FROM THE PRESIDENT'S DESK

Discussions on weather modifications of different types have been very fascinating the world over. In the extreme case, there had been attempts to provoke damaging weather against the enemy nation as a military strategy or economic warfare. However, cloud seeding for rainfall has remained the most common form of weather modification. Weather modification has also been the goal of preventing damaging weather such as hailstorm or hurricanes. In this issue 45(2) of VayuMandal, the first review paper and the paper following that have been devoted to Quick Reaction Helicopter (QRH) for safe and efficient hail-suppression operation and Artificial Cloud Target (ACT) for weather radar data generation in case of cumulus clouds respectively. The first paper discusses the design and development of QRH with its side attachments for rockets, navigational screen and human machine interface screen along with its safe operational norms. In the second paper, short range X-band radar used for data generation has been described. Outputs of software developed for the purpose could be spontaneously disseminated without loss of time, which is crucial in hail suppression mission in particular and all weather modification campaigns in general.

Study shows that among deaths due to exposure to severe weather events, thunderstorms/lightning strikes claimed the most number of lives between 2001 and 2014 in India. The annual death toll in the country has gone up to 2000. Some figures even show the number more than that. Further, it is found that due to global warming, the number of lightning occurrences are increasing. Considering the societal importance of the issue, IMS has been involved with the Lightning Resilient India Campaign in the country for awareness generation and reduction in human loss. In collaboration with IMD and CROPC, a seminar was also organised by IMS on Lightning Early Warning, its Operation and Safety cum Awareness in IMD in October 2019. In this particular issue, there are three papers on case studies of thunderstorms in different parts of India. The fourth paper is on case study on dust storms/thunderstorms over Uttar Pradesh on 2nd May 2018, the fifth is on the trend of thunderstorms and associated casualties over hilly terrain of Jharkhand and Gangetic West Bengal plains and the last one is on the impact of winds of various layers upon thunderstorms and rainfall over Vidarbha. On 2nd May 2018, dust storms/thunderstorms prevailed over large parts of Uttar Pradesh killing more than 100 lives. The synoptic conditions, current weather observation, satellite imageries, Doppler Weather Radar products and also products from numerical models have been used. Observation across 22 meteorological stations in Jharkhand and Gangetic West Bengal over 32yrs indicates that the trends of thunderstorms and associated casualties over the two regions have been increasing in both pre-monsoon and monsoon seasons. The meteorological data of Nagpur for forty years (1965-2004) on the other hand indicate that there is a positive and significant correlation between the number of thunderstorms and the amount of rainfall and that both are decreasing at Nagpur.

It is well known that regional models are more suitable for the study of regional weather and climate. RegCM developed at the Abdus Salam ICTP in Trieste has been increasingly used by scientists across India. In the third published paper in this issue, RegCM3 is used to conduct two experiments one with unperturbed SST and the other with enhanced SST by $+0.5^{0}$C over the Arabian Sea. Model simulated vertical wind profile and water vapour mixing ratio during Indian Summer Monsoon months over the Arabian Sea show that both the parameters increase in the perturbed SST experiment. Further, the Indian Monsoon Index enhances due to extra SST warming. Today, the CORDEX programme has yielded large amounts of useful downscaled products. The sixth paper in this issue has been devoted to the analysis of rainfall pattern inferred from CORDEX-SA domain models for future warming scenarios over Northwest Himalayan Region (NWH). It is found that MIROC5 and MPI-ESM-LR models provide the best spatial distribution of rainfall, although CORDEX domain models are unable to simulate the intensity of daily rainfall as compared to IMD data over the NWH region.

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