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APHRODITE: Constructing a long-term daily gridded precipitation dataset for Asia based on a dense network of rain gauges and improving the Asian monsoon forecasts

Akiyo Yatagai[†]; Akio Kitoh; Tiruvalum Krishnamurti
[†] Kobe University, Japan
Leading author: ayatagai@gmail.com

A better understanding of the behavior of the precipitation system and its interactions with the climate system components is critical to predict its future evolution, reduce vulnerability to high impact weather and sustain life. Precipitation is one of the most discontinuous atmospheric phenomena due to its high spatial and temporal variability. Hence, lack of a quantitative high-resolution precipitation product was a bottleneck for many climate studies. A daily gridded precipitation dataset covering a period of 57 years 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 the Evaluation of Water Resources (APHRODITE) project. APHRODITE's daily gridded precipitation is presently the only long-term continental-scale high-resolution daily product. Our product is based on data collected at 5000 to 12,000 stations, which represents 2.3 to 4.5 times the data available through the Global Telecommunication System (GTS) network that are used for most daily gridded precipitation products. Hence, the APHRODITE project has substantially improved the depiction of the areal distribution and variability of precipitation around the Himalayas, Southeast Asia and mountainous regions of the Middle East. For example, an analysis which uses only GTS-gauge underestimates 2000 mm/year precipitation over the Himalayas and Indonesia compared with the APHRODITE product, which corresponds to 1/3 to 1/2 of the annual total precipitation. Hence, APHRODITE product could contribute to understand the latent heat releases associated with the Asian monsoon, and to improve of monsoon climate forecast. Further, the APHRODITE project contributes to studies such as the determination of Asian monsoon precipitation change, evaluation of water resources, verification of high-resolution model simulations and satellite precipitation estimates, and improvement of various forecasts. The APHRODITE project carried out outreach activities with Asian countries, and communicates with national institutions and world data centers. We released APHRO_V1101 datasets for Monsoon Asia, the Middle East and Russia (on 0.5∞◊ 0.5∞ and 0.25∞ ◊ 0.25∞ grids) and the APHRO_JP_V1005 dataset for Japan (on a 0.05∞ ◊ 0.05∞ grid, 100 years) on the website (http://www.chikyu.ac.jp/precip/). We welcome cooperation and feedback from users.