A Big Earth Data Platform for Three Poles

**China meteorological assimilation driving datasets for the SWAT model Version 1.1 (2008-2016)**

1、Description

CMADS V1.1(The China Meteorological Assimilation Driving Datasets for the SWAT model Version 1.1) Version of the data set introduced the STMAS assimilation algorithm. 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°, 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 (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 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 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/m2),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/m2)  
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

2、Keywords

Theme：Precipitation,Radiation,Temperature,Precipitation amount,Humidity/Dryness,Pressure  
Discipline：Atmosphere  
Places：East Asia,   
Time：2016

3、Data details

1.Scale：None

2.Projection：

3.Filesize：50000.0MB

4.Data format：数字文档

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：65.0 | - |
| west：60.0 | - | east：160.0 |
| - | south：0.0 | - |

5、Time frame:2008-05-11 00:00:00+00:00--2017-05-11 00:00:00+00:00

6、Reference method

References to data:

Wang Hao, Meng Xianyong. China meteorological assimilation driving datasets for the SWAT model Version 1.1 (2008-2016). A Big Earth Data Platform for Three Poles, doi:10.3972/westdc.002.2016.db2018

References to articles:

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. (2016). 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, 37(7), 1-19.  
  
孟现勇, 吉晓楠, 刘志辉等. (2014). SWAT模型融雪模块的改进与应用研究[J]. 自然资源学报, 29(3), 528-539.  
  
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.  
  
Meng, X.Y., Ji, X.N., Liu, Z.H. (2015). 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, 12(2), 368-381. DOI:10.1007/s11629-014-3081-6.

7、Supporting project information

8、Data resource provider

name: Meng Xianyong  
unit: College of Resources and Environment Sciences, China Agricultural University  
email: xymeng@cau.edu.cn  
  
name: Wang Hao  
unit: China Institute of Water Resources and Hydropower Research  
email: None