A Big Earth Data Platform for Three Poles

**HiWATER: Dataset of hydrometeorological observation network (cosmic-ray soil moisture of Daman Superstation, 2014)**

1、Description

This data set contains cosmic ray instrument (CRS) observations from January 1, 2014 to December 31, 2014.The station is located in gansu province zhangye city da man irrigated area farmland, under the surface is corn field.The longitude and latitude of the observation point are 100.3722e, 38.8555n, and 1556m above sea level. The bottom of the instrument probe is 0.5m from the ground, and the sampling frequency is 1 hour.  
The original observations of the cosmic ray instrument (CRS1000B) included: voltage Batt (V), temperature T (c), relative humidity RH (%), pressure P (hPa), fast neutron number N1C (hr), thermal neutron number N2C (hr), fast neutron sampling time N1ET (s) and thermal neutron sampling time N2ET (s).The data published are processed and calculated. The data headers include Date Time, P (pressure hPa), N1C (fast neutron number/hour), N1C\_cor (fast neutron number/hour with revised pressure) and VWC (soil volume moisture content %). The main processing steps include:  
1) data filtering  
There are four criteria for data screening :(1) data with voltage less than and equal to 11.8 volts are excluded;(2) remove the data of air relative humidity greater than and equal to 80%;(3) data whose sampling interval is not within 60±1 minute are excluded;(4) the number of fast neutrons removed changed by more than 200 in one hour compared with that before and after.In addition, the missing data was supplemented by -6999.  
2) air pressure correction  
According to the fast neutron pressure correction formula mentioned in the instrument instruction manual, the original data were revised to obtain the revised fast neutron number N1C\_cor.  
3) instrument calibration  
In the process of calculating soil moisture, N0 in the calculation formula should be calibrated.N0 is the number of fast neutrons under the condition of soil drying. The measured soil moisture (or through relatively dense soil moisture wireless sensor) m (Zreda et al.  
(1)  
Where m is mass water content, N is the number of fast neutrons after revision, N0 is the number of fast neutrons under dry conditions, a1=0.079, a2=0.64, a3=0.37 and a4=0.91 are constant terms.  
Here, the instrument was calibrated according to Soilnet soil water data in the source area of the instrument, and the relationship between soil volumetric water content (v) and fast neutrons was established according to the actual situation. In formula (1), m was replaced by v.Selected dry wet condition are the obvious difference of June 26-27 June and July 16 - July 17 four days of data, including June 26-27 rate data showed that soil moisture is small, so the selection of 4 cm, 10 and 20 cm as the rate of the three values of average data, its range is 22% 30%, and July 16 - July 17 rate data showed that soil moisture is bigger, so select 4 cm and 10 cm as two value average rate data, the range of 28% - 39%,Finally, the average values of crs\_a and crs\_b, N0, were 3252 and 3597, respectively.  
4) soil moisture calculation  
According to formula (1), 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：2014, 2014-01-01 to 2014-12-31

3、Data details

1.Scale：None

2.Projection：4326

3.Filesize：0.5MB

4.Data format：CSV

4、Space scope

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

5、Time frame:2014-01-10 16:00:00+00:00--2015-01-09 16:00:00+00:00

6、Reference method

References to data:

LI Xin, LIU Shaomin, XU Ziwei, ZHU Zhongli. HiWATER: Dataset of hydrometeorological observation network (cosmic-ray soil moisture of Daman Superstation, 2014). A Big Earth Data Platform for Three Poles, doi:10.3972/hiwater.247.2015.db2016

References to articles:

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Zhu, Z.L., Tan, L., Gao, S.G., & Jiao, Q.S. (2015). Oberservation on soil moisture of irrigated cropland by cosmic-ray probe. IEEE Geoscience and Remote Sensing Letters, 12(3), 472-476. doi:10.1109/LGRS.2014.2346784.

7、Supporting project information

National Natural Science Foundation of China

8、Data resource provider

name: ZHU Zhongli  
unit:   
email: zhuzl@bnu.edu.cn  
  
name: XU Ziwei  
unit: Beijing Normal University  
email: xuzw@bnu.edu.cn  
  
name: LI Xin  
unit:   
email: xinli@itpcas.ac.cn  
  
name: LIU Shaomin  
unit: Beijing Normal University  
email: smliu@bnu.edu.cn