CHARACTERIZATION OF THUNDERSTORMS OVER SRI LANKA USING WEATHER DATA IN GIS

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ABSTRACT

Thunderstorm is a severe weather phenomenon, the impact of which is being increasingly felt by all the sectors of society. Most of the high impact weather phenomenon on mesoscale like heavy rain, lightning flashes, thunder, tornadoes and hailstorm (not common in Sri Lanka) are caused by thunderstorms. These cause loss to life, damage to crops and property. The knowledge of the behavior of thunderstorms with respect to its climatology, frequency of occurrence, location of occurrence, intensity, diurnal variation and duration is essential particularly in the interest of safe air navigation and taking necessary precautions to avoid the loss of life and minimizing the loss of property. Nowadays there are many sources to learn about thunderstorm behavior like data, maps, and tables. This study will describe a method to combine weather data to assist in understanding past, current and future thunderstorm behaviors for any location in Sri Lanka using desktop mapping system because, with the right weather information delivered at the right time, many officials could make profitable decisions. The objective of the study is to integrate weather data into Geographic Information System (GIS) to identify thunderstorm behaviors over Sri Lanka. This helps to better communicate, plan and respond to both natural and technological disasters that we are facing today.

In this study, there are several attempts. First attempt has been made to develop a sophisticated Thunderstorm Climatological System (TSCS) over Sri Lanka based on latest representative climatological data. In all, data of 25 observatories comprising of 17 Sri Lanka Meteorological Department (SLMD) observatories, seven Indian

observatories and one in Maldives have been analyzed. Using GIS application software packages, climatological maps were created as annual, seasonal and month. In the next attempt, a sophisticated method was developed to predict thunderstorm activities over Sri Lanka using output data of a numerical model which is called MM5. Finally, surface runoff during heavy rains on consecutive thunderstorm days in a thunderstorm prone area which is led to flash flooding was simulated by means of dynamic modelling.

Thunderstorm is a primarily short lived mesoscale weather phenomenon. Existing synoptic network of observatories have limitations in recording all the occurrences of thunderstorms at the observatory and adjoin areas. Efforts have been in this study to develop thunderstorm climatology by using quality data of available full time current weather observatories. As there are just a few full time observatories in most of the sub divisions, the study is not able to bring out fine spatial variation of thunderstorm activity within sub divisions.

Key words – Thunderstorm, Mesoscale, Aviation hazard, Climatology, Frequency, High impact weather event, Flash flooding, Dynamic modeling.