

# AMSR2 Soil Moisture Algorithm

Input: AMSR2 L1R Brightness Temperature  
10.65GHz (V, H) and 36.5GHz (V)

Ancillary data:  
Lookup table, and  
Vegetation fractional area (MODIS)

## Overview:

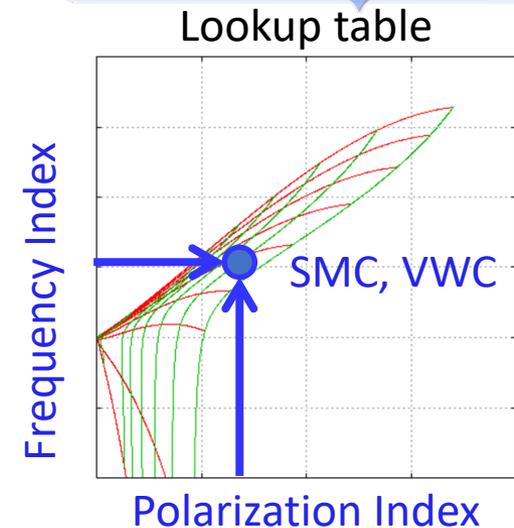
This algorithm estimates surface soil moisture from brightness temperature (L1R) referring a lookup table (LUT) which is used to simultaneously retrieve soil moisture and vegetation water content from frequency index and polarization index. The LUT is corrected for vegetation fractional area to account for the non-uniformity of the vegetation distribution in the footprint.

## Remark:

Difference between standard products and research products is the ancillary dataset of vegetation coverage. The standard Product uses normal values and the research product uses MODIS data.

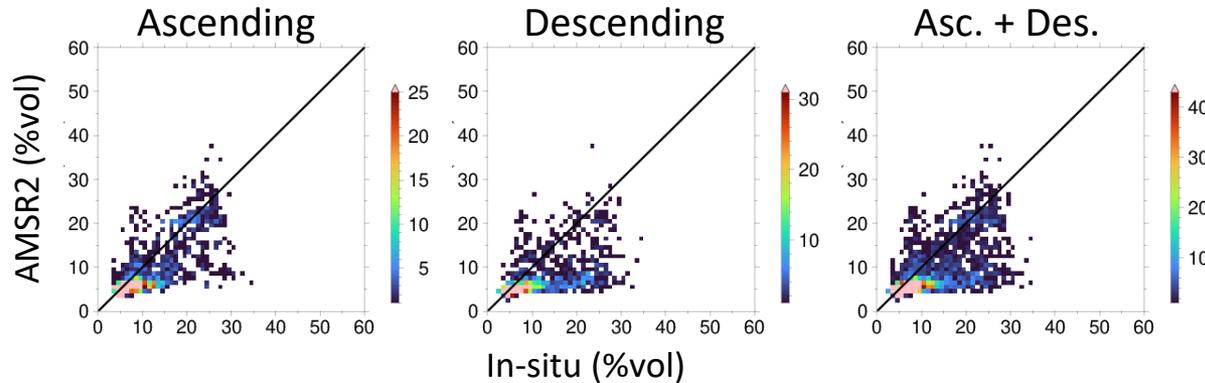
## Reference:

Fujii et.al. 2009, <https://doi.org/10.11440/rssj.29.282>



# A Validation Result

## Research Product

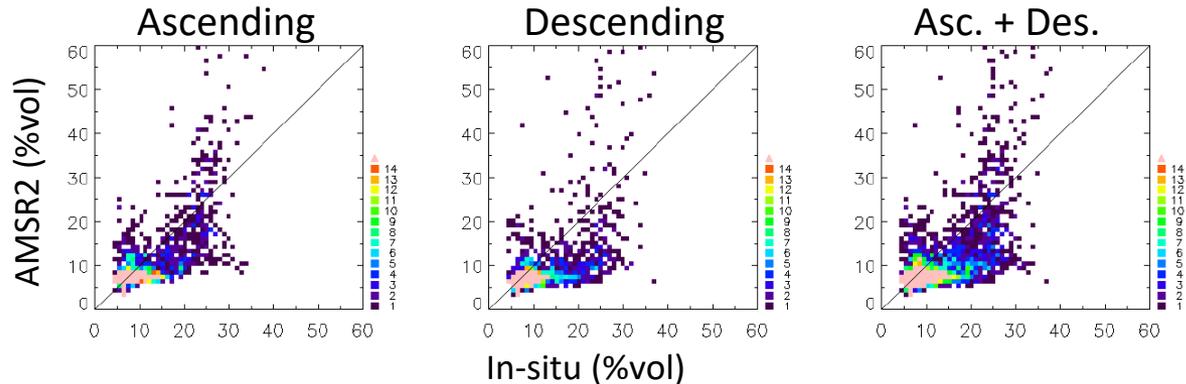


Unit: volumetric soil moisture in %

Orbit	Num.	R	Bias	RMSE	MAE
Asc	1983	0.777	-1.698	4.277	2.732
Des	1974	0.620	-2.705	5.739	3.420
A+D	3957	0.694	-2.200	5.059	3.075

※ MAE: Mean Absolute Error

## Standard product



Unit: volumetric soil moisture in %

Orbit	Num.	R	Bias	RMSE	MAE
Asc	1969	0.716	-1.021	5.098	3.375
Des	1981	0.596	-2.162	6.022	3.703
A+D	3950	0.657	-1.593	5.580	3.540

※ MAE: Mean Absolute Error

### In-situ data:

AMSR2 validation sites at Mongol ( July 2012 – August 2018) and Yanco (Australia, July 2012- May 2020)

### Match-up method

- The AMSR estimates are average over the Mongol validation area (N45.9-46.9, E106.5-107.1) and are from the nearest footprint when the center position of the footprint was within 7km of the Yanco site.
- The in-situ value is the average of the data from each location at the closest time within one hour of the AMSR observation time.