A Big Earth Data Platform for Three Poles

**HiWATER: The multi-scale observation experiment on evapotranspiration over heterogeneous land surfaces 2012 (MUSOEXE-12)-dataset of flux observation matrix (cosmic-ray soil moisture)**

1、Description

This dataset includes the observational data that were collected by two sets of Cosmic-ray Soil Moisture Observation System (COSMOS), named crs\_a and crs\_b, which were installed near the Daman Superstation in the flux observation matrix from 1 June through 20 September 2012. The land cover in the footprint was maize crop, and the site was located with the cropland of the Daman Irrigation District, Zhangye, Gansu Province. Crs\_a was located at 100.36975° E, 38.85385° N and 1557.16 m above sea level; Crs\_b was located at 100.37225° E, 38.85557° N and 1557.16 m above sea level. The bottom of the probe was 0.5 m above the ground; the sampling interval was 1 hour.  
The raw COSMOS data include the following: battery (Batt, V), temperature (T, ℃), relative humidity (RH, %), air pressure (P, hPa), fast neutron counts (N1C, counts per hour), thermal neutron counts (N2C, counts per hour), sample time of fast neutrons (N1ET, s), and sample time of thermal neutrons (N2ET, s). The distributed data include the following variables: Date, Time, P, N1C, N1C\_cor (corrected fast neutron counts) and VWC (volume soil moisture, %), which were processed as follows:  
1) Quality control  
Data were removed and replaced by -6999 when (a) the battery voltage was less than 11.8 V, (b) the relative humidity was greater than 80% inside the probe box, (c) the counting data were not of one-hour duration and (d) then neutron count differed from the previous value by more than 20%.  
2) Air pressure correction  
An air pressure correction was applied to the quality-controlled raw data according to the equation contained in the equipment manual. The procedure was previously described by Jiao et al. (2013) and Zreda et al. (2012).  
3) Calibration  
After the quality control and corrections were applied, soil moisture was calculated using the equation in Desilets et al. (2010), where N0 is the neutron counts above dry soil and the other variables are fitted constants that define the shape of the calibration function. Here, the parameter N0 must be calibrated using the in situ observed soil moisture within the footprint. This procedure was previously described by Jiao et al. (2013) and Zreda et al. (2012)  
4) Computing the soil moisture   
Based on the calibrated N0 and corrected N1C, the hourly soil moisture was computed using the equation from the equipment manual. This procedure was previously described by Jiao et al, (2013) and Zreda et al. (2012)  
For more information, please refer to Liu et al. (2016) (for multi-scale observation experiment or sites information), Zhu et al. (2015) (for data processing) in the Citation section.

2、Keywords

Theme：Soil,Soil moisture/Water content  
Discipline：Terrestrial Surface  
Places：Heihe River Basin, the artificial oasis experimental area in the middle reaches, flux observation matrix  
Time：2012-06-01 to 2012-09-20, 2012

3、Data details

1.Scale：None

2.Projection：4326

3.Filesize：0.34MB

4.Data format：文本

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：38.8539 | - |
| west：100.3698 | - | east：100.3698 |
| - | south：38.8539 | - |

5、Time frame:2012-06-09 08:02:00+00:00--2012-09-28 08:03:00+00:00

6、Reference method

References to data:

LI Xin, LIU Shaomin, XU Ziwei, ZHU Zhongli. HiWATER: The multi-scale observation experiment on evapotranspiration over heterogeneous land surfaces 2012 (MUSOEXE-12)-dataset of flux observation matrix (cosmic-ray soil moisture). A Big Earth Data Platform for Three Poles, doi:10.3972/hiwater.107.2013.db2016

References to articles:

Li, X., Liu, S.M., Xiao, Q., Ma, M.G., Jin, R., Che, T., Wang, W.Z., Hu, X.L., Xu, Z.W., Wen, J.G., Wang, L.X. (2017). A multiscale dataset for understanding complex eco-hydrological processes in a heterogeneous oasis system. Scientific Data, 4, 170083. doi:10.1038/sdata.2017.83.  
  
Zhu ZL, Tan L, Gao SG, Jiao QS. Observation on soil moisture of irrigation cropland by cosmic-ray probe. IEEE Geoscience and Remote Sensing Letters, 2015, 12(3), 472-476. doi:10.1109/LGRS.2014.2346784.

7、Supporting project information

National Natural Science Foundation of China

8、Data resource provider

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