This document explains the dataset used in paper Shan et al., 2024 “Assimilating ASCAT normalized backscatter and slope into the land surface model ISBA-A-gs using a Deep Neural Network as the observation operator: Case studies at ISMN stations in western Europe”

This dataset comprises open loop simulations of the ISBA land surface model and ASCAT normalized backscatter and slope data at grid points (GPIs) containing International Soil Moisture Network stations. The dataset covers the period from 2007 to 2019 and includes a total of 31 GPIs.

The ISBA land surface model runs on the offline version of SURFEX software (https://www.umr-cnrm.fr/surfex/) using ERA5 forcing data.

The netcdf file contains the following variables:

|  |  |
| --- | --- |
| Variable name | Short description |
| gpi\_id | Identifier for the grid element on the ASCAT/ISBA grid. |
| sig | ASCAT normalized backscatter |
| slop | ASCAT slope |
| LAI | Leaf area index [m2m-2] from ISBA open loop simulations |
| WG1 | soil moisture [m3m-3] from ISBA open loop simulations (0-0.01m) |
| WG2 | soil moisture [m3m-3] from ISBA open loop simulations (0.01-0.04m) |
| WG3 | soil moisture [m3m-3] from ISBA open loop simulations (0.04-0.1m) |
| WG4 | soil moisture [m3m-3] from ISBA open loop simulations (0.1-0.2m) |
| WG5 | soil moisture [m3m-3] from ISBA open loop simulations (0.2-0.4m) |
| WG6 | soil moisture [m3m-3] from ISBA open loop simulations (0.4-0.6m) |
| WG7 | soil moisture [m3m-3] from ISBA open loop simulations (0.6-0.8m) |
| WG8 | soil moisture [m3m-3] from ISBA open loop simulations (0.8-1.0m) |

ASCAT normalized backscatter (“sig”) data are provided at 10am and 10pm every day. If normalized backscatter are not acquired at a particular time, a value of 999 is provided.

ASCAT slope (“slop”) is calculated daily following Hahn et al. (2017). These daily values are provided at 10am in this dataset. The slope value at 10pm is set to 999.

The netCDF4 file includes state variables from the open loop simulations of ISBA such as Leaf Area Index (LAI), WG1 to WG8 representing different soil moisture layers (See Table S1 in paper Shan et al., 2024).

The file 'Table\_S2.csv' documents the details of the GPIs and information of corresponding ISMN sites.

Reference:

Hahn, S., Reimer, C., Vreugdenhil, M., Melzer, T., & Wagner, W. (2017). Dynamic characterization of the incidence angle dependence of backscatter using metop ASCAT. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 10(5), 2348-2359.