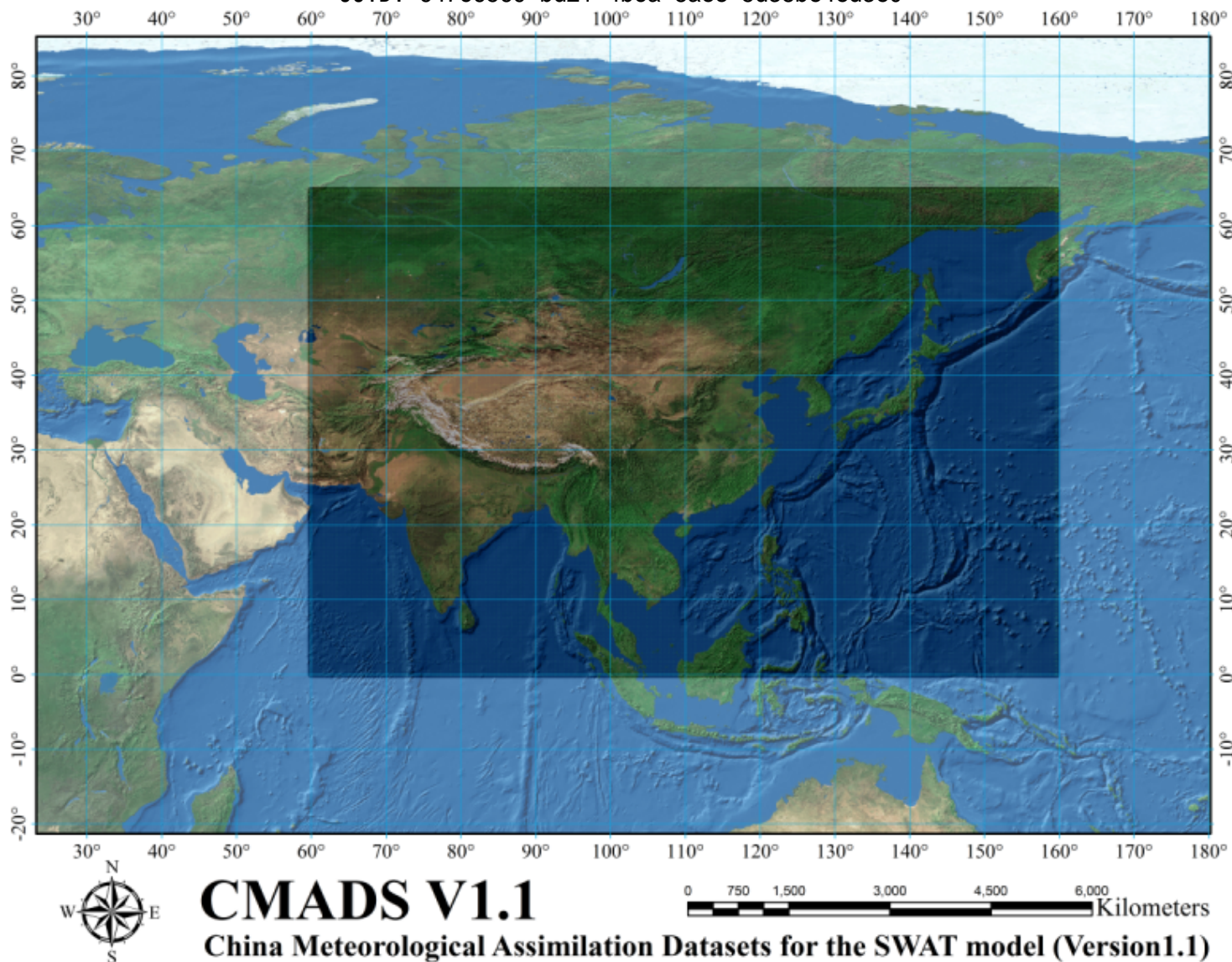




Cold and Arid Regions Science Data Center

# China Meteorological Assimilation Driving Datasets for the SWAT model Version 1.1

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## 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 (2m), air pressure, humidity, and wind speed data (10m) 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  $1/3^\circ$ ,  $1/4^\circ$ ,  $1/8^\circ$ , and  $1/16^\circ$ , respectively.

In CMADS V1.0 (at a spatial resolution of  $1/3^\circ$ ), East Asia was spatially divided into  $195 \times 300$  grid points containing 58,500 stations. Despite being at the same spatial resolution as CMADS V1.0, CMADS V1.1 contains more data, with  $260 \times 400$  grid points containing 104,000 stations. For both versions, the stations' daily data include average solar radiation, average temperature (2m), average pressure, maximum and minimum temperature (2m), specific humidity, cumulative precipitation, and average wind speed (10m). The CMADS comprises other variables for any hydrological model (under 'For-other-model' folder): Daily Average Temperature (2m), Daily Maximum Temperature (2m), Daily Minimum Temperature (2m), Daily cumulative precipitation (20-20h), Daily average Relative Humidity, Daily average Specific Humidity, Daily average Solar Radiation, Daily average Wind (10m), and Daily average Atmospheric Pressure.

Introduction to metadata of CMADS

CMADS storage path description:(CMADS was divided into two datasets)

- 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/m<sup>2</sup>)

Temperature-58500\ Daily maximum and minimum 2m temperature( )

Wind-58500\ Daily average 10m 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/m<sup>2</sup>), Daily maximum and minimum temperature( ) 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 2m temperature( )  
Maximum-Temperature-txt\ Daily maximum 2m temperature( )  
Minimum-Temperature-txt\ Daily minimum 2m temperature( )  
Precipitation-txt\ Daily accumulated 24-hour precipitation (mm)  
Relative-Humidity-txt\ Daily average relative humidity(fraction)  
Solar-Radiation-txt\ Daily average solar radiation(MJ/m<sup>2</sup>)  
Specific-Humidity-txt\ Daily average Specific Humidity(g/kg)  
Wind-txt\ Daily average 10m wind speed(m/s)

Data storage information: data set storage format is .dbf and .txt  
Other data information:  
Total data: 45GB  
Occupied space: 50GB  
Time: From year 2008 to year 2014  
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

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University of Maryland  
Jiangxi Meteorological Information Center  
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memorial university of newfoundland  
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 2014-12-31,  
Discipline: Geographic science, Hydrology, Meteorology,  
Statrum:

## ISO 19115 Category

Category: climatologyMeteorologyAtmosphere

## Detail

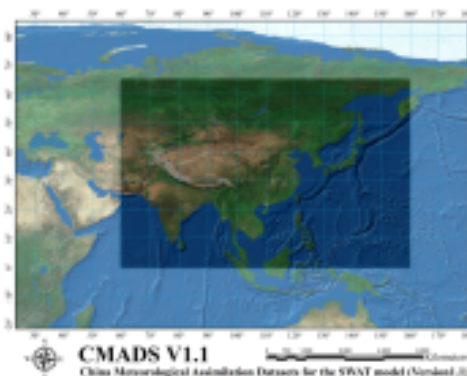
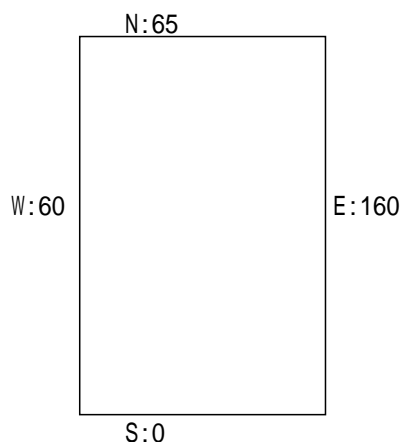
Scale: 10000

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

Data Volume(MB): 50000

Data Format: text and dbf

## Position and Thumbnail



## Temporal Range

Start: 2008-01-01

End: 2014-12-31

## Citation

1. 孟现勇,吉晓楠,刘志辉等.SWAT模型融雪模块的改进与应用研究[J].自然资源学报.2014.29(3):528-539.
2. 孟现勇,师春香,刘时银,王浩,雷晓辉,刘志辉,吉晓楠,蔡思宇,赵求东.CMADS数据集及其在流域水文模型中的驱动作用——以黑河流域为例[J].人民珠江,2016,37(7):1-19.
3. MENG Xian-yong, XiaoNan JI,LIUZhi-hui.Energy Balance-Based SWAT Model to Simulate the Mountain Snowmelt and Runoff – Taking the Application in Juntanghu Watershed (China) as an Example[J]. Journal of Mountain Sciences, 2015.12(2):368-381.DOI:10.1007/s11629-014-3081-6.
4. 孟现勇,王浩,刘志辉,师春香,刘时银,陈曦,龚伟伟.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).DOI:10.5846/stxb201508171717.

## Recommended Publications

1. 师春香, 2008.基于EnKF算法的卫星遥感土壤湿度同化研究[D].博士学位论文,北京:中国科学院研究生院.
2. MENG Xian-yong. Snowmelt Runoff Analysis Under Generated Climate Change Scenarios for the Juntanghu River Basin in China[J].Water Technology and Sciences,2016.7(4),41-54.
3. 张涛, 2013. 基于LAPS/STMAS的多源资料融合及应用研究[M]. 硕士学位论文,南京:南京信息工程大学.
4. 任芝花,熊安元.地面自动站观测资料三级质量控制业务系统的研制[J].气象, 2007,(01):19-24.
5. 游然,卢乃锰: FY-2C 卫星降水估计产品 [http://satellite.cma.gov.cn/jsp/basic/online\\_help.jsp#](http://satellite.cma.gov.cn/jsp/basic/online_help.jsp#)
6. 师春香, 谢正辉. 2008, 基于静止气象卫星观测的降水时间尺度研究.地理科学进展, 27(4): 15-22.

DOI

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5. National Natural Science Foundation of China : (No: 41130531)

## 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://ftp1.westgis.ac.cn/>

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