Match-up point database for SMOS: the Valencia Anchor Station case

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- ***SMOS (Soil Moisture Ocean Salinity) mission*** - *aims at providing global maps of soil moisture and ocean salinity using L-band (1.4 GHz) radiometry*
- ***Cal/Val plan*** - *to validate and calibrate SMOS data after launch using ground based measurements*
- ***VAS (Valencia Anchor Station)*** - *reference Meteorological Station for Remote Sensing data*

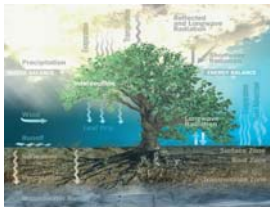
Valencia Anchor Station (VAS)

- ***Location :*** *Utiel-Requena Plateau (Valencia, Spain)*
- ***Coordinates :*** *39º34'15''N, 1º17'18''W*
- ***Soil :*** *Calcic and haplic soil*
- ***Topography :*** *Flat (slope <2%) and gently rolling hills (8%-15%) regions, N and E – mountainous regions*
- ***Climate :*** *between semi-arid and the dry-subhumid*
- ***Land uses:*** *Vineyard crops, olive and almond trees surrounded by pine and Mediterranean forests.*

SURFEX model *(SURface EXTernalisée) Météo France*

ISBA: Interface Soil Biosphere Atmosphere

- *describe the heat and mass exchanges at the surface – atmosphere interface*
- *relies on the water partitioning between vegetation transpiration, drainage, surface runoff and soil moisture change*

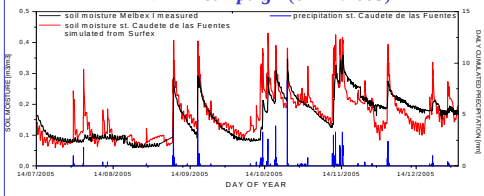


Objective :

- *spatialize point measurements to larger area (pixel SMOS – 50X50 km²) using Surfex model and Surface Description from VAS site*

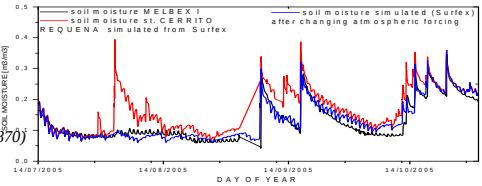
Soil moisture simulated using SURFEX – comparison with ground measurements

– MELBEX I campaign (07-12.2005) -



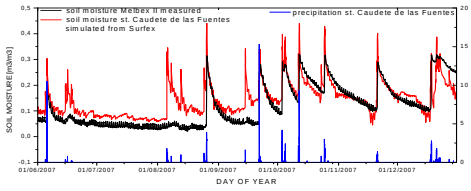
- *SURFEX model simulates very well the surface soil moisture (R^2= 0.6870)*
- *good quantitative agreement is found (RMSE =0.0398) between the two soil moisture data*
- *the same variability*
- *the same drying slope*
- *the simulated soil moisture is driven by the weather patterns and especially by the precipitation*

- Precipitation influence -



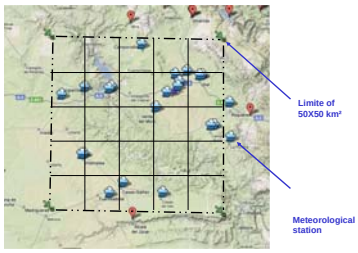
- *simulated soil moisture in a better agreement with the ground measurements after changing the initial forcing.*

- MELBEX II campaign (04-12.2007) -



- *validation done with data from the Melbex II campaign data set*
- *discrepancies due to weather differences can be seen between the two sites*
- *a good agreement is observed*

Soil moisture simulated using SURFEX – comparison with remotely sensed data

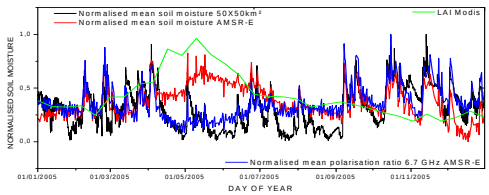


- *4 complete meteorological stations*
- *18 rain gauges*
- *an irregular distribution of stations*

=> spatialization of data - inverse distance weighed method (IDW)

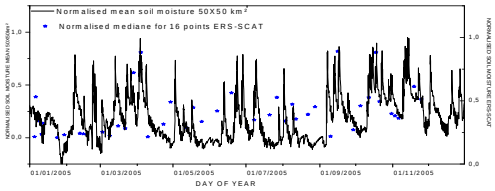
- *average of all soil moisture data from the 25 areas considered as representative for the 50X50 km²*

AMSR – E



- *big difference observed in the soil moisture level*
- *more detailed comparison - normalized to [0, 1]*
- *good agreement in terms of temporal variations*
- *middle of the year - the opposite trend is observed due to vegetation growth (soil moisture AMSR-E)*
- *leaf area index from Modis (green curve)*
- *better agreement is found between simulated soil moisture and the polarisation ratio*

ERS - SCAT



- *difference observed between the two soil moisture levels*
- *more detailed comparison - normalized to [0, 1]*
- *main events are captured*
- *few data*

Conclusions :

- *simulation of surface soil moisture using SURFEX*
  => good agreement between measured and simulated soil moisture
  => simulated soil moisture driven by precipitation patterns
- *50x50km² divided in 25 surfaces (10x10km²) - need to interpolate meteorological stations : inverse weighted distance - the most adapted with the number and localization of stations*
  => soil moisture for each surface (10X10km²)
- *comparison with AMSR-E data*
  => different amplitudes
  => good agreement in terms of temporal signatures
  => influence of vegetation on the signal
  => better correlation (0.67) obtained using polarization ratio 6.7 GHz
- *comparison with ERS/SCAT data*
  => main events captured
  => poor temporal sampling (1 time/week)

Perspectives :

- *simulate the brightness temperature at L-band*
- *comparison of TB simulated with TB measured (Emirad ,Elbara)*
- *comparison of TB simulated with TB SMOS*