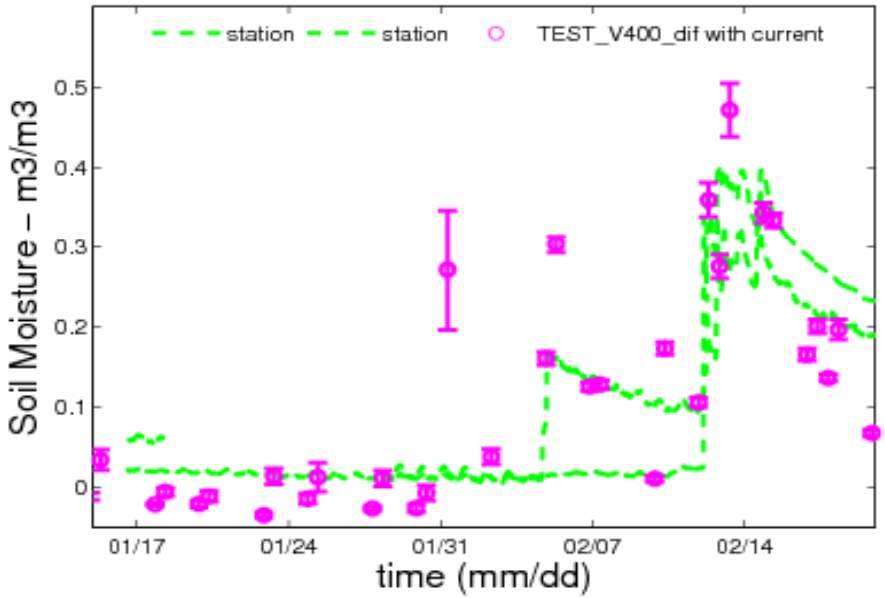
Soil Moisture : Dual in Full (DIF) vs Full ; WITH vs NO current

Soil Moisture : Dual in Full (DIF) vs Full ; WITH vs NO current (A Mialon)

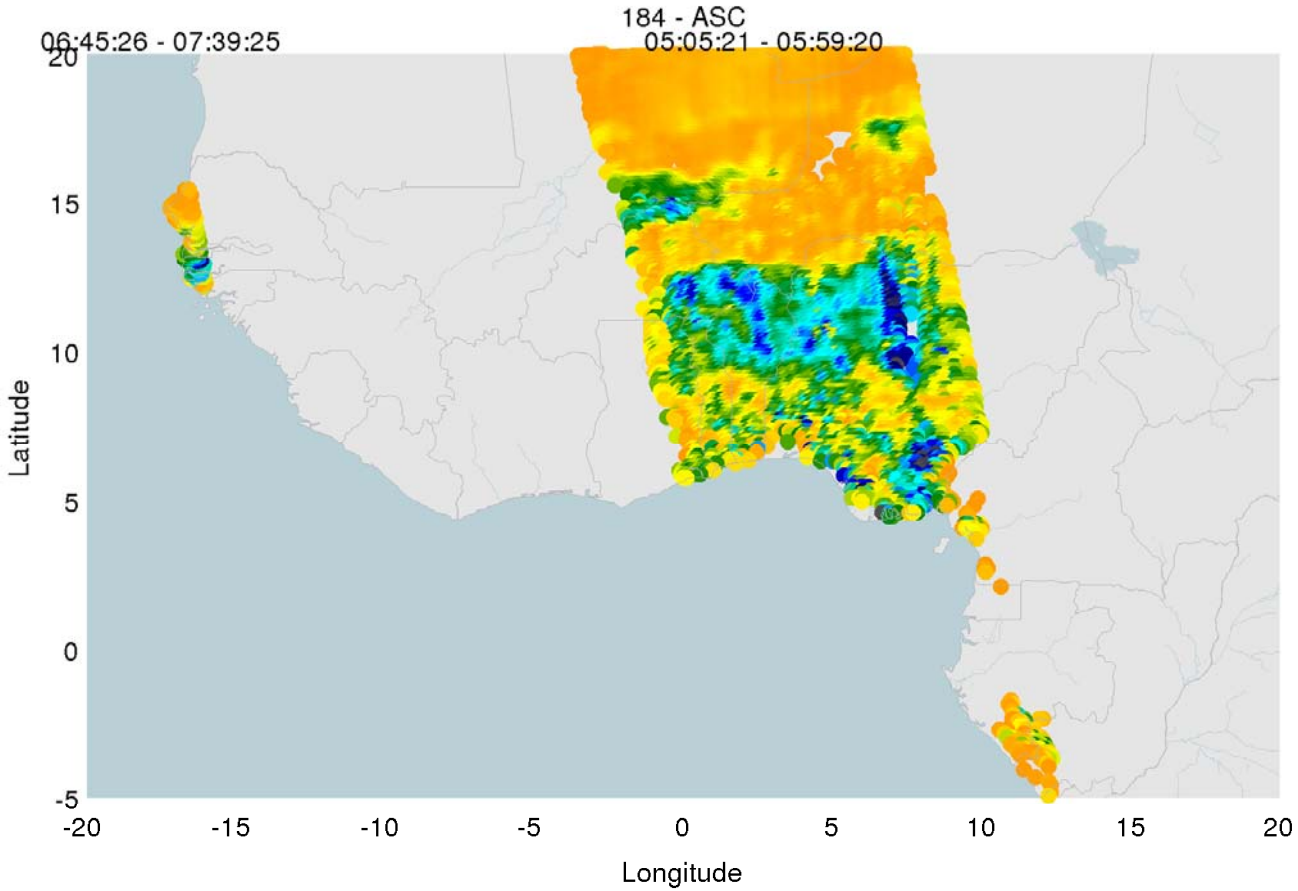




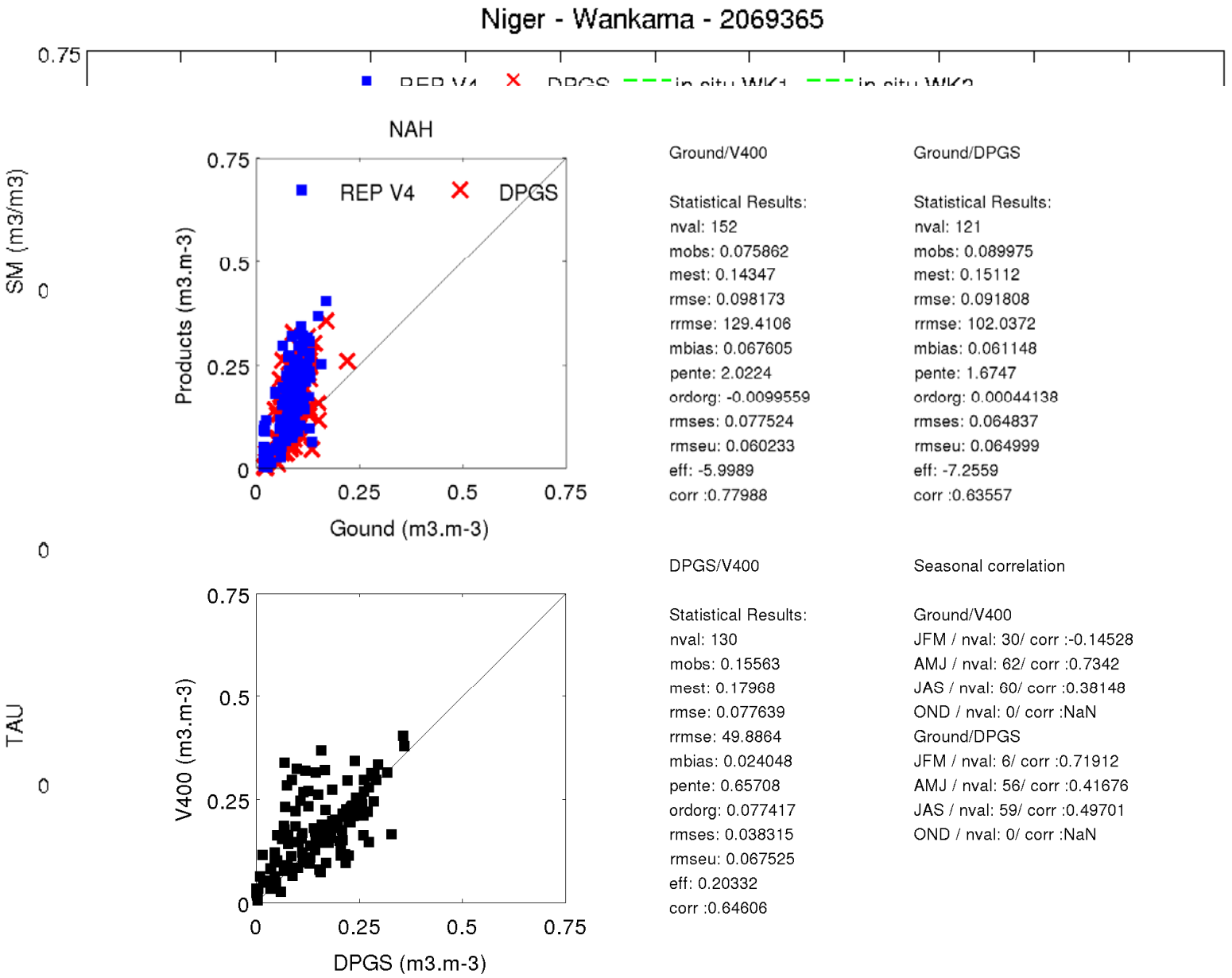




African sites

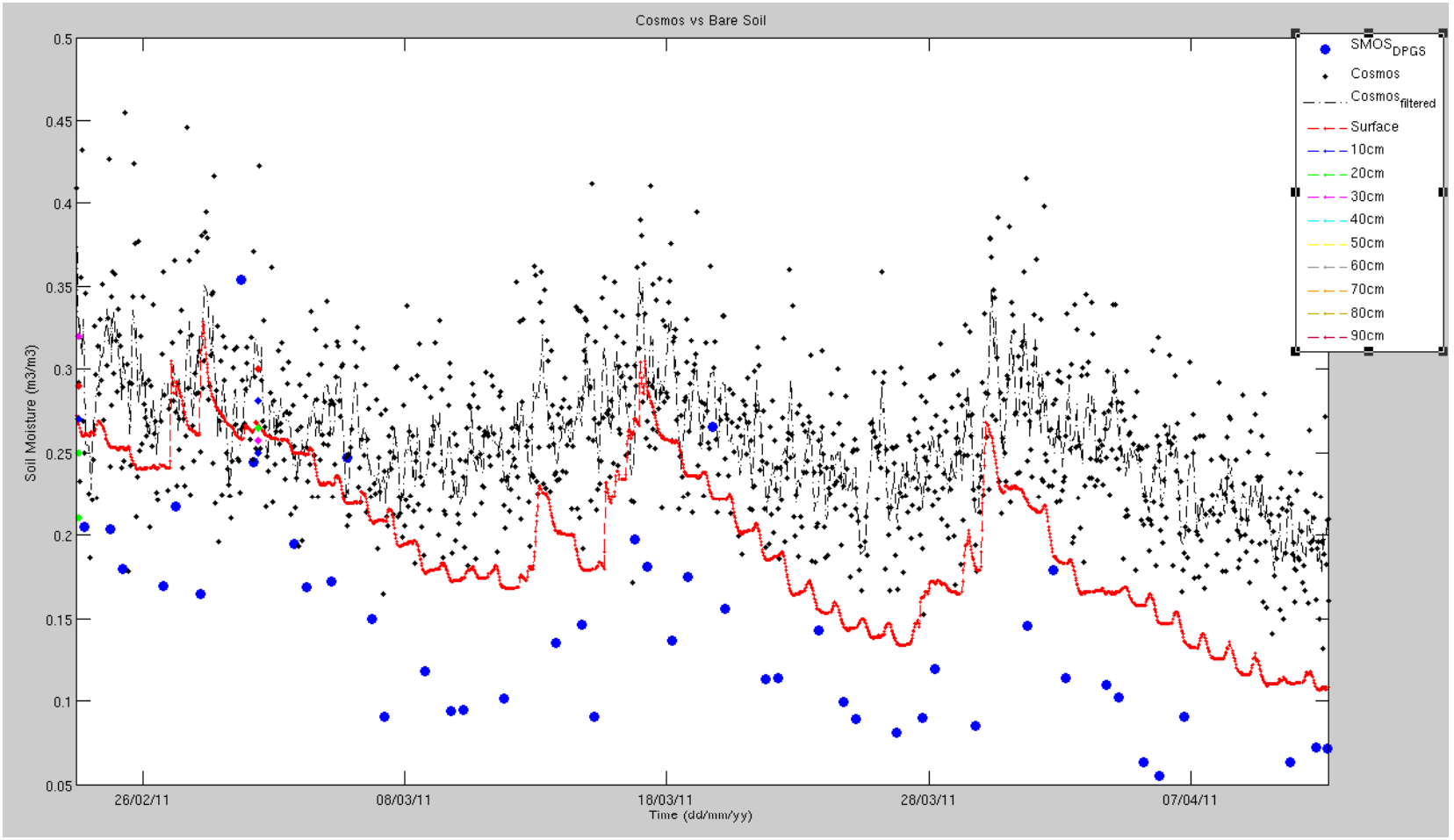


Gruhier Pellarin



Gruhier Pellarin

COSMOS probes
Drought in SW France

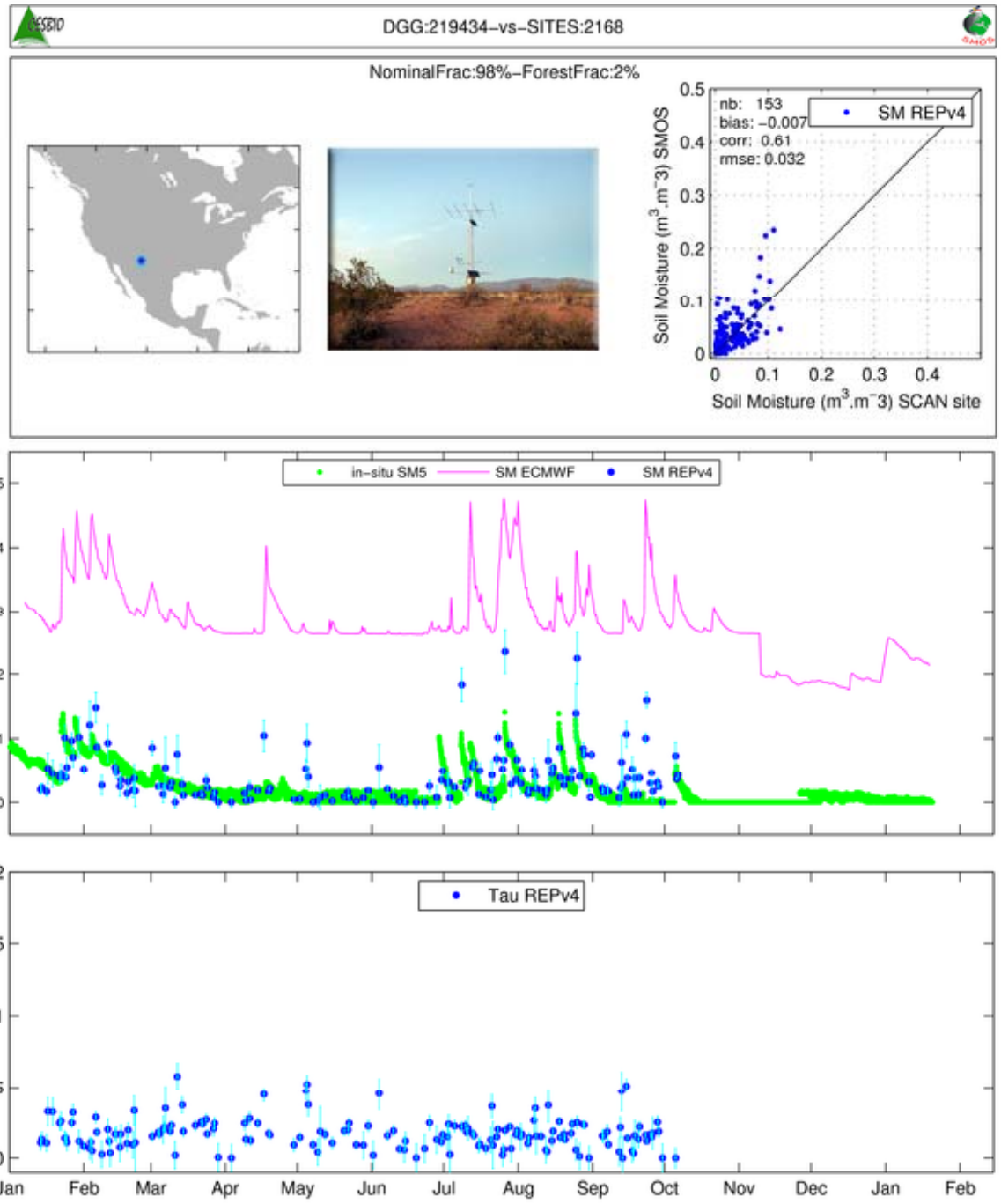


Mialon

Validation of SMOS Soil moiture over Continental US

A. Al Bitar, Y. Kerr, O. Merlin, Ph. Richaume, F. Cabot

EF Wood, A Sahoo



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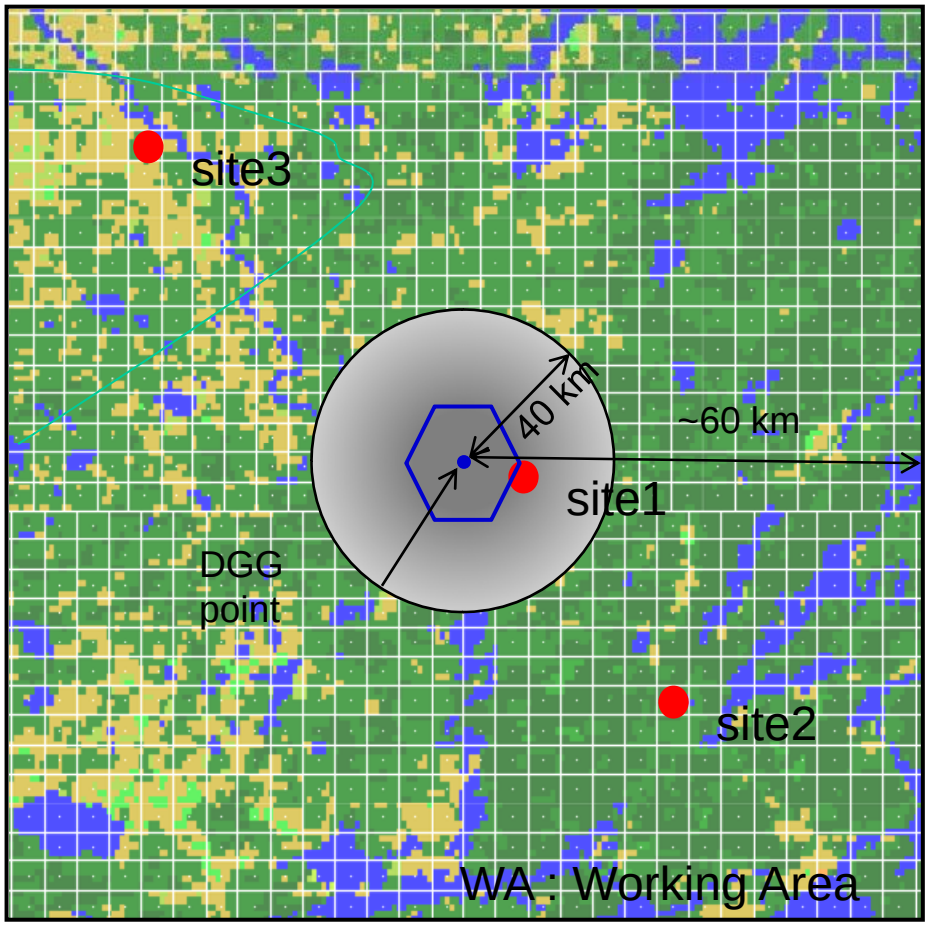
A. Al Bitar

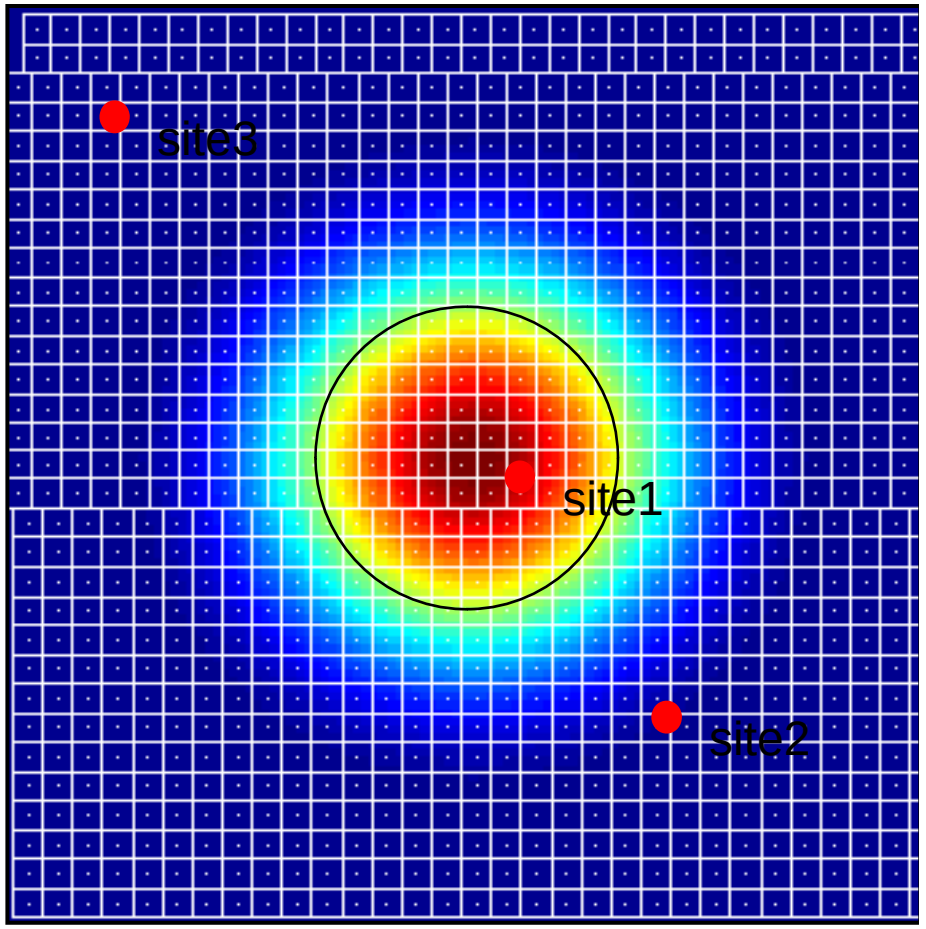
average over sites

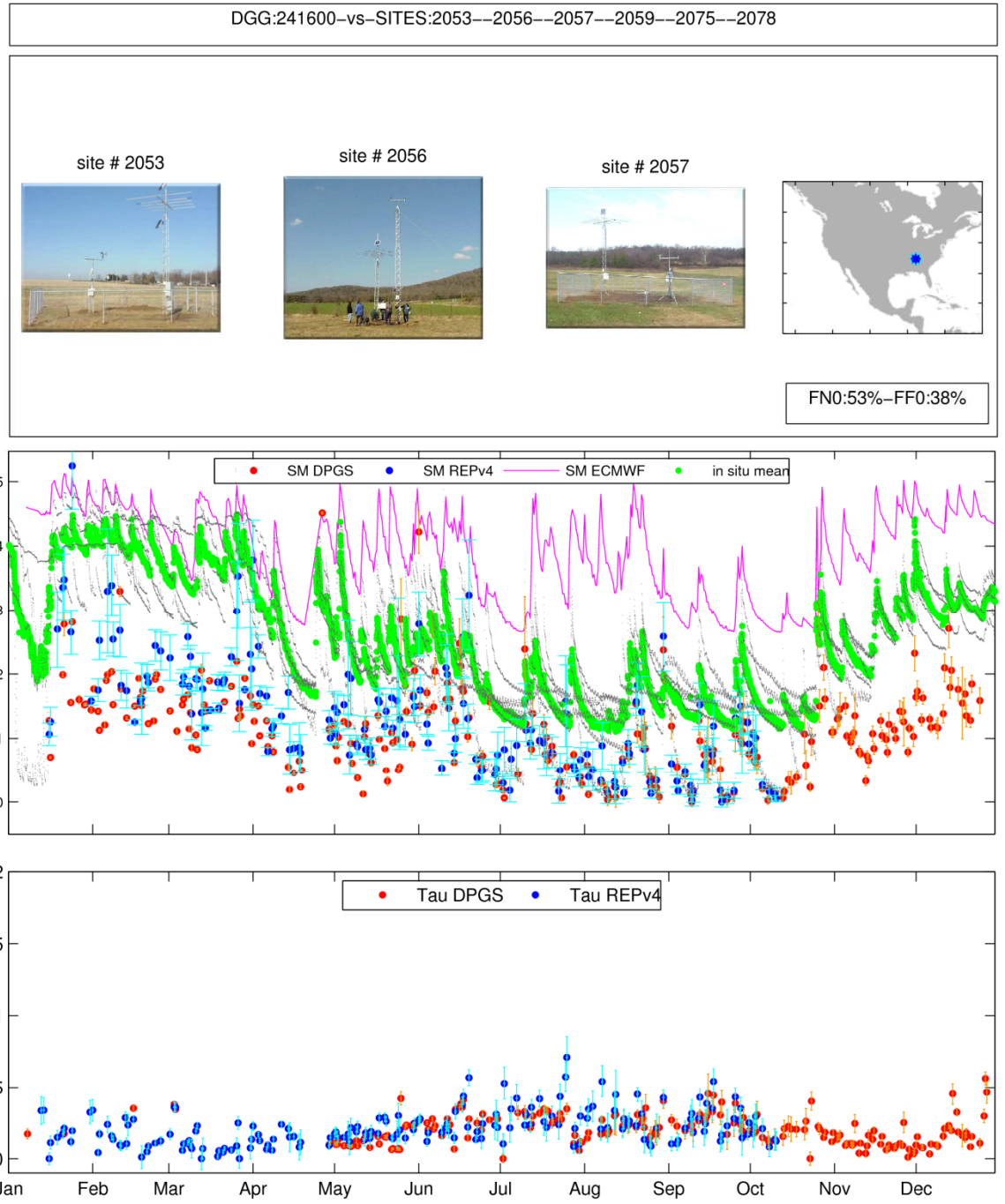
We consider

Cover Fractions

Mean antenna weighting function







Green= radiometric average

Gray = sites data

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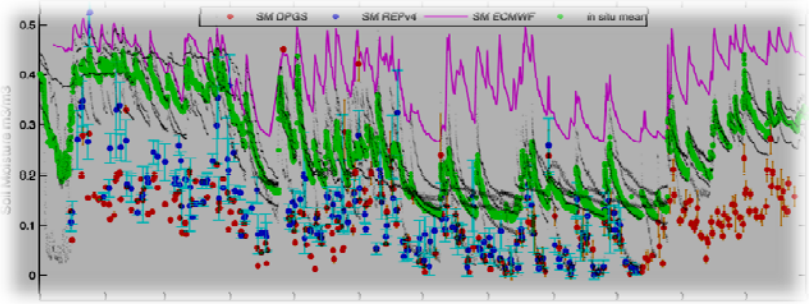
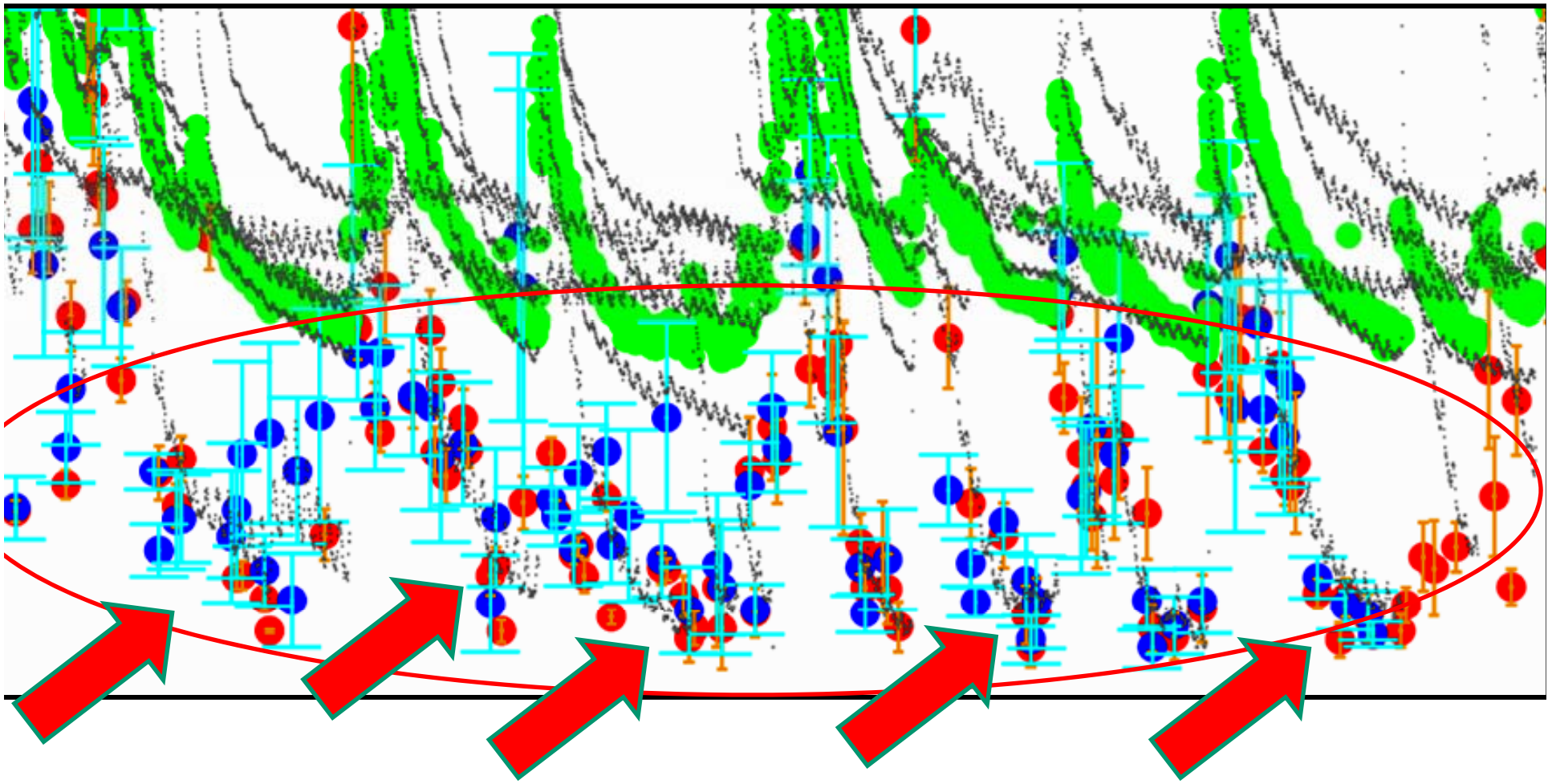


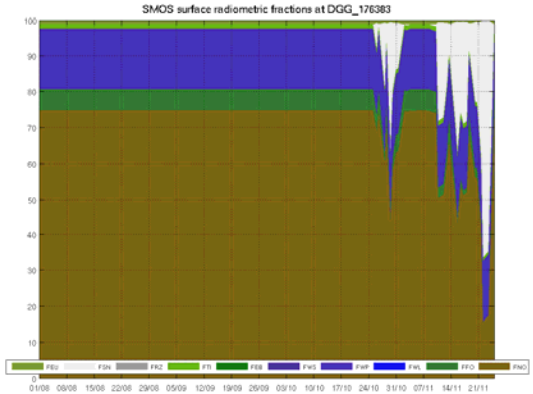


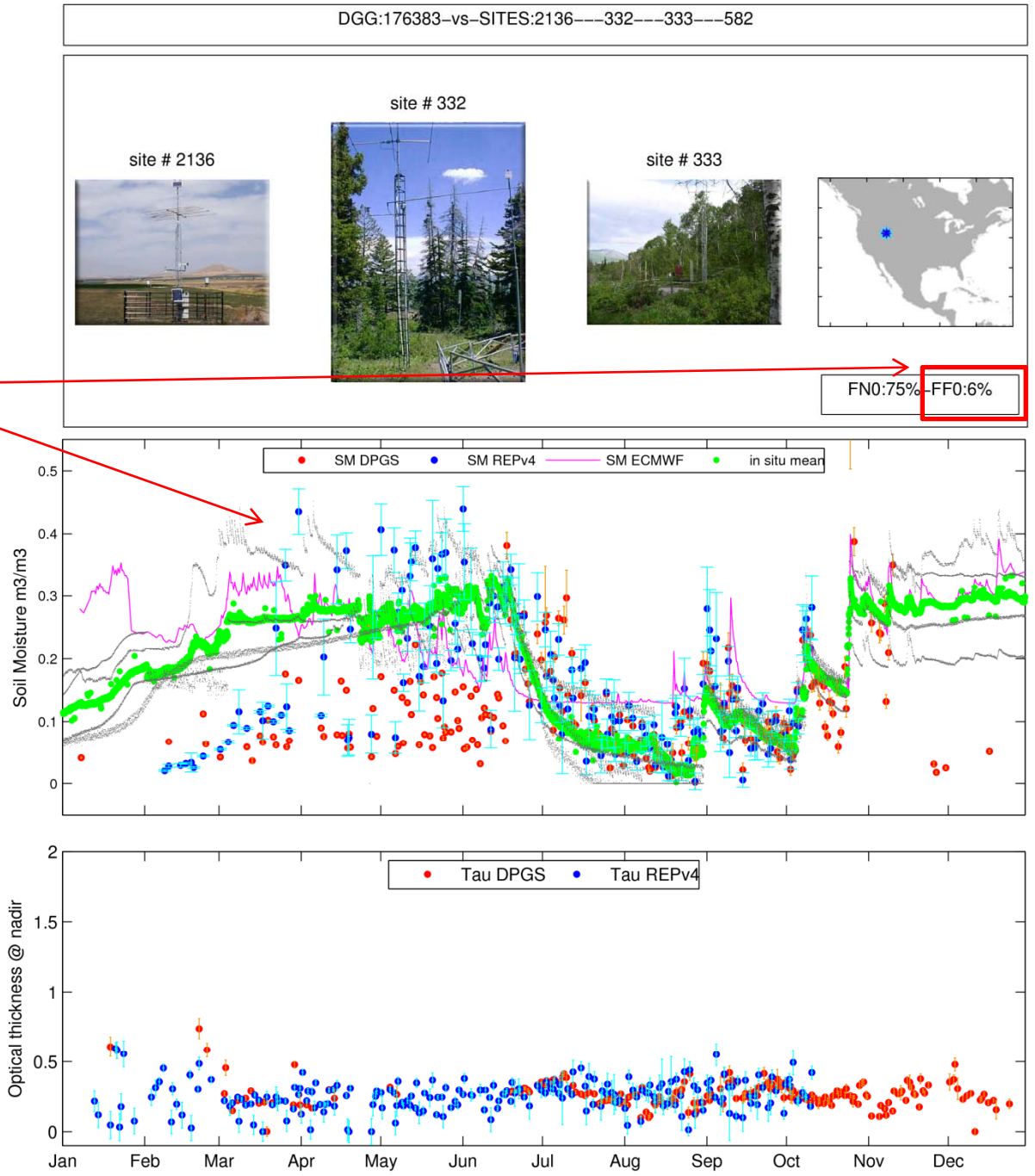
SMOS captures very well the behaviour of the dryest site (even at 40 km)

Forest cover

…getting better

New description of forest fraction by Paolo's team, giving better results.





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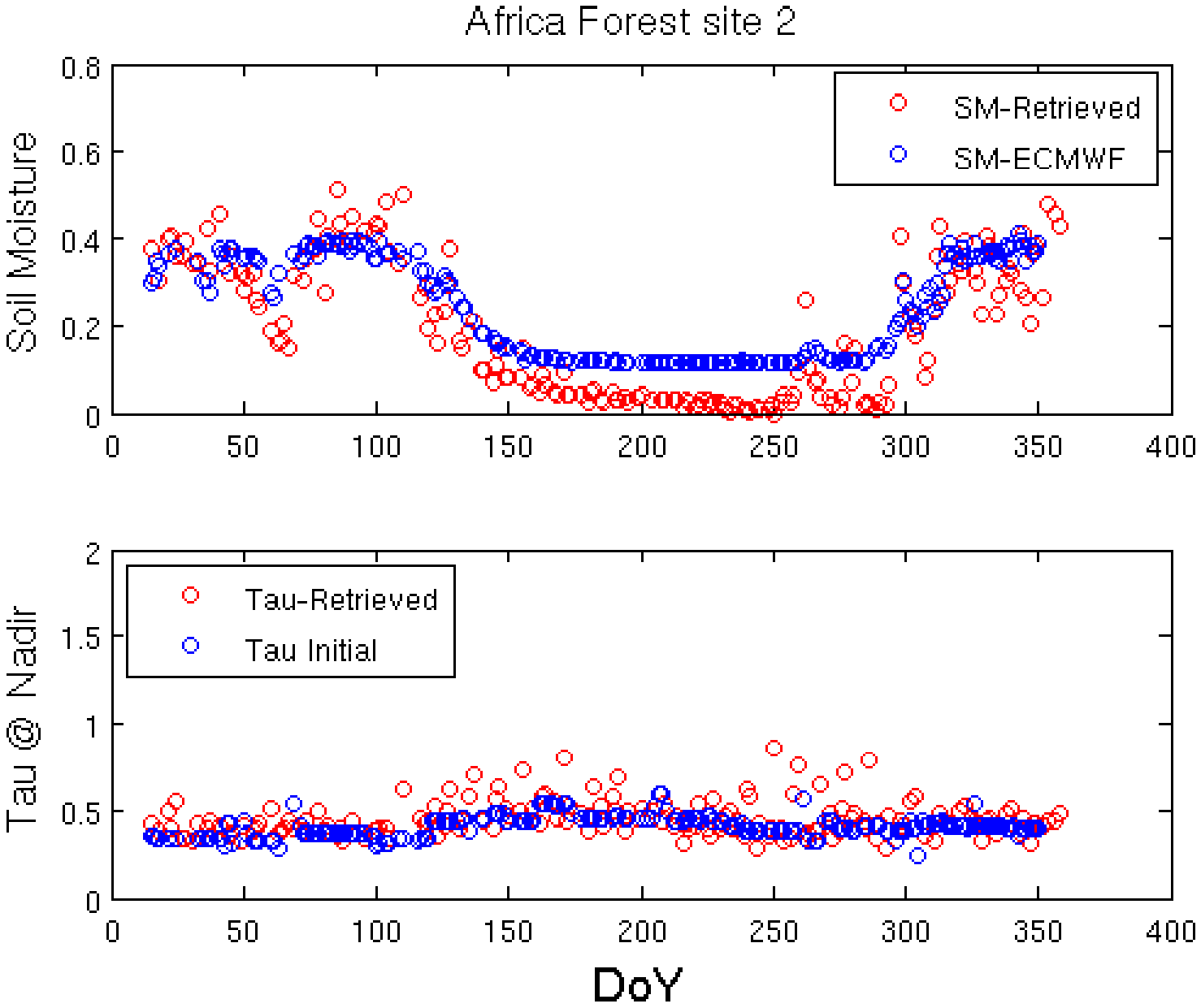
Forests and Opacity



USE of NETWORKS to get a global picture

444 SCAN-SNOTEL sites

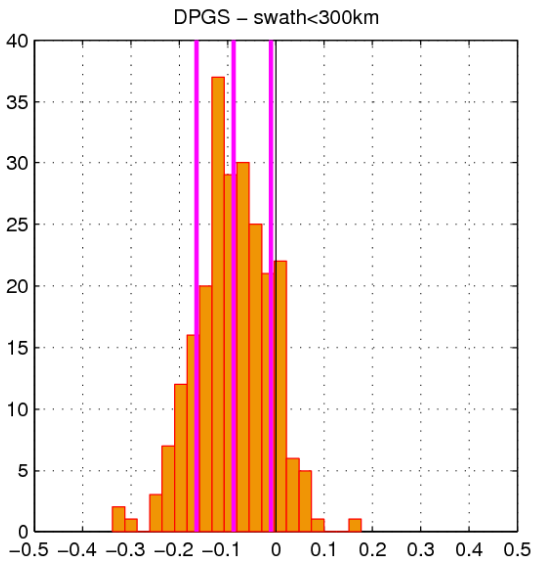
SMOS REPv4 SMOS DPGS VS SCAN-SNOTEL sites

~230 sites considered

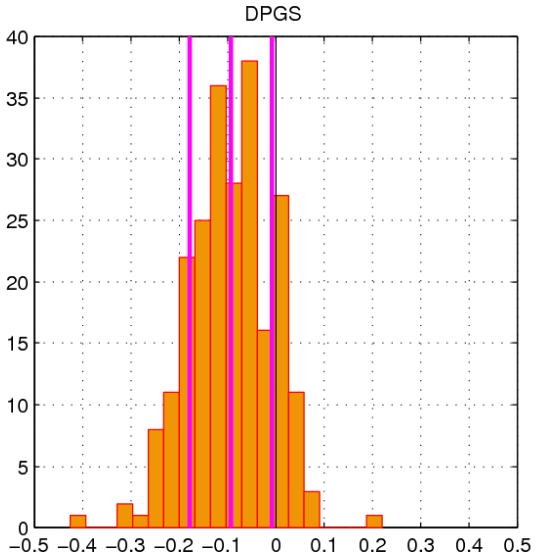
from the ~444 sites that have SM measurements at 5 cm,
from the ~1000 downloaded sites.

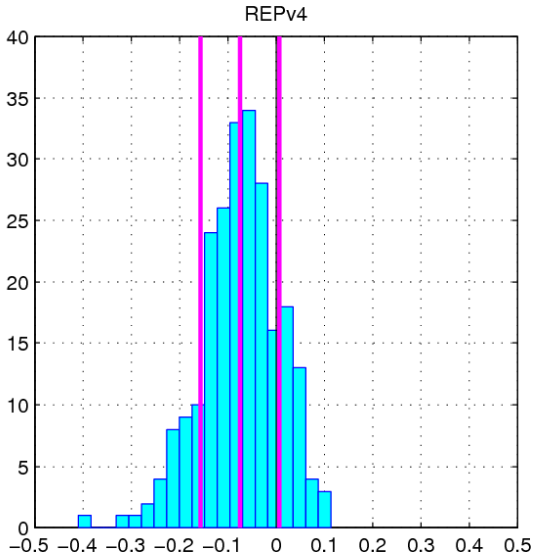
~16000 records considered for closest DGG
For all extracted DGGs ~60000 records total considered
(1 record = 1 SMOS visite & 1 site obs)

SCAN sites vs SMOS – Hist. of mean Delta SM ALL



Avg ($SM_{SMOS} – SM_{site}$)





A. AlBitar

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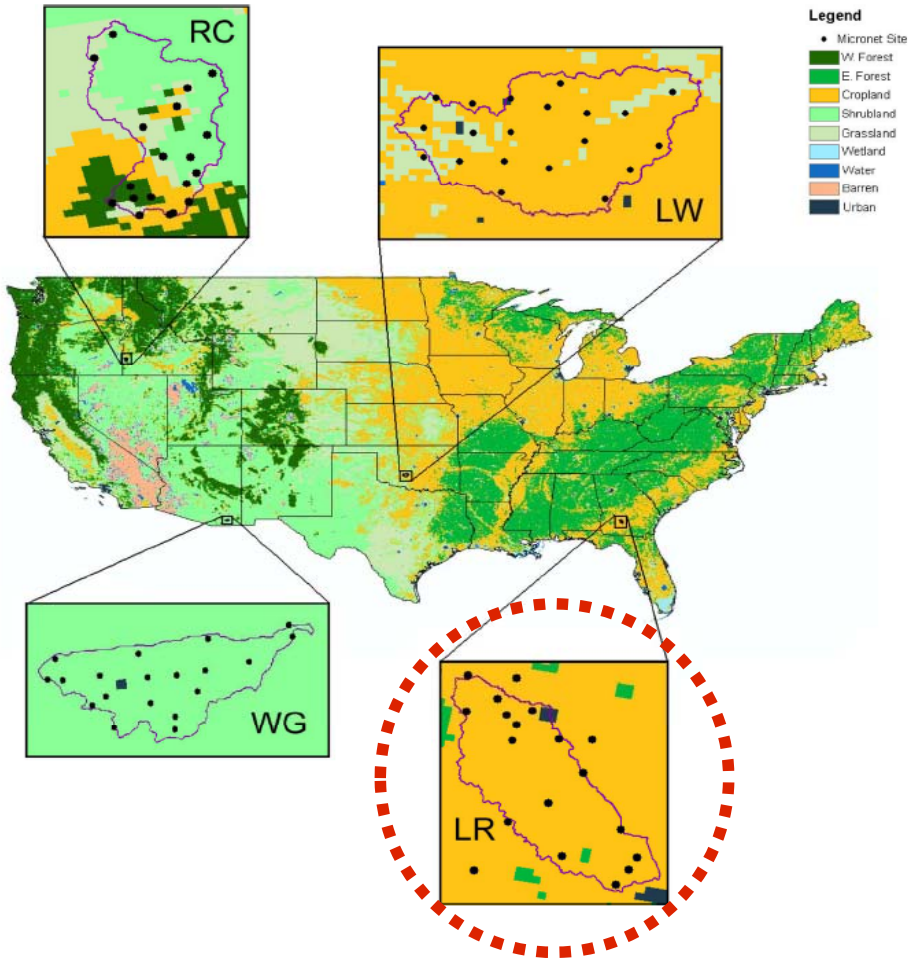
Comparison over « Areas »

with
T. Jackson, R. Bindlish, D. Leroux

- Use of the « Watersheds »

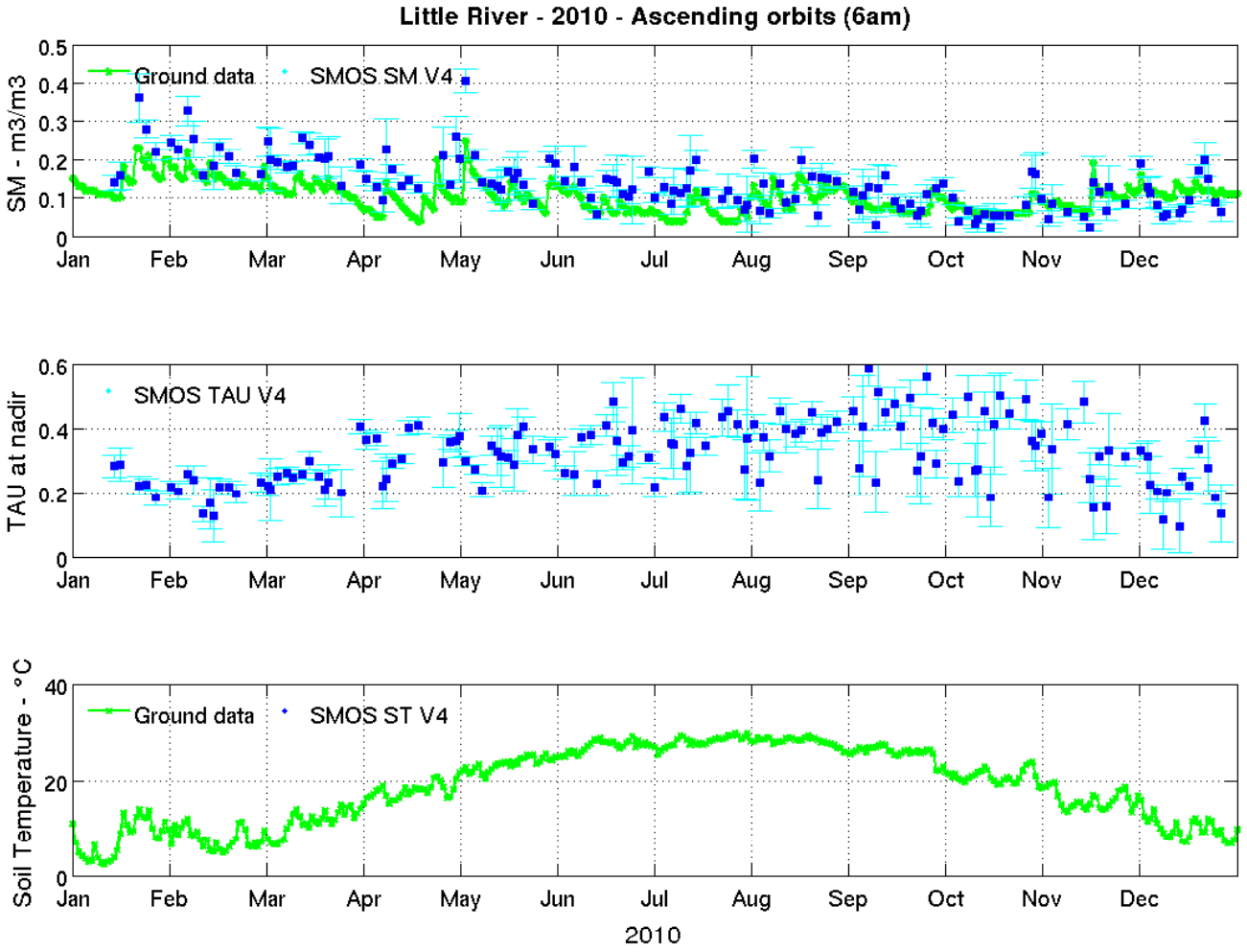
Little River



Climate : humid
Topography : flat
Land use : row crop, forest

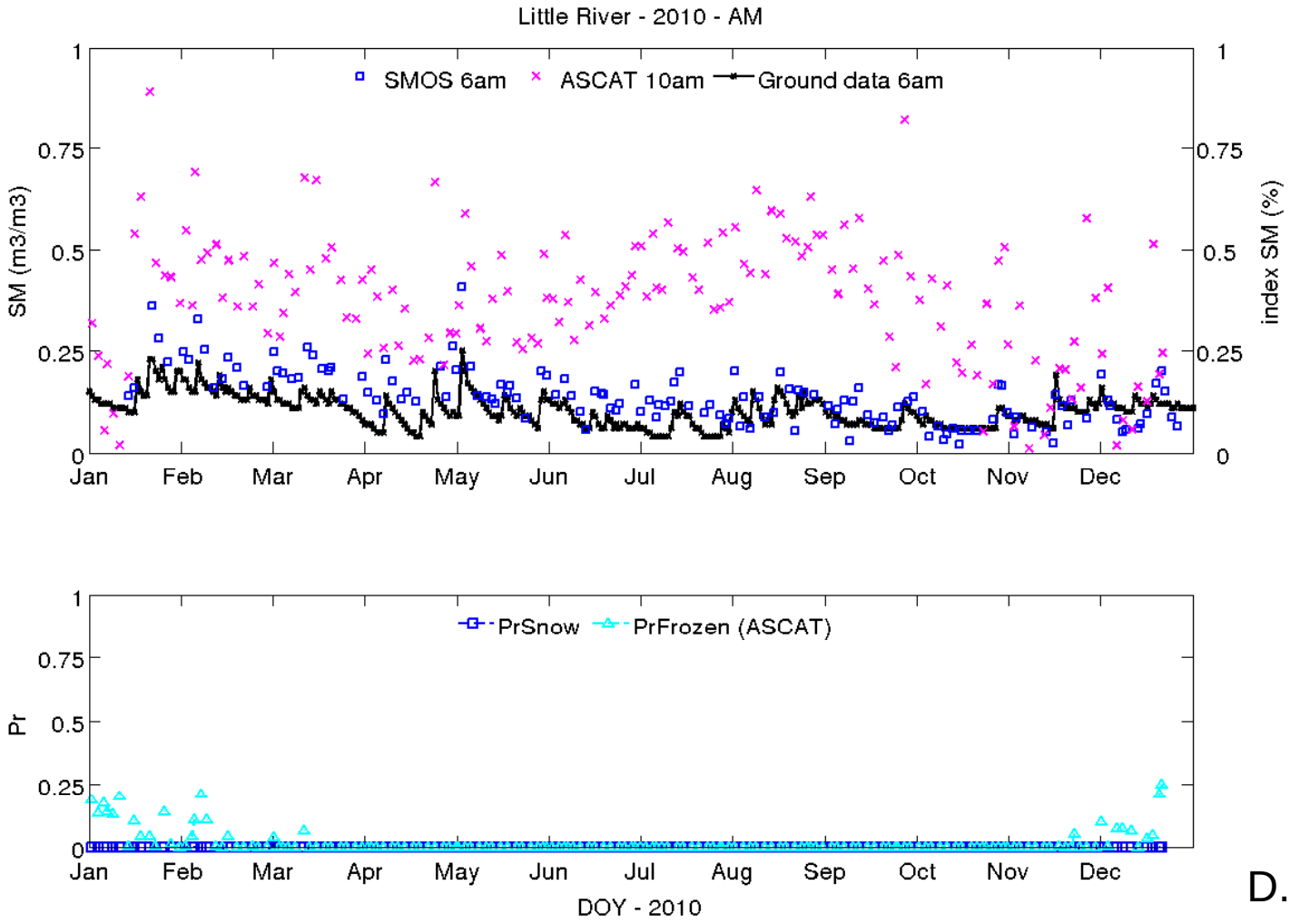
Jackson et al., Validation of AMSR soil moisture products, IEEE Transactions on Geoscience and Remote Sensing, vol. 48, 2010.

SMOS vs. Ground (AM)



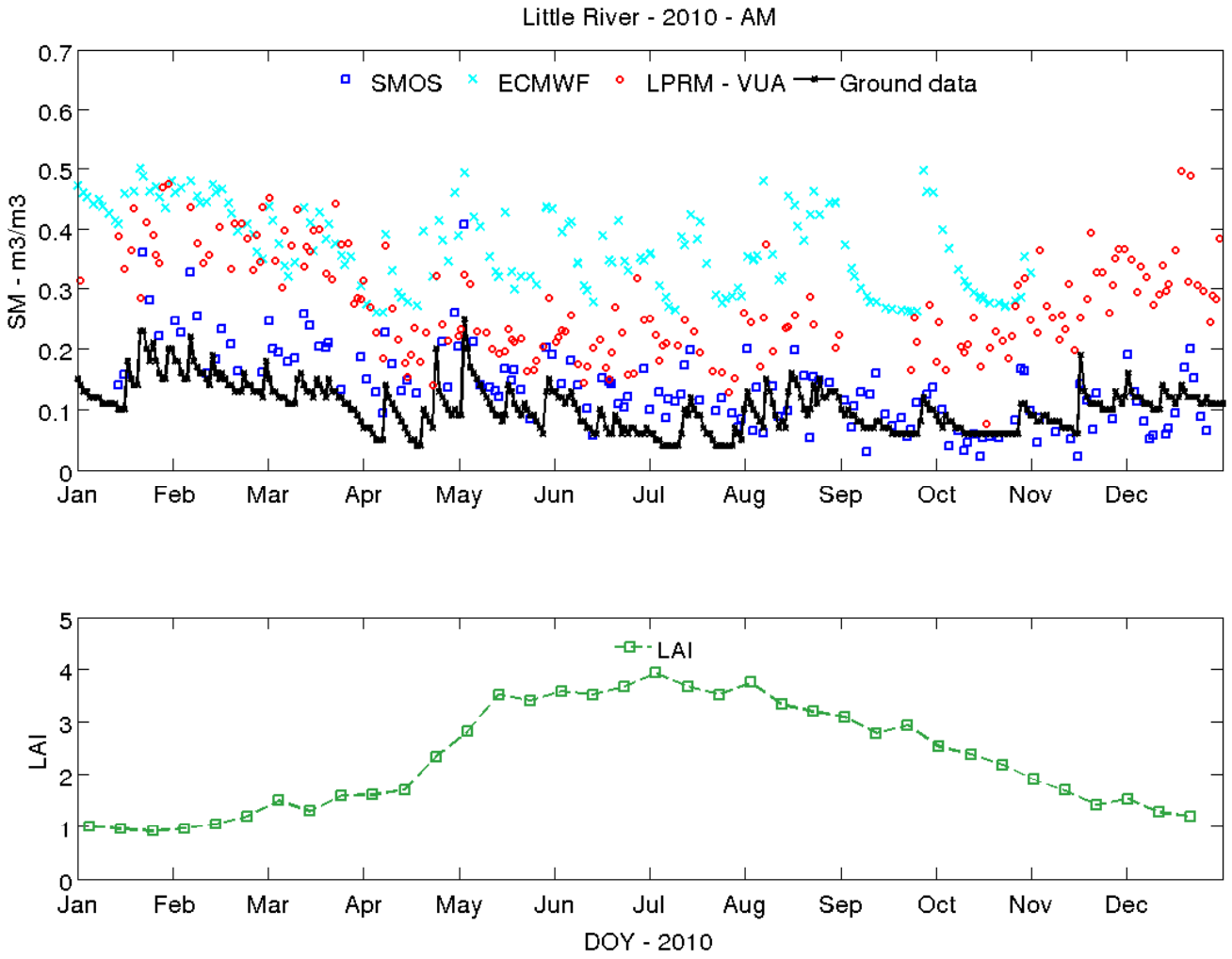
D. Leroux

SMOS vs. ASCAT (AM)



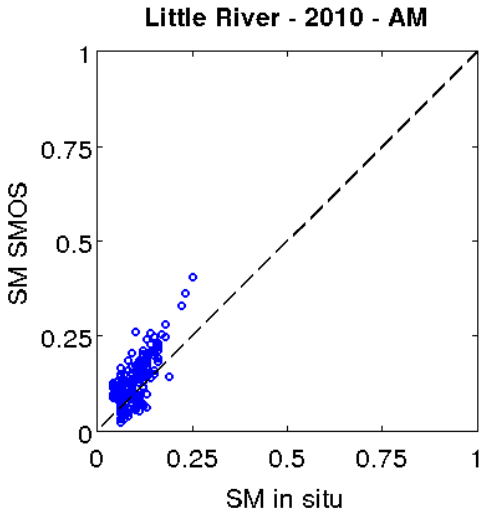
D. Leroux

SMOS vs. ECMWF vs. VUA (AM)

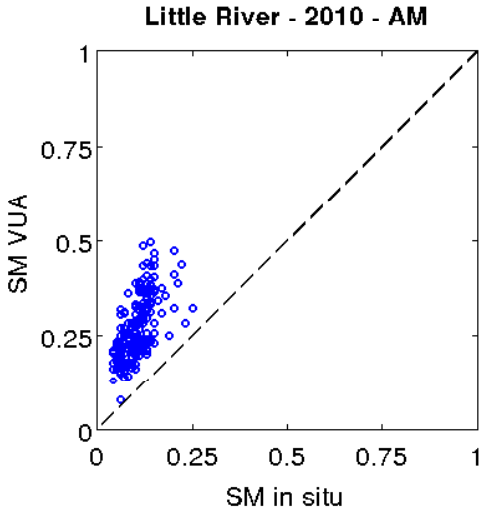


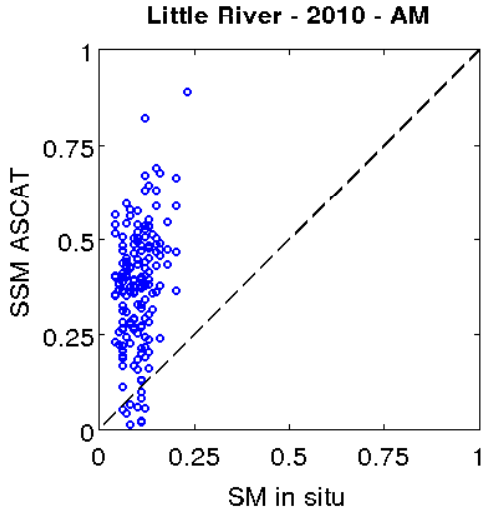
D. Leroux

Scatter plots (AM)



	R2	std	RMSE
SMOS	0.74	0.0459	0.0048
ECMWF			
VUA	0.64	0.0659	0.0135
ASCAT	0.30	0.1510	0.0246





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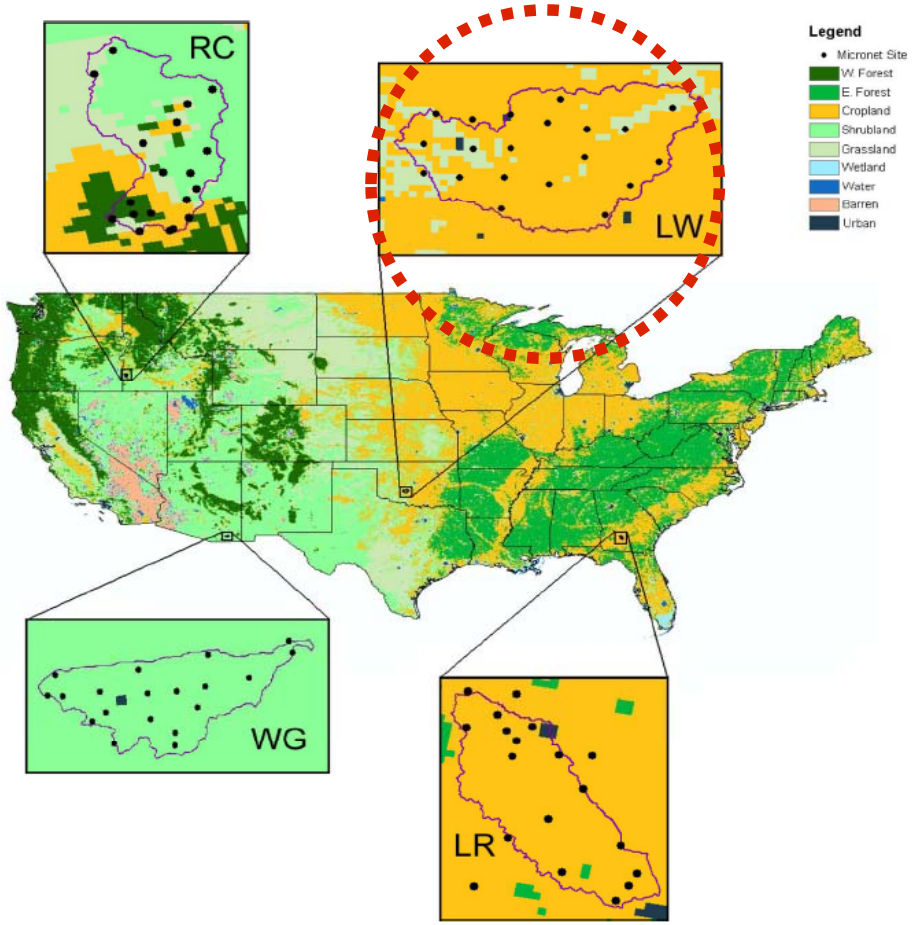
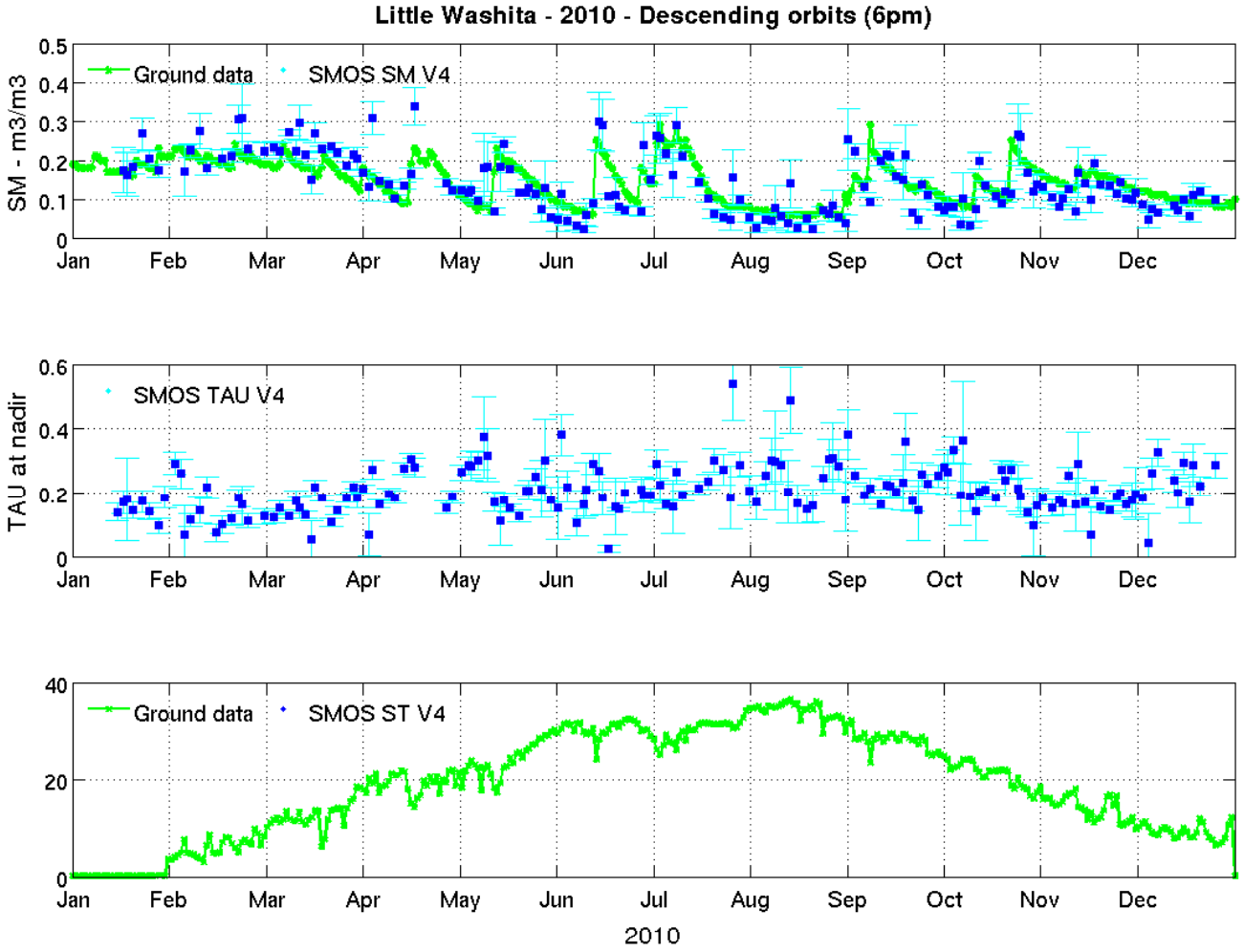
Little Washita



Climate : sub humid
Topography : rolling
Land use : range, wheat

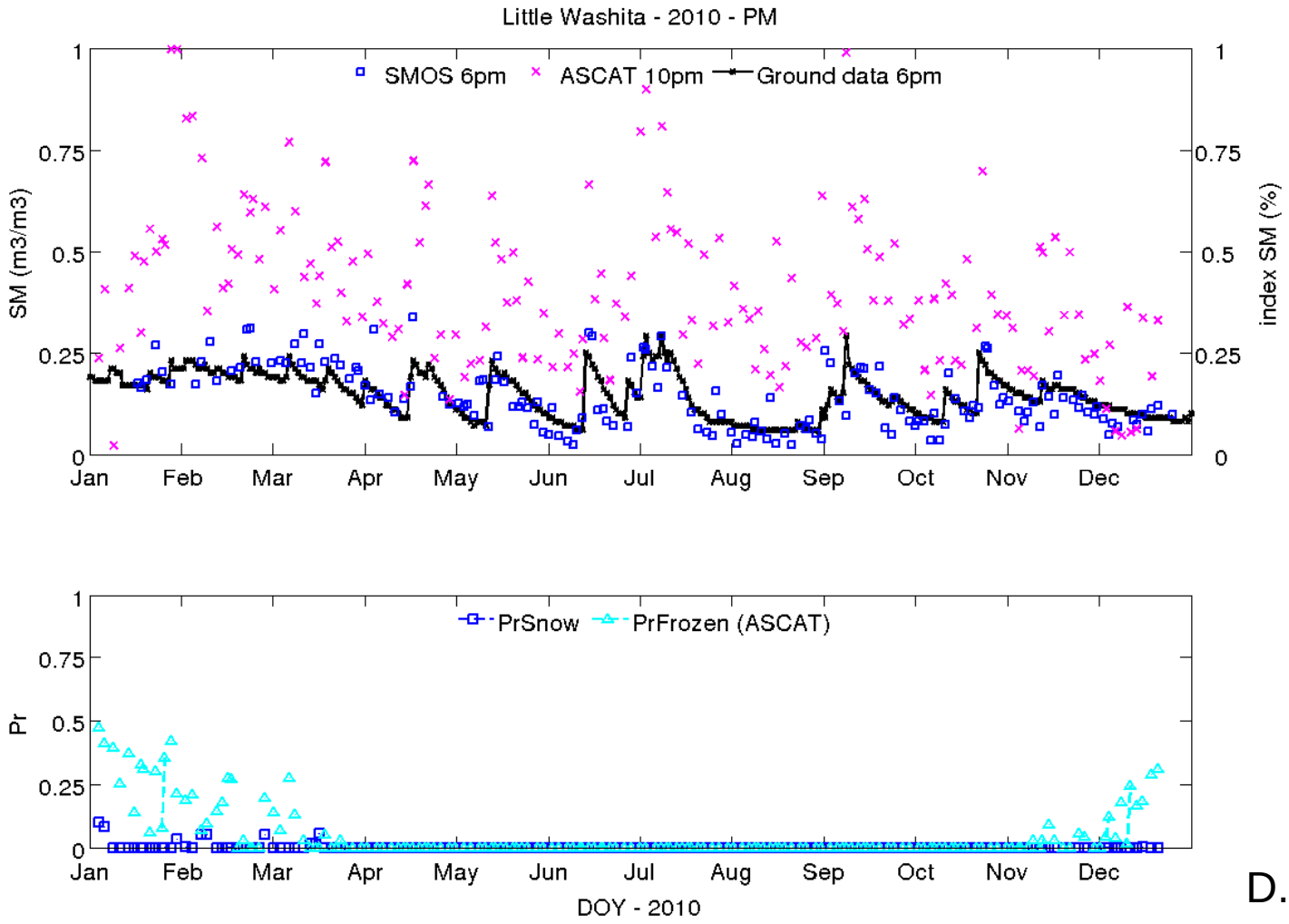
Jackson et al., Validation of AMSR soil moisture products, IEEE Transactions on Geoscience and Remote Sensing, vol. 48, 2010.

SMOS vs. Ground (PM)



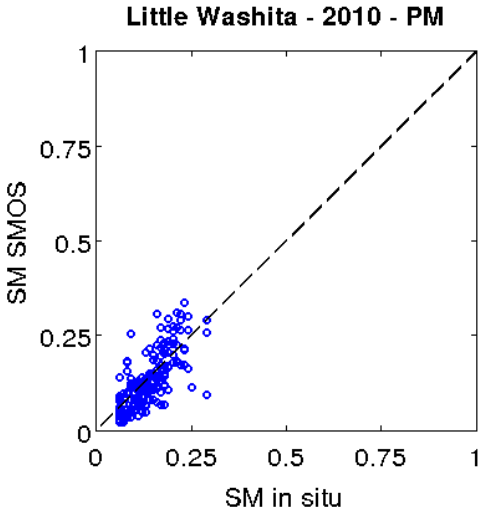
D. Leroux

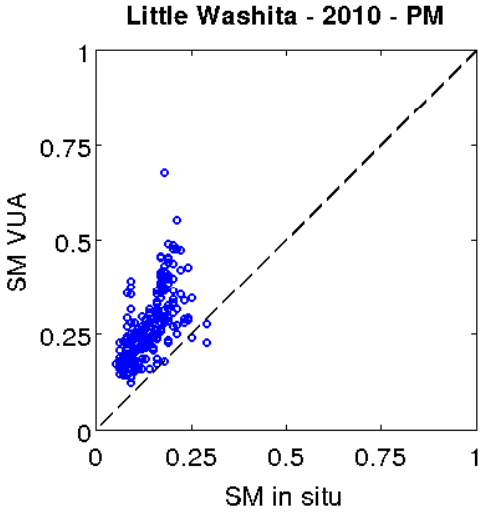
SMOS vs. ASCAT (PM)

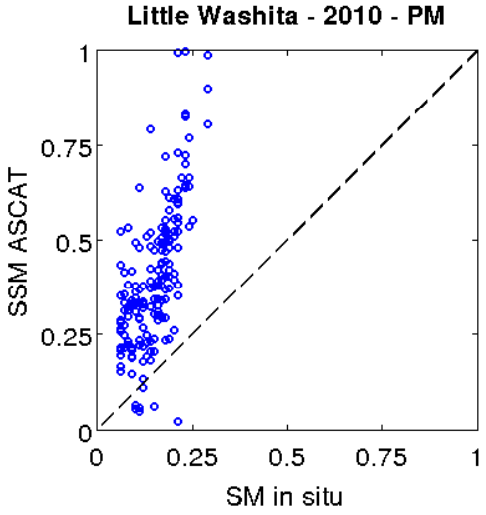


D. Leroux

Scatter plots (PM)

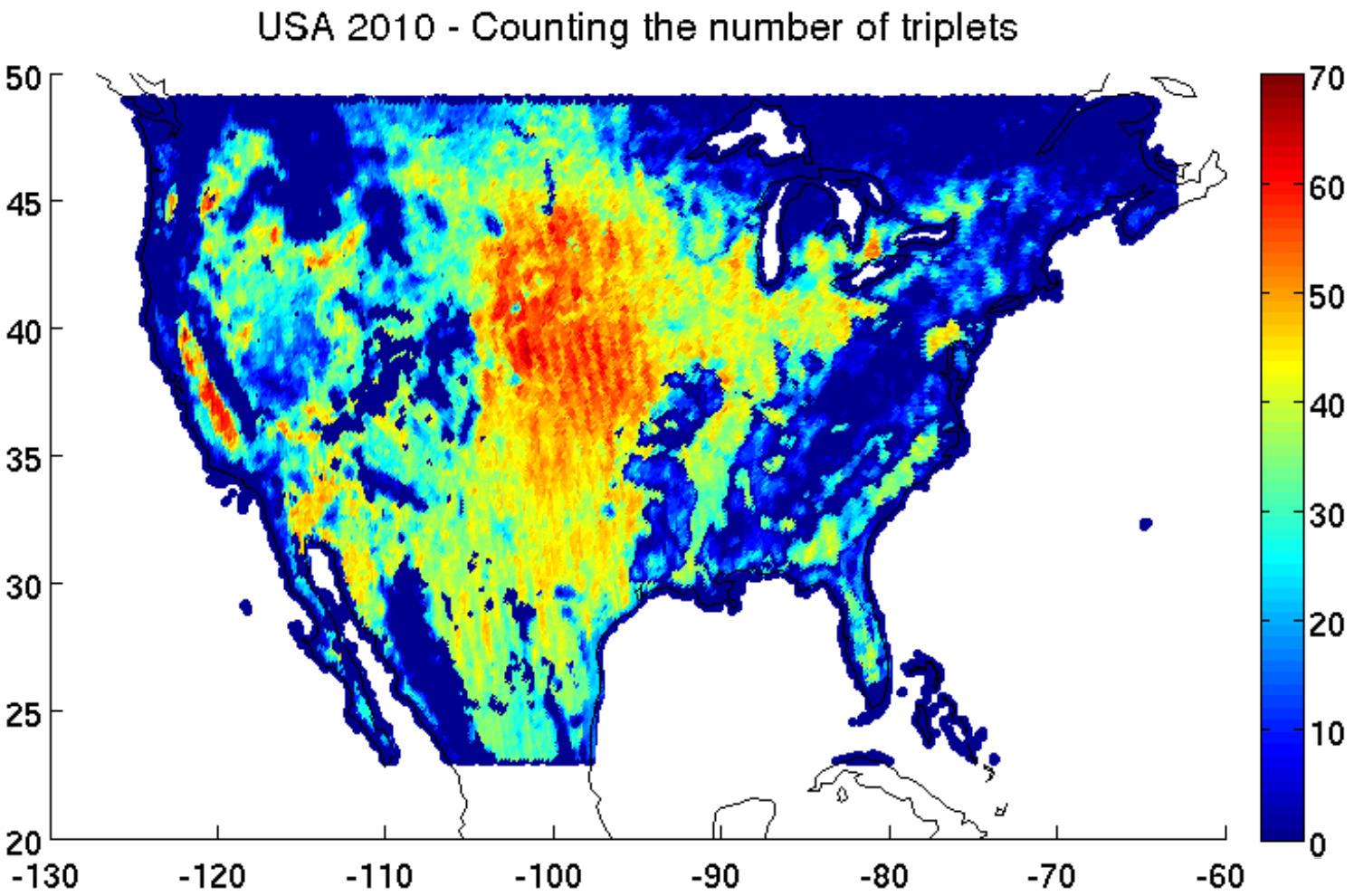






D. Leroux

Triple Collocation – USA



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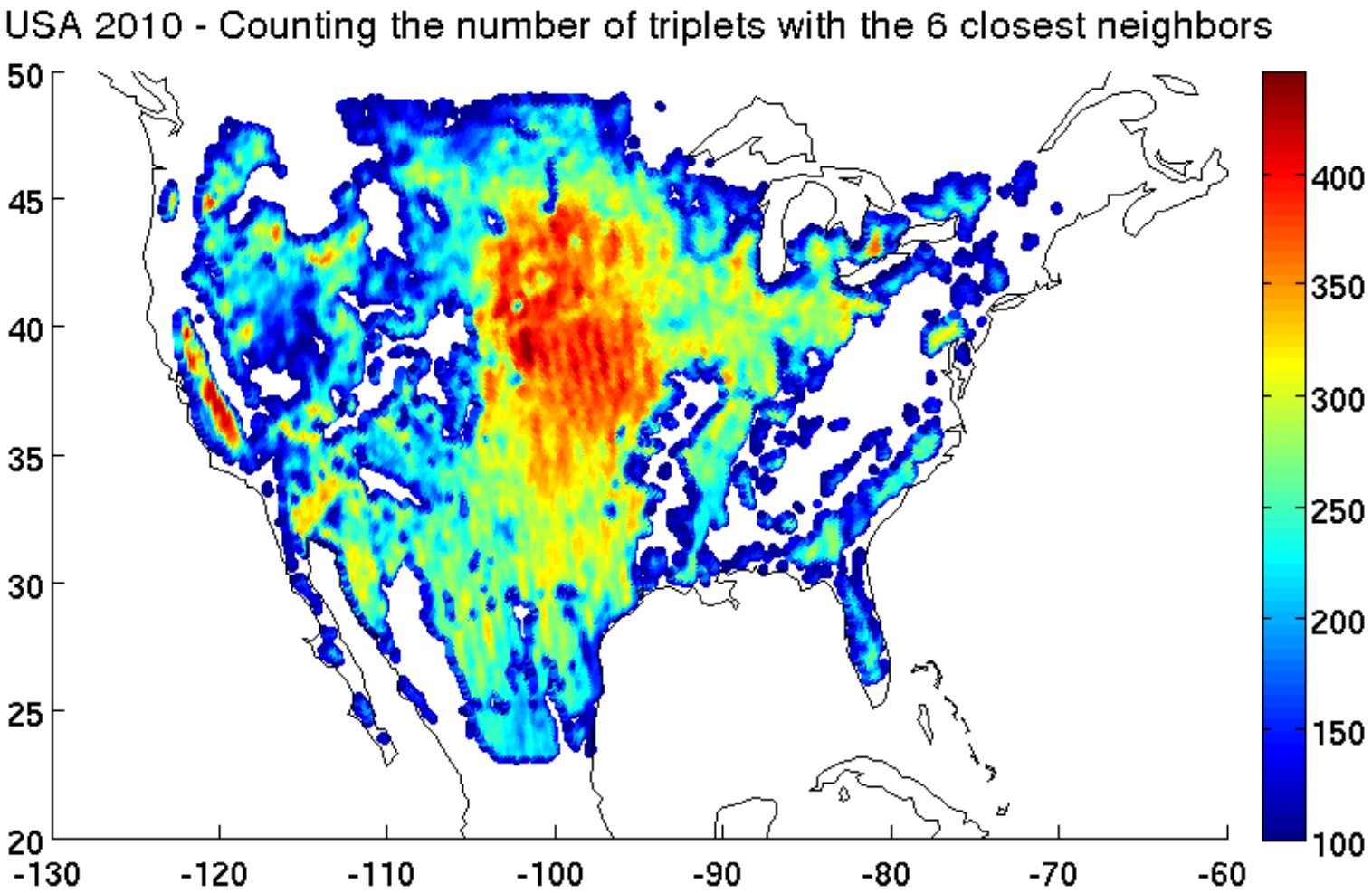
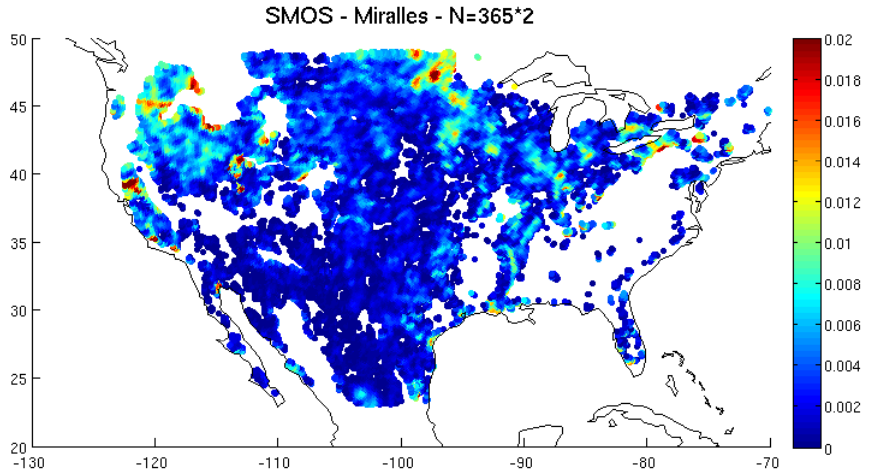
Triple Collocation – USA

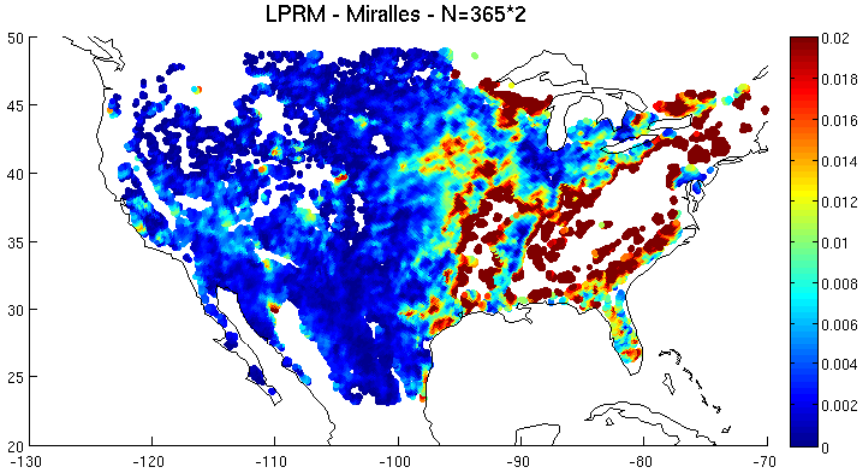


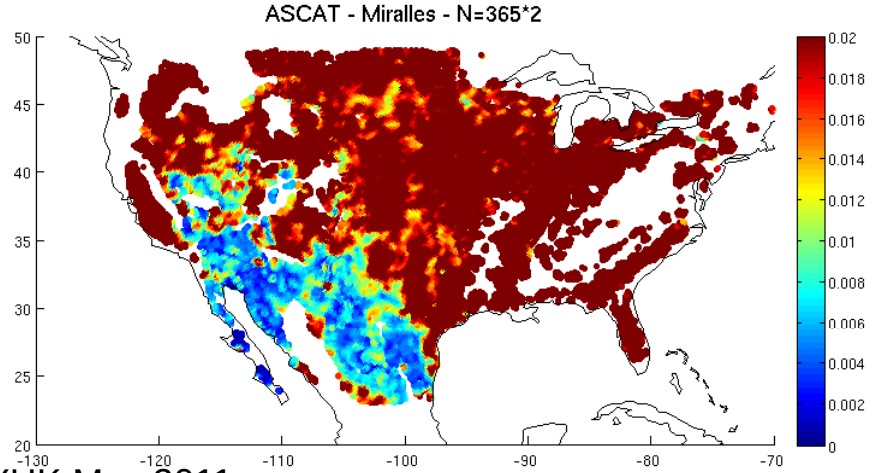
D. Leroux

Triple Collocation – USA

Mean/anomaly sur 365j







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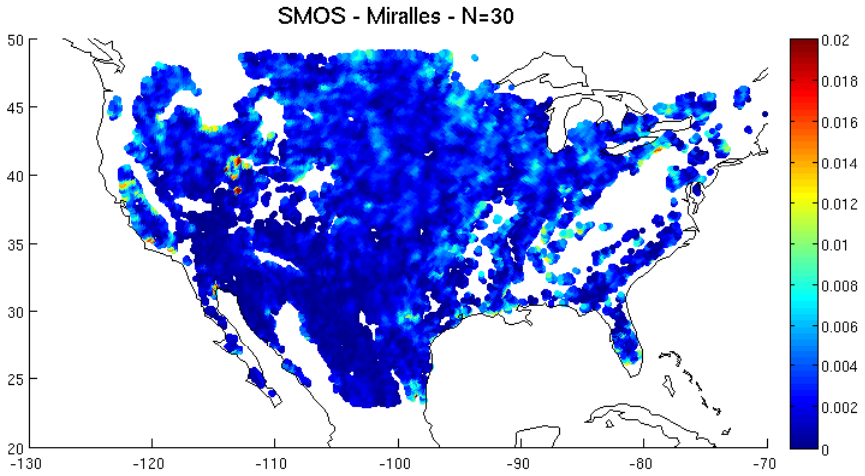
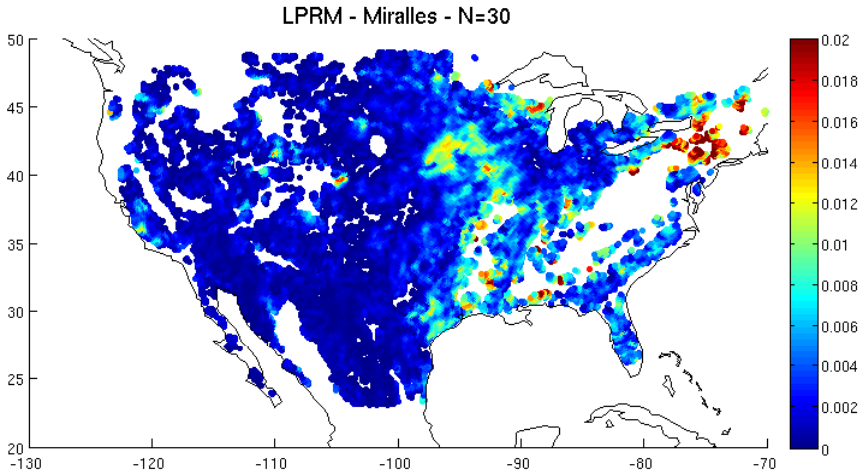
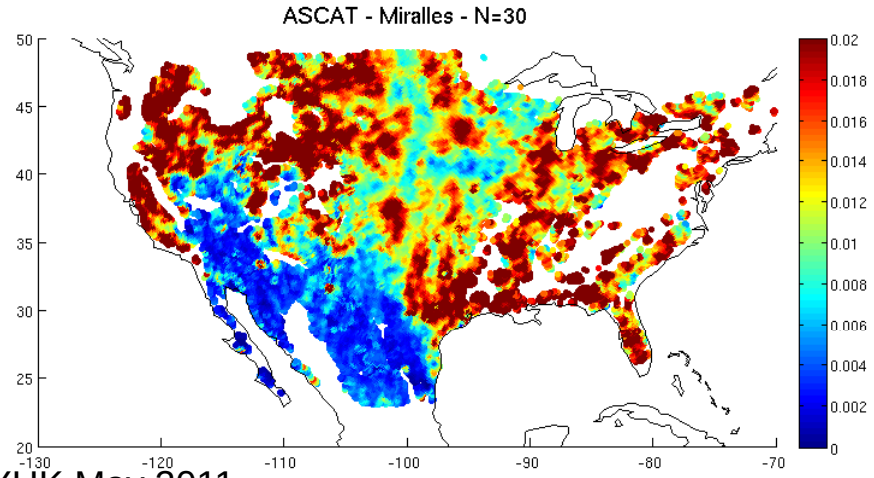
Triple Collocation – USA

Mean/anomaly 30d Sliding window







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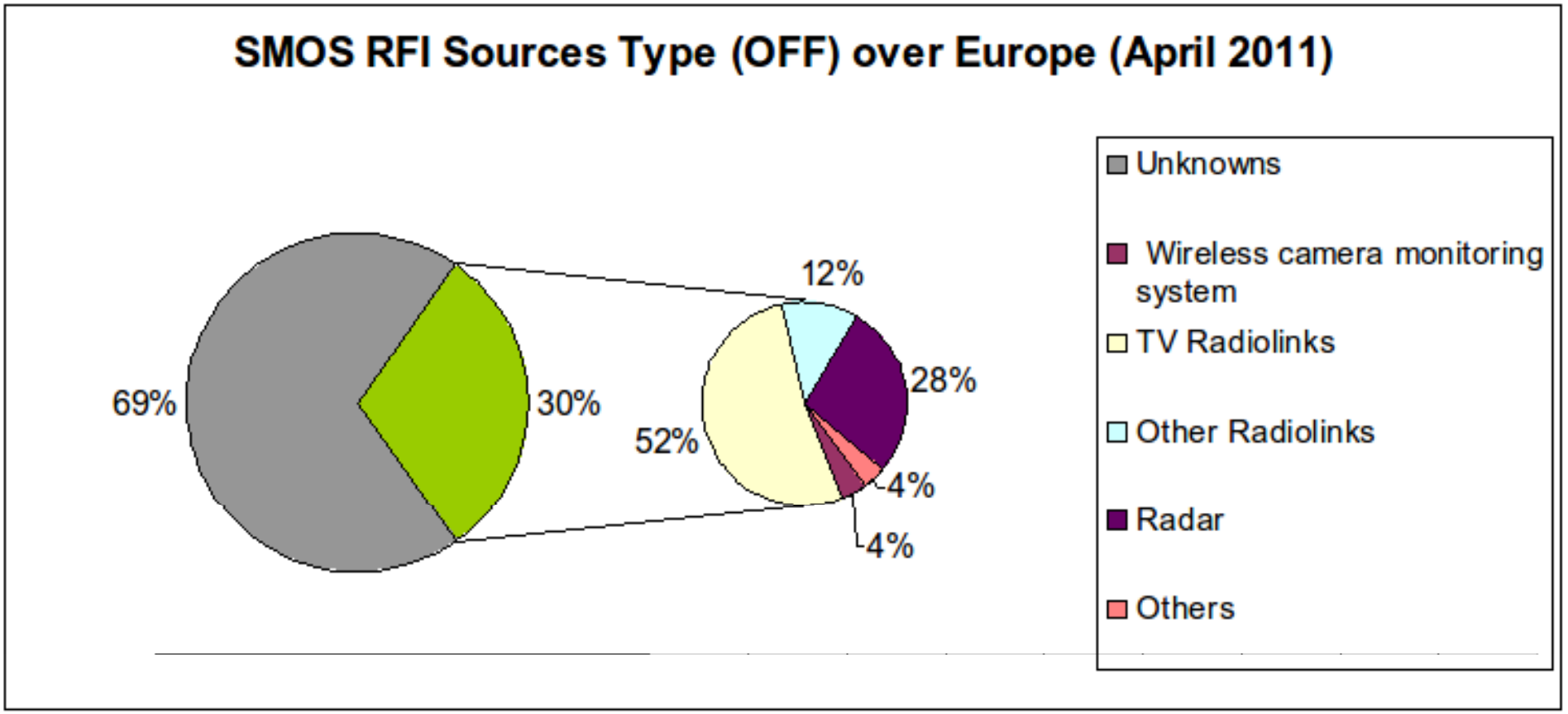
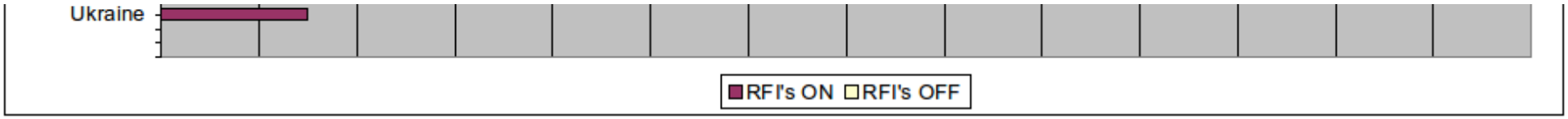
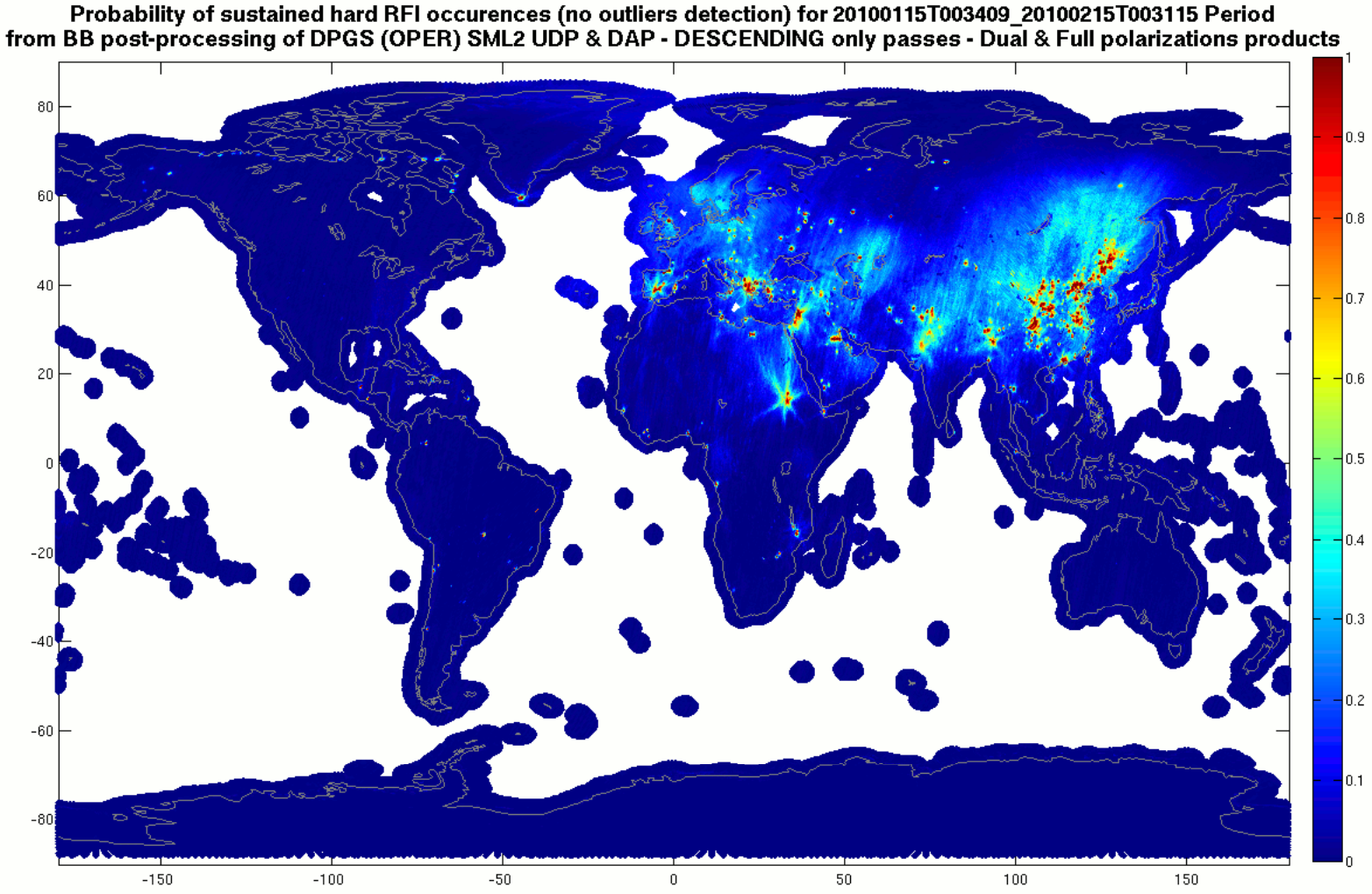
SMOS RFI in Europe (April 2011)





Temporal evolution



Conclusion….

- Cal Val is not easy
  - Especially in 15 months
  - Many pitfalls
- SMOS after 18 months still not there yet
  - Many good results
  - Some issues still to be solved
- Issues of representatitivity and data access (latency)
  - Networks (SCAN SNOTEL, FluxNet, ..) most useful
- For soil moisture we have a bias still to be understood
- A fair proportion of the error is linked to aux data files
- Standing water is not always an issue
- Vegetation Opacity still requires more work
- There is still room for improvement