

*Some studies of the growth of monsoon disturbances*<sup>†</sup>

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ABSTRACT

The structure of the monsoon depression and the observed flow features prior to and at the time of monsoon depression formation (composite of 15 depressions) are examined. The composite monsoon depression (transient eddy) has a scale of 25 degree longitude and extends upto 300 mb and has the greatest intensity at 700 mb. It shows northnortheast to southsouthwest tilt in the lower levels indicating that it may draw upon zonal kinetic energy for its growth. The disturbance has lower temperatures to its west and tilts westwards with height indicating that eddy available potential energy is not converted from zonal available potential energy by large scale advection. There appears to be a reduction of vertical shear at the time of formation of monsoon depressions and this possibly aids cumulus convection.

The profiles of potential vorticity indicate extremes (*i*) in the upper troposphere and (*ii*) at several midtropospheric levels in the region of the monsoon trough indicating the possibility of combined barotropic-baroclinic instability. Using multi-level quasi-geostrophic model and employing the eigen value technique it is shown that the monsoon zonal current is not baroclinically unstable. A barotropic stability analysis is also done for monsoon zonal current in the lower and middle tropospheres. It yields unstable modes at lower and middle tropospheric levels with wave lengths of 20-30 deg. longitude and doubling time of 4-6 days.

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