# Cold and Arid Regions Science Data Center

# China Meteorological Assimilation Driving Datasets for the SWAT model Version 1.0

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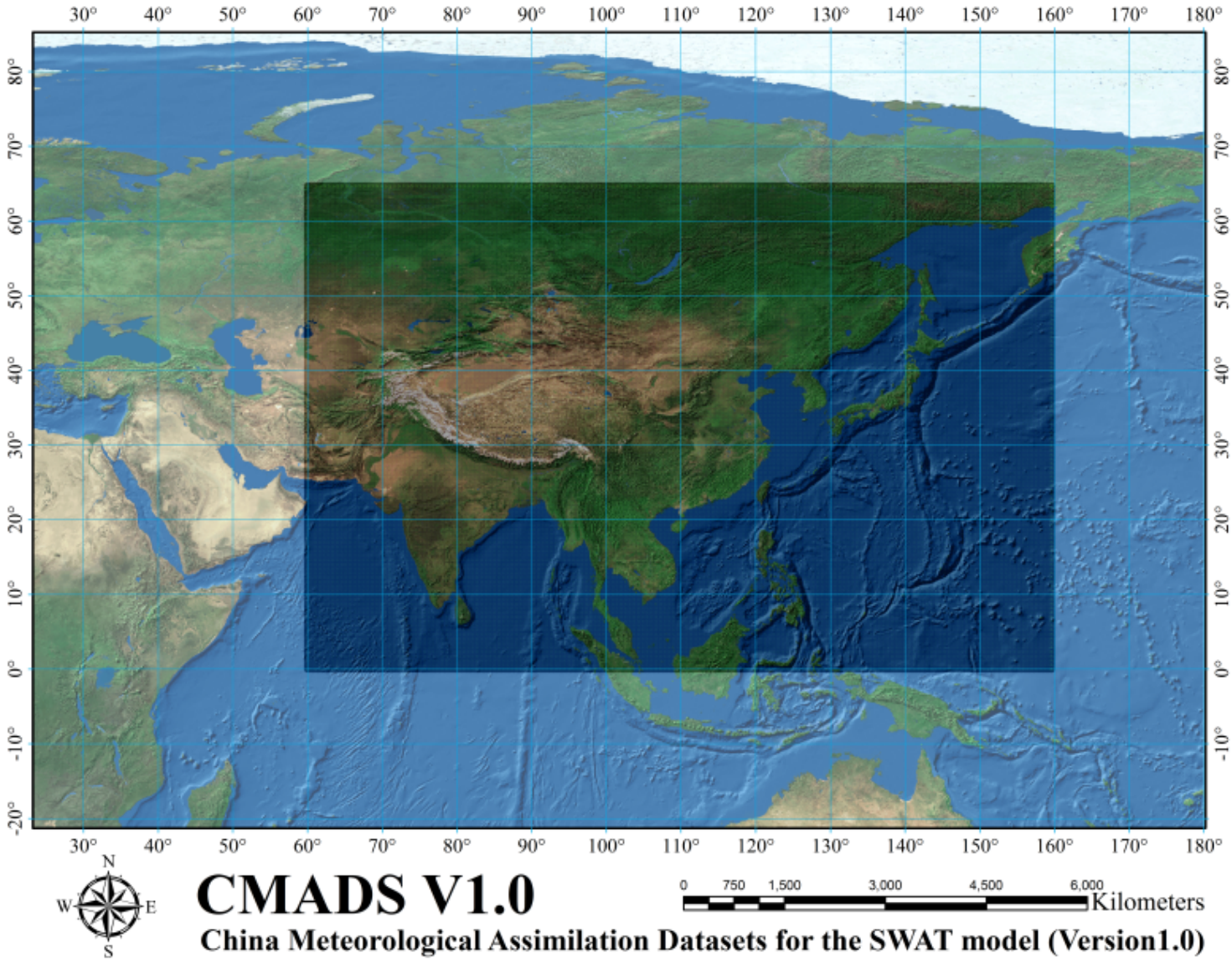

# China Meteorological Assimilation Driving Datasets for the SWAT model Version 1.0


## Abstract

The China Meteorological Assimilation Driving Datasets (CMADS) incorporates technologies of the China Land Data Assimilation System (CLDAS) developed by the China Meteorological Administration. It was constructed using multiple technologies and scientific methods, including loop nesting of data, projection of resampling models, and bilinear interpolation. The CMADS series of datasets can be used to drive various hydrological models, such as SWAT, the Variable Infiltration Capacity (VIC) model, and the Storm Water Management model (SWMM). It also allows users to conveniently extract a wide range of meteorological elements for detailed climatic analyses. Data sources for the CMADS series include nearly 40,000 regional automatic stations under China's 2,421 national automatic and business assessment centres. This ensures that the CMADS datasets have wide applicability within the country, and that data accuracy was vastly improved.

The CMADS series of datasets has undergone finishing and correction to match the specific format of input and driving data of SWAT models. This reduces the volume of complex work that model builders have to deal with. An index table of the various elements encompassing all of East Asia was also established for SWAT models. This allows the models to utilize the datasets directly, thus eliminating the need for any format conversion or calculations using weather generators. Consequently, significant improvements to the modelling speed and output accuracy of SWAT models were achieved.

Most of the source data in the CMADS datasets are derived from CLDAS in China and other reanalysis data in the world. The integration of air temperature, air pressure, humidity, and wind velocity data was mainly achieved through the LAPS/STMAS system. Precipitation data were stitched using CMORPH's global precipitation products and the National Meteorological Information Center's data of China (which is based on CMORPH's integrated precipitation products). The latter contains daily precipitation records observed at 2,400 national meteorological stations and the CMORPH satellite's inversion precipitation products.The inversion algorithm for incoming solar radiation at the ground surface makes use of the discrete longitudinal method by Stamnes et al.(1988)to calculate radiation transmission. The resolutions for CMADS V1.0, V1.1, V1.2, and V1.3 were 1/3°, 1/4°, 1/8°, and 1/16°, respectively.

In CMADS V1.0 (at a spatial resolution of 1/3°), East Asia was spatially divided into 195 × 300 grid points containing 58,500 stations. Despite being at the same spatial resolution as CMADS V1.0, CMADS V1.1 contains more data, with 260 × 400 grid points containing 104,000 stations. For both versions, the stations' daily data include average solar radiation, average temperature, average pressure, maximum and minimum temperature, specific humidity, cumulative precipitation, and average wind velocity.

The CMADS comprises other variables for any hydrological model (under 'For-other-model' folder ) : Daily Average Temperature, Daily Maximum Temperature, Daily Minimum Temperature, Daily cumulative precipitation (20-20h), Daily average Relative Humidity, Daily average Specific Humidity, Daily average Solar Radiation, Daily average Wind, and Daily average Atmospheric Pressure.


Introduction to metadata of CMADS

CMADS storage path description:(CMADS was divided into two datesets)
1.CMADS-V1.0\For-swat\ --specifically driving the SWAT model
2.CMADS-V1.0\For-other-model\ --specifically driving the other hydrological model(VIC,SWMM,etc.)

CMADS--\For-swat-2009\ folder contain:(Station\ and Fork\)

1).Station\

Relative-Humidity-58500\ Daily average relative humidity(fraction)

Precipitation-58500\ Daily accumulated 24-hour precipitation(mm)

Solar radiation-58500\ Daily average solar radiation(MJ/m2)

Tmperature-58500\ Daily maximum and minimum temperature(°C)

Wind-58500\ Daily average wind speed(m/s)

Where R, P, S, T, W+ dimensional grid number - the number of longitude grid is the station in the above five

folders respectively.(Where R,P,S,T,W respective Daily average relative humidity,Daily cumulative

precipitation(24h),Daily mean solar radiation(MJ/m2),Daily maximum and minimum temperature(°C) and Daily mean

wind speed (m/s)) respectively.Data format is (.dbf)

2).Fork\ (Station index table over East Asia)

PCPFORK.txt (Precipitation index table)

RHFORK.txt (Relative humidity index table)

SORFORK.txt (Solar radiation index table)

TMPFORK.txt (Temperature index table)

WINDFORK.txt (Wind speed index)

CMADS--\For-swat-2012\ folder contain:(Station\ and Fork\) Storage structure is consistency with \For-swat-

2009\.However, all the data in this directory are only available in TXT format and can be readed by SWAT2012.

3)\For-other-model\ (Includes all weather input data required by the any hydrologic model (daily).)

Atmospheric-Pressure-txt\ Daily average atmospheric pressure(hPa)

Average-Temperature-txt\ Daily average temperature(°C)

Maximum-Temperature-txt\ Daily maximum temperature(°C)

Minimum-Temperature-txt\ Daily minimum temperature(°C)

Precipitation-txt\ Daily accumulated 24-hour precipitation (mm)

Relative-Humidity-txt\ Daily average relative humidity(fraction)

Solar-Radiation-txt\ Daily average solar radiation(MJ/m2)

Specific-Humidity-txt\  Daily average Specific Humidity(g/kg)

Wind-txt\ Daily average wind speed(m/s)

Data storage information: data set storage format is .dbf and .txt

Other data information:

Total data: 33.6GB

Occupied space: 35.2GB

Time: From year 2008 to year 2016

Time resolution: Daily

Geographical scope description: East Asia

Longitude: 60 ° E

The most east longitude: 160 ° E

North latitude: 65 ° N

Most southern latitude: 0 ° N

Number of stations: 58500 stations

Spatial resolution: 1/3 * 1/3 * grid points

Vertical range: None

The main production and other contributions: Meng Xianyong, Wang Hao, Lei Xiaohui, Liu Shiyin, Liu Zhihui, Shi Chunxiang, Cai Yu, Hu Jiajun, Zhang Xuesong, Long Aihua, Chen Xi, Yin Gang, Bai Lei, Zhang Tao, Liao Weihong, Yang Mingxiang, Zhao Honggang, Zhao Qiudong, well, Ji Xiaonan, Wu Hongjing, Zheng Bin, Cao Kaijun

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Pearl River water conservancy comprehensive technology center

## Keywords

Theme: Atmospheric data assimilation, SWAT, Meteorological and hydrology,
Place: East & South East Asia,
Temporal: 2008-01-01 to 2016-12-31,
Discipline: Geographic science, hydrology, meteorology,
Statrum:

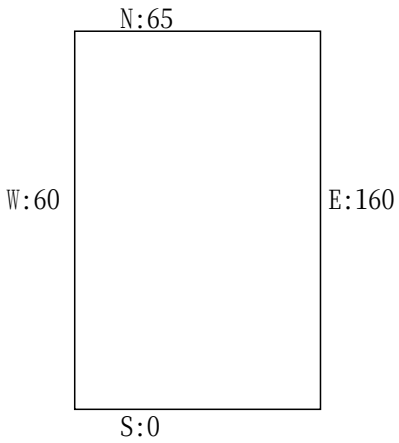
## ISO 19115 Category

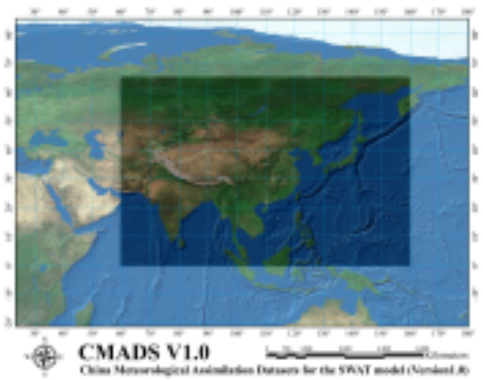
Category: climatologyMeteorologyAtmosphere

## Detail

Scale: 10000
Project:
Data Volume(MB): 35200
Data Format: text and dbf

## Position and Thumbnail




## Temporal Range

Start: 2008-01-01
End: 2016-12-31

## Citation

1. Meng, X.; Wang, H.; Cai, S.; Zhang, X.; Leng, G.; Lei, X.; Shi, C.; Liu, S.; Shang, Y. The China Meteorological Assimilation Driving Datasets for the SWAT Model (CMADS) Application in China: A Case Study in Heihe River Basin. Preprints 2016, 2016120091 (doi: 10.20944/preprints201612.0091.v2).
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## Recommended Publications

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3. 孟现勇,王浩等.基于CLDAS强迫CLM3.5模式的新疆区域土壤温度陆面过程模拟及验证[J].生态学报.2017,37(3),979-995.DOI:10.5846/stxb201508171717.
4. 孟现勇,王浩等. XJLDAS同化驱动场及其强迫CLM3.5模式的新疆区域土壤湿度陆面过程模拟及验证[J].生态学报.2017,40(5).DOI:10.5846/stxb201608241728.
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12. Meng, X., Wang, H. (2017).Significance of the China Meteorological Assimilation Driving Datasets for the SWAT Model (CMADS) of East Asia. Water. 9, (10),765. doi:10.3390/w9100765.
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14. Meng,X.Y.(2018).Spring Flood Forecasting Based on the WRF-TSRM mode.Teh. Vjesn.25(1):27-37.

## DOI

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## Limitation

1. Respect for the protection of intellectual property rights and the interests of the author, the extended data data center service, evaluation of potential data, please data users in the research results generated using the data (including published papers, data products and unpublished research reports, data products and achievements), indicate the source of data author and data. For reprint (two or more times) data, the author must indicate the original data source.

## Online Resources

1. http://card.westgis.ac.cn ftp://ftp2.westgis.ac.cn/

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