

Development of the daily grid precipitation dataset: Towards evaluation of the global warming effects on water resources over the East Mediterranean

A. Yatagai (1), P. Xie (2) and P. Alpert (3)

(1) Research Institute for Humanity and Nature, Japan, (2) Climate Prediction Center/NOAA, USA, (3) Tel-Aviv University, Israel (akiyo@chikyu.ac.jp / Fax: +81-75-707-2506 / Phone: +81-75-707-2204)

Recent high-resolution atmospheric general circulation models, such as 20km resolution model by Japanese Meteorological Research Institute (MRI) of Japan Meteorological Agency can simulate rainfall pattern over the complicated terrains. However, current observed precipitation pattern is not well reported due to lack of progress in data assembly especially over the East Mediterranean region. It is inevitably important to construct a long-term daily precipitation data based on a rain-gauge network over the region, for validating simulated precipitation from high-resolution models. Recent climatological models project that the East Mediterranean/Mid-East will have less rainfall and less river discharge due to the global warming (IPCC, 2001; Milly et al., 2005; Nohara et al., 2006). Recent studies of rainfall trends in the Mediterranean basin, have pointed on a paradoxical increase of extreme rainfall in spite of decrease in the totals, as shown by Alpert et al., 2002. Therefore, quantitative estimate of observed daily precipitation and its time-space variability are inevitably important in order to assess the impacts of global warming to local hydrological resources. Hence, an attempt was made to develop daily grid precipitation dataset over the East Mediterranean with representing orographic effect. Here, advanced methodology followed in constructing daily grid precipitation analysis over the East Mediterranean is reported.

Xie et al. (2004, 2006) developed an algorithm to create daily grid precipitation product based on rain gauge data over East Asia. In this algorithm, orographic effect is considered both implicitly and explicitly. By interpolating daily ratio field separately to the mean field, we can explain orographic effect implicitly (New et al., 1999; Chen et al., 2002). In addition, for the East Asia analysis, monthly mean climatology was adjusted to Parameter-elevation Regressions on Independent Slopes Model (PRISM, Daly et al., 1994). We are developing similar dataset over the East Mediterranean region. Since PRISM is not currently available for East Mediterranean, we devise interpolation implicitly.

We first define monthly climate normal by using the 1222 station data from Israel (19 stations), Iran (337 stations), Turkey (225 stations) and GHCN ver2b. Then, climate normal is analyzed (interpolated) by Shepard (1968) algorithm; we interpolated it into

0.05 degree grid box. The analysis domain is 15E-70E, 15-55N. As a next step, we defined daily climate normal for each station by averaging daily precipitation and then take the first 6 harmonics to truncate the averaged time series. The daily precipitation climatology was adjusted by monthly precipitation climatology. Then we compute analyzed field of ratio of daily observation to daily climatology for the target day, and finally daily precipitation is defined by multiplying the daily climatology with the daily ratio. In the current version (V0605) only uses daily precipitation data from Turkish State Meteorological Service and from Global Telecommunication System (GTS). We are assembling historical archive daily precipitation data of this region for the improvement of this dataset.

Our product shows quantified daily precipitation variation over the East Mediterranean. It also successfully expressing orographically induced precipitation over Iran, especially along the southern periphery of Caspian Sea and the west side slopes of Zagros Mountains, although they are base on monthly precipitation data. This data can be used for any scientific purposes in the future. We welcome any form in improving this analysis by refining the algorithm and including more rain-gauge data.