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APHRODITE daily precipitation and temperature dataset: Development, QC, Homogenization and Spatial Correlation

Akiyo YATAGAI (1) and Tianbao Zhao (2)

(1) Solar-Terrestrial Environment Laboratory, Nagoya University (akiyoyatagai@stelab.nagoya-u.ac.jp), (2) Institute of Atmospheric Physics, Chinese Academy of Sciences

A daily gridded precipitation dataset for the period 1951–2007 was created by collecting and analyzing rain-gauge observation data across Asia through the activities of the Asian Precipitation – Highly Resolved Observational Data Integration Towards Evaluation (APHRODITE) of water resources project. They are available at http://www.chikyu.ac.jp/precip/.

Utilization of station data is ideal for analyses of climatic trends, especially for those of extreme events. However, there was an increasing demand for accurate high-resolution gauge-based precipitation analyses. Rain-gauge based products are sometimes used for assessing trends of climate models or that of river runoff through driving hydrological models, because they are convenient and long records.

On the other hand, some information is lost during the gridding process. Hence, in-house results of testing interpolation scheme, quality control and homogenization may give important information for the users. We will present such results as well as our quality control (QC) in the APHRODITE project activities.

Before gridding, 14 objective QC steps were applied to the rain-gauge data, which mainly includes position checking, duplicate data checking and inhomogeneity and spatiotemporal isolation etc. Details are described in Hamada et al. (2011). For Chinese data, basic QC steps such as duplicate checking and position checking have been made by the local meteorological agency. Hence we made homogenization test and spatial correlation analyses separately.

For 756 Chinese daily temperature stations, we applied Multiple Analysis of Series for Homogenization (MASH) developed by Szentimrey (1999, 2008). The results show this statistical method we used has a good performance to detect the discontinuities in climate series caused by station relocation, instrument change etc. regardless of the absence of metadata. Through the homogenization, most of discontinuities existed in original temperature data can be removed, and the trend become more spatially coherent. However, there are still some uncertainties existed in estimating the amount of adjustments because the data homogenization depends on the statistical method and the reference data to a certain degree.
We will try use similar method to detect and adjust the discontinuties existed in precipitation series in the future.

Following Xie et al. (2007), a cross validation of the interpolation technique used in APHRODITE daily precipitation was conducted The method is based on removing 10% randomly selected stations at a time and performing the interpolation for the locations of the removed stations using the remaining 90% stations. This procedure is repeated 10 times to ensure that all stations were withdrawn once. Then some statistics between the interpolated daily grid box (0.05 degree) precipitation and withdrawn stations were taken. We plotted the correlations against the distance between the withdrawn station and the nearest gauge station, and used the distance as a measure of the station density. As a result, the proportion of significant correlations on all correlations decreases more than 30km away (Zhao and Yatagai, 2013). The statistics between the density and correlation are different from region to region. We will also show the similar analyses results of other domains of Asia at the meeting.