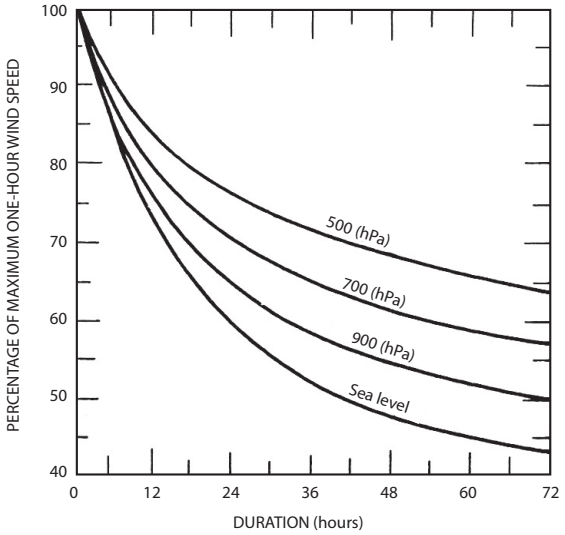

Figure 3.8. Variation of maximum 6-hour wind speed with time (after United States Weather Bureau, 1961*a*)

3.3.3 Variations in orographic PMP

As mentioned, PMP varies with region, season, duration and size of area. The generalized maps show the regional variation, and no further discussion is required. While the discussion of the other variations presented in this section applies particularly to the orographic separation method, especially as used in the California study given as an example, much of it applies to variations of orographic PMP in general.

3.3.3.1 Seasonal variation

In any region where snowmelt or the occurrence of frozen ground is likely to contribute significantly to the probable maximum flood, it is necessary to determine the seasonal variation of PMP. In orographic regions the seasonal variation should be determined even when snowmelt or frozen ground is not involved in order to ensure that the month of highest potential for total PMP (orographic plus convergence) has not been overlooked. A logical procedure is to compute PMP for each month on the basis of maximum values of wind and moisture in each month. The seasonal variation of major storms recorded over a long period is generally a useful guide in delineating the seasonal variation of PMP.

Evaluation of seasonal variation of orographic PMP by means of the model has several shortcomings. In the transitional seasons (spring and autumn), the usual orographic influences prevail, but stimulation of storm precipitation by upwind slopes or barriers is often most effective in determining precipitation distribution. The need for generalizing topography leads to differences between computed orographic PMP and that indicated by the actual terrain. For different terrain profiles, seasonal influences may vary with barrier height, steepness of slope and other features. In some cases, a compromise between seasonal variation indicated by computed orographic PMP values and that based on maximum storm rainfall amounts observed at well-exposed stations may yield the most realistic results.

3.3.3.2 Durational variation

Variations in maximum wind speeds and moisture with time are used to determine durational variation of computed orographic PMP. The variation of winds in major observed storms is probably the best type of information to use in establishing variations in the shape of the inflow profile with duration, and this was used in the example study. Variation of moisture with time was based on the durational variation of maximum persisting 1 000-hPa dewpoints (United States Weather Bureau, 1958). Moisture values at upper levels were based on the assumption of a saturated pseudo-adiabatic lapse rate. A common durational variation (Figure 3.10) for all months and regions was adequate for the example study. An additional factor found helpful in some studies (United States Weather Bureau, 1966) is the variation of moisture with duration during major observed storms.

3.3.3.3 Areal variation

The variation of orographic PMP with basin size is controlled by the orography, and therefore, may vary greatly from basin to basin. As stated in section 3.3.2, the averaging of index PMP by superimposing an outline of the basin on the index map eliminates the need for the usual type of depth–area relation. The average index PMP thus obtained usually requires some adjustment for basin size, however, since the intensity of moisture inflow decreases with increasing width of inflow. In the example study (United States Weather Bureau, 1961*a*), no adjustment was required for basin widths up to 50 km, but a reduction curve for greater widths reduced the basin average index PMP by 15 and 25 per cent for widths of 160 and 300 km, respectively.

3.3.4 Convergence PMP for combination with orographic PMP

The procedure described here for estimating convergence (non-orographic) PMP for combination with orographic PMP was developed for the coastal