EWHA WOMANS UNIVERSITY

Max Planck Institute
for Biogeochemistry

Machine learning-based multilayer soil moisture datasets: *SoMo.ml*

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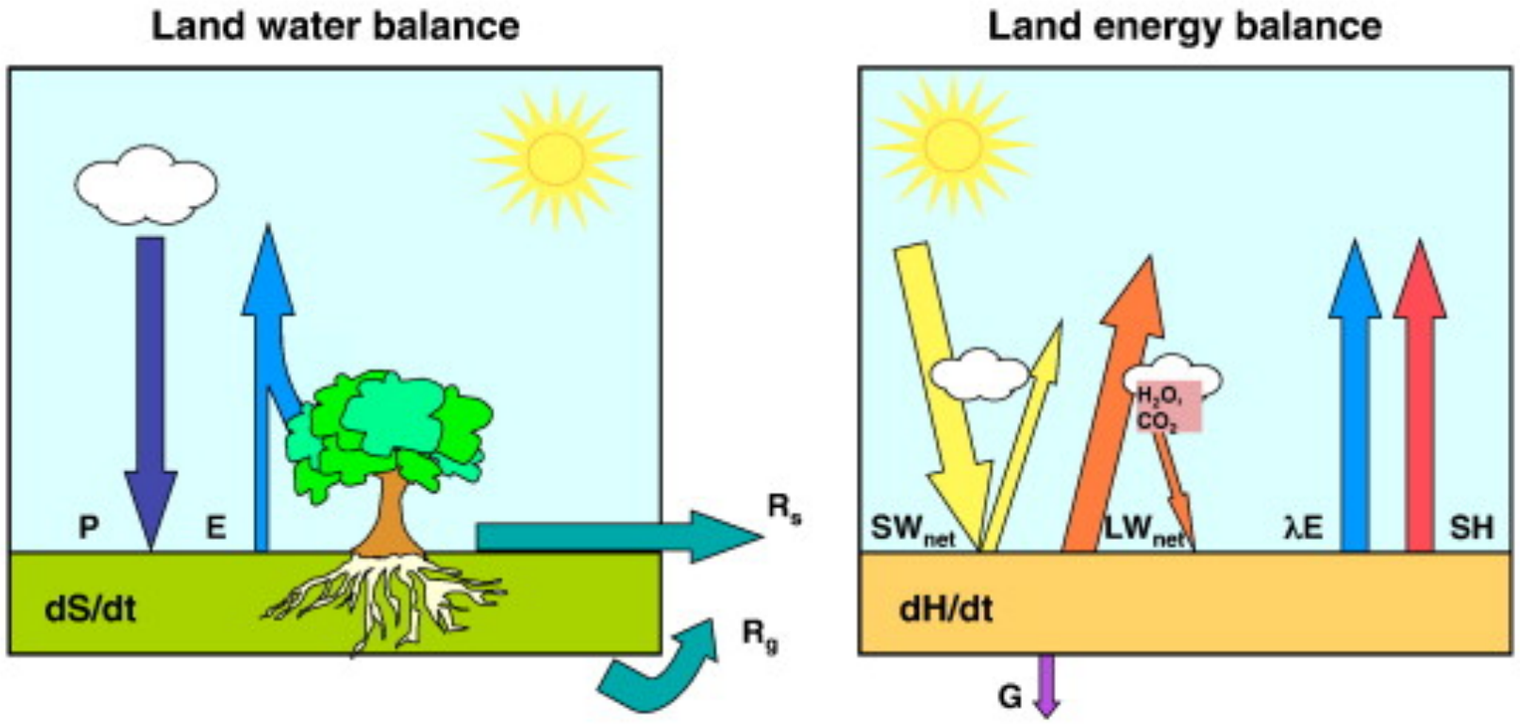
Soil moisture is a key variable in controlling the exchange of water and heat energy between the land surface and the atmosphere



Seneviratne et al., 2010

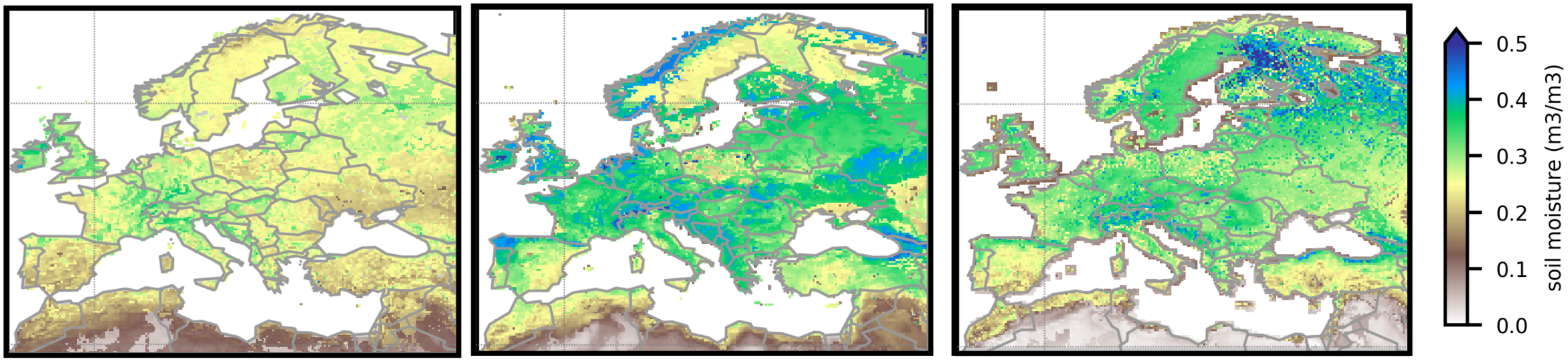
Where can we obtain large-scale soil moisture information?

Each source of soil moisture data has characteristic strengths and weaknesses

Satellite observation
(ESA CCI v04.4 COMBINED)

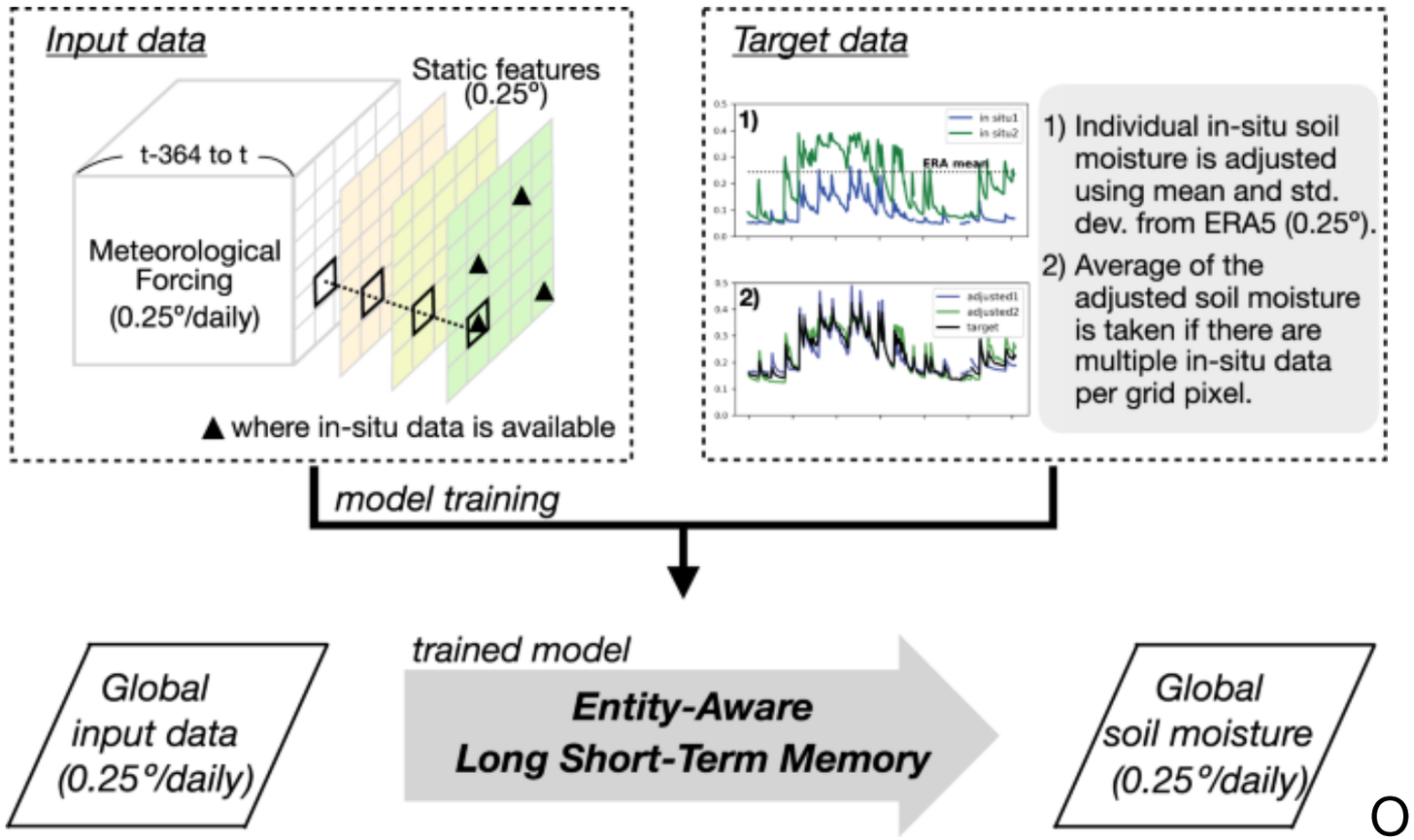
Physically-based modeling
(GLEAM v3.3a)

Data-driven modeling
(***SoMo.ml*** v1.0)



We use Long Short-Term Memory (LSTM) as a new tool to generate large-scale soil moisture data ***SoMo.ml***.

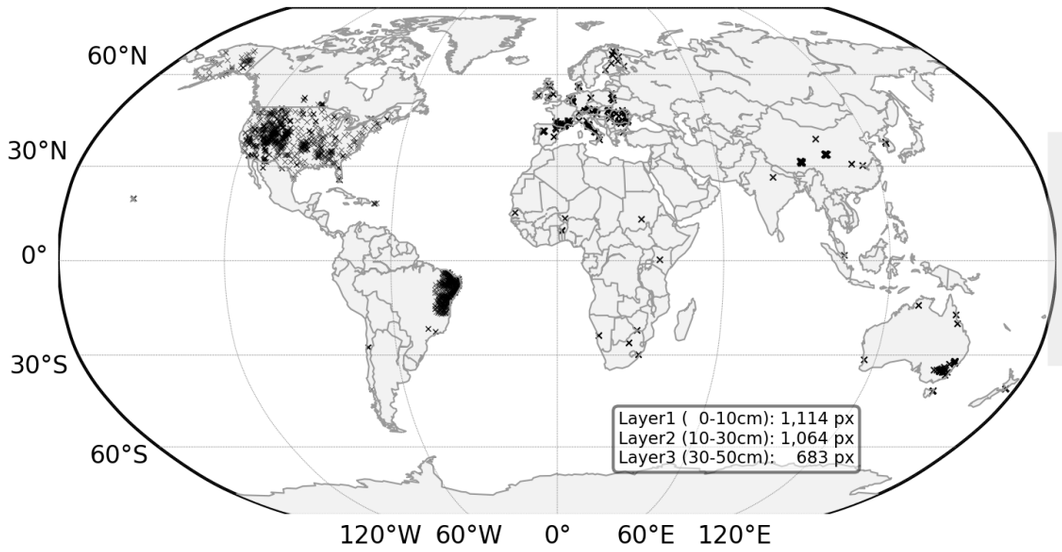
The LSTM model is trained to learn the relationship between the multiple predictor variables and the target soil moisture



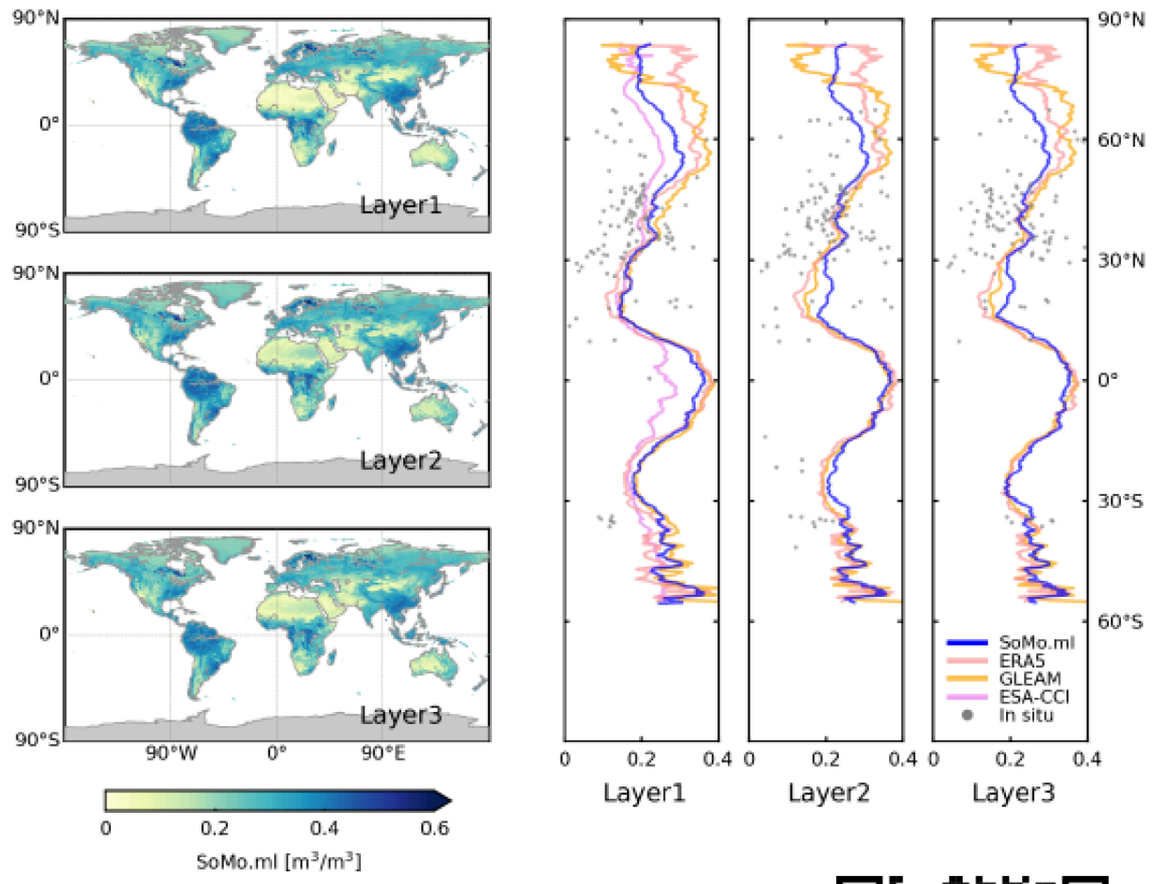
O and Orth, 2021

By design, *SoMo.ml* closely follows daily variations in in-situ data.

SoMo.ml provides global soil moisture with 0.25° and daily resolutions over the period 2000-2019

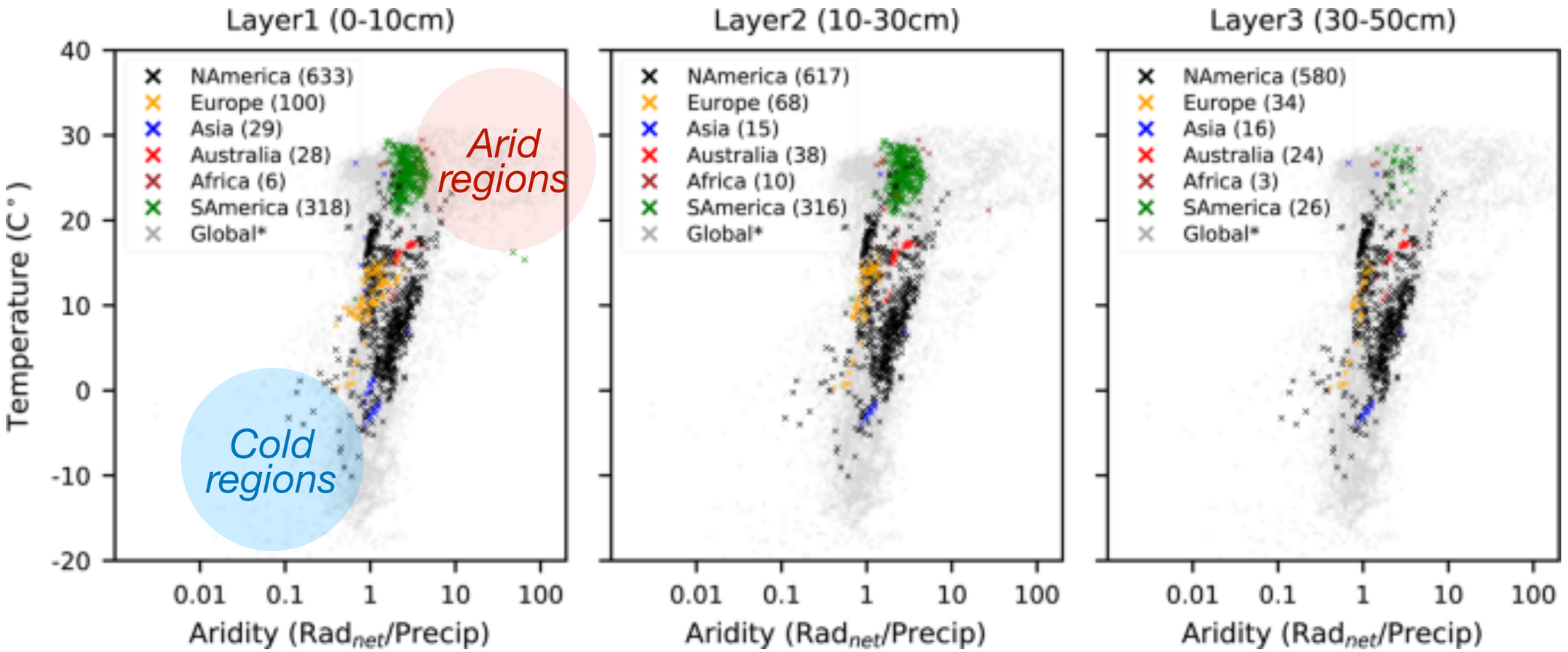


In-situ data for model training are mostly collected from the ISMN networks.



Please find more detailed information can be found from O and Orth (*Sci. Data*, 2021)

Is the performance of *SoMo.ml* soil moisture data reliable?



O and Orth, 2021

Data performance depends on *in-situ* data availability, which is low in high latitudes and tropical regions.

SoMo.ml can support large-scale hydrological, meteorological, and ecological analyses

- ☑ *SoMo.ml* has been used in e.g. observation-based analysis of drought-related ecosystem damages or heat events (Zhang et al., 2021; Bastos et al., 2021; O et al, 2022) and soil moisture data comparison (Wang et al., 2021).

- ☑ Try *SoMo.ml*! https://www.bgc-jena.mpg.de/geodb/

- ☑ High-resolution (0.1°) European soil moisture data now under review https://arxiv.org/abs/2205.10753; *Data will be available soon!*

THANK YOU

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