

5.2.3.3.1 *Cross-sectional profiles*

A useful step in preparation of the final charts is to plot cross-sections along latitude lines, longitude lines, or lines normal to steep gradients on the isohyetal maps. These are usually plotted as depth–area–duration diagrams. The precipitation depths are selected along the cross-section lines at reasonably short intervals. These values are then plotted on a semi-logarithmic graph. The points should form a set of smooth curves. When smooth curves do not result, adjustments are made to the original maps and the process of depth–area, depth–duration and regional smoothing repeated. This is also an iterative process with the procedures continuing until the best possible set of depth–area curves, depth–duration curves and regionally smoothed isohyetal maps are prepared.

5.2.3.3.2 *Maintenance of consistency between maps*

In order to maintain consistency between maps when several are to be drawn for various durations and sizes of area, it is recommended that successive maps in a series be superimposed on a light table, and isohyets adjusted as required to form consistent patterns for both maps. For example, the map of 6-hour PMP for 1 000 km² might be superimposed on that for 1-hour PMP for the same size area. The 6-hour PMP isohyets should, of course, indicate higher values at every point on the map. Also, there is usually no reason for an isohyet on one map to show a dip, or depression, while the isohyet at the corresponding location on another map of about the same duration and size of area in the series shows a bulge. Of course, as differences in duration and size of area increase, there may be gradual changes in patterns so that bulges eventually become dips or vice versa.

Maps for different sizes of area should be compared and fitted to each other in the same manner. For example, isohyets on a map of 24-hour PMP for 1 000 km² should everywhere indicate greater depths than those for 24-hour PMP for 10 000 km².

If maps for various months are required, as well as the all-season envelope, seasonal smoothing is necessary. Seasonal variation was discussed in section 2.10.

5.2.4 *Supplementary aids*

Preparation of generalized PMP charts is often facilitated by supplementary considerations. These considerations apply only to isohyetal gradients

and patterns, and should have little or no effect on magnitude of PMP values throughout the region, though they may have an impact at some locations. In other words, they provide guidance on the gradient and shape of isohyets while moisture-maximized storm rainfall values provide information on the magnitude of PMP.

Guidance can be provided by various types of climatological data. For example, a chart of maximum observed 24-hour point rainfall values from long observational records should show some resemblance to a generalized chart of 24-hour PMP for any size of area up to about 1–000 km². Rainfall-frequency charts may also be used for guidance, although they are not as reliable an indicator of regional variation of PMP since frequency is involved rather than magnitude alone. Similar regional patterns may be found also between charts of maximum observed point rainfalls for relatively long durations, say three consecutive days, and generalized PMP charts for similar durations. For larger areas, say 10 000 km² to 50 000 km², weekly or monthly averages over geographic regions such as climatic zones of similar area sizes, can provide guidance on gradients and orientation of PMP isolines.

Regional similarity of generalized PMP and precipitation-frequency patterns does not prevail in those regions where one type of storm produces a large number of moderate to heavy rainfalls, but a different type provides the truly outstanding amounts. An example of this lack of similarity is found on Hawaii Island. There, frequent heavy showers associated with north-east trade winds produce high rainfall-frequency values, while extreme rainfalls invariably occur with the breakdown of these trade winds, and generally with winds from a very different direction. This climatic feature is reflected in differences between generalized PMP and rainfall-frequency patterns (Figure 5.1).

5.2.5 *General remarks*

Much work is involved in the preparation of a series of generalized PMP charts for different durations, area sizes and months. Two different procedures are followed in presenting the results of regionalized or generalized estimates of PMP. One method is to prepare as few such charts as are absolutely required and to provide depth–duration, depth–area, and seasonal variation curves to adjust the chart PMP index values as required. Often, especially for small basin sizes, index charts of point values are prepared for 1-, 6- and 24-hour depth–duration diagrams (Figure 5.2) and area–reduction curves (Figure 4.7)