

through the calculation of runoff yield and time of concentration. If the calculated process is similar to the surveyed flood process, then the combined storm sequence can represent the actual storm sequence that led to the large flood on the Changjiang River in 1870, thereby quantitatively determining the extraordinary storm process that led to the extraordinary flood.

Before the simulation and trial calculation of runoff yield and concentration, the scheme for these calculations was verified with observed data from 25 July to 2 September 1974. It turned out that all calculation errors were less than 9 per cent. After 60 trial calculations, the simulated flood process approximated the surveyed flood process (Figure 7.15). The simulated storm sequence that was ultimately selected is shown in Table 7.12. Days 21 to 27 are the extraordinary storm that led to the extraordinary flood peak in Yichang in 1870. The duration is 7 days, and the total rainfall distribution of the simulated process is shown in Figure 7.16.

7.7.3.4.3 Maximization

According to descriptions in the literature about the extraordinary storm that led to the flood peak in 1870, it was reasonably assumed to be a high-efficiency storm, so only moisture maximization was needed.

Moisture for the storm was from the Indian Ocean and the South China Sea. Owing to data conditions, the moisture inflow direction could only be from the Guiyang station. Its representative dewpoint was 20°C. After being corrected to a 1 000 hPa dewpoint, it was 24.5°C. The historical maximum

Table 7.13. PMF estimate for Three Gorges (Yichang) – scheme of simulating 1870 historical flood (Jin and Li, 1989)

<i>Daily average discharge (m³/s)</i>	<i>7-day flood volume (10⁹ m³)</i>	<i>15-day flood volume (10⁹ m³)</i>
120 000	63.00	110.9

dewpoint at the 1 000 hPa elevation at the Guiyang station was 26.2°C, so the coefficient of moisture maximization K was given by:

$$K = \frac{(W_{Td})_m}{W_{Td}} = 1.17 \quad (7.8)$$

Using that coefficient, the 5-day rainfalls that led to the flood peak were maximized.

Considering the fact that the annual maximum flood volume of long durations includes those of short duration on the Changjiang River, a precipitation process for the minor peak was replaced for the major peak, in addition to moisture maximization, thereby forming the PMP series.

7.7.3.4.4 Probable maximum flood

The reach above Yichang was divided into 18 areas, and the calculation of runoff yield and flow concentration was done for each of them. The flood process for each area was calculated by typical year or unit hydrograph. The travel time of the channel was calculated using the Changjiang Basin Planning Office flow concentration curve (linear flow concentration curve) formula. The PMF estimate was ultimately obtained as shown in Table 7.13.