Simulation of Convective Hot Spots along the Foot-Hills of the Himalayas that Kicked-off a Tornado in Nepal and a Severe Storm in Bangladesh on 31st March 2019

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A series of convective hot spots occurred along the foot-hills of the Himalayas on 31st March 2019, which kicked-off a tornado in Nepal and a severe thunderstorm over Bangladesh due to excess heating of the land and multiple low-level cyclonic circulations located over the region. The severe storm killed several people in the Bara and Parsa districts of Nepal and damaged enormous properties over the region. That was the first officially recorded tornado in Nepal. A supercell thunderstorm spawned the tornado in the Chitwan National Park of Nepal. Traveling along a 90 km path, which was visible from space (Sentinel-2 satellite) and reaching a maximum width of 200 m, the tornado caused twenty-eight deaths, 1176 injuries, and damaged 2600 homes in the late afternoon (12-13 UTC). Tornadoes are common during the pre- and post-monsoon months in the Ganges Basin to the south of Nepal. During this time, the CAPE and wind shear are high and conducive to the development of rotating thunderstorms. On the same day, around the same time, Dhaka in Bangladesh, and its surrounding regions experienced a severe thunderstorm with 74 kmph wind speed, which damaged several properties.

An attempt is made to analyse the convective hot spots based on ground and spaced based observations. An attempt is also made to simulate the storm using the WRF model. The storms are diagnosed based on simulated fields such as wind circulations, rainfall, CAPE, reflectivity, helicity, etc. Preliminary results show that while the model was unable to simulate the tornado over Nepal accurately, it could simulate the severe thunderstorm over Bangladesh reasonably well. The failure of the model in simulating the tornado over Nepal emphasizes the need of high resolution data and appropriate initial conditions compatible to the scale of the tornado. Detailed results will be discussed during the workshop.