

README FILE

Products: Soil Moisture Maps

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

Scale: Plot scale

Site: Provence-Alpes-Côte d'Azur Region, 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 September 2017 and August 2019.

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

The land cover map provided by Jordi Inglada et al. (Cesbio, Theia) was used as well as Sentinel-2 images corrected for atmospheric effects. The Land cover map was 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.

The table below details each Sentinel-1 acquisition date and the corresponding NDVI map used in producing the soil moisture map:

Sentinel-1 acquisition date	NDVI map used
September – 2017	September – 2017
October – 2017	October – 2017
November – 2017	November – 2017
December – 2017	December – 2017
January – 2018	January – 2018
February – 2018	February – 2018
March – 2018	March – 2018
April – 2018	April – 2018
May – 2018	May – 2018
June – 2018	June – 2018
July – 2018	July – 2018
August – 2018	August – 2018
September – 2018	September – 2018
October – 2018	October – 2018
November-December – 2018	December – 2018
January-February – 2019	February – 2019
March – 2019	March – 2019
April – 2019	April – 2019
May – 2019	May – 2019
June – 2019	June – 2019
July – 2019	July – 2019
August – 2019	August – 2019

Deliverable description:

The Soil Moisture Maps are divided into two main folders:

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

The folder contains one footprint folder:

- Footprint_1

Each footprint folder contains the soil moisture maps corresponding to the footprint location.

To see the location of the footprint according to Provence-Alpes-Côte-d'Azur please refer to the provided map "Footprint_S1A (.JPEG)" in folder S1A.

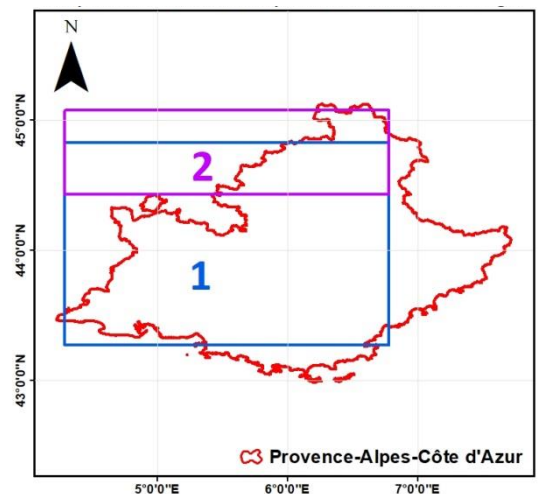
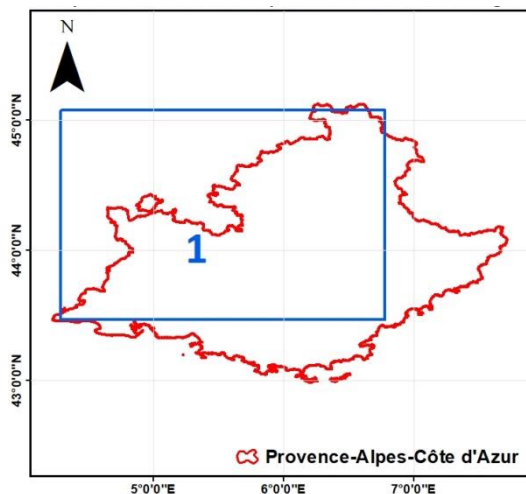
- **S1B: referring to maps derived from Sentinel 1B Satellite**

The folder contains two footprint folders:

- Footprint_1
- Footprint_2

Each footprint folder contains the soil moisture maps corresponding to the footprint location.

To see the location of each footprint according to Provence-Alpes-Côte-d'Azur please refer to the provided map "Footprint_S1B (.JPEG)" in folder S1B.



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**.

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

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

Nicolas Baghdadi, Mohammad El Hajj, Hassan Bazzi & Michael A. Arhinful
Irstea, TETIS, Montpellier

Avec la collaboration de Mehrez Zribi (Cesbio)

