which give valuable additional information. The content in the manual should be adequate for hydrometeorologists. PMP estimation occurs in many countries, and the manual takes examples from Hydrometeorological Reports (HMR) published by the United States Weather Bureau (renamed National Weather Service in 1970), the Australian Bureau of Meteorology and water and power design organizations in China and India. However, those methods and results discussed should not necessarily be considered superior to those from other countries or organizations.

The examples presented are not intended for direct application in deriving PMP estimates. They aim to explain how to estimate PMP in different cases, including watersheds of various sizes as well as different topographies, climates and quality of data. It is not intended that the method given for any particular situation represents the only solution. Other methods may also be effective. The examples should be regarded merely as recommendations for how to derive PMP estimates. Special attention should be paid to the notes at the end of each chapter.

The importance of meteorological studies in PMP estimation cannot be over-emphasized. Such studies give guidance on regional, seasonal, durational and areal variations and topographic effects.

1.7.4 Application of computer technologies

As computers have developed so has their use in hydrometeorology. Computers may be used in everything, from analysing and processing data needed for PMP estimation to determining PMP and PMF. In addition, with the use of geographical information systems (GIS), many stages of PMP and PMF estimation can be improved. The manual includes information on the application of computer technologies, in combination with generalized PMP estimation, in south-eastern Australia.

1.8 PMP AND CLIMATE CHANGE

In assessing the possible impacts of climate change on PMP, the following factors need to be considered: moisture availability, depth–area curves, storm types, storm efficiency and generalized rainfall depths. Since the PMP methodology is related to very large rainfall events, changes in both observed and projected extreme rainfall should also be considered.

These factors can be assessed using both an event-based approach and a station-based approach. In a study undertaken for Australia (Jakob and others, 2008), some significant increases in moisture availability were found for coastal Australia, and climate models project further general increases, although some regions of decrease were also found. Very few significant changes in storm efficiency were found, although there is a tendency to a reduction in storm efficiency for coastal parts of eastern Australia.

Typically, no significant changes were found in generalized rainfall depths, but a recent event broke previous records (both in terms of storm efficiency and generalized rainfall depth) for the season during which the event occurred (winter).

PMP estimates are robust estimates (typically not based on single outliers). Recent significant rainfall events are regularly screened to check whether including these events in the storm databases would increase PMP estimates. In the Australian case study, there had been no recent cases where PMP estimates had to be updated.

Long-term trends in rainfall extremes were found for only two regions: a decrease in coastal south-western Western Australia and an increase in parts of northern New South Wales. The fact that trends were found for only two regions implies that current generalized PMP estimates are representative of current climate conditions for most of Australia.

Global climate models do not accurately model the trends of late twentieth century Australian rainfall. However, there is an indication that, due to the overall increase in moisture availability in a warming climate, the most extreme rainfall events are likely to increase in the twenty-first century.

Based on the above analysis, the Australian case study indicates that so far we cannot confirm whether PMP estimates will definitely increase under a changing climate.