Note that the storm characteristics of the selected typical year should be in accordance with analysis of the qualitative characteristics of PMP in the design watershed described in section 7.2.5.

7.5.2.1.3 ***Principles of similar process substitution***

To minimize randomness, similar process substitution should adopt the following four principles:

(a) Large circulation types should be similar. Large circulation types are those that have direct effects on the storm weather system in the region, such as location of long wave troughs and ridges and subtropical highs, as well as their intensities.
(b) Weather systems that cause storms should be identical – processes included in the substitution must fall into the same type of weather systems.
(c) Rain types and their evolvement should be similar. During the substitution, special attention must be paid to rain types, their evolvement and the rain axes direction, especially the locations of storm centres and their movement paths.
(d) Storm seasons should be identical – storms included in the substitution should have the exact same seasons.

Principles of combination may also be determined through comprehensive analysis and induction of storm causes, large circulation types and weather systems in the design watershed, and the application of elements of synoptic meteorology and experience in forecasting.

7.5.2.1.4 ***Procedure***

The step-by-step procedure of the similar process substitution method is as follows:

(a) Select the typical year – methods for the selection have been discussed in 7.5.2.1.2.
(b) Categorize weather processes of the typical year – determine the weather processes (such as the low vortex shear line type, the westerly trough type, the typhoon type and more) that occur in the typical year.
(c) Substitute with similar processes – based on storm weather processes of the typical year, substitute processes that have small rainfalls in the design time interval with similar processes selected from historical storms that have large rainfalls, thereby forming a sequence of severe storm processes, which acts as the basis of PMP.

7.5.2.2 **Evolvement trend analysis method**

7.5.2.2.1 ***Basic concept***

In this method, combinations are made from the development trends of synoptic situations. One or several consecutive weather processes in observed data with the largest rainfall is used, and smaller events are built around the largest to form the combination or sequence. Synoptic weather and analytical techniques are used to form the combination.

For example, the original sequence of storm weather processes is $D \rightarrow E \rightarrow F$, and there is now a more severe storm weather process G. In terms of circulation types and weather systems, F and G are different, but it is possible for F to evolve into E – according to deduction based on elements and experience in synoptic meteorology – so $D \rightarrow E \rightarrow G$ is possible.

Keys factors to successful application of this method are the selection of the largest rainfall event in the combination method and suitable analysis of weather systems evolution. This method is used to combine two or three storms only as the randomness increases when the combination time is too long.

7.5.2.2.2 ***Selection of the base point of the combination***

Methods for the selection of the base point of the combination are identical to those used in the selection of the typical process in the similar process substitution method (section 7.5.2.1.2).

7.5.2.2.3 Principles of weather systems evolution analysis

With the evolution method, the storm combination is performed based on circulation evolution characteristics. To perform a suitable analysis the following two principles should be considered:

(a) In-depth analyses on the main types of extraordinary, consecutive storm weather processes that have occurred in the design watershed should be performed as the starting point of the combination. For example, the maximum 10-day precipitations in the Lancang River basin are primarily caused by the continuous occurrence of shearing vorticity, while the maximum 30-day precipitations in the Huaihe River basin are primarily caused by continuous shearing vorticity processes, but may also be affected by typhoons.