A Big Earth Data Platform for Three Poles

**HiWATER: Dataset of hydrometeorological observation network (cosmic-ray soil moisture of Daman Superstation, 2017)**

1、Description

The data set contains observation data of cosmic-ray instrument (crs) from January 1, 2017 to December 31, 2017. The site is located in the farmland of Daman Irrigation District, Zhangye, Gansu Province, and the underlying surface is cornfield. The latitude and longitude of the observation site is 100.3722E, 38.8555N, the altitude is 1556 meters. The bottom of the instrument probe is 0.5 meter from the ground, and the sampling frequency is 1 hour.  
The original observation items of the cosmic-ray instrument include: voltage Batt (V), temperature T (°C), relative humidity RH (%), air pressure P (hPa), fast neutron number N1C (number / hour), thermal neutron number N2C (number / hour), fast neutron sampling time N1ET (s) and thermal neutron sampling time N2ET (s). The data was released after being processed and calculated. The data includes: Date Time, P (pressure hPa), N1C (fast neutrons one/hour), N1C\_cor (pressure-corrected fast neutrons one/hour) and VWC ( soil water content %), it was processed mainly by the following steps:  
1) Data Screening  
There are four criteria for data screening: (1) Eliminating data with a voltage less than or equal to 11.8 volts ; (2) Eliminating data with a relative humidity greater than or equal to 80%; (3) Eliminating data with a sampling time interval not within 60 ± 1 minute; (4) Eliminating data with fast neutrons that vary by more than 200 in one hour. In addition, missing data is supplemented with -6999.  
2) Air Pressure Correction  
The original data is corrected by air pressure according to the fast neutron pressure correction formula mentioned in the instrument manual, and the corrected fast neutron number N1C\_cor is obtained.  
3) Instrument Calibration  
In the process of calculating soil moisture, it is necessary to calibrate the N0 in the calculation formula. N0 is the number of fast neutrons under the situation with low antecedent soil moisture . Usually, soil samples in the source area are used to obtain measured soil moisture (or obtained by relatively dense soil moisture wireless sensors) θm (Zreda et al. 2012) and the fast neutron correction data N in corresponding time periods, then NO can be obtained by reversing the formula.  
Here, the instrument is calibrated according to the Soilnet soil moisture data in the source region of the instrument, and the relationship between the soil volumetric water content θv and the fast neutron is established. The data of June 26-27, and July 16-17, respectively, which have obvious differences in dry and wet conditions, were selected. The data from June 26 to 27 showed low soil moisture content, so the average of the three values of 4 cm, 10 cm and 20 cm was used as the calibration data, and the variation range was 22% to 30%; meanwhile , the data from July 16 to 17 showed high soil moisture content, so the average of the two values of 4cm and 10 cm was used as the calibration data, and the variation range was 28% - 39%, and the final average N0 was 3597.  
4) Soil Moisture Calculation  
According to the formula, the hourly soil water content data is calculated.  
Please refer to Liu et al. (2018) for information of hydrometeorological network or site, and Zhu et al. (2015) for observation data processing.

2、Keywords

Theme：Soil,Cosmic-ray soil moisture observing system,Soil moisture/Water content  
Discipline：Terrestrial Surface  
Places：Heihe River Basin, the artificial oasis experimental area in the middle reaches, Daman Superstation  
Time：2017, 2017-01-01 to 2017-12-31

3、Data details

1.Scale：None

2.Projection：4326

3.Filesize：0.42MB

4.Data format：CSV

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：38.8556 | - |
| west：100.3723 | - | east：100.3723 |
| - | south：38.8556 | - |

5、Time frame:2017-01-18 08:00:00+00:00--2018-01-17 08:00:00+00:00

6、Reference method

References to data:

TAN Junlei, LI Xin, LIU Shaomin, XU Ziwei, ZHU Zhongli, CHE Tao, REN Zhiguo. HiWATER: Dataset of hydrometeorological observation network (cosmic-ray soil moisture of Daman Superstation, 2017). A Big Earth Data Platform for Three Poles, doi:10.3972/hiwater.1.2018.db2018

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Wang, Binbin, Ma, Yaoming, Chen, Xuelong, Ma, Weiqiang, Su, Zhongbo, Menenti, Massimo. Observation and simulation of lake-air heat and water transfer processes in a high-altitude shallow lake on the Tibetan Plateau. Journal of Geophysical Research: Atmospheres, 2015, 120(24):2015JD023863. doi:10.1002/2015JD023863

7、Supporting project information

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