

## Editors' Page

Thunderstorms and lightning are highly localised typical atmospheric phenomena. Often associated with tornadoes, strong winds, hail or flash floods these weather events put people as well as infrastructure at risk in varying degrees. It is well known that in India lightning has been the biggest killer which account 33% of the total fatalities due to natural hazards. Various studies indicate that in a future warmer climate we may have more intense thunderstorms, and increase in the amount of lightning by about 10% for every 1°C global warming. Development of adequate early warning systems and suitable preventive measures will help minimising the risk of death and loss. Considering the importance of the topic, this issue of VayuMandal is entirely devoted to thunderstorms and lightning. The first invited review paper by the concerned expert Col (Dr.) Sanjay Srivastava, Chairman, Climate Resilient Observing Systems Promotion Council (CROPC) and Convener, Lightning Resilient India Campaign (LRIC) gives a very good account of this timely campaign. It may be noted that India Meteorological Department (IMD) started lightning forecasts from 1st April 2019. To enhance outreach of these forecasts, CROPC in collaboration with IMD, Indian Meteorological Society (IMS), World Vision India and Red Cross, launched LRIC two years back. The campaign, through multi-stakeholders' engagement at the national and state levels with government departments, academia, NGOs and communities, has been successful in bringing down deaths considerably. Scientific mapping of lightning in the whole of India as well as in all of its states and union territories is another important achievement of this campaign.

It is encouraging to see that three of the contributing papers in this issue, the second, third and sixth, are from scientists from Russia, Bangladesh and Myanmar respectively. The second paper on the analysis of thunderstorm activities in Moscow and Bengaluru is the result of a collaborative research between Russian and Indian scientists. In this work, the climatology of thunderstorms in Moscow and Bengaluru are analysed using data from Moscow State University (MSU) Meteorological Observatory for the period 1954-2017 and the Meteorological Centre of India Meteorological Department at Bengaluru for the period 1969-2017. Results reveal that the total number of days and thunderstorm duration remain the same during the study period. Further, it is found that there is no impact of thunderstorms on Ozone and Nitrogen Dioxide. A case study of flash flood producing thunderstorms and associated lightning potential in the North-eastern Bangladesh has been examined in the third paper. In this paper, an attempt has been made to simulate the different atmospheric conditions associated with the severe thunderstorms and lightning, which occurred during 28-30 March 2017 over northeastern Bangladesh using Weather Research and Forecasting (WRF) model. The study reveals that it is possible to forecast severe thunderstorms which produce flash flood and lightning in the northeastern part of Bangladesh using WRF model. In the sixth paper from Myanmar, attempt has been made to examine the thunderstorm days in Yangon KabaAye for 1971-2000 and three other stations from Northern Myanmar area for 1991-2000. Results show bi-modal type monthly highest frequency in May, June and September with the highest frequency of thunderstorms days in afternoon and evening hours.

The fourth research paper discusses the latest approaches to thunderstorm/lightning and severe weather forecasting by initiating probabilistic forecast using GFST1534 (12.5km) and WRF models in NCMRWF, India. Here, the Lightning Potential Index has been used as a lead to lightning flashes. The sixth research paper discusses monitoring and forecasting challenges using a unique case of the occurrence of winter thunderstorm and squall followed by immediate dense fog at the IGI airport. This study shows that use of Doppler Weather Radar (DWR), satellite and the Integrated Aviation Weather Observing System (IAWOS) at IGI airport has an advantage over synoptic and NWP inputs. The seventh and the last research paper deals with the climate change aspects of lightning in Odisha, the state which has been appreciated globally for addressing the vulnerability of people in cyclone, floods and heat wave. It is worth mentioning that the early warning system in lightning has been introduced in Odisha in 2019 and further, the policy makers have introduced adequate compensation since 2010-11.

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