

README FILE

Products: Soil Moisture Maps

Data used: Sentinel-1 (SAR- radar sensor) and Sentinel-2 (optical sensor)

Scale: Plot scale

Site: Chartres – Versailles, France

The soil moisture maps were carried out at a plot scale. A map is provided each 6 days (12 days with Sentinel-1A and 12 days with Sentinel-1B) for the period between March 2016 and December 2018.

Inversion algorithm for estimating soil moisture was applied for agricultural areas with any vegetation cover.

The land cover maps (2016, 2017, and 2018) provided by Jordi Inglada et al (Cesbio, Theia) were used as well as Sentinel-2 images corrected for atmospheric effects. The Land cover maps were used to extract the agricultural areas. Sentinel-2 images were used to calculate the NDVI (Normalized Differential Vegetation Index) and to segment the agricultural areas in order to extract homogeneous polygons within agricultural plots.

Using several in situ measurements of soil moisture, the accuracy on soil moisture estimation was evaluated to be about 6 vol.

28 NDVI maps are provided in the folder named "NDVI". For each Sentinel-1 acquisition date a corresponding NDVI map was used in producing the soil moisture map:

Sentinel-1 acquisition date	NDVI map used
March – April 2016	NDVI March 2016
May – June 2016	NDVI May 2016
July 2016	NDVI July 2016
August 2016	NDVI August 2016
September – October 2016	NDVI September 2016
November – December 2016	NDVI December 2016
January 2017	NDVI January 2017
February 2017	NDVI February 2017
March 2017	NDVI March 2017
April 2017	NDVI April 2017
May 2017	NDVI May 2017
June 2017	NDVI June 2017
July 2017	NDVI July 2017
August 2017	NDVI August 2017
September 2017	NDVI September 2017
October 2017	NDVI October 2017
November – December 2017	NDVI November 2017
January 2018	NDVI January 2018
February - March 2018	NDVI February 2018
April 2018	NDVI April 2018
May 2018	NDVI May 2018
June 2018	NDVI June 2018
July 2018	NDVI July 2018

August 2018	NDVI August 2018
September 2018	NDVI September 2018
October 2018	NDVI October 2018
November 2018	NDVI November 2018
December 2018	NDVI December 2018

Deliverable description

The Soil Moisture Maps are divided into two main folders:

- **S1A: referring to maps derived from Sentinel 1A satellite**

To see the location of S1A surface soil moisture map please refer to the provided map "Footprint_S1A (.JPEG)" in folder S1A.



- **S1B: referring to maps derived from Sentinel 1B Satellite**

To see the location of S1B surface soil moisture map please refer to the provided map "Footprint_S1B (.JPEG)" in folder S1B.

Footprint of Soil Moisture Maps from Sentinel-1B SAR images



Format:

Format description of soil moisture maps (for example 20160904T173856_mv.tif):

- GeoTIFF
- Structure of files name: `yyyymmddThhmmss_mv.tif`
 - yyyy: year
 - mm: month
 - dd: acquisition day

T is used to separate the date and the time (UTC)

- hh: hour
- mm: minutes
- ss: seconds

Important:

1. In the provided soil moisture maps (WGS84, EPSG: 4326), the soil moisture values (*mv*) are multiplied by **5**. In order to derive the estimated soil moisture value from the provided maps **it is necessary to divide** by **5**.

$$\text{Soil Moisture Estimation (mv Vol.\%)} = \frac{\text{Value obtained from the Map}}{5}$$

2. In the provided NDVI maps (NDVI folder, Geotiff format), the NDVI values are multiplied by **100**. To derive the NDVI value from the maps **it is necessary to divide** the obtained value by **100**.

$$NDVI = \frac{\text{Value obtained from the Map}}{100}$$

3. Null values in the soil moisture maps = no data (no soil moisture estimation)

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