



Sensitivity of pollutant concentrations towards anthropogenic emissions: A case study over Indian region using WRF/Chem model

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Concentration of an air pollutant over a given region is generally associated with the emissions, regional meteorology, and topographic conditions in addition to the chemical transformation of the pollutant. In general, the role of meteorology is often relegated in policymaking and the entire narrative of air pollution mostly revolves around the emissions. However, there may be regions where the local meteorology, in some seasons or even perennially, may predominantly govern the overall concentration, and the emissions have a little role to play. For instance, the concentrations may be high in a region despite significantly reducing the emissions. Similarly, there may be other regions wherein the prevailing meteorology would cleanse the pollutant even with high emission rates. Thus, if we better understand the seasonal meteorology of smaller regions well and their role in dispersing various pollutants, it would lead to more robust policy formulations. Therefore, there is a need to study the contribution of meteorology as isolated from the emissions, over the pollutant concentrations.

In the present study we have used the on-line coupled chemical transport model WRF/Chem to investigate the role of meteorology in determining pollutant concentrations over the Indian tropical region. By using the SEAC4RS emission for the months of April, July, and December, which represents three important meteorological seasons (summer, monsoon, and winter respectively) over India we have performed the simulations of ozone (O_3), oxides of nitrogen (NOX), carbon monoxide (CO), and sulphur dioxide (SO_2); representative scenario. Further, to assess the role of meteorology alone all the anthropogenic emissions were flattened over the entire continental India (given as one value); flat emission scenario. Our simulations show that during the month of April and December the concentration levels of the major pollutants are largely governed by the meteorology, whereas during the month of July the concentration of various pollutants is directly proportional to the emissions. The further details of the simulations will be presented.