

### PARTITIONS OF AIR MASSES IN THE TROPICS, AND THE I.T.F.

THE Norwegian school of meteorologists expounded and developed the Polar-Front theory of extra-tropical cyclones. An active outbreak of cold polar air across this semi-permanent polar front led to the formation of the cyclones. The approximate positions of the semi-permanent Polar, Arctic and Antarctic fronts were given. An equally simple picture for a semi-permanent front given by the same school is the Inter-tropical-front (I.T.F.) representing the belt or region of convergence of the trade-winds from the two hemispheres. This line was represented as a broken line circling round the globe.<sup>1</sup> Willett has made the line a bit more continuous or unbroken.<sup>2</sup> It is very nearly the pressure equator. In Indian area, Willett has passed the line in summer through the seasonal low pressure area. But in the corresponding North American area, the line is kept away from the seasonal low, and drawn nearer the geographical equator. The behaviour of "Hurricanes" of West Indies must have been responsible for this change.

In India, the importance of this partition of the trade-winds from the two hemispheres has been implicit in Eliot. In describing the passage of Typhoons of the China Seas into the Indian area, the position of this partition has been found very useful by Doraiswamy Iyer<sup>3</sup> who has described its position from month to month.

The weather in the tropics needs three air masses—Equatorial Maritime air (Em.), Far-Eastern Transitional or Mixed air (Tr.) and Tropical Continental (Tc.) or Tropical Continental-Martime air (Tcm.). In several papers, these air masses have been described and their properties developed.<sup>4</sup>

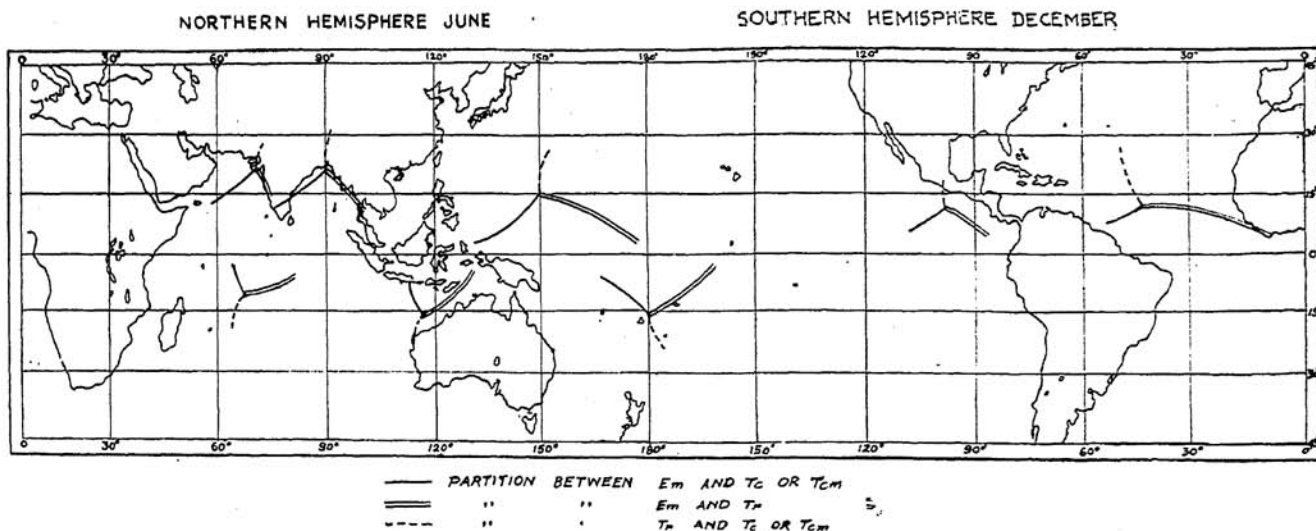
During the northern summer Em. has a southerly component; the Tr. may have components from both north and south according to the geographical position and the Tc. is from W. or W.N.W. All these three air masses are essential, and without any one of them a monsoon depression, a tropical cyclonic storm or a tropical depression cannot form in the strict sense.<sup>5</sup>

The main criterion of drawing the I.T.F. is the direction of the wind. It separates at some places Em. and Tr. and at others Em. and Tc. or Tcm. The partition between Em., which

can be made easily unstable, and the hot, almost-saturated, more stable Tr. can show clouds, weather and squalls over a wide stretch. In the partition of Em. and Tc., it may show a few thundershowers or even a scatter of only dry thunderstorms. Between different portions of the I.T.F., there would be distinct differences and the utility for a forecaster also would not be equally satisfactory. With three air masses which go to determine

and Pisharoty, "Evidence of three air masses from temperatures aloft in Tropical Cyclones" (in Press). —, "Abnormally Dry and Wet Western disturbances over N. India" (in Press). —, "Air Mass interpretation of Sen's Vortex method of Weather Forecasting", (in Press). 5. —, *Curr. Sci.*, 1947, 16, 14. 6. Gibbs, *Synoptic Studies in Australian Met.* 7. Malurkar, "Occasional Distant Weather Information and Forecasting" (in Press).

PARTITION LINES IN THE TROPICS



tropical weather, it is hardly possible to represent the semi-stationary conditions by a single front. Gibbs<sup>6</sup> tried a compromise by an extra front called "Tropical front" which, when it combined with the I.T.F., indicated tropical depressions or cyclonic storms. It would be only logical to draw partitions of the three air masses over the Tropical belt as an idealised condition. An active outbreak of the various air masses across these fronts (particularly Em.) would be favourable for unsettled conditions and for development later of a tropical cyclonic storm or monsoon depression.

The available climatic information has been used, and the partitions for the months of June and December have been drawn on a single diagram of the Tropical belt. The partitions in the northern hemisphere represent the conditions in June, while the partitions in the southern hemisphere represent the conditions in December. As tropical weather comes from the east,<sup>7</sup> the map is drawn with the Pacific Ocean in the middle.

The fairly strong circulation south of the equator in the Atlantic and the Eastern Pacific Oceans, and the extension of the seasonal highs to within a few degrees of the equator prevent any partition lines being drawn. In other words, tropical cyclonic storms do not form there.

Poona 5,  
April 19, 1947.

S. L. MALURKAR.

1. S. Petterssen, "Weather Analysis and Forecasting," 1940, pp. 270 and 272. 2. H. C. Willett "Descriptive Meteorology," 1944, pp. 192-93. 3. *Mem. Ind. Met. Dep.*, 26, p. 98 (Discussion) and references to Eliot. 4. Malurkar, "Forecasting Weather in and near India" released Nov. 1945, p. 34 *et seq.*; and p. 87 *et seq.* Malurkar