

Soil Moisture

ESSENTIAL CLIMATE VARIABLE (ECV)
FACTSHEET



GLOBAL CLIMATE
OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE



ECV IN BRIEF

Domain:	Terrestrial
Subdomain:	Hydrology
Scientific Area:	Hydrosphere
ECV Stewards:	Wolfgang Wagner
Products:	Surface Soil Moisture; Freeze/Thaw state; Surface Inundation; Root-Zone Soil Moisture



Soil Moisture

Soil moisture is an important variable in land-atmosphere feedbacks at both weather and climate timescales. It plays a major role in partitioning the incoming radiation flux onto the land into fluxes of latent and sensible heat from the land to the atmosphere, and in separating precipitation into runoff, subsurface flow, and infiltration. Soil moisture is intimately involved in the feedback between climate and vegetation, as both local climate and vegetation influence soil moisture through evapotranspiration, while soil moisture is a determinant of the type and condition of vegetation in a region. Changes in soil moisture can accordingly have substantial impacts on agricultural productivity, forestry and ecosystem health.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQUENCY	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
Surface soil moisture	Average water content in topmost soil layer (0-5 cm)	Daily	1-25 km	0.04 m ³ /m ³	0.01 m ³ /m ³ /year	WMO (2008b)
Freeze/thaw	Flag indicating whether the land surface is frozen or not	Daily	1-25 km	90%	tbd	
Surface inundation	Flag indicating whether the land surface is inundated or not	Daily	1-25 km	90%	tbd	
Root-zone soil moisture	Average soil moisture content in root-zone layer	Daily	1-25 km	0.04 m ³ /m ³	0.01 m ³ /m ³ /year	

Data Sources²

¹ Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements until 2022. More information on: gcos.wmo.int and climatedata.wmo.int.



- ▶ ESA Climate Change Initiative for Soil Moisture
<http://www.esa-soilmoisture-cci.org/>
- ▶ Copernicus Climate Change Service
<https://climate.copernicus.eu/>
- ▶ International Soil Moisture Network
<http://ismn.geo.tuwien.ac.at/>
- ▶ Soil Moisture Active Passive mission (NASA)
<https://www.nasa.gov/smap>
- ▶ Soil Moisture Ocean Salinity mission (ESA)
https://www.esa.int/Our_Activities/Observing_the_Earth/SMOS
- ▶ Satellite ECV Inventory by the CEOS/CGMS Working Group on Climate (WGClimate)
<http://climatemonitoring.info/ecvinventory>

Large spatial and temporal variability

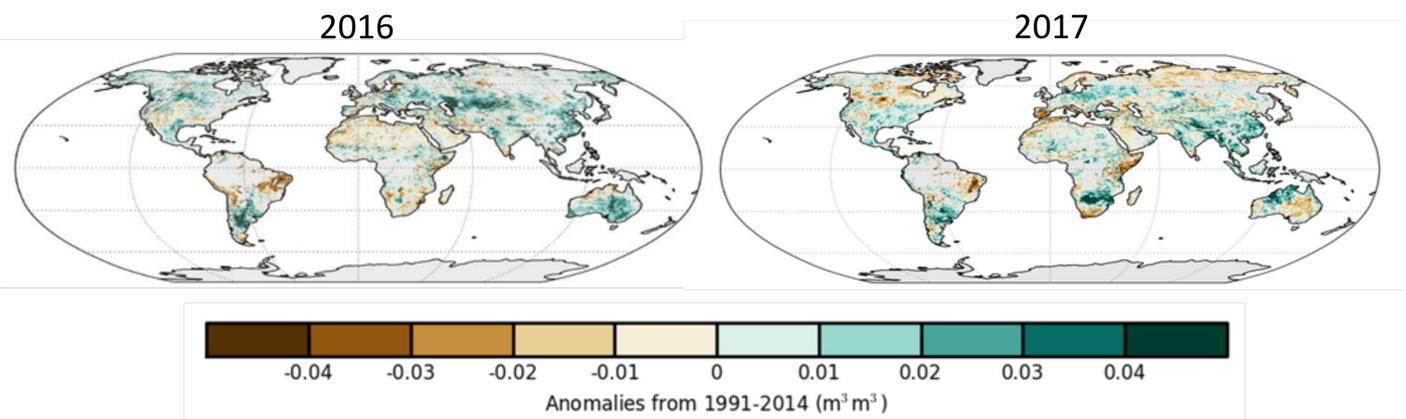


Figure: Anomalies from the long term mean in ESA CCI soil moisture in the years 2016 (left) and 2017 (right)

² This list provides sources for openly accessible data sets with worldwide coverage for which metadata is available. It is curated by the respective GCOS ECV Steward(s). The list does not claim to be complete. Anyone with a suitable dataset who would like it to be added to this list should contact GCOS.



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