province is broken down into level 1 and level 2 storm areas based on geographical and topographical characteristics. Such a breakdown can be used as the basis for classifying storm transposition, storm statistical parameter synthesis and storm DAD relations.

5.6.3 Maximization method of meteorological factors of storms

Moisture maximization is performed for 24-hour large storms that are observed, surveyed or transposed. Methods discussed in section 2.3.4 are used for moisture maximization. When the historical maximum dewpoint is not large enough, 50-years-at-a-time dewpoint temperatures are also used as the maximum index. When storm transposition is performed, elevation and displacement adjustments need to be made. If it is believed that it is impossible to reach the probable maximum value using only moisture maximization, meteorological factors such as the moisture transportation rate may also be used for further maximization.

5.6.4 Statistical estimation method

Based on the idea of Hershfield's statistical estimation method (1961*a*, 1961*b*, 1965) the following formula is used to calculate PMP at each station:

$$\mathrm{PMP} = \overline{X}_m(1 + \phi_{mm} C_{vn})$$

where $\overline{X}_m$ and C_{vn} are the average and the coefficient of variation calculated from an n-year series including the maximum X_m; ϕ_{mm} is the enveloping value of ϕ_m, the deviation coefficient calculated from an n-year series including the maximum X_m.

It is easy to see that in this method, the enveloping value ϕ_{mm} is used to replace K_m in Hershfield's statistical method.

5.6.5 Storm frequency estimation method

5.6.5.1 Storm data

More than 15 years of records from rainfall stations were applied. In regions where observation stations were scarce, more than 10 years of data from stations were also used for reference. For the years when large storms happened at adjacent stations, interpolation was done based on the same-time storm rainfall isoline map. As for data consisting of only daily rainfall records, the multi-year average was multiplied by 1.13 to convert into the multi-year average of maximum 24-hour rainfalls.

5.6.5.2 Return period

Return periods of large storms observed or surveyed may be indirectly estimated based on recurrence periods of corresponding floods of small rivers near storm centres. Also, they may be ranked by size according to the total number of years of observation at each station in the storm homogeneous region. Sometimes, it may be estimated based on topographical and geomorphic changes caused by storms and comparison with storm records at home and abroad.

5.6.5.3 Frequency curve and statistical parameters

A Pearson Type III curve was used as the frequency curve of storms. The average and the coefficient of variability C_v were determined according to the frequency curve on the probability grid paper under the principle of point group centres. It was specified that the deviation coefficient $C_s = 3.5C_v$.

To reduce the error of the result of frequency analysis on data from a single station, regional synthesis was applied. If storm observation series of each station in the storm homogeneous region could be believed to come from the same overall distribution independently and randomly, then the average line and corresponding statistical parameters of the storm frequency curve of each station could be regarded as the common statistical characteristics of each station. The method can be used directly in small ranges in plains. Nonetheless, in large ranges in orographic regions or plains, difference among stations should be considered properly based on the above-mentioned averaging and rules of the regional distribution of statistical parameters.

5.6.5.4 Drawing the storm frequency isoline map

Draw the isoline maps of the average and C_v value of annual maximum 24-hour point rainfalls based on calculated averages and values for each station and considering geographical locations, ground elevations, topographical characteristics and characteristics of the distribution of meteorological factors such as moisture and thermodynamics. Superpose the two isoline maps and compare them to see if their high and low sections and trends are rational. After smoothing, read the average and the C_v value of each station, calculate their 10 000-year return period values and draw isoline maps of 10 000-year return period values of annual maximum 24-hour point rainfalls. If results are irrational, make corrections by modifying the average and the C_v value. Results of the calculation can be regarded