Introduction

• Comparison at TB level are conducted over various surfaces
  – Based on near simultaneous, iso geometry
    • Land
    • Ocean
  – Ice core around Dome Concordia
• Latest versions of processing
  – SMOS v620,
  – SMAP T11850
  – Aquarius v4.0
• Compared TBs are ToA, without reflexion foreign source corrections (gal, sun, moon)
DomeC

- All instruments are processed to a common footprint centered on DomeC at 100km resolution, with Gaussian PSF.
- Comparison is done at Top of Atmosphere level
- Daily or angle bins averages are compared
  - Access to Dome C depends on orbital characteristics and swath coverage
- Latest versions include: SMOS v620, Aquarius v4.0 and SMAP R11850.
SMOS V 620 validation

• Improvements wrt v551
LittleWashita - Ascending orbits

<table>
<thead>
<tr>
<th>Series</th>
<th>$\rho$</th>
<th>$\mu$</th>
<th>$\sigma$</th>
<th>RMSE</th>
<th>#kept</th>
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</thead>
<tbody>
<tr>
<td>OP620</td>
<td>0.90</td>
<td>-0.008</td>
<td>0.035</td>
<td>0.036</td>
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<tr>
<td>OP551</td>
<td>0.81</td>
<td>-0.040</td>
<td>0.042</td>
<td>0.058</td>
<td>206</td>
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</table>
SMOS V 620 validation

- Improvements wrt v551
- Extensive comparison with
  - core sites
  - Sparse networks
    - Some issues
  - Other satellites (SCAT, AMSR)
    - SMAP missing but
  - First comparisons with SMOS (see Rajat’s, Steven’s presentations!). François is also on it
  - Joint cal val site approach?
Soil moisture preliminary comparison

• Starting may 5, SMOS SM is produced using v620
  • Enhanced calibration and reconstruction at L1
  • Improved retrieval over forest with new parametrisation
  • Improved retrieval at low soil moisture with symmetrization of dielectric constant model
  • Reprocessing completed up until end 2014, bridging phase for early 2015 on its way.

• SMOS L3 filtered for RFI, nominal and forest only.
  • Issue with RFI filter ➔ one component (Snapshot Flag) wrong threshold (to aggressive!) Very few data to be corrected
    – SMAP L2_SM_P T11850
    – Dualpol
    – Filtered for surface (ice/snow, water bodies, frozen), TB quality, retrieval quality

• Compare 1 month (may 5 to June 2)
Comparison of different SMOS products

<table>
<thead>
<tr>
<th>SM</th>
<th>Mean STDE</th>
<th>Mean R</th>
<th>Mean Bias</th>
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<tbody>
<tr>
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<tr>
<td>All network types: Sites 477, Mean $N_{points}$ 120.2 Ascending</td>
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<td>SMOS-NN</td>
<td>0.063</td>
<td>0.56</td>
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<td>ECMWF</td>
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<td>0.55</td>
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<td>SMOS-NN</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>ECMWF</td>
<td>7</td>
<td>3</td>
<td>1</td>
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<tr>
<td>SMOS-L3</td>
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<td>3</td>
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<tr>
<td>All network types: Sites 402, Mean $N_{points}$ 156.6 descending</td>
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<td>SMOS-NN</td>
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<td>ECMWF</td>
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<tr>
<td>SMOS-NN</td>
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<tr>
<td>ECMWF</td>
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<tr>
<td>SMOS-L3</td>
<td>0</td>
<td>0</td>
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</tr>
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• Next points
  – Identification of a Land use map issue
  – Work with Forest
  – And for high latitudes
  – SM NRT at ECMWF
  – Common RFI product
Impact of Land use map

- IGBP SM

- ECOCLIMAP SM
SCAN 184: Wedowee Site

SCAN184-Wedowee, SMOS Node D249294, ASC, Time Radius: 0.5h, RFI Prob < 0.3

Soil Moisture (m$^3$/m$^2$)

Date

SC184-Wedowee, Num of Retrievals (IGBP vs ECOC) = (327, 71)

DAP Mean FMO: IGBP vs ECOC

YHK–FC SMAP Cal Val #6 Columbia September 1-3 2015
SCAN 156: Sudduth Farms Site

SCAN156-SudduthFarms, SMOS Node D243132, ASC, Time Radius: 0.5h, RFI Prob < 0.3

Soil Moisture (m^3/m^3)

Date

Num Ret: 51 314
Num Match: 42 223
Bias: -0.187 -0.018
R: -0.171 0.499
EMSE: 0.211 0.085
SEE: 0.100 0.084
Mean: 0.022 0.148
STD: 0.064 0.077
Mean Ref: 0.209 0.161

SCAN156-SudduthFarms, Num of Retrievals (IGBP vs ECOC) = (55, 318)

DAP Mean FM0: IGBP vs ECOC

YHK–FC SMAP Cal Val #6 Columbia September 1-3 2015
SCAN 34: Everglades

SCAN34-EvergladesArs, SMOS Node D5023540, ASC, Time Radius: 0.5h, RFI Prob < 0.3

Soil Moisture (m^3/m^3)

Date

Num Ret: 0 306
Num Mach: 0 193
Bias: 1.000 0.262
R: 0.000 -0.023
RMSE: NaN 0.304
SEE: NaN 0.154
Mean: NaN 0.165
STD: NaN 0.140
Mean Ref: NaN 0.103

DAP Mean FM0: IGBP vs ECOC

τ

Date

IGBP
ECOC

YHK–FC SMAP Cal Val #6 Columbia September 1-3 2015
SCAN: Sites where SM significantly differ (diff of abs Bias or R > 0.1)(3)
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Height from **GLAS LIDAR** (Simard et al.) filtered for **RMSE < 5m**
Optical thickness over forests

Examples: FFO>80%, South East, trends for 2011

Scan/Snotel site: 2113 - DGG: 244160

Scan/Snotel site: 2179 - DGG: 242619

YHK–FC SMAP Cal Val #6 Columbia September 1-3 2015

Ferrazzoli- Vittucci
Results

SWaF: SMOS Water Fraction in tropical watersheds


YHK–FC SMAP Cal Val #6 Columbia September 1-3 2015
SMOS Water Fraction & Jason2 Water Height

Results:

Jason2 river height from Hydroweb Legos (J.F. Creteaux)
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