storms. According to the available wind field data, the method uses either a convergence model or a laminar model. In the convergence model, it is assumed that the inflow of storm moisture converges to the centre from all sides and rises to create an event. In the laminar model, it is assumed that the inflow of storm moisture crawls along an inclining surface in a laminar fashion and rises to create an event. This method, requiring strong available observation data of upper meteorology in the design area, is applicable for watersheds with an area of hundreds to thousands of square kilometres.

1.4.2.2.5 *Generalized method*

The generalized method is used to estimate PMP for a large, meteorologically homogeneous zone. The procedure involves grouping the observed rainfall of a storm into convergence and orographic rainfall. Convergence rain, which is the rainfall created through atmospheric convergence and rising induced by a passing weather system, is assumed to occur anywhere in meteorologically homogeneous zones. Orographic rain is the rainfall created through orographic rising. The generalization method uses convergence rainfall and the main results are as follows:

(a) PMP depth, which is shown as a generalized depth–area–duration (DAD) curve (produced via storm transposition);
(b) PMP spatial distribution, which is a group of concentric ellipses generalized from isohyets;
(c) PMP temporal distribution, which is a single-peak map of a generalized hyetograph.

This method requires a large amount of long-term data obtained by rainfall self-recorders in the study area. This is a time-consuming and expensive process. However, the method can lead to high accuracy and easy application of PMP results. This method is applicable to watersheds under 13 000 km^2 in orographic regions and 52 000 km^2 in non-orographic regions, and rainfall durations of 72 hours or less.

1.4.2.2.6 *Statistical method*

The statistical method was proposed by Hershfield of the United States. PMP is derived from data from numerous gauge stations in a meteorologically homogeneous zone, using the hydrological frequency analysis method together with the regional generalized method. The procedure differs from the traditional frequency analysis method, resulting in different physical connotations (Wang G., 2004). This method is mainly applicable for watersheds with a collecting area under 1 000 km^2.

1.4.2.2.7 *Major temporal and spatial combination method*

In this method, the part of the PMP that has the larger influence on PMF temporally (flood hydrograph) and spatially (flood source area) at the design section is treated with hydro-meteorological methods (local, transposition, combination and generalized), and the part of PMP which has the smaller influence is treated with the common correlation method and the typical flood distribution method. Obviously, this method, which can be regarded as a storm combination method, combines both temporal and spatial conditions. It only makes detailed computations for the main part while making rough computations for the secondary part. This method is mainly used for watersheds above the design section and for large rivers with a great difference between upstream and downstream weather conditions.

1.4.2.2.8 *Storm simulation method based on historical flood*

This method produces a storm that could have potentially created the historical flood. This is done through hydrological watershed models. This method is inherently based on the incomplete temporal and spatial distribution information of the known extraordinary flood. It is also based on the assumption that modern synoptic meteorological conditions and synoptic forecast experience are applicable to the historical period. Then, with the extraordinary storm as a high-efficiency storm, the PMP is derived after maximizing moisture. This method is applicable where information about the flood hydrograph at the design section and knowledge of the rainfall, hydrological and flooding situations in some parts of the upstream mainstream and tributaries have been obtained through investigation and analysis of historical literature (books, newspapers, anecdotes and other records).

Local, transposition and combination methods are described in Chapters 2, 3 and 7 of this manual. Various additional methodologies and practices have been introduced in this third edition, including approaches that have been developed and applied in China.

1.4.3 Main steps for storm and watershed approaches

1.4.3.1 Approach based on storm area

The generalized estimation method and statistical estimation method are the commonly used