

Summary

There was a big shortage on the possession and the processing capacity of the global climate data in China. Therefore, through extensive research and international cooperation, CMA's first global land surface datasets was developed by integrating the multi-source global/regional/national datasets. The intent is to increase the intensity of stations in sparse regions and extend the time length of stations in density regions, basing on the several typical global climate datasets. The datasets will be used for CMA climate monitoring activates, including calculation of global land surface temperature anomalies and trends, especially in Asia regions.

1. Temperature

Monthly (1900-): Totally, By integrating 15 data resources, the dataset contains 9519 stations from all over the world with the length no less than 20 years for mean temperature, while 7073 for maximum and 6587 for minimum temperature. Compared with other existing temperature datasets, the station density is much higher, especially for South America, Africa and Asia regions; besides, there are much more stations after 1990s, which would dramatically reduce the uncertainty of the estimated global temperature trend for the last two decades. The new dataset can be served as a reliable data source for global climate change study.

Daily (1951-): the dataset integrated different data resources: GHCN daily (7752), GSOD (9546), ECA(2569), Australia, Russia, China, Korea, the station number is about 8000-9000 after 1970s, before that it is about 3000-7000. Asia has the densest stations, the number is above 2000 after 1970s.

2. Precipitation

Monthly (1900-): 9 data resources including GHCN daily, CPC, have been integrated into the new dataset. The dataset contains 33492 stations, in which 3681 stations with the length more than 100 years.

Daily(1951-): GHCN daily(24338), GSOD(8452), CPC(3016) and China(825), the station number is larger than that of global scale, but in Asia, the station number is less than that of temperature. Considering the precipitation has worse spatial representation, the data coverage is inadequate in this region.

1 Overview of the CMA's integrated global dataset

1.1 Temperature

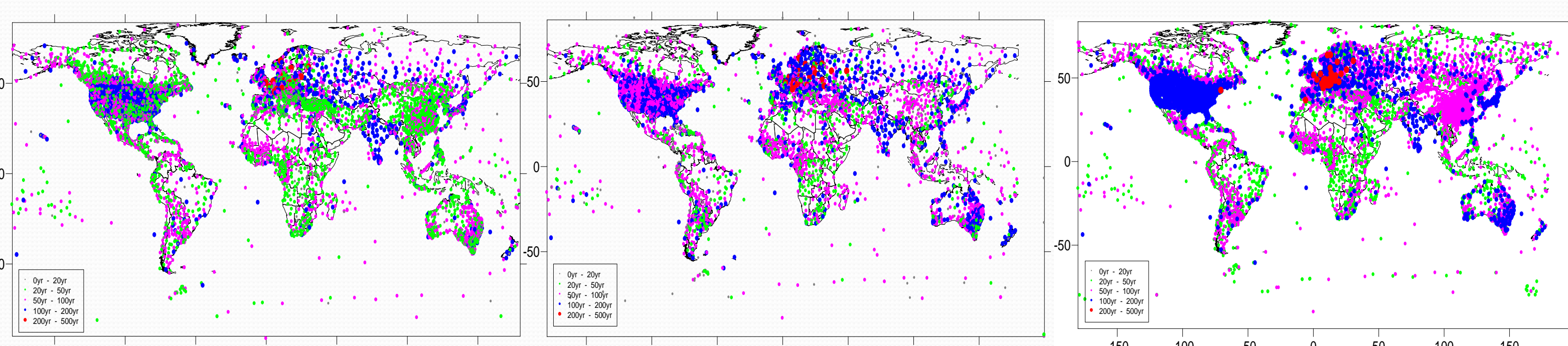


Fig 1 the distribution of the stations for monthly temperature in 3 global datasets (left: GHCN monthly; middle : CRUTemp3; right: CMAInt)

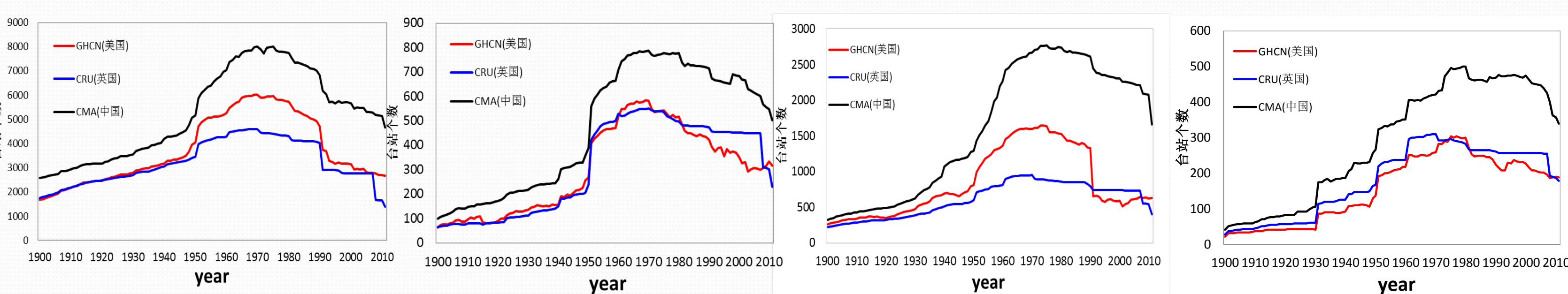


Fig 2 the variations of the station numbers for different datasets during 1900-2013 (from left-right : global, Africa, Asia, South America)

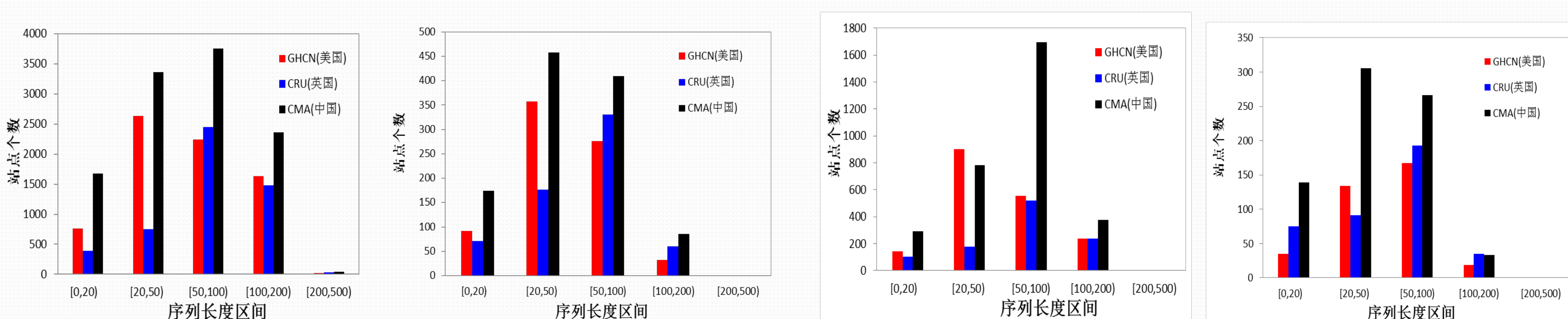
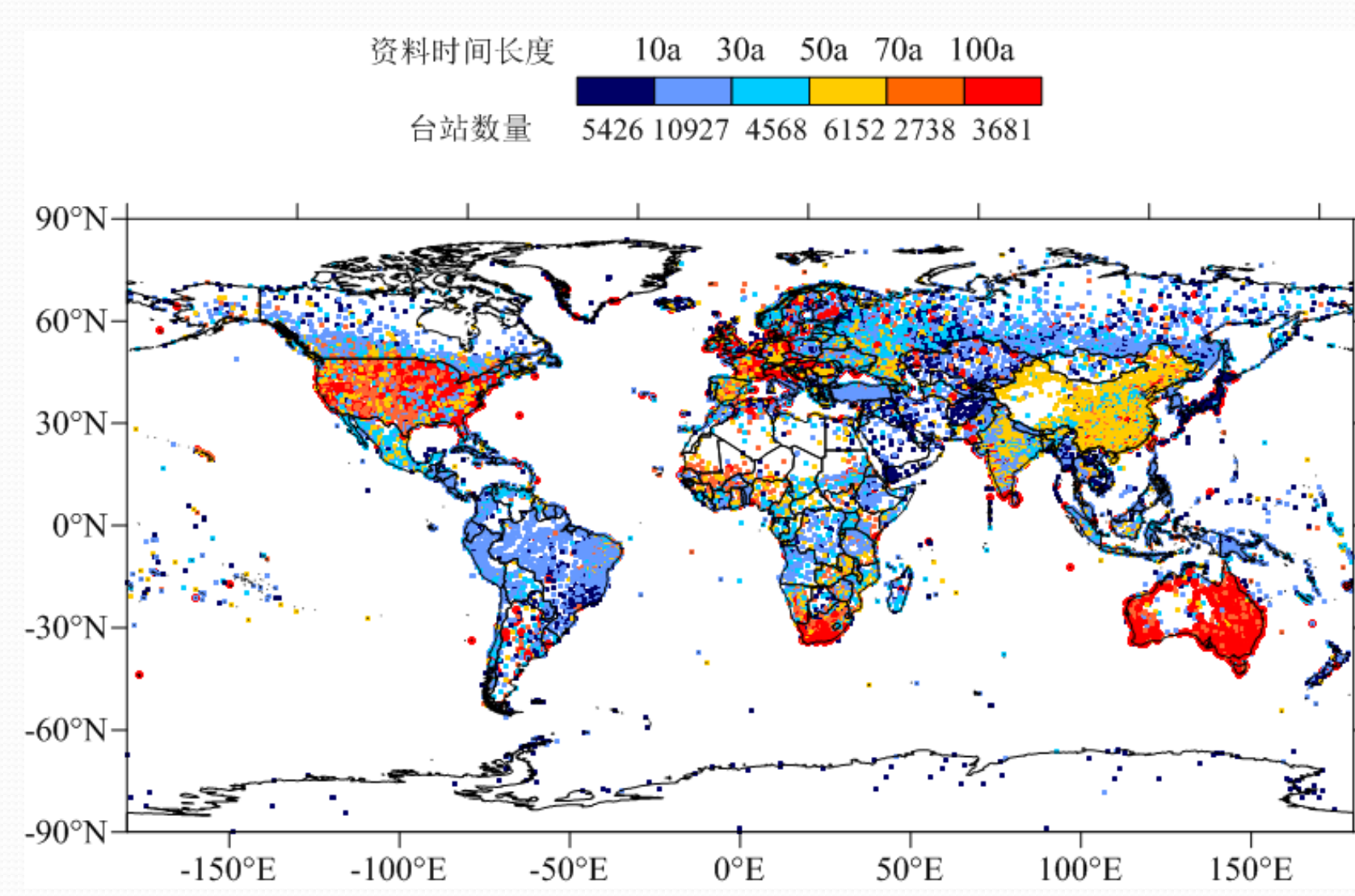


Fig 3 the comparison of the length of the stations series for different datasets (from left-right : global, Africa, Asia, South America)

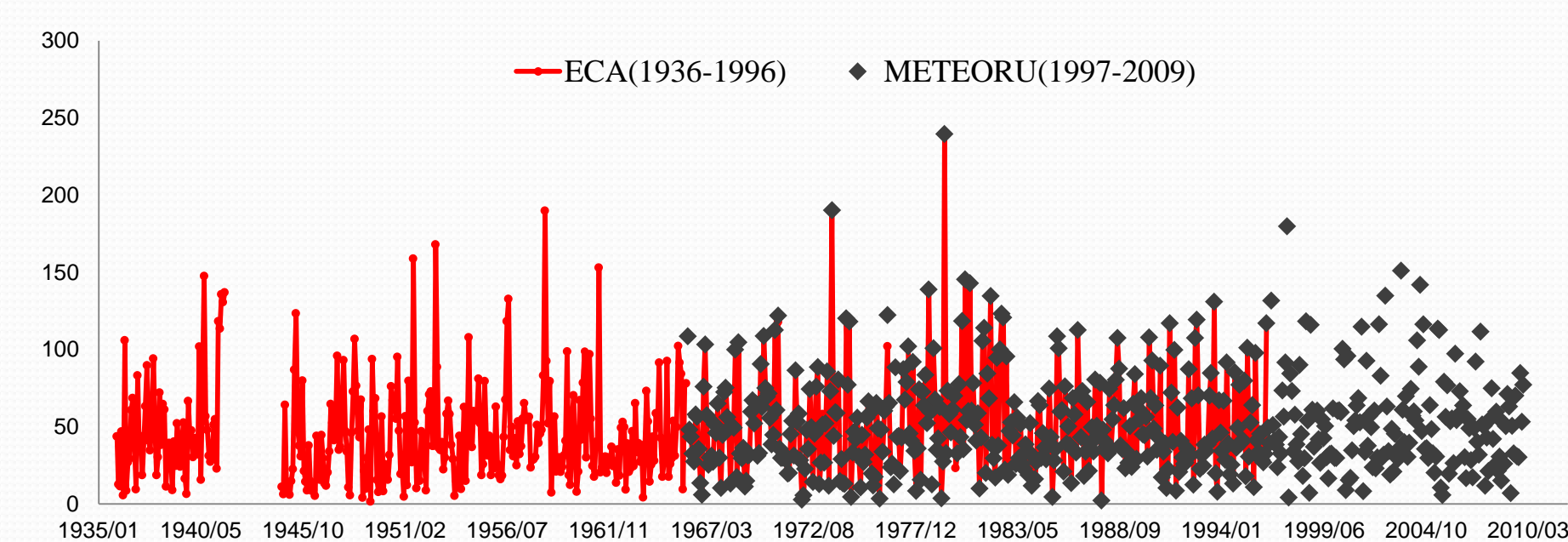
1.2 Precipitation



- I. Add monthly precipitation of 825 national stations (1951-2013) in China
- II. Interpolation of the long term series before 1950 in China;
- III. Interpolation of other 380 stations series outside China;
- IV. Totally, about 32 thousand monthly series

Fig 4 The length of the stations series for CMAInt (upper)

Fig 5 Interpolation of the long term series (for station 34202, from ECA and Meteoru) (botom)



1.3 daily data

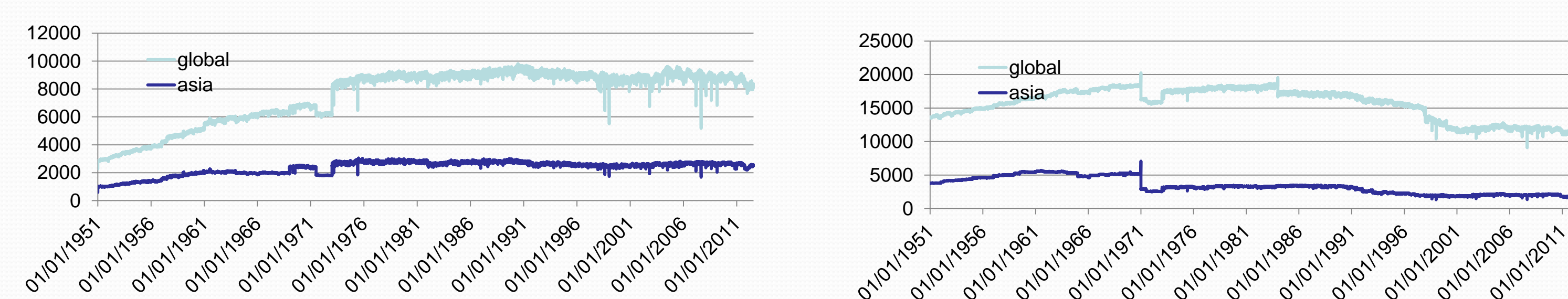
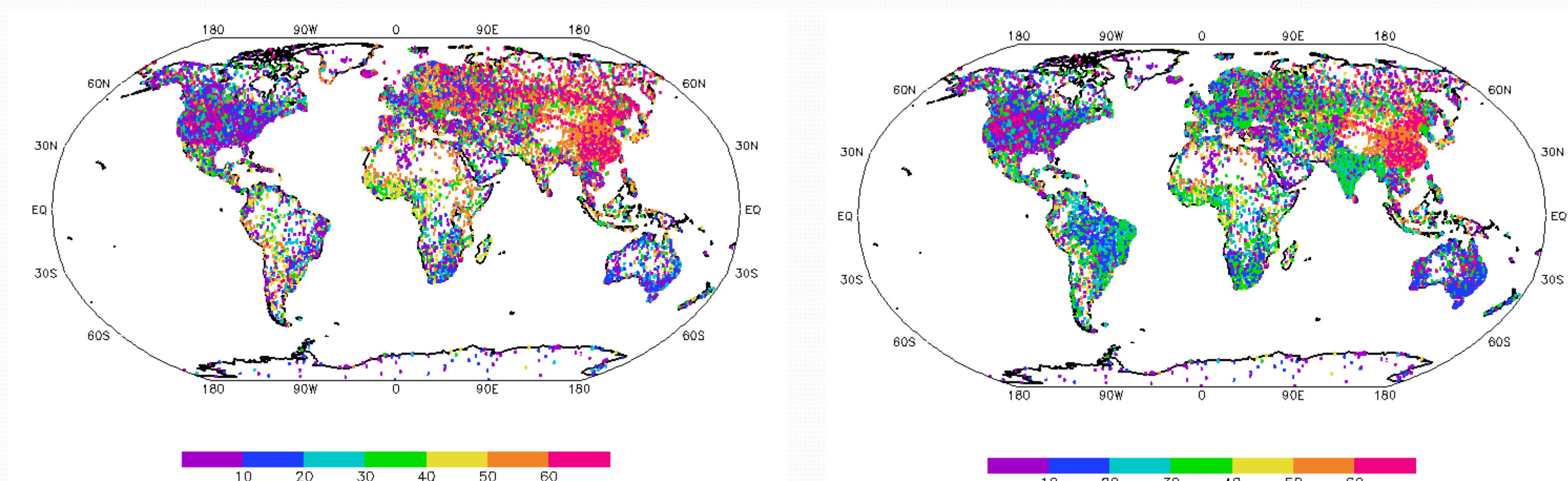


Fig 5 The length of the stations series for daily temperature (left) and precipitation (right) in CMAInt

2 Problems and future prospect

2.1 inhomogeneity

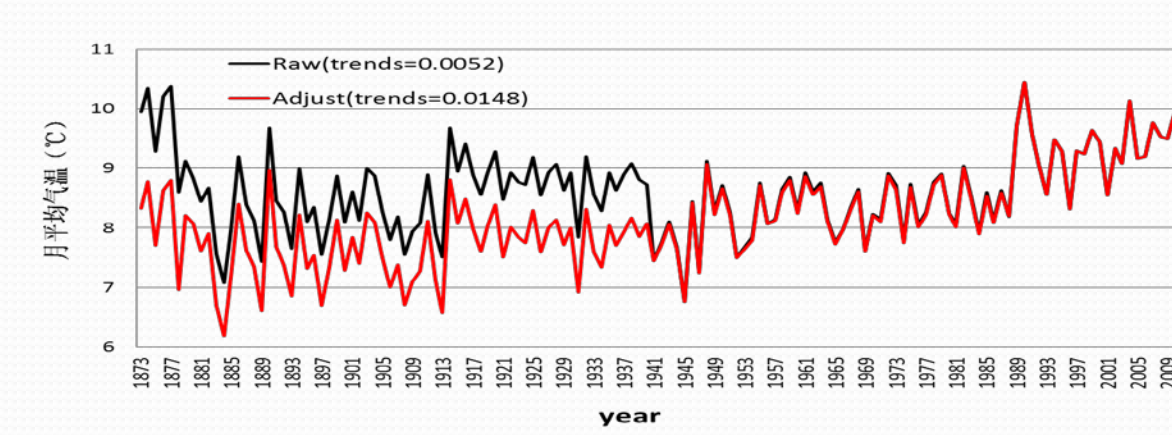
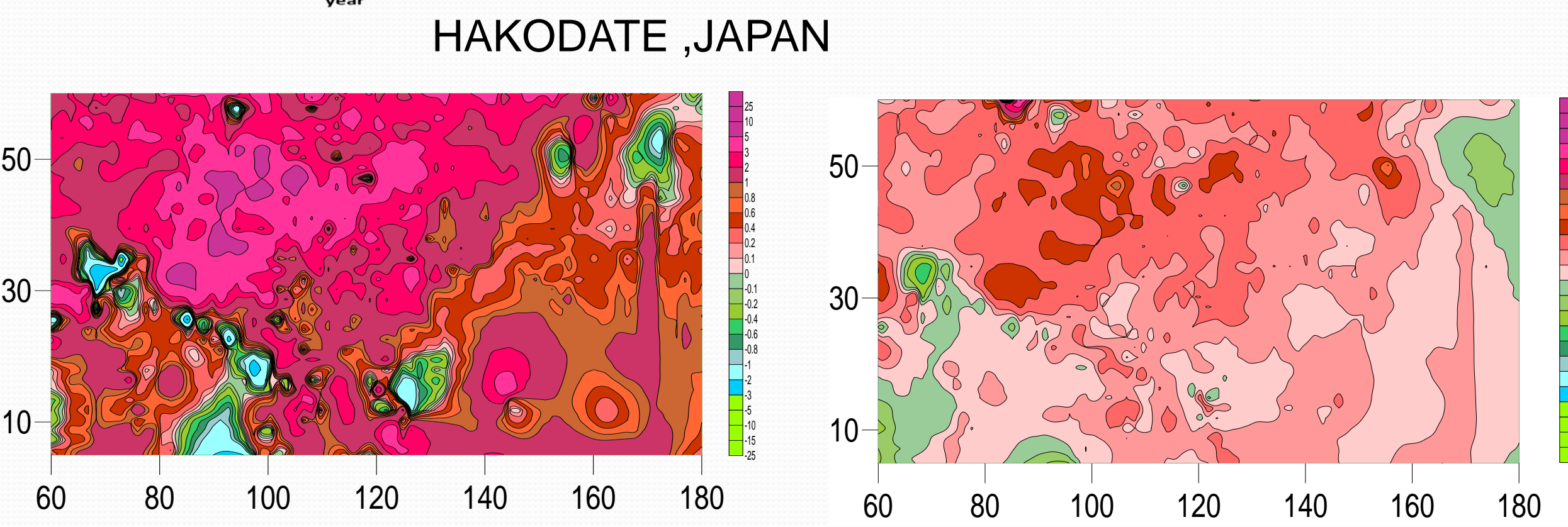


Fig 6 Upper: homogenization of a single stations in Japan Bottom: distribution of the temperature change trends before and after homogenization in Asia



2.2 stations distribution (different between monthly data and daily data)

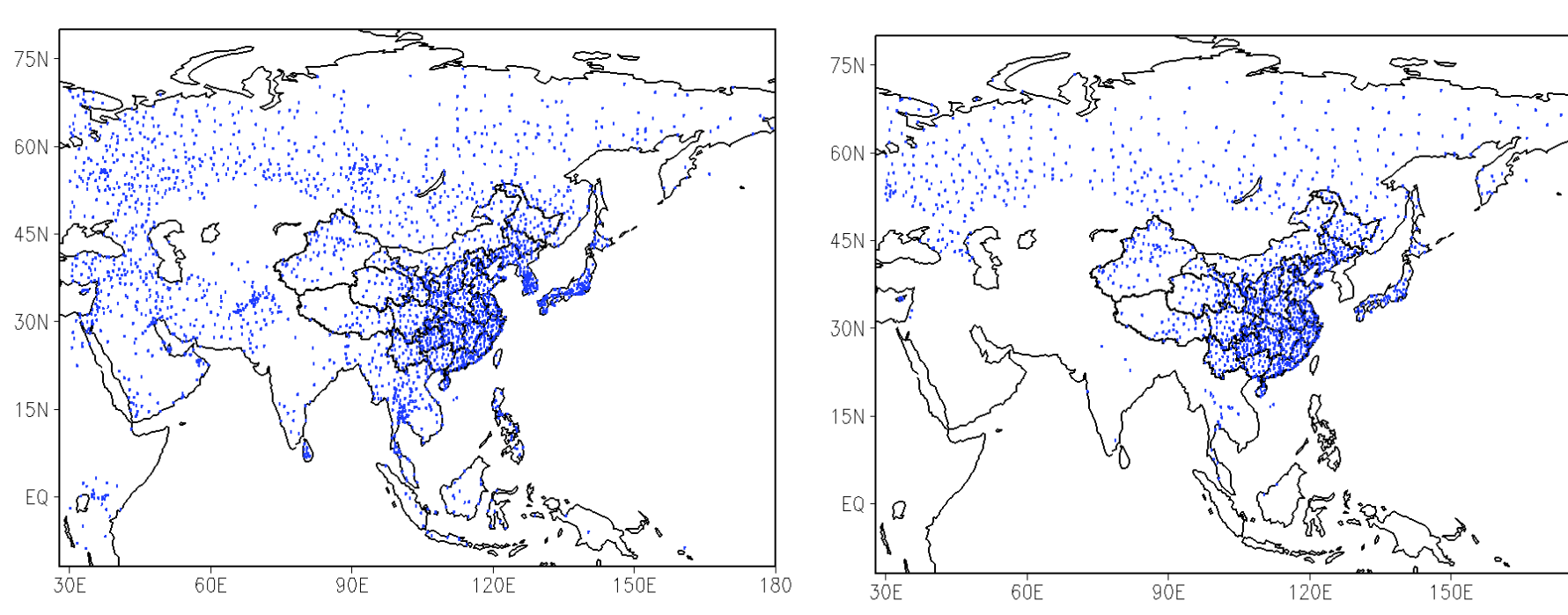


Fig 7. Station numbers in 20121102 and 20070828

2.3 calculation methods correction of daily temperature and precipitation

2.4 Application and prospect

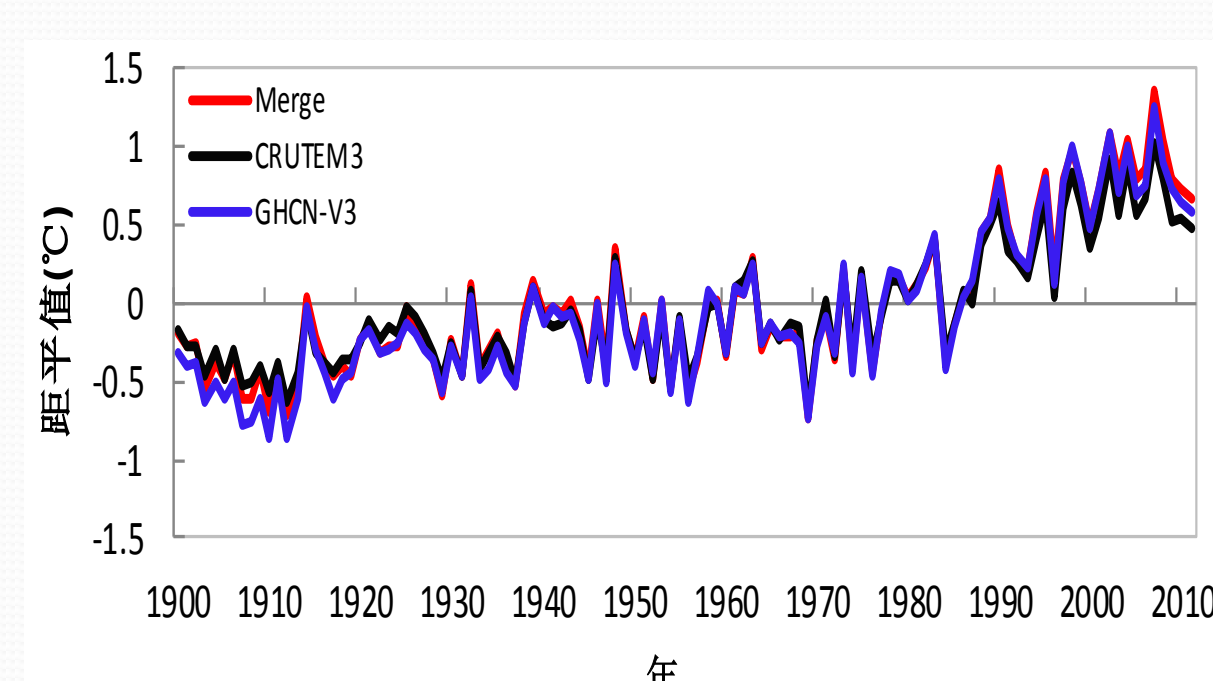


Fig 8. The annual average surface temperature anomaly series during 1900-2011

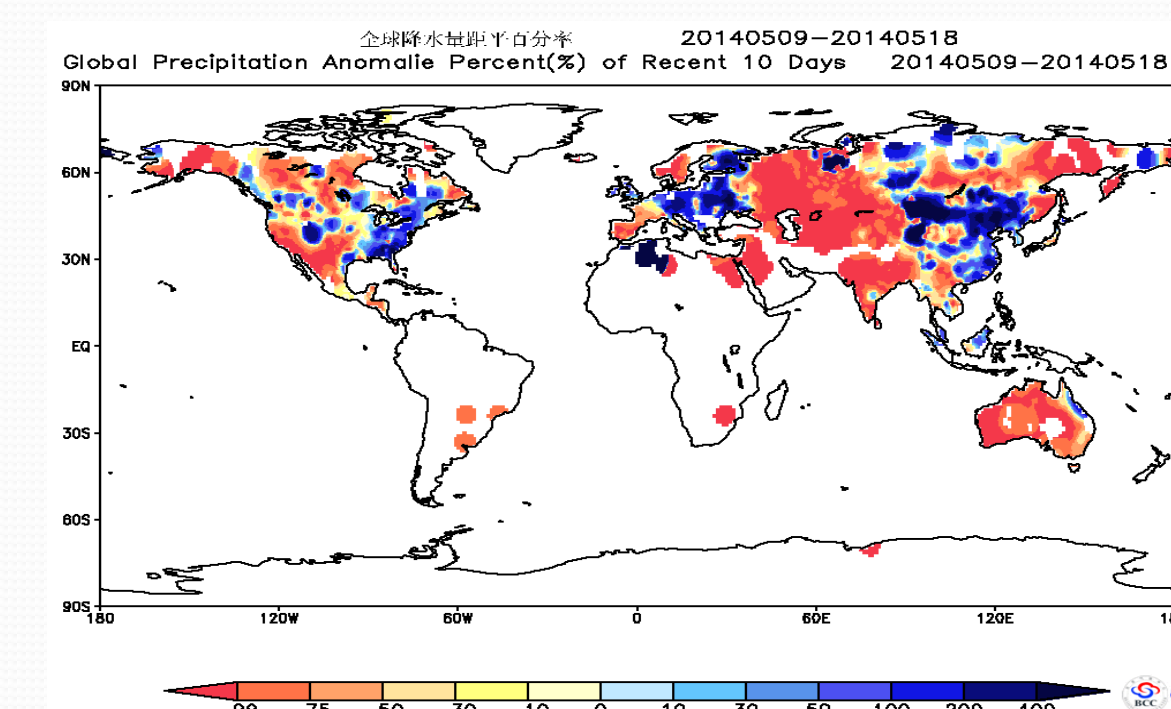


Fig 9. global precipitation anomaly percent (%) of recent 10 (from BCC/NCC)