# The SAARC STORM Pilot Field Experiment 2009

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The SAARC STORM Pilot field experiment was conducted during 1-31 May 2009 as a joint field campaign between India, Bangladesh, Bhutan and Nepal to study severe thunderstorms (Nor'westers) that occur during the premonsoon season. Intensive field observations were collected in the four countries in a coordinated way with existing stations during several outbreaks of thunderstorms declared as Intensive Observation Periods (IOP). The main objective of the field experiment was to monitor the life cycle of Nor'westers/ severe thunderstorms, formulate ideas on modeling of mesoscale oconvection (including the study of their dynamical and physical characteristics) for developing accurate early warning system, and validate available models.

Observations showed that the cloud tops usually reached 10-12 km, but in some cases reached more than 18 km. The cloud top temperatures (retrieved from satellite) varied between $-40^0$C to $-70^0$C and temperatures as low as $-80^0$C were also observed. The squall lines were usually of 150 to 250Km in length and occasionally more than 300km in length. The average speed of movement of the squall lines was about 50-60 Km/hr. The life time of intense squall lines was about 8-10hrs. More than 85% of the squalls were of moderate intensity (wind speed $\leq$ 40kts). About 12% of them had wind speed > 40kts. The strongest wind speed was recorded up to 111.2 km/hr. Most squalls occurred during 1200-2400 hrs IST.

The WRF model was run at 9 km resolution for 4 intense cases (3, 11, 15 and 18 May) in which widespread thunderstorms were reported in all the 4 countries. Results showed that accurate forecasts could be made at best 6-12 hours in advance, though the signature of the storms could be seen at least 24-48 hours in advance. A composite of these cases together with the 15 cases of Nor'westers of 2008 indicate many interesting features and deficiencies in the model. The results showed a cyclonic circulation over the west Bengal and adjoining region at 850 hPa, or a long line of convergent winds, low level moisture incursion from the Bay of Bengal and a significant trough at 200hPa over the north central India were the basic factors for the outbreaks of the thunderstorms. Strong wind shear was seen over much of the region where squall lines developed. Many pockets of strong rising motion were seen

over the region. CAPE values were high (> 1500 $Jkg^{-1}$) over the Head Bay of Bengal and adjoining coastal regions. The model generally overestimated the cloud top heights, altitude and intensity of the core precipitation, and length of the squall lines, but underestimated maximum winds speed at the surface.