

C h a p t e r - I X

Summary and outlook

9.1 Summary

A study has been made of role of some physical and dynamical parameters involved in the atmospheric circulation over India and neighbourhood during Indian summer monsoon in two contrasting years of monsoon activity viz. 1966 and 1967.

Examination has been made of the vertical and spatial structures of the basic meteorological parameters. The good monsoon year is associated with higher values of specific humidity and meridional winds and with stronger zonal winds than the drought year.

The surface synoptic features have been studied. The dates of onset and withdrawal of monsoon and the number of depressions and storms which occurred are nearly same in both the years. However, the frequency of occurrence of low pressure areas is large during the good monsoon year, with the axis of monsoon trough in its normal or south of its normal position. The daily rainfall amounts were near to normal in the good monsoon year. The seasonal rainfall amounts were higher over west coast and central India and lower over northeast and peninsular India in the good monsoon year.

Analysis has been made of sea surface temperature over the sea areas surrounding the Indian sub-continent. The temperature patterns are similar in both the years, increasing from the east African coast to the west coast of India. The temperature decreased over the Arabian sea during the peak monsoon months. There was greater upwelling along the east African coast during the good monsoon year.

Based on aerological data over India, computations have been made of the water vapour flux. It is inferred that major portion of transport is confined to lower regions of the troposphere in both the years. The good monsoon year is characterised by higher zonal and meridional transports. There was increased eddy activity over monsoon trough zone and the vergence patterns are stronger.

The net water vapour flux has been studied, considering India as one box with western and eastern parts as sides and the Himalayas as lid. It is observed that water vapour flux by mean component is higher, with net moisture convergence over India, than by the eddy component. The rainfall and moisture convergence

are of the same order of magnitude in both the years with prominent diurnal variations along the west coast. There has been higher water vapour flux and moisture convergence, with larger diurnal variation, in the good monsoon year.

A discussion has been made of the energetics of the atmosphere in the two years. It is inferred that the patterns of mean fluxes of sensible heat and latent heat are similar with maximum contribution from lower regions of the troposphere. The country acts as a sink for angular momentum and the flux of kinetic energy was southwards. The good monsoon year suggests higher sensible and latent heat fluxes in the mean component over areas of north east and west coast of India. The flux of relative angular momentum, by mean component, is also higher over west coast. The eddy activity in sensible and latent heat and angular momentum are higher along the monsoon trough zone.

Power spectral analysis has been made of temperature and winds in the troposphere over the Indian

Ocean area. The study suggested the existence of the mixed Rossby-gravity wave with a periodicity of 4 to 6 days, besides another wave with periodicity of 2 to 3 days in both the years. The 2 to 3 day wave is present near 10° N and the 4 to 6 day wave near the equator. There is no indication of the presence of the Kelvin wave in both the years. The activity of wave disturbances does not indicate relationship with contrasting monsoons.

9.2 Outlook

The present study is confined to two years of contrasting monsoon activity. The results of the study are, therefore, only illustrative but not conclusive. More pairs of contrasting monsoon are to be examined to obtain conclusive results.

It is recognised that the entire atmosphere is only one fluid and thermodynamical entity. The disturbances in one part of the fluid are, therefore, bound to affect another part. The monsoon circulation is believed to extend northward and also upward to stratospheric heights. An intensive study of association between

wave disturbances in the equatorial lower stratosphere and the quasi-biennial oscillation in the stratospheric winds on one hand and monsoon activity on the other will be both interesting and fruitful.