

### Monsoon: Onset Criteria for Bhutan

South west monsoon or popularly called summer season in Bhutan spans over four months (June-September). The summer season is the predominant season in Bhutan as more than 70% of the annual rainfall is received during the season. Moreover, the summer rainfall influences more than 60% of the total population of the country whose livelihoods are dependent on agriculture. Therefore, it is important to forecast monsoon rainfall and its onset. Several criteria are being set to determine the onset of southwest monsoon across several countries in South Asia.

For Bhutan, the normal onset of the monsoon season is 5<sup>th</sup> June. The monsoon onset is subjectively defined owing to the shorter period of the climate data. The criteria set is mainly based on the subjective definitions that are mainly used in India by the India Meteorological Department. Following criteria have to be met to declare the onset of monsoon in Bhutan.

- i. If after 5<sup>th</sup> June, 50% of the 20 class A meteorological stations report rainfall of 1.0 mm or more for two consecutive days and widespread rainfall across the country, the onset of monsoon in Bhutan is declared with the concurrence of the following criteria.
- ii. Onset date of isochrones produced by IMD either passes through Bhutan or near bordering states of India, namely, Arunachal Pradesh, Assam, West Bengal and Sikkim.
- iii. The orientation of cloudiness across the northern Bay of Bengal and over Bhutan from the satellite images, and forecast of widespread rainfall by Weather Research and Forecasting model (WRF) for two or more consecutive days.