

Soil Moisture Dataset with Machine Learning for China (SMML-CHN v1.0)

Product description

SMML-CHN is a daily multiple-layer (0-50cm, 10-cm depth each layer) cropland soil moisture (SM) dataset during 1981-2013 for China, with granularity of cropping patterns. It is developed based on gravimetric SM measurements at 273 agro-meteorological stations across China during 1981-2013, using machine learning technique (deep neural network, NN). During the training and testing of the NN, environmental factors including climate, topography, soil properties and cropping patterns are considered to predict SM. The dataset is at a spatial resolution of 0.25-degree. It only represent SM at rain-fed cropland area, and the effects of irrigation is not considered here.

This dataset includes 7 sets of SM estimates, one for the reference cropping pattern, and the six others for six alternative ones as below:

- 1) Reference (described in Section 2.3.2 in the article Liu et al. below)
- 2) Pattern 1: winter wheat + fallow
- 3) Pattern 2: winter wheat + maize
- 4) Pattern 5: spring wheat + potato/cotton/fallow
- 5) Pattern 8: rapeseed + cotton/potato/fallow
- 6) Pattern 10: fallow + maize
- 7) Pattern 11: fallow + soybean

File Format

SMML-CHN dataset is provided in the format of netCDF. The file name is organized as the format of “China_SM_crop_[crop]_[year].nc”, where [crop] stands for the type of cropping pattern, and [year] represent the year between 1981-2013.

The information contained in these files include daily soil moisture estimates ($\text{m}^3 \text{m}^{-3}$) at five soil layers from 1981-2013 across the cropland area of China. Two quality flags are also provided: 1) time flag indicating whether extrapolation is within the temporal range of observations; and 2) cropping pattern flag indicating whether extrapolation is within the range of observed cropping patterns.

Acknowledgement

This research is supported by the Modeling, Analysis, Predictions and Projections (MAPP) program of NOAA NA17OAR4310127 and NASA NNH17ZDA00IN-THP to Pierre Gentine. We thank the Chinese Meteorological Administration for providing the soil moisture measurements.

Data Usage and Citation

SMML-CHN product is freely available for any non-commercial application. Redistribution of these data without prior permission from the developers is prohibited. Developers request to be contacted and invited to collaborate in any research study that uses the SMML-CHN product so they can provide guidance as they have the best knowledge of this product.

Users are asked to cite the following publication when using this product:

Liu, Y., Chen, D., Mouatadid, S., Lu, X., Chen, M., Cheng, Y., Xie, Z., Jia, B., Wu, H. and Gentine, P., 2021. Development of a Daily Multilayer Cropland Soil Moisture Dataset for China Using Machine Learning and Application to Cropping Patterns. Journal of Hydrometeorology, 22(2), pp.445-461.

Contact

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