

HYDROLOGICAL MONITORING AND FLOOD FORECASTING IN CHINA

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Abstract: Due to special geographical location and climate conditions, China has frequently been hit by floods and suffered from flood disasters. The Chinese government has devoted great efforts on flood control since the establishment of the People's Republic. The hydrological monitoring system of China and progress of flood forecasting techniques were introduced in this paper. As of 2015, Hydrological Gauging Network of China consists of a total of 42,682 types of stations of different types (i.e. 3200 hydrometric stations, 17250 rain gauges, 1200 soil moisture monitoring stations, etc.) for supporting flood forecasting and water resources management. Most of these stations are located in the eastern part of China. 86% of the hydrological stations measure and report information automatically. About 97% of the collected hydrological information can be transmitted from the hydrological stations to the Bureau of Hydrology of the Ministry of Water Resources (MWR) within 30 minutes. Flood forecasting is an important non-structural measure for flood control, especially in the case of over-standard floods. Flood forecasting techniques in China went through three significant phases: (1) empirical forecasting schemes (EFS) before 1970s, (2) watershed hydrological models (WHM) employed in 1970s and 1980s, and (3) national flood forecasting system (NFFS) after 1990s, which has been designed, developed, tested and implemented by the MWR Bureau of Hydrology. The basic design requirements for NFFS include: (1) establishing advanced standard software and hardware configuration based on a uniform standard real-time database and client/server environment, (2) adopting modular structure so that modules can be independent from the system and components could be developed by a number of individuals; (3) allowing users to select models and the sequence of use, (4) possessing a model calibration system which can combine manual and automatically calibration methods, (5) permitting users to control real-time processing flexibly and use graphical & tabular interface for interactive forecasting, (6) processing efficiently large amounts of data to produce forecasts at hundreds or thousands of locations, (7) having integrated powerful flood forecasting management function. So far, NFFS has played a very important role in flood defense on major rivers of China.

Key words: Hydrological monitoring system, flood forecasting, China