A Big Earth Data Platform for Three Poles

**HiWATER: The multi-scale observation experiment on evapotranspiration over heterogeneous land surfaces (MUSOEXE-12)-Flux Observation Matrix (stable isotopic observation) (2012)**

1、Description

This dataset includes 5 sub-datasets obtained from measurements in the flux observing matrix at observing site No.15 (the Daman superstation) and 13. Specifically, the sub-datasets include the following: (1) a dataset that contains atmospheric water vapor D/H and 18O/16O isotopic and flux ratio measurements from site No.15 from 27 May to 21 September in 2012, (2) a dataset that contains D/H and 18O/16O isotopic ratios of water in soil and in corn xylem at site No.15 from 27 May to 21 September 2012, (3) a dataset that contains atmospheric water vapor D/H and 18O/16O isotopic ratios at site No.13 when airborne surveys occurred, and (4) a dataset that contains D/H and 18O/16O isotopic ratios of water in soil and in corn xylem at sites No.13 and 15 when airborne surveys occurred, (5) a dataset that contains the ratios of evaporation and transpiration to evapotranpiration at site No.15. The experiment area was located in a corn cropland in the Daman irrigation district of Zhangye, Gansu Province, China. The positions of observing sites No.15 and 13 were 100.3722° E, 38.8555° N and 100.3785° E, 38.8607° N, respectively, with an elevation of 1552.75 m above sea level. The atmospheric water vapor D/H and 18O/16O isotopic and flux ratios at site No.15 were continuously measured using an in situ observation system. The system consisted of an H218O, HDO and H2O analyzer (Model L1102-i, Picarro Inc.), a CTC HTC-Pal liquid auto sampler (LEAP Technologies) and a multichannel solenoid valve (Model EMT2SD8 MWE, Valco Instruments CO. Inc.). The heights of the two intakes were 0.5 and 1.5 m above the corn canopy. The water vapor D/H and 18O/16O isotopic ratio analyzer recorded signals at 0.2 Hz; data were recorded for 2 minutes per intake. The data were block-averaged to hourly intervals. The sampling frequency of soil and xylem at site No. 15 was 1-3 days. The atmospheric water vapor D/H and 18O/16O isotopic and flux ratios at site No.13 were measured using a cold traps/mass spectrometer. The sampling frequency of atmospheric water vapor, soil water and xylem water at site No.13 was the same as that of the airborne surveys. Briefly, the Picarro analyzer measurements were calibrated during every 3 h switching cycle using a two-point concentration interpolation procedure in which the water vapor mixing ratio was dynamically controlled to track the ambient water vapor mixing ratio. Possible delta stretching effects were not considered. A schematic diagram of the Picarro analyzer and its operation principles and calibration procedure are described elsewhere in the literature (Huang et al., 2014; Wen et al. 2008, 2012).
The dataset of atmospheric water vapor D/H and 18O/16O isotopic and flux ratios at site No.15 includes the following variables: Timestamp (time, timestamp without time zone), Number (available record number), δD for r1 (δD for the lower intake, ‰), δD for r2 (δD for the higher intake, ‰), δ18O for r1 (δ18O for the lower intake, ‰), δ18O for r2 (δ18O for the higher intake, ‰), vapor mixing ratio for r1 (vapor mixing ratio for the lower intake, mmol/mol), vapor mixing ratio for r2 (vapor mixing ratio for the higher intake, mmol/mol), δET\_D (δD of evapotranspiration, ‰), and δET\_18O (δ18O of evapotranspiration, ‰). The dataset of D/H and 18O/16O isotopic ratios of water in soil and in corn xylem at site No.15 includes the following variables: Timestamp (time, timestamp without time zone), Remark (treatment: soil without mulch (Ld)=1; soil with mulch (Fm)=2; soil with male corns (F)=3; Xylem=4), δD (‰), and δ18O (‰). The dataset for the ratio of soil evaporation and transpiration to the evapotranspiration at site 15 includes the following variables: Timestamp (time, timestamp without time zone), E/ET (ratio of soil evaporation to the evapotranspiration, %), and T/ET (ratio of transpiration to the evapotranspiration, %). The mean (±one standard deviation) ratio of transpiration to evapotranspiration was 86.7±5.2% (the range was 71.3 to 96.0%). The mean (±one standard deviation) ratio of soil evaporation to the evapotranspiration was 13.3 ±5.2% (the range was 4.0 to 28.7%).
The dataset of atmospheric water vapor D/H and 18O/16O isotopic ratio at site No. 13 when airborne surveys occurred includes the following variables: Timestamp1 (start time, timestamp without time zone), Timetamp2 (end time, timestamp without time zone), Height (observation height, cm), δD (‰), and δ18O (‰). The dataset of D/H and 18O/16O isotopic ratios of water in soil and in corn xylem at sites No. 13 and 15 when airborne surveys occurred include the following variables, Timestamp (time, timestamp without time zone), Remark (treatment: soil without mulch (Ld)=1; soil with mulch (Fm)=2; Xylem=4), δD (‰), δ18O (‰), and Location (observing site 13 or 15) . The missing measurements were replaced with -6999.
For more information, please refer to Liu et al. (2016) (for multi-scale observation experiment or sites information), Wen et al. (2016) (for data processing) in the Citation section.

2、Keywords

Theme：Evapotranspiration,Vegetation,Evapotranspiration,Evaporation,Atmospheric Water Vapor
Discipline：Atmosphere,Terrestrial Surface
Places：Heihe River Basin, the artificial oasis experimental area in the middle reaches, flux observation matrix
Time：2012-05-27 to 2012-09-21, 2012

3、Data details

1.Scale：None

2.Projection：4326

3.Filesize：14.0MB

4.Data format：EXCEL

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：38.8555 | - |
| west：100.3722 | - | east：100.3722 |
| - | south：38.8555 | - |

5、Time frame:2012-06-10 00:13:00+00:00--2012-10-05 00:13:00+00:00

6、Reference method

References to data:

LI Xin, WEN Xuefa, LIU Shaomin. HiWATER: The multi-scale observation experiment on evapotranspiration over heterogeneous land surfaces (MUSOEXE-12)-Flux Observation Matrix (stable isotopic observation) (2012). A Big Earth Data Platform for Three Poles, doi:10.3972/hiwater.108.2013.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.

Wen X, Yang B., Sun X., Lee X. Evapotranspiration partitioning through in-situ oxygen isotope measurements in an oasis cropland. Agricultural and Forest Meteorology, 2016, 230-231, 89-96. doi:10.1016/j.agrformet.2015.12.003.

7、Supporting project information

National Natural Science Foundation of China

8、Data resource provider

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