EXTREMELY SEVERE CYCLONIC STORM FANI

A Study of its Meteorological and Electrical Properties and its Role in Coupling of the Lower and Upper Atmosphere

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ABSTRACT

This thesis is a study on the characteristics of the extremely severe cyclonic storm (ESCS) FANI, which crossed the eastern coast of India near Puri on 3rd of May, 2019. This report deals with the meteorological conditions prevailing in the north Indian ocean (IO) during this period which gave rise to ESCS Fani. The analysis begins from the genesis of a depression in the north IO on 25th of April 2019 and ends on the dissipation of Fani over Bangladesh on 5th of May 2019. In this thesis, it is expected to establish a link between the lower and the upper atmosphere via atmospheric gravity waves, and to closely characterize the properties of such waves generated by the intense lightning activity of the cyclone. The findings of this project are very crucial in understanding the genesis of such extreme weather phenomena in the low near-equator regions of the IO. One such finding is that the sea surface temperature (SST) plays an extremely important role in the evolution of tropical cyclones. If the SST is high enough, a weak depression can result in a destructive cyclone even in the equatorial oceans where the Coriolis force is not enough to carry out cyclogenesis. The SST during the Fani genesis was around 31.5^{o}C which helped Fani to grow in 2^{o}N latitudes of the IO. During the entire life period of Fani, the lowest cloud top temperature value was found to be 177.1795K or -95.97^{o}C. Such low temperatures were resulted from towering convection cells of the thunderstorm reaching a height of around 20 kms. The winds generated by the cyclone reached speed of 175-185 kmph, gusting to 205 kmph at the time of landfall close to Puri. These weather conditions resulted in heavy precipitation in the coastal low-lying regions of eastern India, mainly in the states of Odisha, Andhra Pradesh and West Bengal, and in some regions of Bangladesh. Its longest lifetime and its persistence to stay active even for 24 hours after landfall makes Fani an interesting and unique case to understand more about tropical cyclones.