representative storm dewpoints for adjusting storm rainfall values over various time intervals – for example, 24-, 48- and 72-hour dewpoints – showed only small differences from the results obtained from the use of the 12-hour representative storm dewpoint. The general practice is to use a single representative persisting 12-hour dewpoint for adjusting the storm rainfall for all durations and sizes of area.

2.3.4 Maximization of storm in place

Moisture maximization of storms in place – that is, without change in location – is calculated by simply multiplying the observed storm rainfall amounts by the moisture maximizing ratio r_m.

This ratio is defined by:

$$r_m = \frac{W_m}{W_s} \tag{2.1}$$

where, W_m is the maximum precipitable water indicated for the storm reference location and W_s is the precipitable water estimated for the storm.For example, if the representative persisting 12-hour 1 000-hPa storm dewpoint is 21°C and the maximum is 24°C and the rain area is at mean sea-level (always assumed to be at 1 000 hPa) with no intervening topographic barrier between the rain area and moisture source, then the moisture maximizing ratio is computed from precipitable water values obtained from the Table A.1.1 in Annex 1:

$W_m = 74.0$

$W_s = 57.0$

$r_m = 1.30$

The precipitable water values used in determining Wm and Ws are for a moisture column with the base at 1 000 hPa and the top at 300 hPa. If values in Table A.1.3 were used instead of those in Table A.1.1, the resulting value of r_m would be unchanged.

2.3.4.1 Adjustment for storm elevation

Some correction for storm elevation may be required if the storm elevation is not at mean sea-level. Some studies have not made an adjustment for storm elevation (Hart, 1982; Schreiner and Riedel, 1978) if the elevation of the storm is less than 300 m. This decision is based on the distance to the moisture source, the storm characteristics and the topography of the region. Several procedures have been used. If the previous storm example (section 2.3.4) is assumed to occur some distance from the moisture source on a broadly sloping plain at an elevation of 400 m still with no intervening topographic barrier between the rain area and the moisture source, then the moisture maximizing ratio (rm) can be computed from precipitable water values obtained from Tables A.1.1 and A.1.2 in Annex 1:

$W_m = 74.0 – 8.00 = 66.0$

$W_s = 57.0 – 7.00 = 50.0$

$r_m = 1.32$

Table A.1.3 provides values between the indicated elevation and the 300 hPa level. This table can be used to compute the maximizing ratio without having to subtract the amount of moisture lost. If this method were used, the computation would be:

$W_m = 65.7$

$W_s = 50.0$

$r_m = 1.31$

The differences result from the degree of precision for data presented in Tables A.1.1 to A.1.3 and should not be considered significant.

2.3.4.2 Adjustment for intervening barrier

If it is now assumed that there is an extensive, relatively unbroken range of hills with a mean crest elevation of 600 m between the rain area and moisture source, rm would then be determined as follows using Tables A.1.1 and A.1.2:

$W_m = 74.0 – 12.0 = 62.0$

$W_s = 57.0 – 10.0 = 47.0$

$r_m = 1.32$

Here, the precipitable water in the 1 000-hPa to 300-hPa column is decreased by the water column with a base at 1 000 hPa and a top at 600 m, that is, the elevation of the barrier crest and not the elevation of the rain area. If values from Table A.1.3 were used, rm would also be 1.32.

An alternative procedure (Hart, 1982) does not consider the barrier to be completely effective in removing moisture from the airflow reaching a sheltered location if the barrier does not exceed about 500 m. Although the airflow in the vicinity of mountains is not well understood, it can be assumed that the convergent layer is merely lifted by the height of the barrier, but the storm is otherwise not affected. The moisture flow into the area behind the barrier is reduced by the ratio of the