

README FILE

Products: Soil Moisture Maps

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

Scale: Plot scale

Site: Bekaa plain, Lebanon

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 September 2018.

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

The Land cover map generated by the National Centre for Remote Sensing CNRS-Lebanon for the year 2017 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.

11 NDVI maps for Bekaa plain 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:

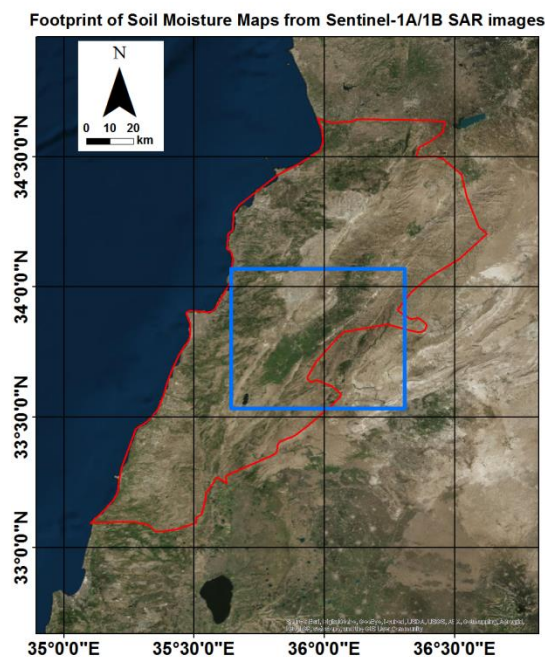
Sentinel-1 acquisition date	NDVI map used
September 2017	September 2017
October 2017	October 2017
November 2017	November 2017
December 2017 - January 2018	December 2017
February - March 2018	March 2018
April 2018	April 2018
May 2018	May 2018
June 2018	June 2018
July 2018	July 2018
August 2018	August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

Deliverable description

The Soil Moisture Maps are divided into two main folders:

- **S1A: referring to maps derived from Sentinel-1A satellite**
- **S1B: referring to maps derived from Sentinel-1B Satellite**

To see the location of S1A and S1B surface soil moisture map (blue rectangle) according to Bekaa plain please refer to the provided map "Footprint_S1A_S1B (.JPEG)".



Format:

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

- GeoTIFF
- Structure of files name: yyyyymmddThhmmss_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)

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