

Editors' Page

The editorial committee of VayuMandal invited two distinguished Professors such as Dr.P.K. Pallath and Dr.P.K. Mohanty for writing review papers for this issue of VayuMandal. The committee members are very much thankful to these two scientists for devoting their valuable time in writing and submitting their articles on two important topics in the field of atmospheric science. The first review paper discusses various aspects of ice nucleation in clouds. There are large gaps in our understanding of the ice nucleation and ice multiplication processes occurring inside natural clouds. There are also shortcomings in ice nucleation parameterization in models. Globally, the measurements are very sparse and quantification of the types of ice nuclei is also not up to mark. This important article dwells on the mechanisms of secondary ice multiplication processes and addresses several gaps that need to correctly quantify the ice formation in clouds. The second review paper is on the role of ENSO and IOD in the Indian Summer Monsoon variability. Spatial and temporal variability of Indian Summer Monsoon Rainfall (ISMR) is well known. This review article focuses on the ISMR variability due to coupled ocean atmosphere processes in the Indian and Pacific oceans. Indian gridded rainfall data for the period 1901 to 2020 are used under different phases of ENSO and IOD. Impacts of true El Nino/La Nina, positive/negative IOD and co-occurrence of El Nino with positive IOD and La Nina with negative IOD on ISMR are discussed over All India as well as its several homogeneous zones.

The third paper discusses the visibility prediction using NWP model output at IMD. It is well known that every year, fog during the winter season disrupts the life and property. In real time monitoring of fog, IMD uses INSAT derived operational products and imageries. However, with the support of WRF model outputs, visibility can be predicted in advance up to 36 hours. In the year 2015 as a pilot phase, IMD started to generate operationally model visibility with 36 hours lead time. The results obtained from the limited data sets from Patna airport are quite encouraging. It is proposed that after verifying these forecasts with those at other airports with larger data sets, the method can be utilized in operational forecasting. The fourth paper deals with the spatiotemporal variation of Aerosol Optical Depth (AOD) over the Tibetan Plateau (TP) during 2003-2019 using MODIS Aqua and Terra products. Results show that the AOD values are higher over northern parts of plateau in all the seasons and throughout the year. Further, that the AOD values are highest in the pre-monsoon season. This preliminary study indicates transportation of dust transportation to TP from the adjacent regions.

Increase in the occurrence of heavy rainfall events and thunderstorms are widely discussed now-a-days. In this issue of VayuMandal, the next two papers deal with a couple of case studies. The fifth paper dwells on the July 2014 widespread rainfall activity with isolated heavy falls over Himachal Pradesh and Uttarakhand. In this study, it has been inferred that the sluggish movement of the low pressure area over north Odisha coast and the off-shore trough over the west coast accumulated a large amount of moisture which gave rise to widespread heavy rainfall. The vertical shear and orographic uplifting lead to short lived intensified precipitation. IMD GFS model simulations compare well with these synoptic systems. In the sixth paper, the synoptic, thermodynamic and dynamical features leading to two severe thunderstorms, one in the pre-monsoon month of April and the other in the monsoon month of June 2020 are compared. GFS model at 12 Km resolution along with the WRF model at 3 Km resolution have been used for the analysis of operational forecasts of these two cases. It is inferred that the low-level convergence associated with the cyclonic circulation of strong moist winds from the Bay of Bengal region was responsible for April 2020 severe thunderstorm affecting the Sub-Himalayan West Bengal, Sikkim and North-eastern states, whereas the June case was associated with low level convergence over Bihar and Uttar Pradesh supported by high values of low-level humidity.

The last paper in this issue of VayuMandal discusses efficient silver iodide pyrotechnic perforated cartridge which upon burning inside the cloud chamber under simulated atmospheric conditions emits optimum number of active seeding nuclei those speed up and enhance the nucleation process. The details of the modified pyrotechnic cartridge and its advantages are enumerated in this paper.

It is hoped that the invited review papers as well as the five contributed papers will provide very good information about the state-of-the-art R&D going on in the country in the field of weather and climate.

S. K. Dash, Kamaljit Ray and D. R. Pattanaik