Development of Convection on 1 May 2005 Over the Rocket Launching Site of India Development of Convection on 1 May 2005 Over the Rocket Launching Site of India

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A thunderstorm occurred over SHAR (Sriharikota High Altitude range), the rocket launch sight of India, in the late evening hours of 1 may 2005 during the launch campaign of PSLV-C6. A numerical simulation was performed using Advanced Regional prediction System (ARPS) to study the structure and evolution of convection on that day with the aid of 10GMTsounding. It is observed that the life cycle of the event is around 6 hours, with the initiation around 1930 LT, maturing occurred almost 2130 LT and after dissipation. Pre-conditions to thunderstorm like high (Convective Available Potential Energy) CAPE, and low level wind shear are the favouring conditions existed over the launch site during the thunderstorm day compared to a non-thunderstorm day.To understand the pre-storm environment and the influence of vertical wind shear and humidity on the severity of the storms further four more simulations were performed.

GPS based profiling of atmospheric parameters such as pressure, temperature, humidity, wind speed and wind direction were made twice (~00 GMT and ~12GMT) in a day over SHAR in conjunction with PSLV-C6 launch campaign. The morning 00GMT profile of the event day was characterized by a surface pressure of 1005 hPa with 28.70C temperature and a relative humidity of 91%. The surface prevailing winds are observed to be southerly with a moderate wind speed of 3 to 4 m/s. The profiles of temperature and humidity did not show any indication of the future thunderstorm in the evening.

In the evening around 10GMT, over SHAR the surface pressure was observed to be around 1004 hPa with an ambient temperature of around 31.40C and relative humidity of 79%. The surface wind is around 5-10 m/s having direction changing from southeasterly to southerly and as it goes up, the winds are becoming almost northerly, effectively producing a low level wind shear, which was necessary for the initiation and vertical propagation of the thunderstorm. The surface dew point temperature over SHAR in the evening hours was observed to be 27.30C. This high dew point temperature along with the high ambient temperature of around 31.40C produced an atmosphere which was buoyant enough for the initiation of convection, which in turn contribute to enhance both sensible and latent heat. This sensible heat helps the air parcel to reach above the Level of Free Convection (LFC) and after that the latent heat emission will help the parcel to be buoyant enough to reach the Equilibrium Level (EL) with high vertical velocity and hence high kinetic energy,

which will be derived from the Convective Available Potential Energy (CAPE) of the parcel.

The 10GMT sounding over SHAR showed a deep moist layer, a well mixed subcloud layer and high CAPE of 4170 J/kg. Average low level wind (up to 4km) of magnitude varying from 0-12 m/s, had a direction varying from southerly to south westerly and between 2.5 to 4km, it become almost northerly. This type of wind changing from southerly to south westerly and turning to northerly produced a low level shear in the atmosphere, creating a situation conducive for convection.