

Soil moisture ground-truth: Bridging the scale gap

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FarmerLine 	FutureWater 	GAIP 
GReD 	HCP International 	HydroLogic 
Imperial 	KMD  Ministry of Environment, Water and Natural Resources	KNUST 
Makerere  MAKERERE UNIVERSITY	MicroStep 	PolMi  POLITECNICO MILANO 1863
SAWS  ISO 9001 Certified Organisation	Starlab 	Strathmore 
TAHMO 	TU Delft 	UFZ 

**18
Partners**

**10 - Europe
8 - Africa**



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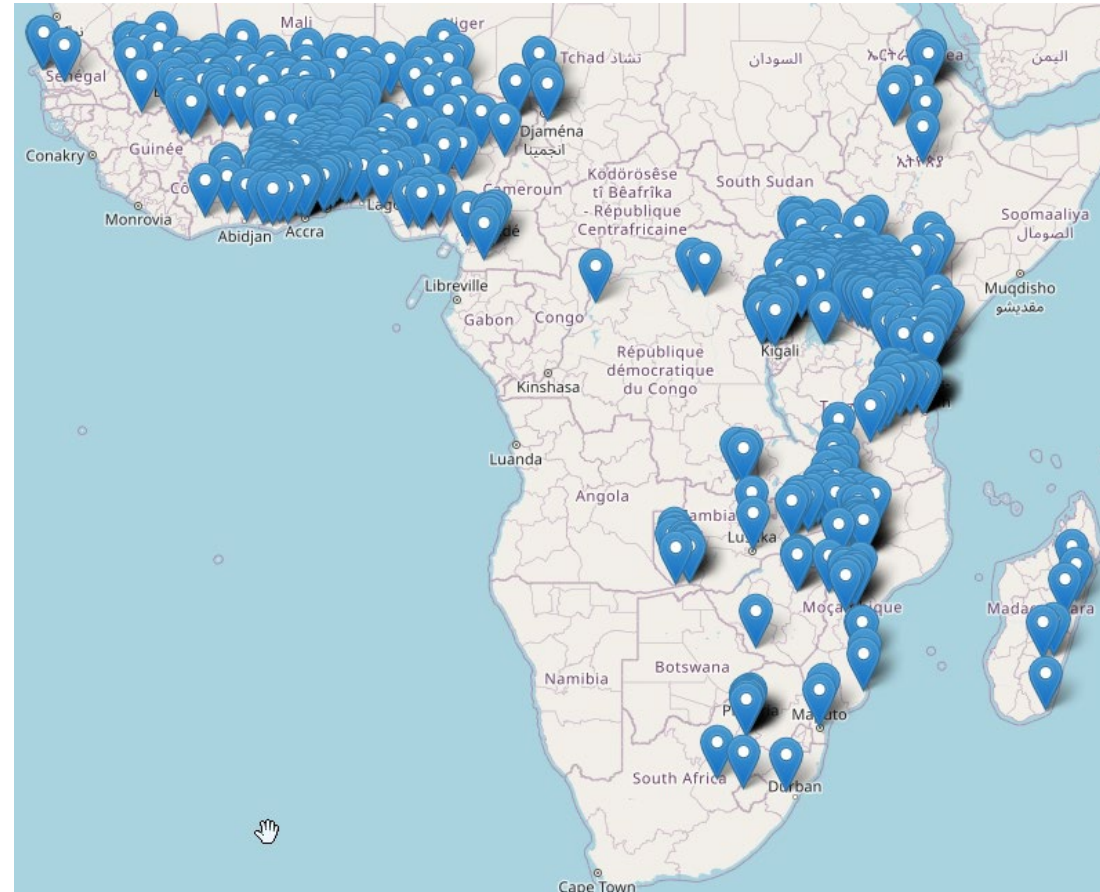
Trans-African Hydro-Meteorological Observatory www.TAHMO.org

TEAM



TAHMO

600 + stations!



TAHMO Network, May 2021

Soil moisture satellites

Dedicated

- SMAP
- SMOS

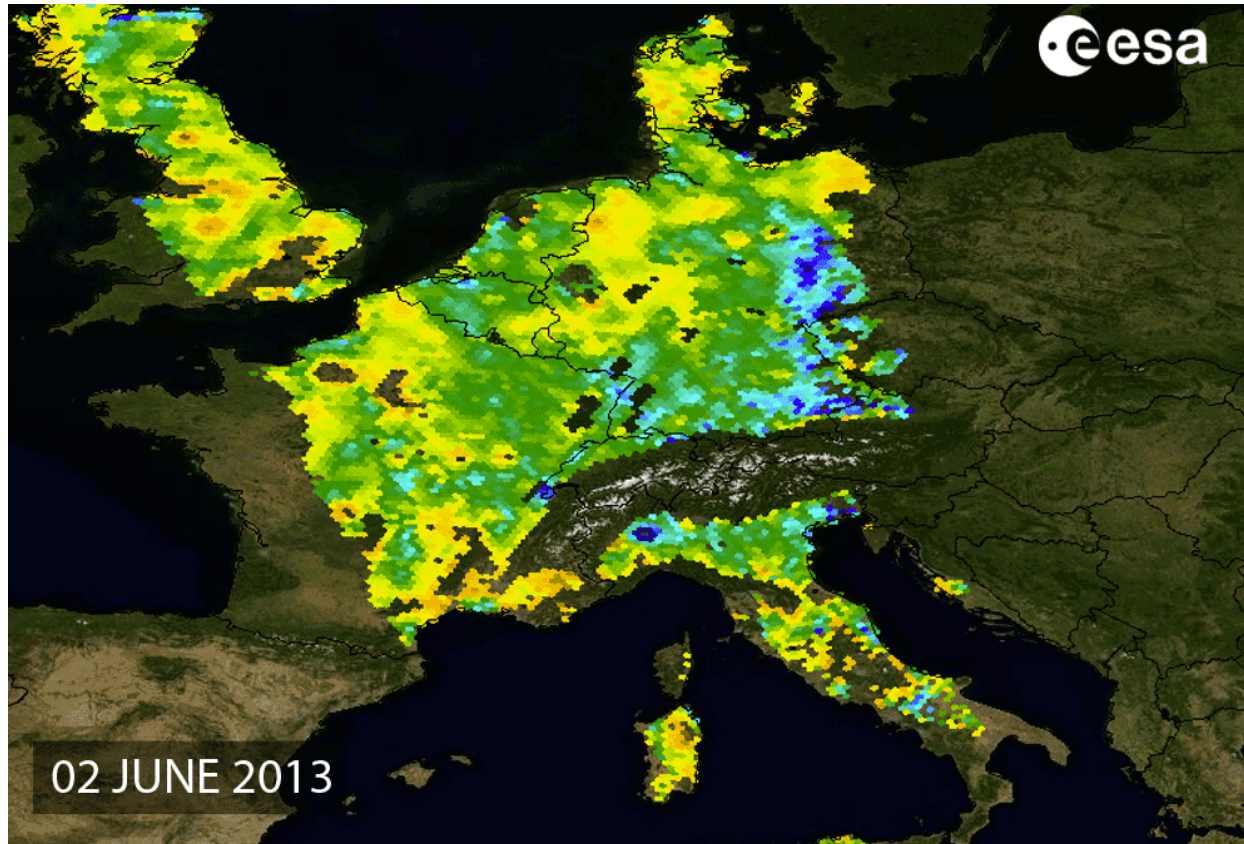
Opportunistic

- AMSR-E
- Sentinel-1
-



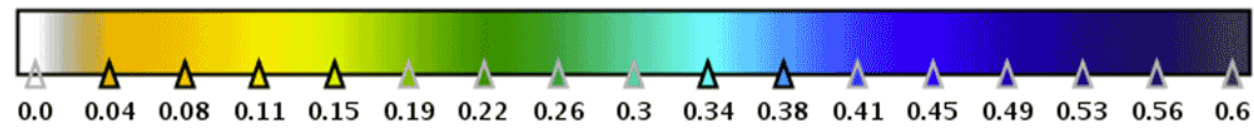
Sentinel-1

Example SMOS

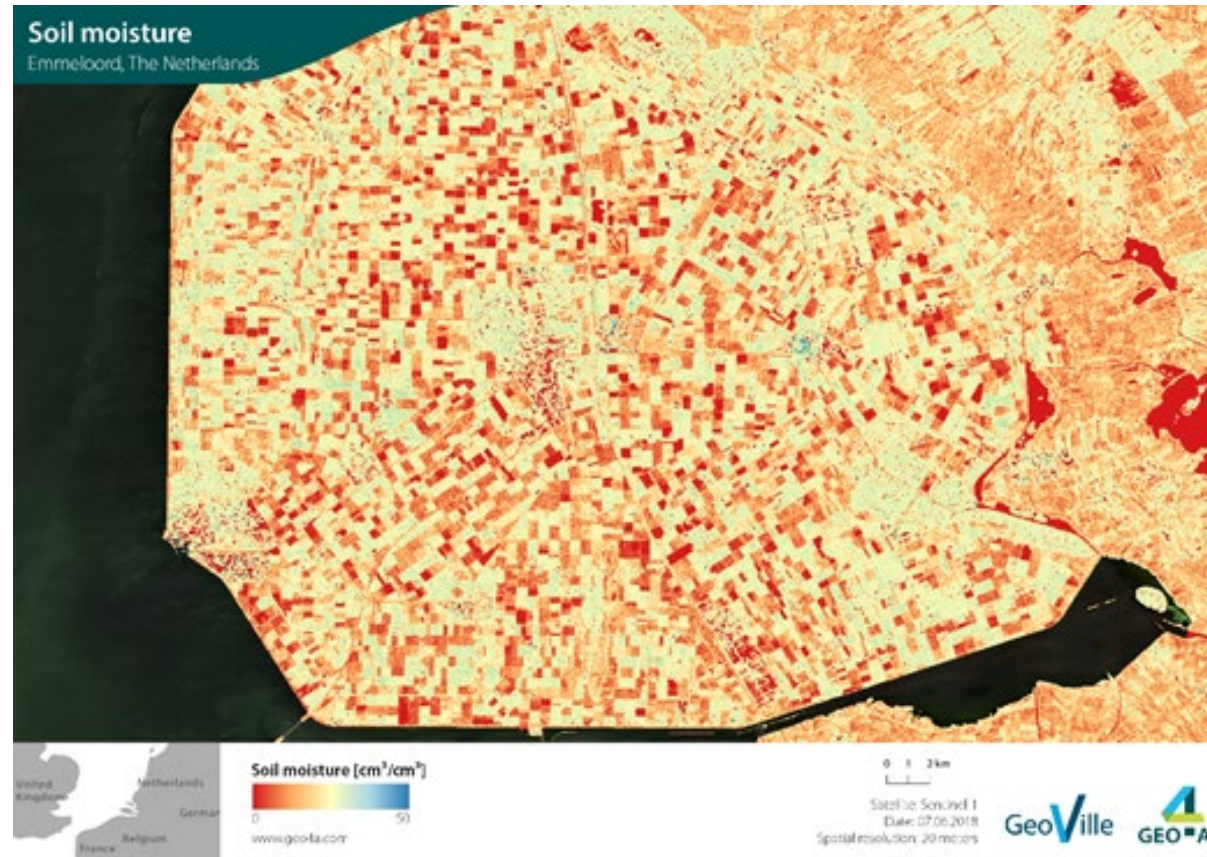


35-50 km

Soil_Moisture [m³ m⁻³]



Example Sentinel-1



30 – 100 m

https://earsc-portal.eu/download/attachments/75892889/image2020-4-27_15-10-38.png?version=1&modificationDate=1587993038394&api=v2

How do you measure soil moisture?

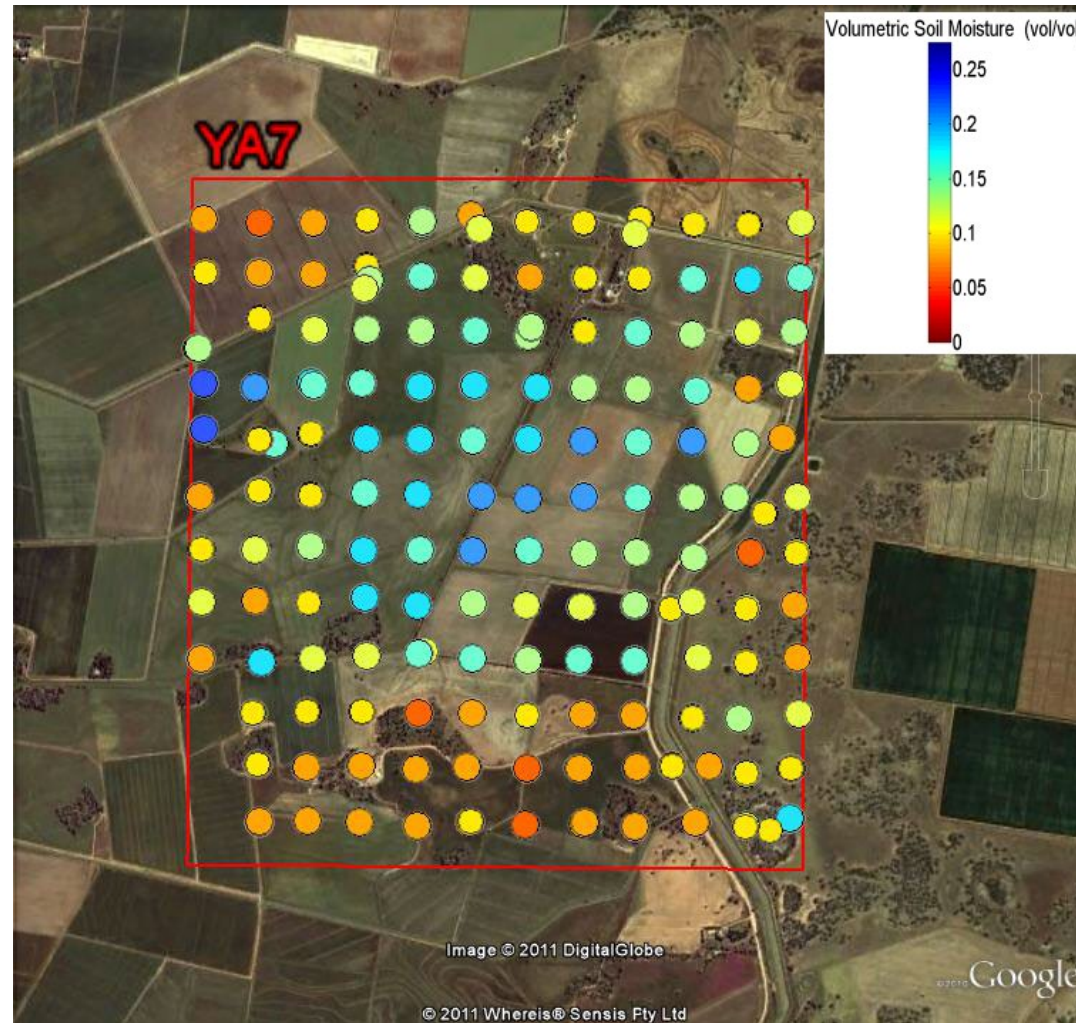


100 – 200 cm³



<https://en.eijkelkamp.com/products/augering-soil-sampling-equipment/soil-sample-rings.html>
<http://hydropedologie.agrobiologie.cz/images/neporuseny/neporus-foto02.jpg>

Soil moisture Cal/Val



SMAPEX-1

<https://www.smapex.monash.edu/Data/SMAPEX-1/Data/YA7-smapling1007.png>

COSMOS

Cosmos station (traditional)

- > \$50,000 incl telemetry etc
- Fast / slow neutrons
- Large footprint (300 m radius)
- Only 5 in Africa



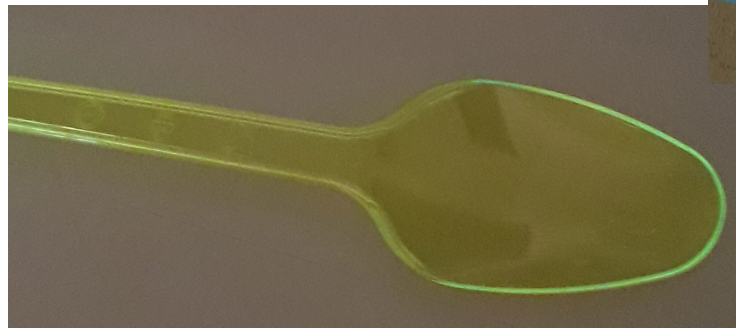
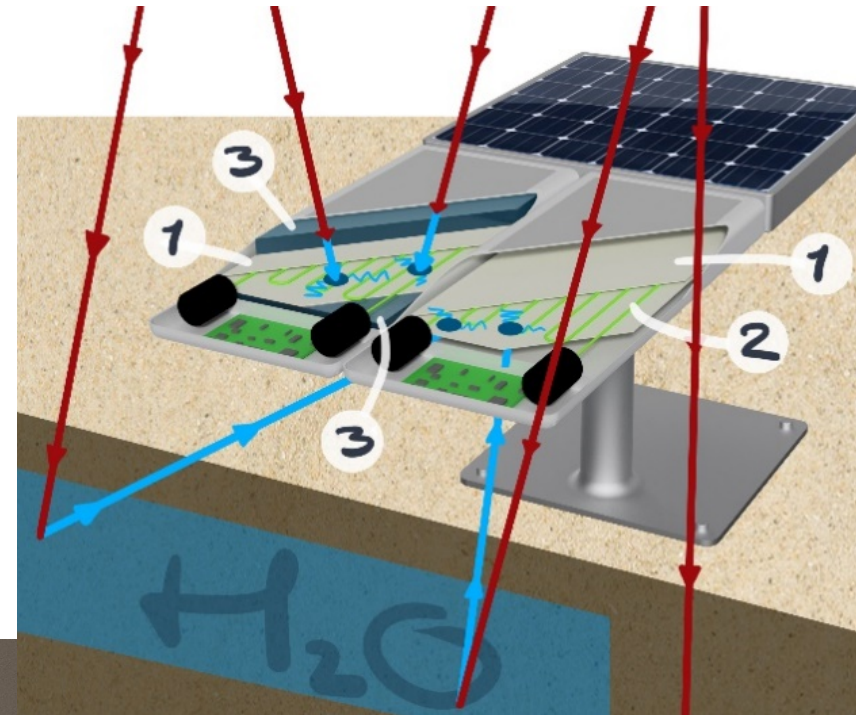
BLOSM

- \$100 muon detector (MIT)
- Same electronics
- Different scintillator
- Detect neutrons!



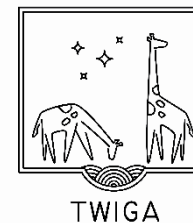
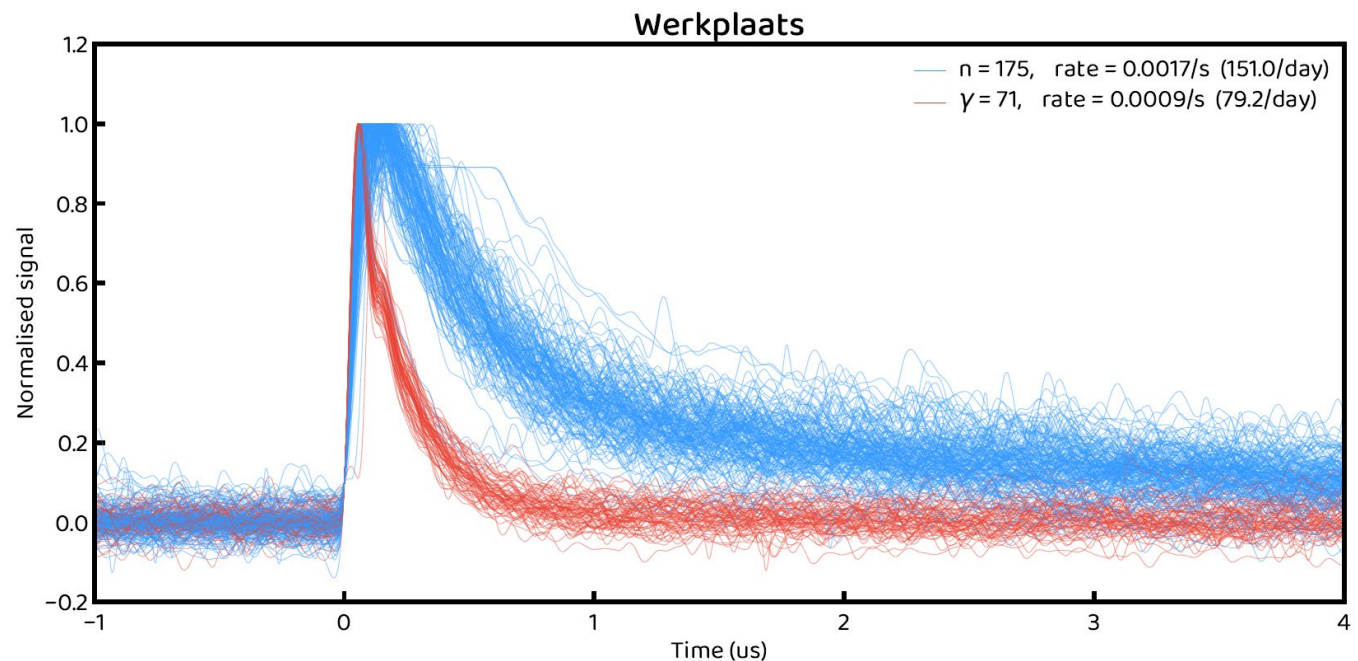
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BLOSM

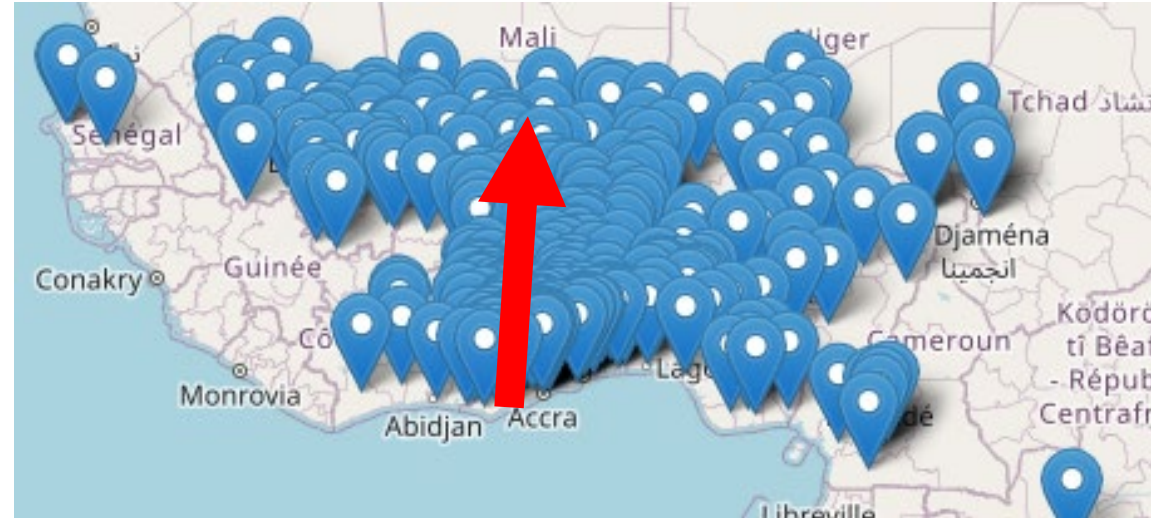
neutron
\$1000 ~~muon~~ detector



First neutrons detected with new scintillator!

Proposal

- 1000 km wet-dry gradient
- 50 stations w/ BLOSM
- EU 100,000
- EU 20,000 / yr
- Ready 2022: Permanent Cal/Val



TAHMO



Thank you!

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