transposed object region; .the greater the similarity, the higher the transposition possibility, and vice versa (Wang G., 1999).

7.4.3.1 Comparison of geographical and climatic conditions

This comparison focuses is on differences between the two regions in terms of geographical location (latitude) and distance to the sea. If the two regions are close to each other geographically, they will have similar climatic and moisture conditions. Separate analysis can be performed to confirm whether climatic and moisture conditions are similar. If geographical conditions (the same latitude belt) and climatic conditions (the same climatic characteristics, especially the annual precipitation and the annual distribution) are similar, the distance of transposition can be widened.

7.4.3.2 Comparison of orographic conditions

The orographic characteristics of the regions should be assessed, followed by a comparison of the two regions' orographic characteristics to establish if they have similar orographic conditions.

When storm weather systems cross high mountains the moisture and dynamic conditions change. Therefore, storm transposition should avoid going across high mountains. Transpositions with an elevation difference greater than 800 m should be avoided in most cases (see section 2.6.3). The elevation difference of the transposition of strong local thunderstorm rains or typhoon storms can be determined through analysis of the storm path. Where there are high mountains, transpositions can be performed along mountain ridges.

Terrain in orographic regions is usually complex and has a variety of impacts on the weather systems. In addition, the impact of terrain on precipitation works best under favourable weather system configurations. Therefore, specific analysis should be performed on specific conditions when determining the transposable elevation difference.

To study if the terrains in two regions are different enough to cause great changes in weather systems and storm structures, comparison of 3-D spatial structures of similar weather systems in the two regions can be analysed, or the actual rainfalls of similar weather systems in the two regions can be assessed. Orographic corrective calculations are performed to account for the degree of the orographic effects.

7.4.3.3 Comparison of spatio-temporal distribution characteristics of storms (floods)

The characteristics of transposed storms – such as storm season, duration, temporal distribution as well as the range and distribution of the storm area – should be compared with the same characteristics of large storms that have occurred in the design watershed.

Such analysis should be based on historical records from the design watershed and data from historical extraordinary storm floods surveyed in the field. Historical extraordinary storms with characteristics very similar to those of the transposed storms can usually be found in the watershed.

In addition, in cases where the design watershed and the transposed storm are adjacent, analysis on the contemporaneity of storms and floods can be performed. In other words, observed data and literature can be checked to see if large storms and floods occurred simultaneously (or almost simultaneously) in the two regions. If this is the case, it suggests that storms caused by weather systems of the same type are likely to occur simultaneously in the two regions.

7.4.3.4 Comparison of weather causes

Storms should be analysed to verify that weather conditions similar to those of the transposed storms have occurred or can occur in the design watershed. If similar storms have occurred, then the transposed storms can occur in the design watershed, and can be transposed. Analysis of the weather related similarity of the transposed storms and design watershed storms focuses mainly on examining historical weather maps to see if the two storm sets are similar in terms of circulation types and weather systems.

Similarities between weather causes of historical floods and storms in the transposition source region and the transposition destination region can be indirectly determined through storms and floods recorded in literature. This includes records about storms, floods and weather conditions such as high temperatures, droughts and winds in related regions.

7.4.3.5 Comprehensive judgement

The above-mentioned four comparisons should not be treated separately. They should be extensively considered together, based on principles of synoptic meteorology and analysis of weather maps.