



## Cold and Arid Regions Science Data Center

HiWATER: The Multi-Scale Observation Experiment on Evapotranspiration over heterogeneous land surfaces (MUSOEXE) Dataset - flux observation matrix (an automatic weather station of site No.10)



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## Abstract

This dataset contains the automatic weather station (AWS) measurements from site No.10 in the flux observation matrix from 1 June to 17 September, 2012. The site (100.39572 ° E, 38.87567 ° N) was located in a cropland (maize surface) in Yingke irrigation district, which is near Zhangye, Gansu Province. The elevation is 1534.73 m. The installation heights and orientations of different sensors and measured quantities were as follows: air temperature and humidity (HMP155; 5 m, towards north), rain gauge (TE525M; 10 m), wind speed (03001; 10 m, towards north), a four-component radiometer (CNR1; 6 m, towards south), two infrared temperature sensors (SI-111; 6 m, vertically downward), soil temperature profile (109ss-L; 0, -0.02, and -0.04 m), soil moisture profile (CS616; 0.02, 0.04 m), and soil heat flux (HFP01; 3 duplicates with one below the vegetation and the other between plants, 0.06 m).

The observations included the following: air temperature and humidity (Ta\_5 m and RH\_5 m) ( °C and %, respectively), precipitation (rain, mm), wind speed (Ws\_10 m, m/s), four-component radiation (DR, incoming shortwave radiation; UR, outgoing shortwave radiation; DLR\_Cor, incoming longwave radiation; ULR\_Cor, outgoing longwave radiation; Rn, net radiation; W/m<sup>2</sup>), infrared temperature (IRT\_1 and IR\_2, °C), soil heat flux (Gs\_1, below the vegetation; Gs\_2 and Gs\_3, W/m<sup>2</sup>), soil temperature profile (Ts\_0 cm, Ts\_2 cm, and Ts\_4 cm, °C), and soil moisture profile (Ms\_2 cm and Ms\_4 cm, %).

The data processing and quality control steps were as follows. (1) The AWS data were averaged over intervals of 10 min; therefore, there were 144 records per day. The missing data were filled with -6999. (2) Duplicate records were rejected. (3) Unphysical data were rejected. (4) In this dataset, the time of 0:10 corresponds to the average data for the period between 0:00 and 0:10; the data were stored in \*.xlsx format. (5) Finally, the naming convention was AWS+ site no. Moreover, suspicious data were marked in red. For more information, please refer to Liu et al. (2016) (for multi-scale observation experiment or sites information), Xu et al. (2013) (for data processing) in the Citation section.

## Keywords

Theme: automatic weather station, hydrometeorology, meteorological element,  
Place: flux observation matrix, Heihe River Basin, the artificial oasis experimental area,  
Temporal: 2012, 2012-06-01 to 2012-09-17,  
Discipline: Atmospheric science, Geographic science,  
Statrum:

## ISO 19115 Category

Category: geoscientificInformation

## Detail

Project: +proj=longlat +datum=WGS84 +no\_defs

Data Volume(MB): 2.54

Data Format: \*.csv

## Position and Thumbnail

N:38.8757



W:100.396

E:100.396

## Temporal Range

Start: 2012-06-01

End: 2012-09-17

## Citation

1. Liu SM, Xu ZW, Song LS, Zhao QY, Ge Y, Xu TR, Ma YF, Zhu ZL, Jia ZZ, Zhang F. Upscaling evapotranspiration measurements from multi-site to the satellite pixel scale over heterogeneous land surfaces. *Agricultural and Forest Meteorology*, 2016, 230-231, 97-113. doi:10.1016/j.agrformet.2016.04.008.
2. Xu ZW, Liu SM, Li X, Shi SJ, Wang JM, Zhu ZL, Xu TR, Wang WZ, Ma MG. Intercomparison of surface energy flux measurement systems used during the HiWATER-MUSOEXE. *Journal of Geophysical Research*, 2013, 118, 13140-13157, doi:10.1002/2013JD020260.

## Recommended Publications

1. Liu SM, Xu ZW, Wang WZ, Bai J, Jia Z, Zhu M, Wang JM. A comparison of eddy-covariance and large aperture scintillometer measurements with respect to the energy balance closure problem. *Hydrology and Earth System Sciences*, 2011, 15(4): 1291-1306. doi:10.5194/hess-15-1291-2011.
2. Li X, Cheng GD, Liu SM, Xiao Q, Ma MG, Jin R, Che T, Liu QH, Wang WZ, Qi Y, Wen JG, Li HY, Zhu GF, Guo JW, Ran YH, Wang SG, Zhu ZL, Zhou J, Hu XL, Xu ZW. Heihe Watershed Allied Telemetry Experimental Research (HiWATER): Scientific objectives and experimental design. *Bulletin of the American Meteorological Society*, 2013, 94(8): 1145-1160, 10.1175/BAMS-D-12-00154.1.
3. Xu ZW, Ma YF, Liu SM, Shi SJ, Wang JM. Assessment of the energy balance closure under advective conditions and its impact using remote sensing data. *Journal of Applied Meteorology and Climatology*, 2017, 56: 127-140, doi: 10.1175/JAMC-D-16-0096.1.
4. Liu SM, Xu ZW, Zhu ZL, Jia ZZ, Zhu MJ. Measurements of evapotranspiration from eddy-covariance systems and large aperture scintillometers in the Hai River Basin, China. *Journal of Hydrology*, 2013, 487, 24-38.
5. Wang JM, Zhuang JX, Wang WZ, Liu SM, Xu ZW. Assessment of uncertainties in eddy covariance flux measurement based on intensive flux matrix of HiWATER-MUSOEXE. *IEEE Geoscience and Remote Sensing Letters*, 2015, 12 (2), 259-263. doi:10.1109/LGRS.2014.2334703
6. Song LS, Liu SM, Zhang X, Zhou J, Li MS. Estimating and Validating Soil Evaporation and Crop Transpiration During the HiWATER-MUSOEXE. *IEEE Geoscience and Remote Sensing Letters*, 2015, 12 (2), 334-338. doi:10.1109/LGRS.2014.2339360
7. Ma YF, Liu SM, Zhang F, Zhou J, Jia ZZ. Estimations of regional surface energy fluxes over heterogeneous oasis-desert surfaces in the middle reaches of the Heihe River during HiWATER-MUSOEXE. *IEEE Geoscience and Remote Sensing Letters*, 2015, 12(3), 671-675. doi:10.1109/LGRS.2014.2356652
8. Xu TR, Bateni S.M., Liang SL. Estimating turbulent heat fluxes with a weak-constraint data assimilation scheme: A case study (HiWATER-MUSOEXE). *IEEE Geoscience and Remote Sensing Letters*, 2015, 12 (1), 68-72. doi:10.1109/LGRS.2014.2326180
9. Ge Y, Liang YZ, Wang JH, Zhao QY, Liu SM. Upscaling sensible heat fluxes with area-to-area regression kriging. *IEEE Geoscience and Remote Sensing Letters*, 2015, 12(3), 656-660. doi:10.1109/LGRS.2014.2355871
10. Gao SG, Zhu ZL, Liu SM, Jin R, Yang GC, Tan L. Estimating spatial distribution of soil moisture based on Bayesian maximum entropy method with auxiliary data from remote sensing. *International Journal of Applied Earth Observation and Geoinformation*, 2014, 32, 54-66. doi:10.1016/j.jag.2014.03.003
11. Bai, J., Jia, L., Liu, S., Xu, Z., Hu, G., Zhu, M., Song, L.. Characterizing the Footprint of Eddy Covariance System and Large Aperture Scintillometer Measurements to Validate Satellite-Based Surface Fluxes. *IEEE Geoscience and Remote Sensing Letters*, 2015, 12(5), 943-947. doi:10.1109/LGRS.2014.2368580
12. Xu TR, Liu SM, Xu ZW, Liang SL, Xu L. A dual-pass data assimilation scheme for estimating surface fluxes with FY3A-VIRR land surface temperature. *Sci. China Earth Sci.*, 2015, 58(2), 211-230, doi: 10.1007/s11430-014-4964-7.
13. Hu MG, Wang JH, Ge Y, Liu MX, Liu SM, Xu ZW, Xu TR. Scaling Flux Tower Observations of Sensible Heat Flux Using Weighted Area-to-Area Regression Kriging, *Atmosphere* 2015, 6, 1032-1044.

14. Xu T, Liu S, Xu L, Chen Y, Jia Z, Xu Z, Nielson J. Temporal Upscaling and Reconstruction of Thermal Remotely Sensed Instantaneous Evapotranspiration. *Remote Sensing*. 2015, 7(3):3400-3425.  
doi:10.3390/rs70303400
15. Song LS, Liu SM, William Kustas P, Zhou J, Ma YF. Using the Surface Temperature-Albedo Space to Separate Regional Soil and Vegetation Temperatures from ASTER Data. *Remote Sensing*, 2015, 7(5):5828-5848.  
doi:10.3390/rs70505828
16. Zhou J, Li MS, Liu SM, Jia ZZ, Ma YF. Validation and performance evaluations of methods for estimating land surface temperatures from ASTER data in the middle reach of the Heihe River Basin, Northwest China. *Remote Sensing*, 2015, 7, 7126-7156.
17. Li Y, Sun R, Liu SM. Vegetation Physiological Parameters Setting in the Simple Biosphere Model 2 (SiB2) for alpine meadows in upper reaches of Heihe River. *SCIENCE CHINA*, 2014,doi:10.1007/s11430-014-4909-1
18. Zhang L, Sun R, Xu ZW, Qiao C, Jiang GQ. Diurnal and Seasonal Variations in Carbon Dioxide Exchange in Ecosystems in the Zhangye Oasis Area, Northwest China. *PLoS ONE*, 2015, 10(3).  
doi:10.1371/journal.pone.0120660

#### DOI

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#### Limitation

1. The dataset is generated from the "Heihe Watershed Allied Telemetry Experimental Research (HiWATER)". User must have a clear statement in the article of the original data source and cite the dataset and papers in the Citation section.

#### Online Resources

1. <ftp://ftp2.westgis.ac.cn>
2. <http://card.westgis.ac.cn>

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