

Progress Report on the Construction of the Daily Precipitation Analyses Over China

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1. Introduction

As part of the Yellow River Project, a suite of daily precipitation analyses products are being constructed for potential applications in meteorological, hydrological and water resources research. The products suite, designed to best take advantage of the available information to meet the needs for various programs, is comprised of three major components; i.e. 1) a gauge-based analysis on a 0.5° lat/lon grid over the East Asia ($70^\circ\text{E} - 140^\circ\text{E}$; $0^\circ-60^\circ\text{N}$) for an extended period from 1961 to the present (the Base Product); 2) a gauge-based analysis on 0.1° lat/lon grid over the Yellow River basin for the same period (the Derived Product); and 3) a satellite-gauge merged analysis on a 0.25° lat/lon grid over the East Asia for a recent period (the Merged Product).

The gauge-based analyses are the mainstay of the products suite, both for its extended temporal coverage and for its role in determining the magnitude in the merged analysis. In this article, we will report the recent progress on the construction of the gauge-based analyses of daily precipitation over the East Asia.

2. Methodology

The overall strategy for constructing the daily precipitation analyses is a modification of Chen et al. (2002), which was originally designed for gauge-based analyses of monthly precipitation over the global land areas.

The construction of the daily precipitation is composed of three steps. First, a gridded analysis of daily precipitation climatology is created for each of the 365 calendar days by interpolating the long-term mean daily precipitation observations at available gauge stations. An analyzed field of the ratio between the daily observation and daily climatology is then generated from the corresponding values at all available stations. The analysis of total daily precipitation is finally defined by multiplying the analyzed daily climatology with the ratio.

In creating the products suite, the analysis is first produced on a 0.05° lat/lon grid over the entire East Asia domain. The Base Product and the Derived Product are then computed by averaging the values at the 0.05° lat/lon resolution. A gauge-based analysis on 0.25° lat/lon is also created for use as input to the Merged Product, ensuring the consistency between the gauge-based analyses and the merged analysis.

3. Gauge Data

Station observations of daily precipitation from three individual data sets are used to construct the gauge-based analyses over the East Asia. These are the Global Telecommunication System (GTS) daily summary files archived by the NOAA Climate Prediction for a period from 1977 to the present; a personal collection of Chinese daily observations (CHN) for a period from 1951 to the present; and the daily gauge data from the Chinese Yellow River Commission (YRC) for a period from 1930S to 1997. Since most of the GTS stations are included in the CHN data set, only daily observations from CHN and YRC data sets are used inside China, while the GTS gauge data are used over the regions outside China. When combined, observations of daily precipitation at over 2500 stations are available over the East Asia domain. Fig.1 shows gauge locations from the individual and the combined data sets. Reasonable gauge coverage is available over most of the land areas of the East Asia domain, while network density is very high along the Yellow River, making it possible to creating a high resolution precipitation analysis with reliable quality over the region.

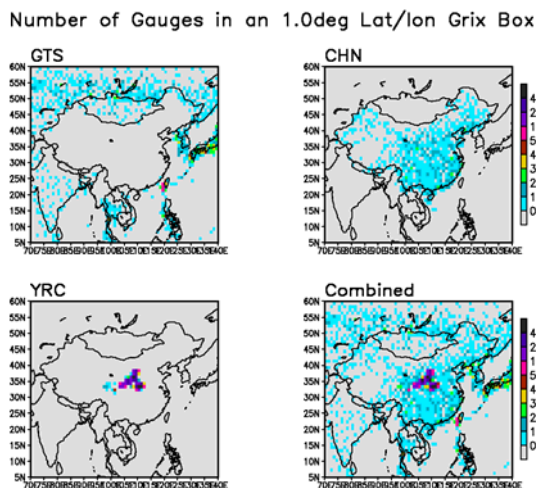
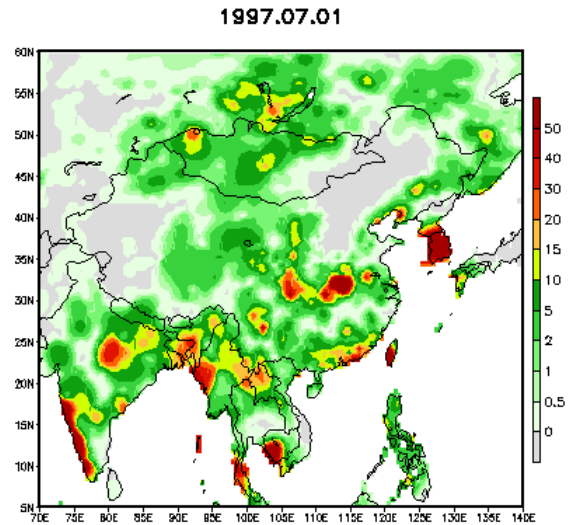


Figure 1. Number of gauges in each 1.0° lat/lon grid box as from the individual and the combined data sets.

4. Preliminary Result

A test version of the gauge-based analyses of daily precipitation has been generated for a 5-year period from 1994 to 1998 for quantitative examinations. Presented in fig.2 is an animation of the daily precipitation maps for a 31-day period from July 1 –31, 1997. Day-to-day variations of precipitation are well captured by this test product.

Figure 2: An animation of daily precipitation maps (mm/day) for a 31-day period from July 1 – 31, 1997.



5. Future Plan

Work is underway toward the completion of the gauge-based analyses for the Yellow River Project. In addition to the quantitative examinations for the test products for the 5-year period as mentioned above, our future work will focus on:

- 1) collecting station data from more stations;
- 2) improving the daily precipitation climatology with orographic consideration; and;
- 3) modifying the interpolation algorithm for better quantitative accuracy.

Your comments, suggestions, and cooperation are highly appreciated.

6. References

Chen, M., P. Xie, and J.E. Janowiak, and P.A. Arkin, 2002: Global Land Precipitation: A 50-yr Monthly Analysis Based on Gauge Observations, *J. Hydrometeor.*, **3**, 249 – 266.