



## **The analysis on the extreme water shortage event in Hangzhou in 1247 AD and its natural and social backgrounds**

Haolong Liu

Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing, China (liuhl@igsnr.ac.cn)

### Abstract:

Yangtze River Delta locating in the north subtropics of China, is famous for numerous rivers and lakes. Because of East Asian monsoon rainfall, flood is always the most primary disaster in this area during the past 2000 years. However, there were also several extreme water shortage events in the history. Example in Hangzhou in 1247 AD was such a typical year in the area. In the paper, the severity of this extreme event and the closely tied spatiotemporal variation of drought in Yangtze River Delta was quantitatively analyzed on the basis of documentary records during Southern Song Dynasty. Furtherly, its natural and social backgrounds was discussed. The result s are summarized as follows: 1) Wells, canals and West Lake of Hangzhou dried up in 1247 AD. The water level of canals was about 1.32-2.64 m lower than that in the normal year. The reduction of storage capacity in West Lake was 21 million stere or so. 2) The droughts in Yangtze River Delta was moderate on the whole, but that in the west of Zhejiang Province was severe. The drought in Hangzhou lasted from the 2nd lunar month to the end of this year. 3) The water shortage event was closely related to the quick going north and farther northern location of summer rain belt. The descending sea-level weakening the tide in Qiantang River, can also reduce the supply of water resources. 4) The quick growth of urban population, excessive aquaculture, and ineffective government supervision played an important social role in the process of this event. In the all, this extreme water shortage event was the result of both natural and social factors. This research is very helpful for the futuristic water resource forecast in Yangtze River Delta, and it also affords us lessons on the risk management and heritage conservation that merit attention.

Key Words: Hangzhou, 1247 AD, water shortage, canal, West Lake, natural factors, social factors