Improving APHRODITE algorithm for assessing precipitation extremes -- Check End of the Day --

*Akiyo Yatagai[1], Minami Masuda[1], Kenji Kamiguchi[3], Sunil Kumar[1], Natsuko Yasutomi[2], Mio Maeda[1]

1. Hirosaki University, 2. Disaster Prevention Research Institute, Kyoto University, 3. Japan Meteorological Agency

The Asian Precipitation–Highly-Resolved Observational Data Integration Towards Evaluation of Water Resources (APHRODITE, Yatagai et al., 2012) is widely used for analyzing Asian monsoon systems and for validating various estimated precipitation by climate models and satellite estimates. The algorithm was developed mainly for driving hydrological models (Xie et al., 2007) and we tried to use as many as rain-gauge observation data (Yatagai et al., 2008, 2009 and 2012).

Recently, the change of extreme events are focused by the international scientific frameworks. However, there are some trade-off issues to develop/utilize the APHRODITE data for extreme event studies. One of them is different “end-of-day”, which is attributed from different 24-hour accumulation time of measuring “daily” precipitation of routine observation at each meteorological organization. For example, most countries are archiving their 24-hour precipitation data separately from reporting near-real time 6-hourly or 12-hourly observation to global telecommunication system (GTS) for instant exchange of observation data under WMO resolution#40. APHRODITE has used all these different 24-hour accumulation data according to the above mentioned strategy. Many are manually measured and recorded in the morning of local time, for example, India (Nepal) records daily precipitation at 8:30AM (8:45AM), which is 3UTC of the stamped date. In this case we define end of the day (EOD) is 3 UTC.

In order to use grid data for extreme event studies, at least we must avoid in mixing different EOD data in a region (e.g. country). Hence, we checked EOD by using satellite-based hourly precipitation estimates (Xie et al., 2016). We take 24-hour accumulation starting one day before and one day after, namely we created 72-case of “daily” precipitation time series of CMORPH, and compare them with rain-gauge data according to each dataset at each country. This method generally works well and show exact results to known EOD data over the tropics and/or regions where convective rainfall dominates (e.g. Philippines, India, Nepal, central/southern part of China). However, estimated EOD is less stable in dry region of few precipitation and cold region where stratiform precipitation dominates. Hence, we are using 3 hourly forecast precipitation data by ECMWF’s ERA-interim. Using these EOD information in addition to personal meta-data archive, we select data to use next version of APHRODITE (V1801).

Combining other efforts of the APHRODITE algorithm developments including quality control, EOD adjustment using satellites and further improvement of interpolation scheme, we will release next version sometime in 2019.

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