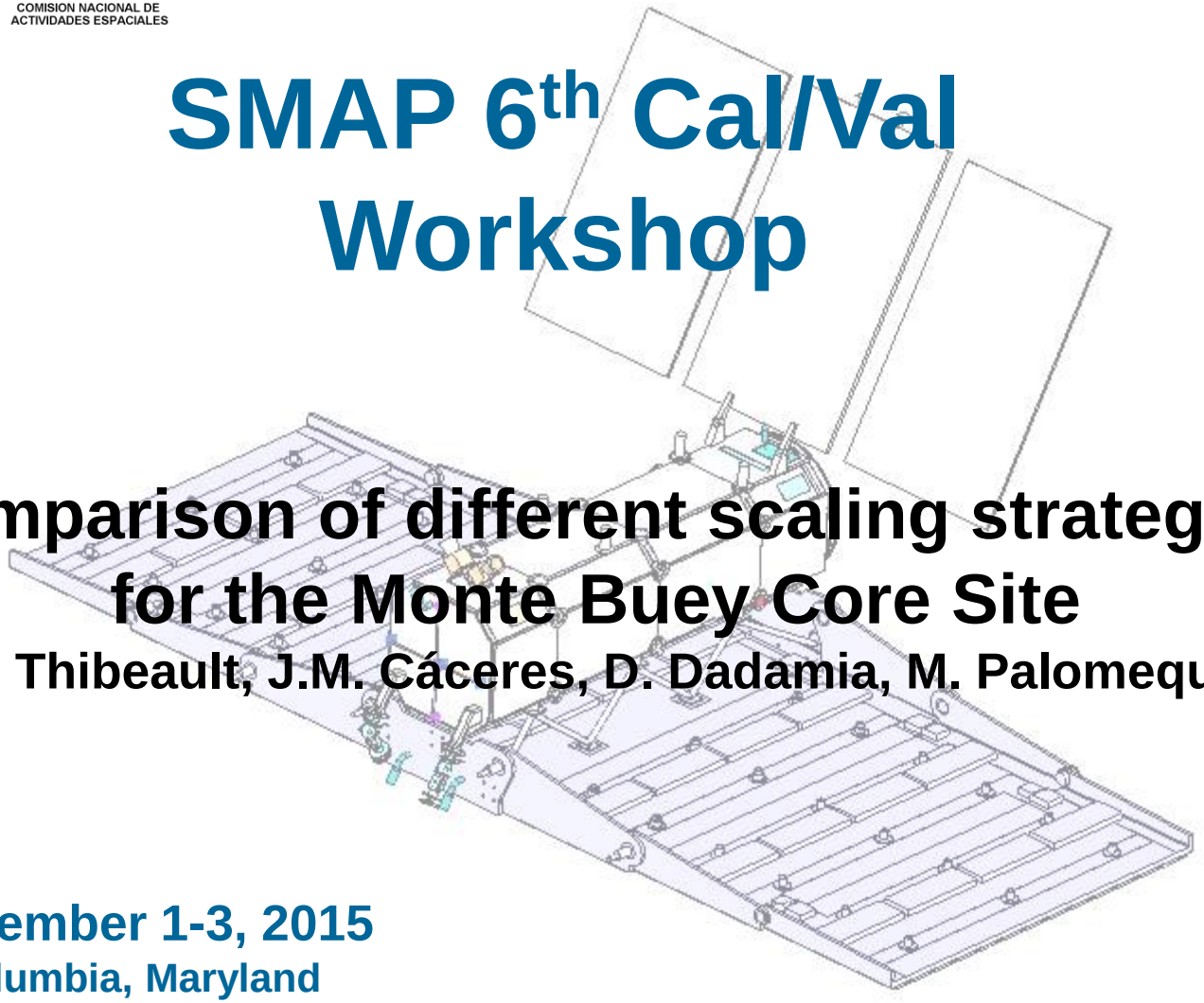
COMISION NACIONAL DE ACTIVIDADES ESPACIALES

SMAP 6th Cal/Val Workshop



Comparison of different scaling strategies for the Monte Buey Core Site

M. Thibeault, J.M. Cáceres, D. Dadamia, M. Palomeque

September 1-3, 2015
Columbia, Maryland

Outline

- **The Monte Buey Core site**
- **Thiessen vs Area Weighted by Soil type**
- **SMOS, Meteorological and Crop Simulation Models**
- **Conclusion and future works**

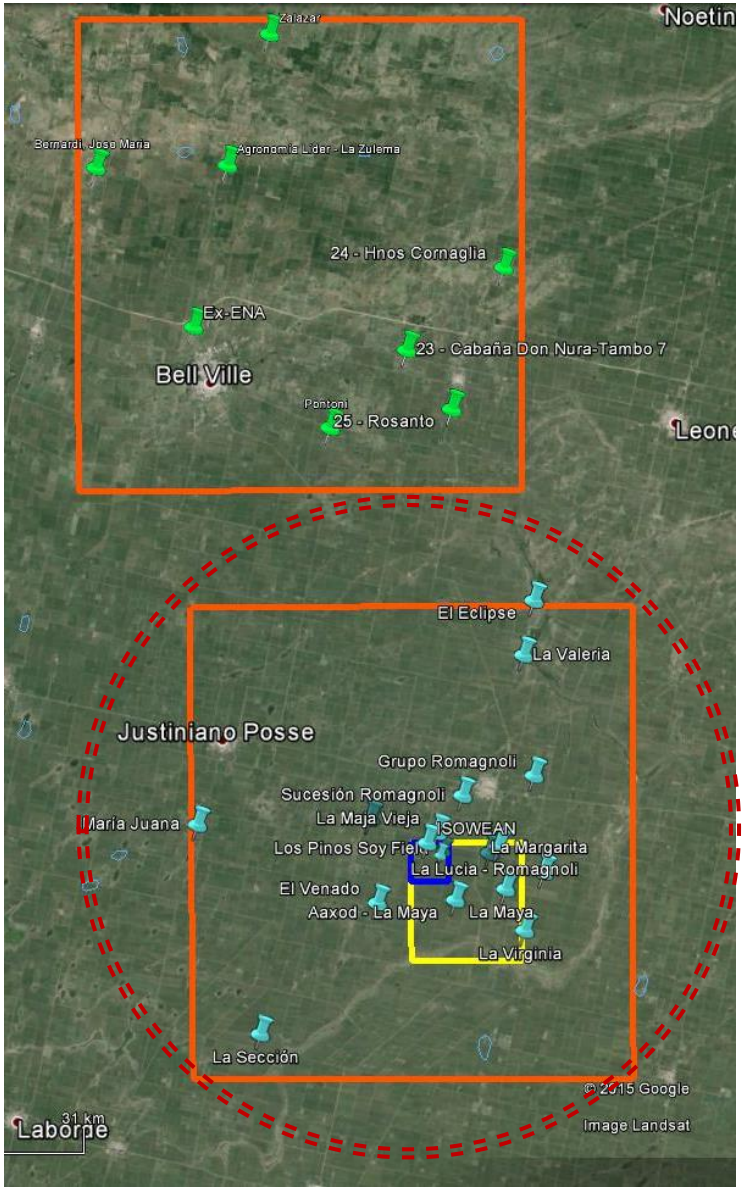
Objectives

1. To obtain a reliable, well calibrated network of sensors

2. To obtain good scaling functions with known errors

Note: This presentation is a complement of the poster where other works related to the site is shown.

SMAP Argentinean Core Sites



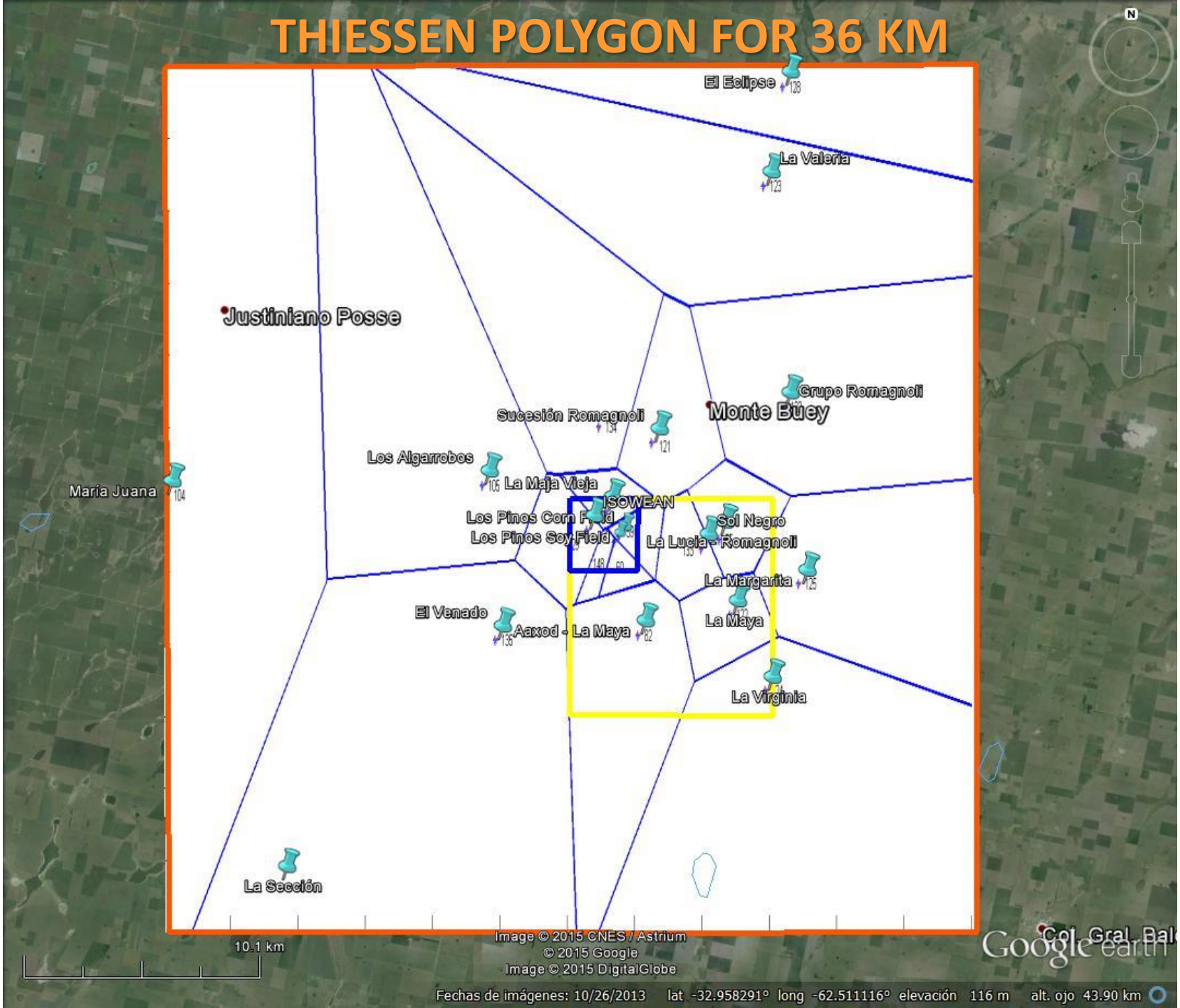
Bell Ville:

- 1 x 36 km: 8 sensors

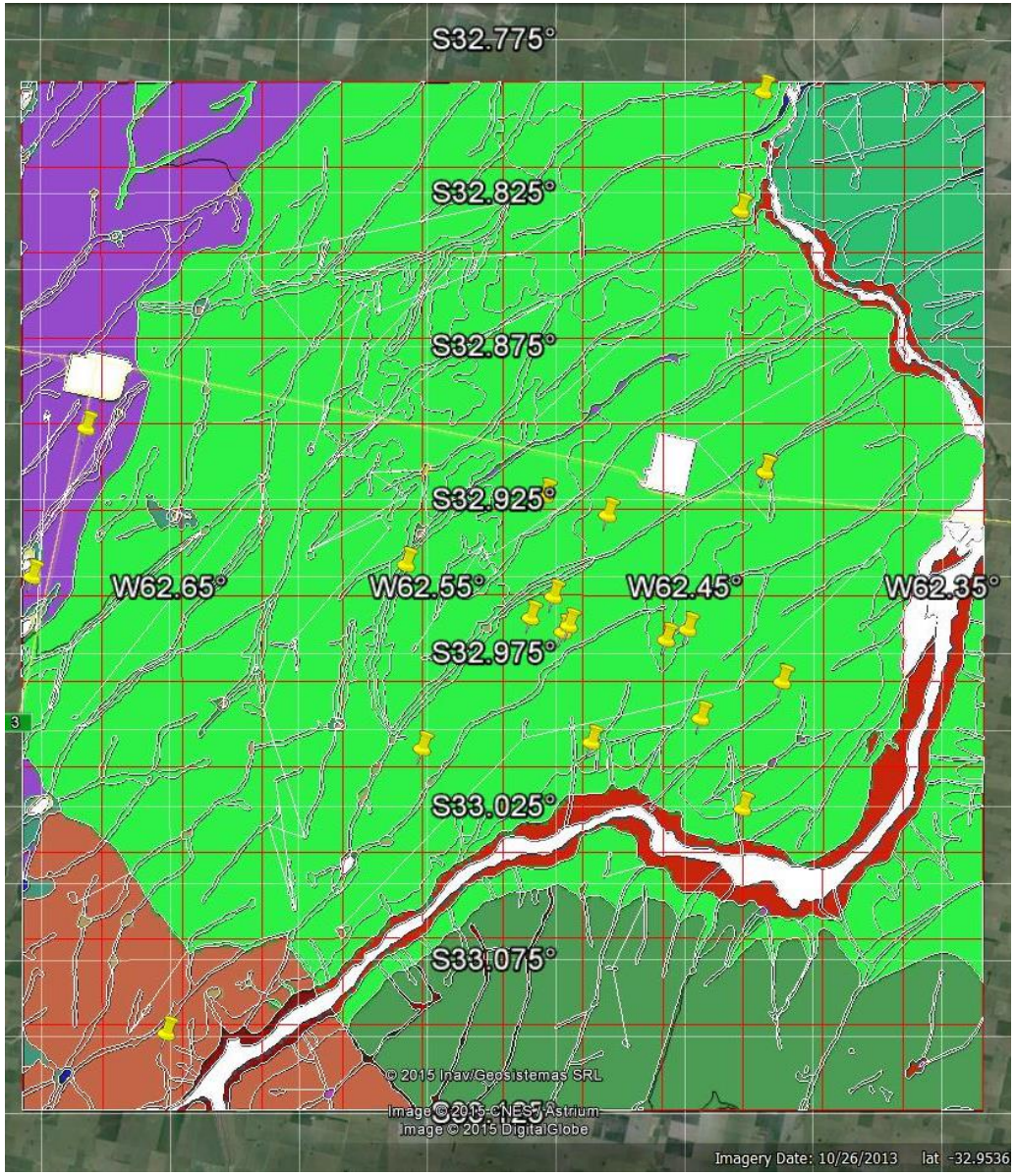
Monte Buey:

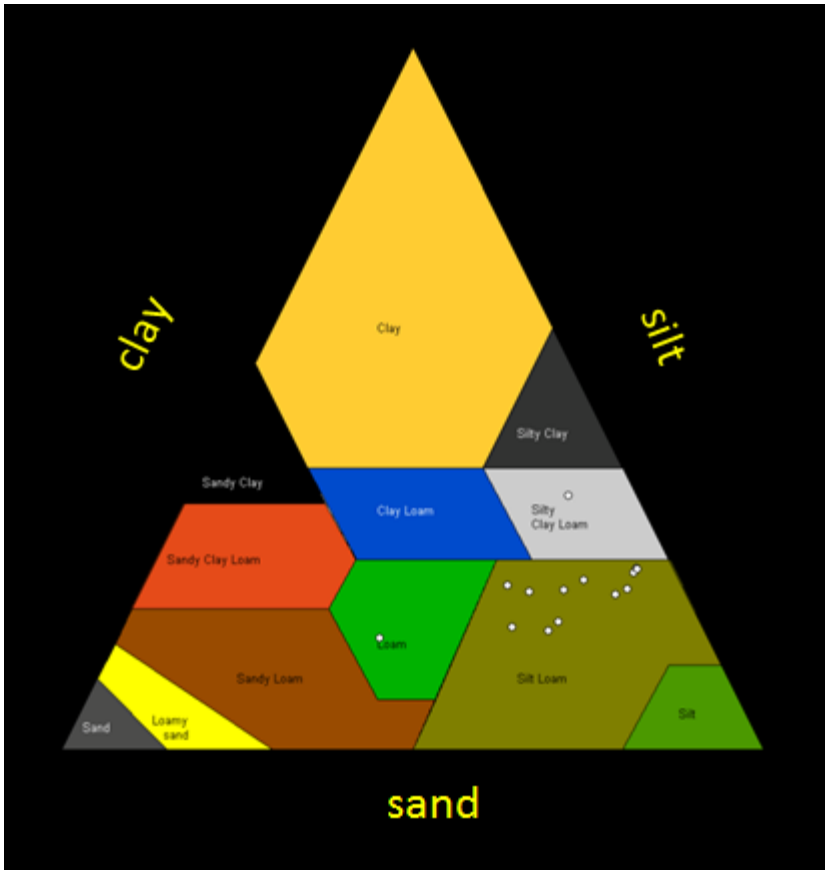
- 1 x 36 km: 9 sensors
- 1 x 9 km: 5 sensors
- 1 x 3 km: 4 sensors

THIESSEN POLYGON FOR 36 KM



SOIL MAP AND AV SOIL TYPE METHODS[1]

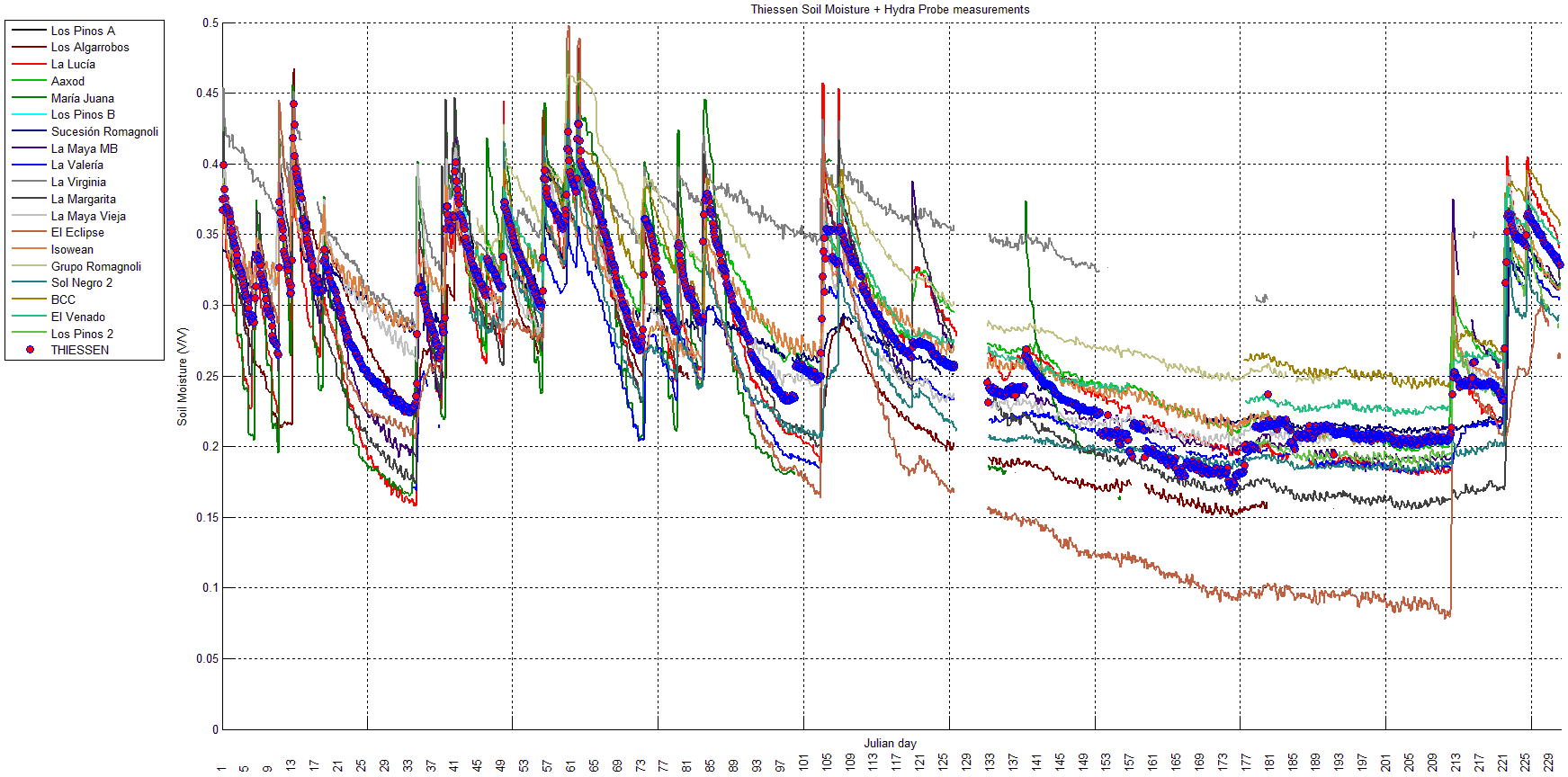




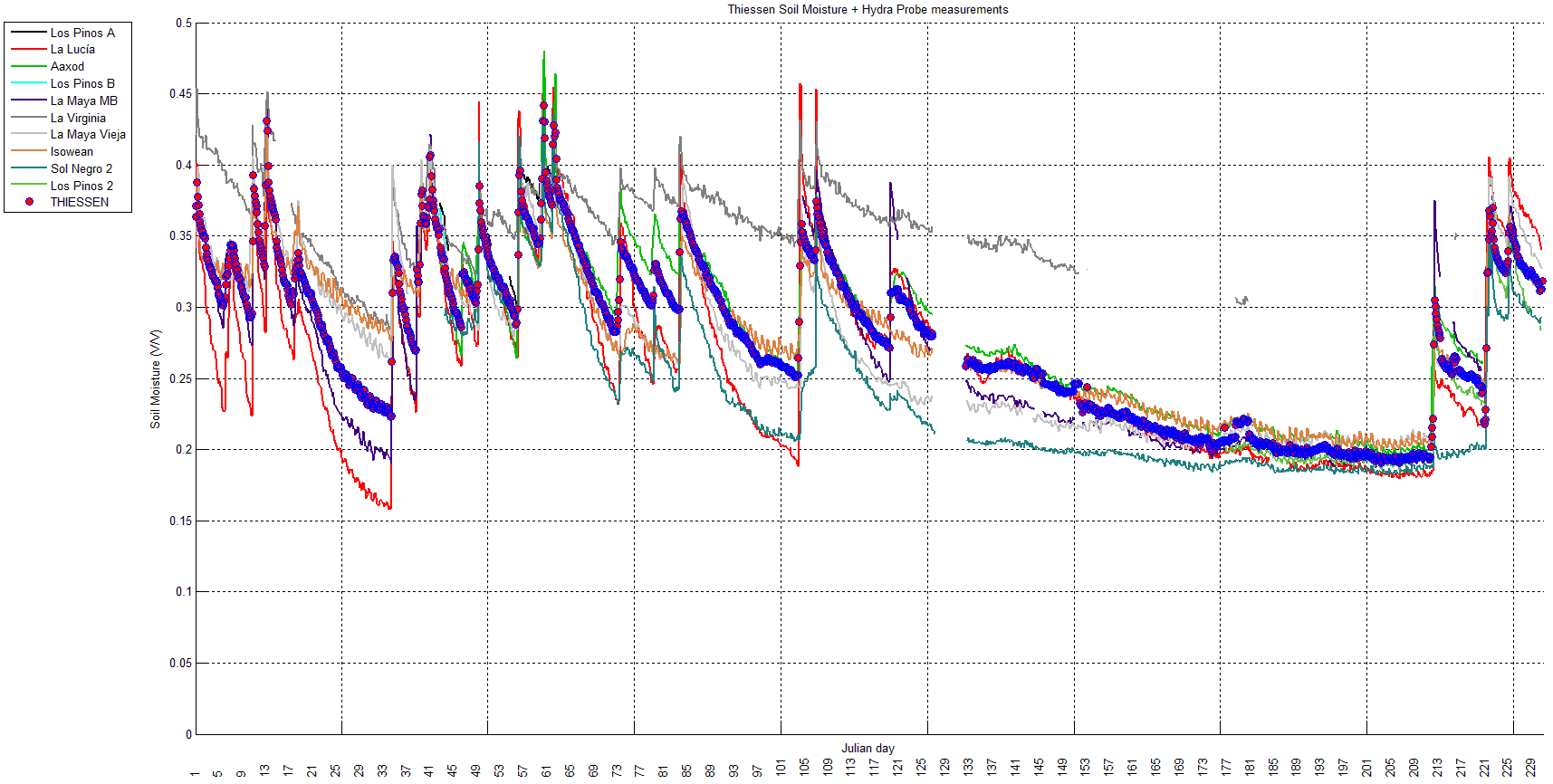
$$\langle \theta_{scale} \rangle = \sum_{i}^{N} w_{soil}^{i} \langle \theta_{soil}^{i} \rangle$$

[1] **"Scaling Approach for the validation of SMAP Soil Moisture Products" Agriculture and Agri-Food Canada, June 2013.**

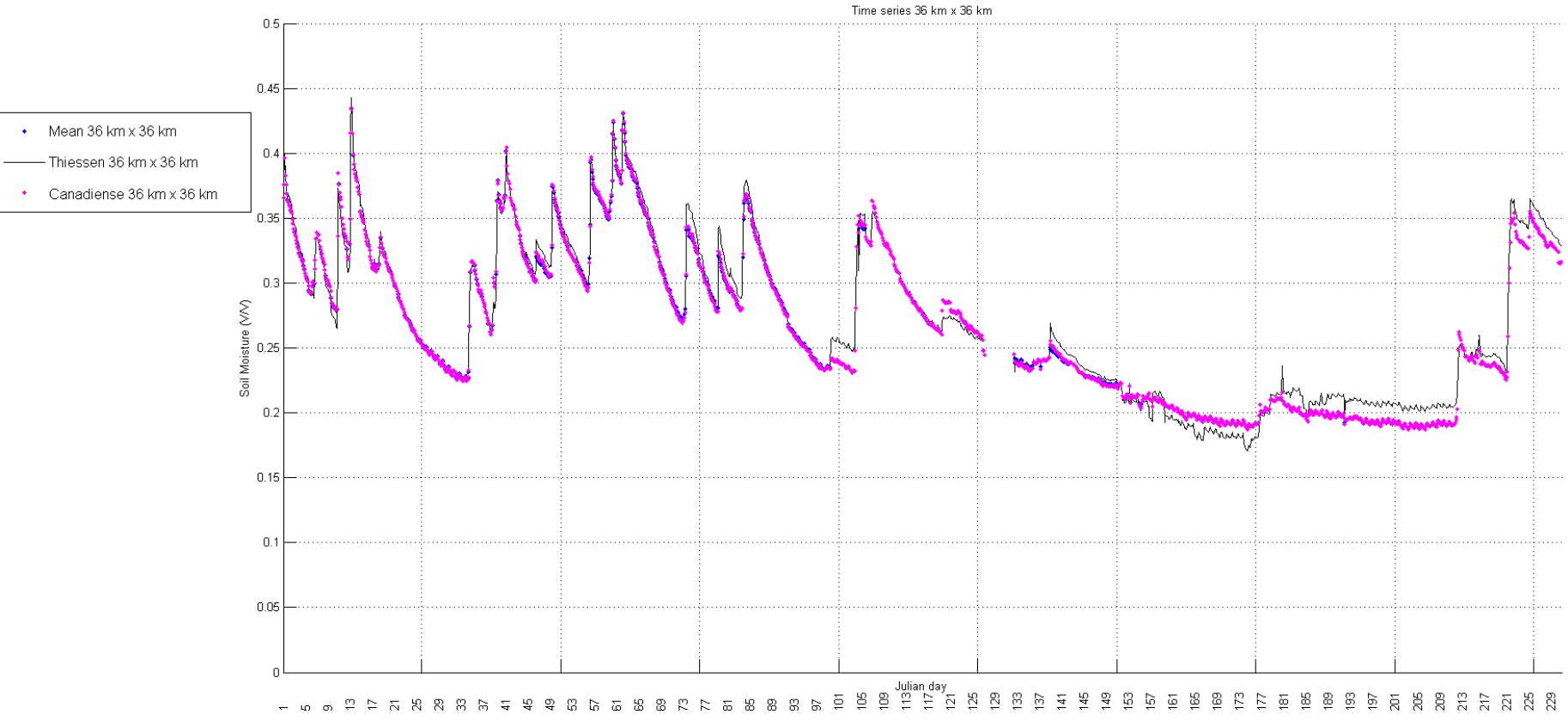
SENSORS AND THIESSEN 36 KM



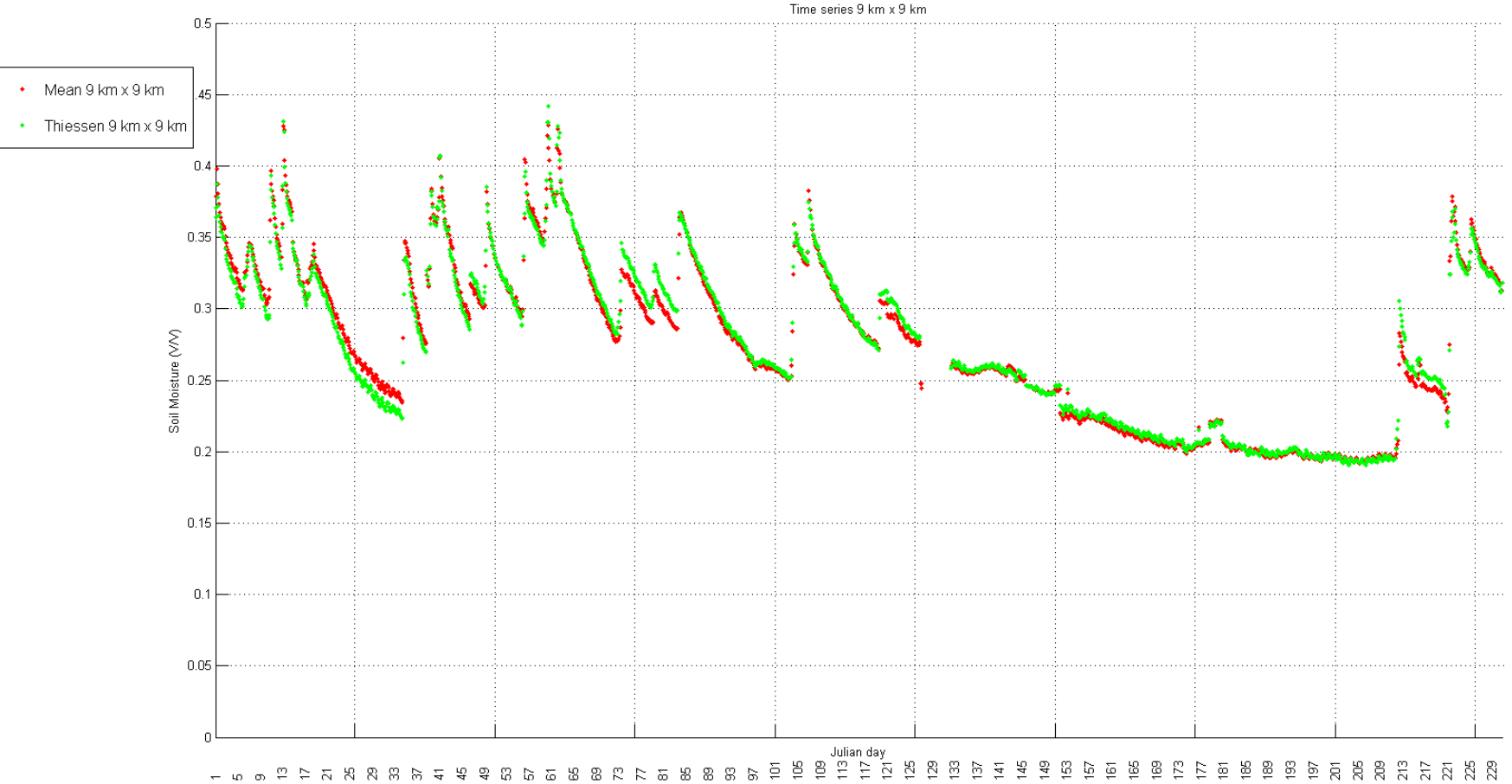
SENSORS AND THIESSEN 9 KM



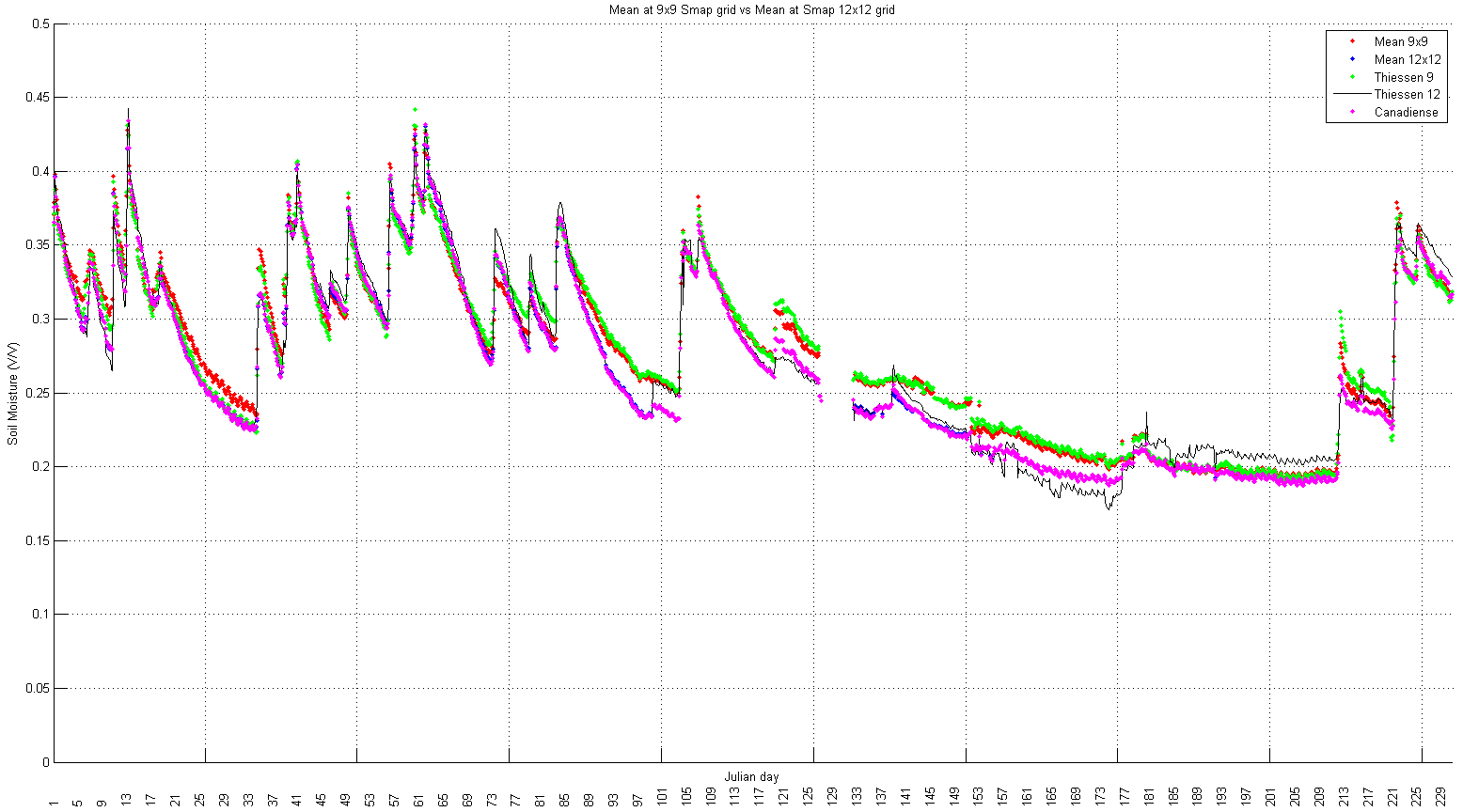
SCALING COMPARISON 36 KM



SCALING COMPARISON 9 KM



THIESSEN vs WEIGHTED BY SOIL CLASS AVERAGE
9 KM AND 36 KM



DYNAMICAL MODEL TO TAKE INTO ACCOUNT LAND COVERS AND DYNAMIC

HRLDAS

- **H**igh **R**esolution **L**and **D**ata **A**ssimilation **S**ystem

→ **Run by the reaserch team of the Argentinian weather service (SMN)**

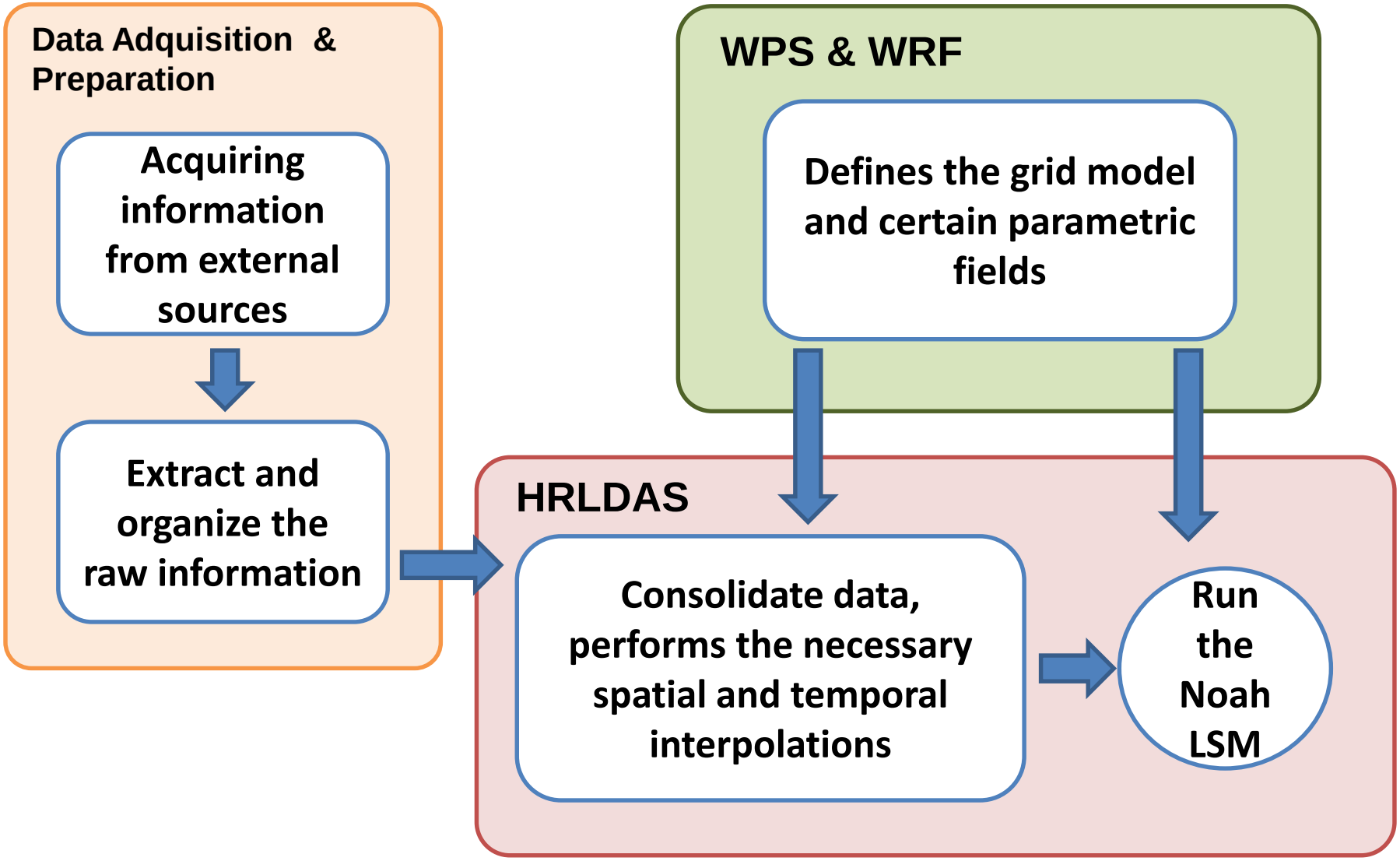
DSSAT →

Adapted and recompiled by SAOCOM Science team

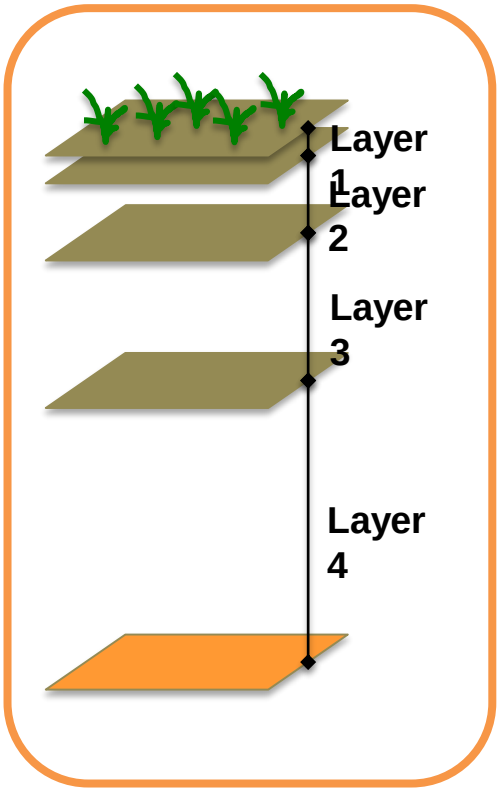
SMOS

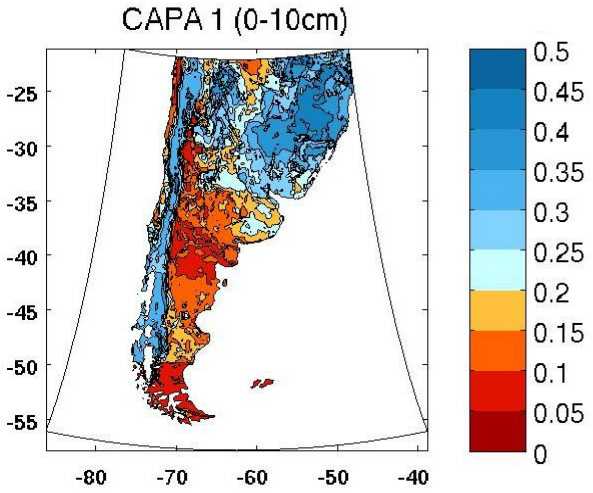
Also, it is a way to estimate the error in the profile for SAOCOM Higher products

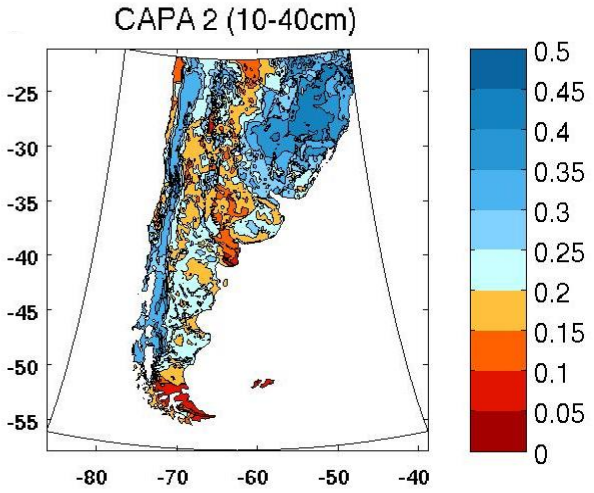
OPERATING SCHEME HRLDAS

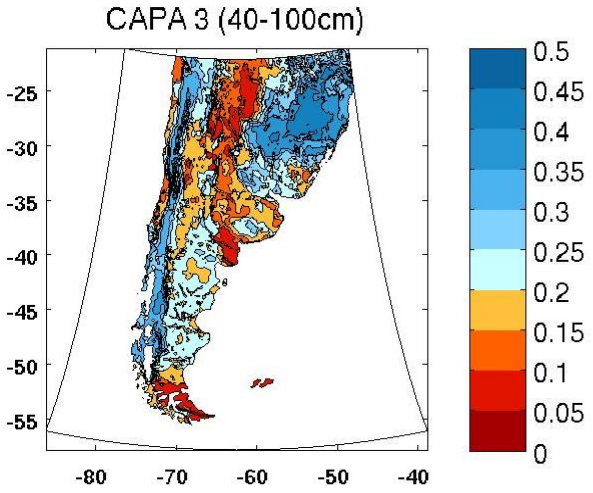


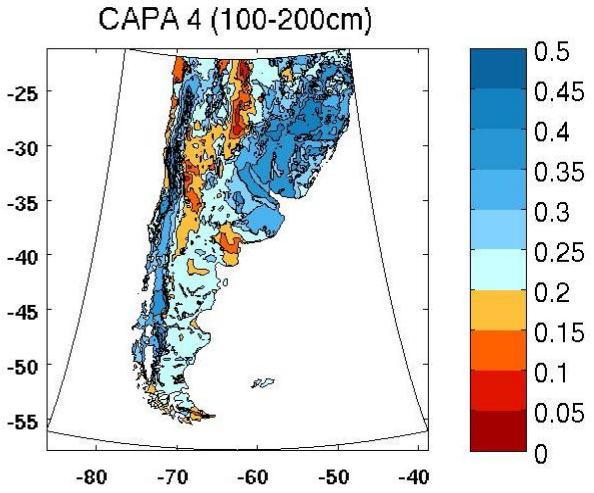
SOIL MOISTURE PROFILE ESTIMATED BY HRLDAS











USE TRIPLE COLLOCATION TECHNIQUES

$$\theta_i(t) = \beta_i x_i(t) + \alpha_i + \delta_i$$

We take out the bias α´s and the scale factor β´s using two approach's:

- By taking one as reference at each pixel

$$\theta_1(t) = x_1(t) + \delta_1$$

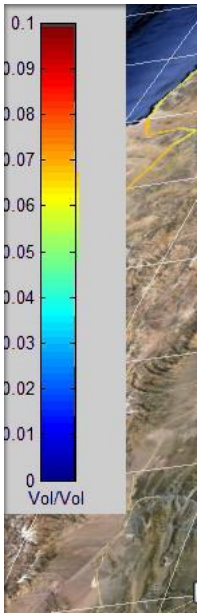
$$\theta_{i\neq 1}(t) = \beta^{(1)}_{i\neq 1} x_{i\neq 1}(t) + \alpha^{(1)}_{i\neq 1} + \delta_{i\neq 1}$$

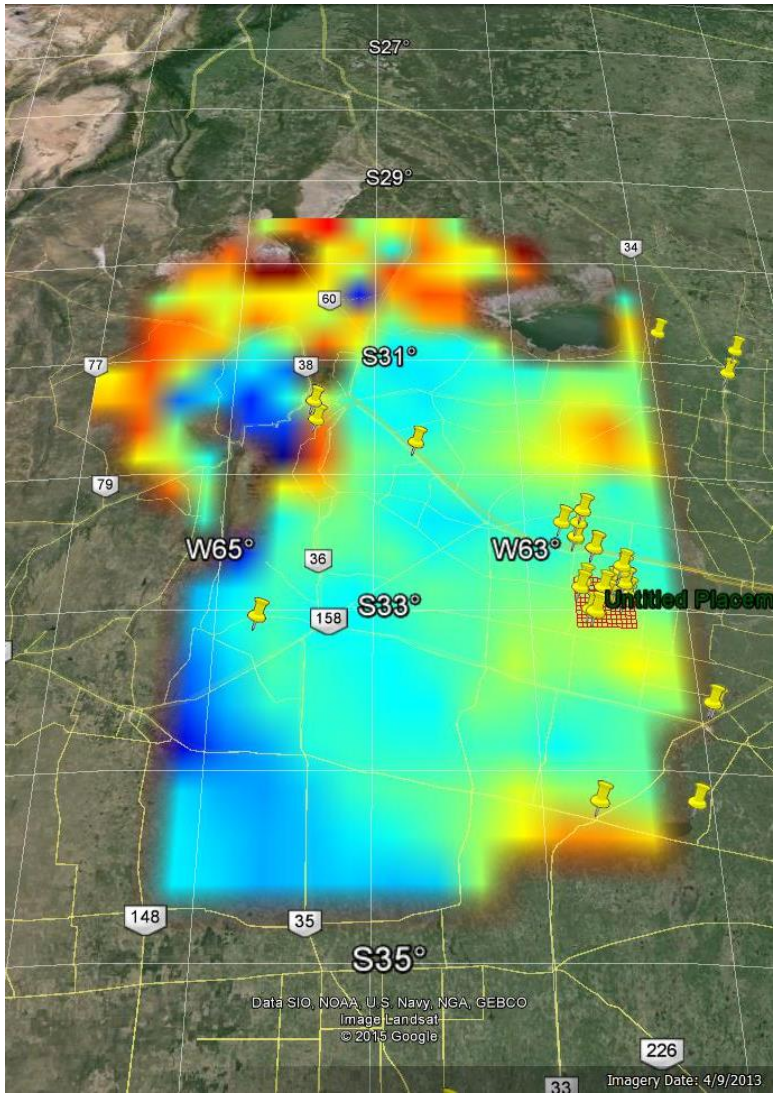
- By comparing with the Ground Truth and extrapolating to all the pixels

In that case, α ´s and β ´s are compute with the pixel corresponding to the Core Site and by hypothesis it's the same for all the image.

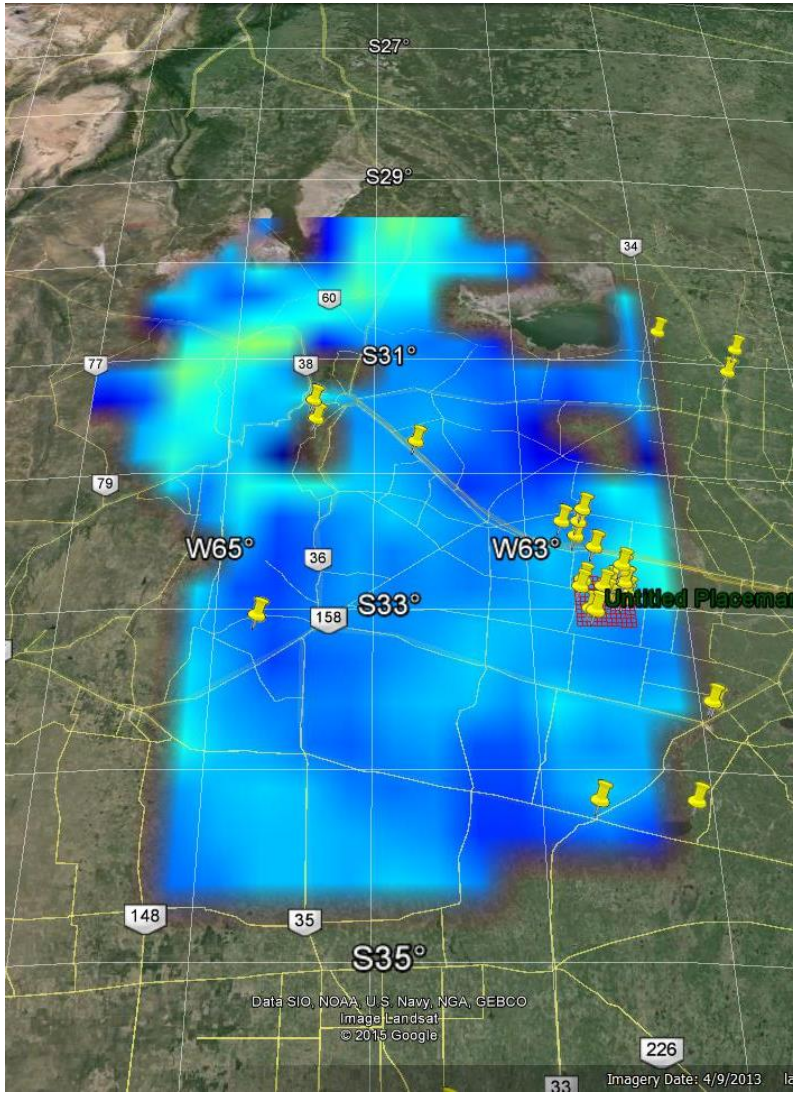
"**Structural and statistical properties of the collocation technique for error characterization",** S. Zwieback, K. Scipal, W. Dorigo, and W. Wagner

ERRORS COMPUTED FROM TC WITHOUT CORE SITE INFO



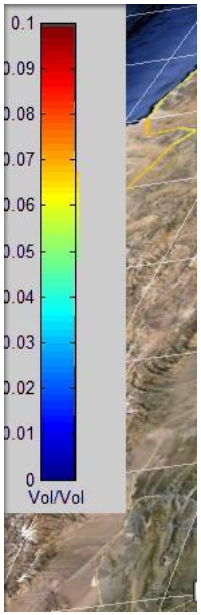


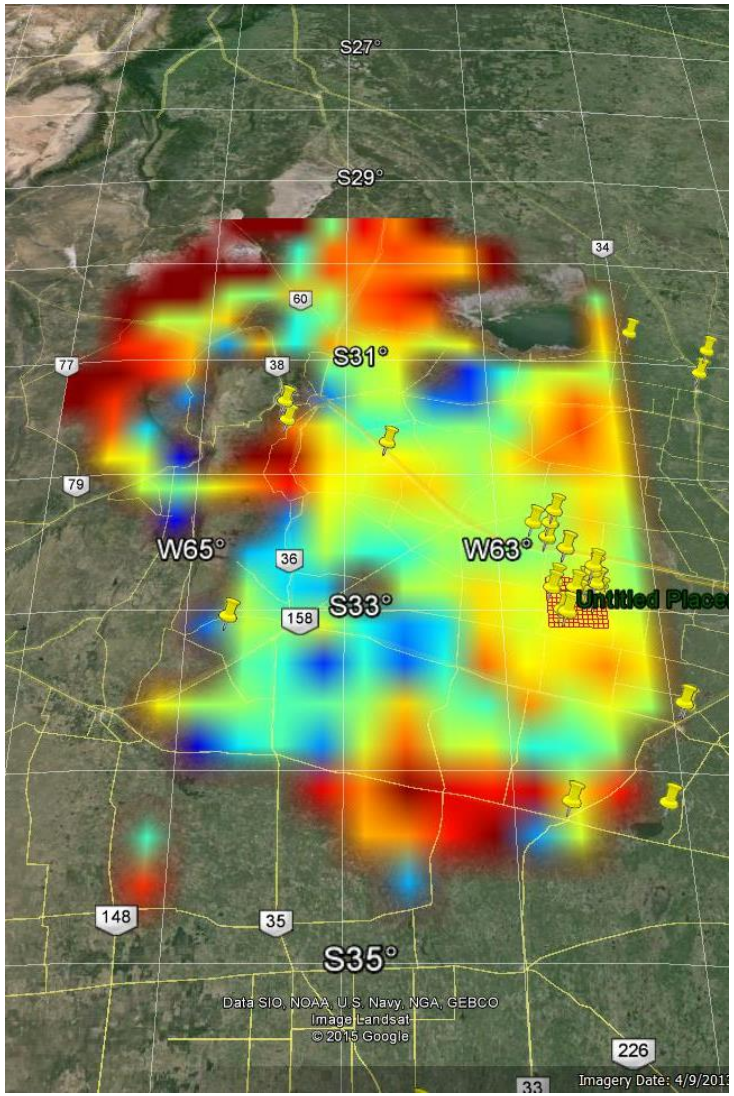
SMOS



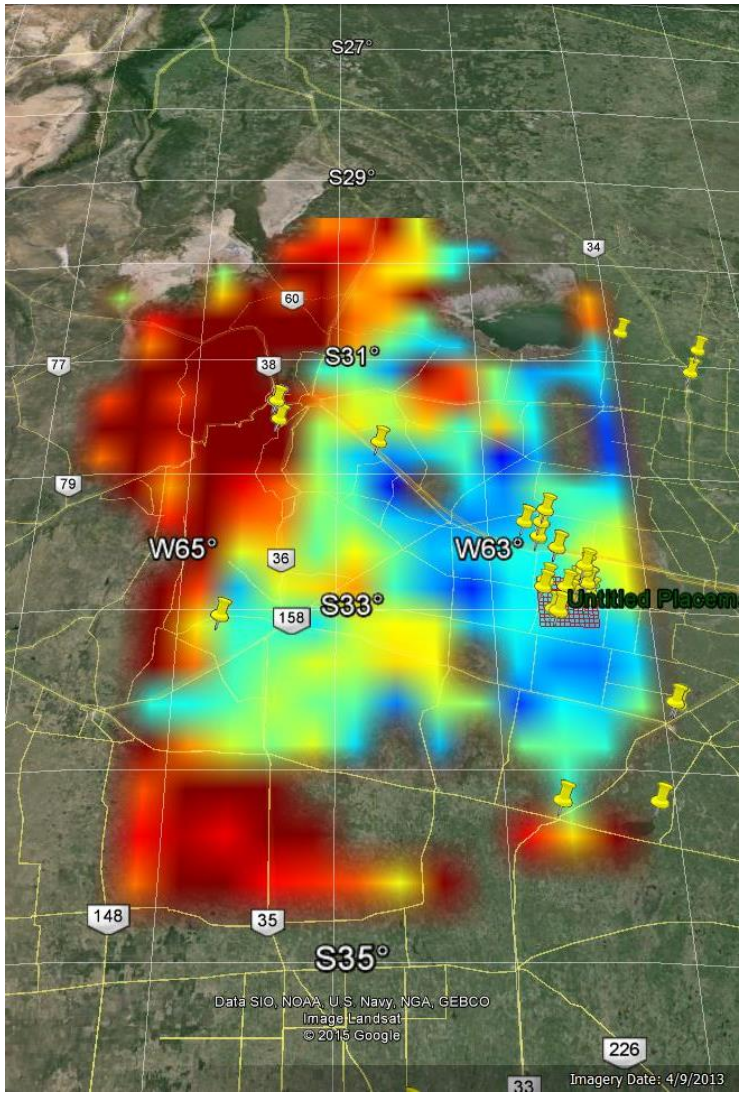
HRLDAS

ERRORS COMPUTED FROM TC USING CORE SITE INFO





SMOS



HRLDAS

CONCLUSION

- **Thiessen, Canadian algorithm and strict average gives very similar results for 9 and 36 km for the Monte Buey Core Site.**
- **HRLDAS and SMOS gives good results, at least for Cordoba Province**
- **Taking care of the bias and scaling factor is very important in order to guess correctly the error.**
- **It seems that a large number of points is needed in order to estimate** β´s, α´s and δ´s; n~400 (**by simulation**).
- **We are still working with Crop Simulation model as a method of scaling but more work need to be done.**

ISSUES AND FUTURE WORKS

ISSUES

From Implementation to Stability (Difficulties to have a stable network)

- **We are working in increasing the stability of the RTU**
  - **Tension regulator**
  - **Wireless transmission for sensor to RTU in troublesome sites**
  - **Redesigning the data base (from RTU to GIS)**
  - **Focusing on maintenance**

FUTURE WORKS

- **From points to plots to 1km and 3 km?**
- **Finish the sensors calibrations with he help of laboratory measurements**
- **More sensors in depth (profiles)**
- **More Analysis with more models**
  - **Surface and profile (or integrated)**
  - **SMAP L2 and L4**

Questions?

Thank you