Variability of Aerosol Concentrations and Characteristics due to Indo-Gangetic Plains

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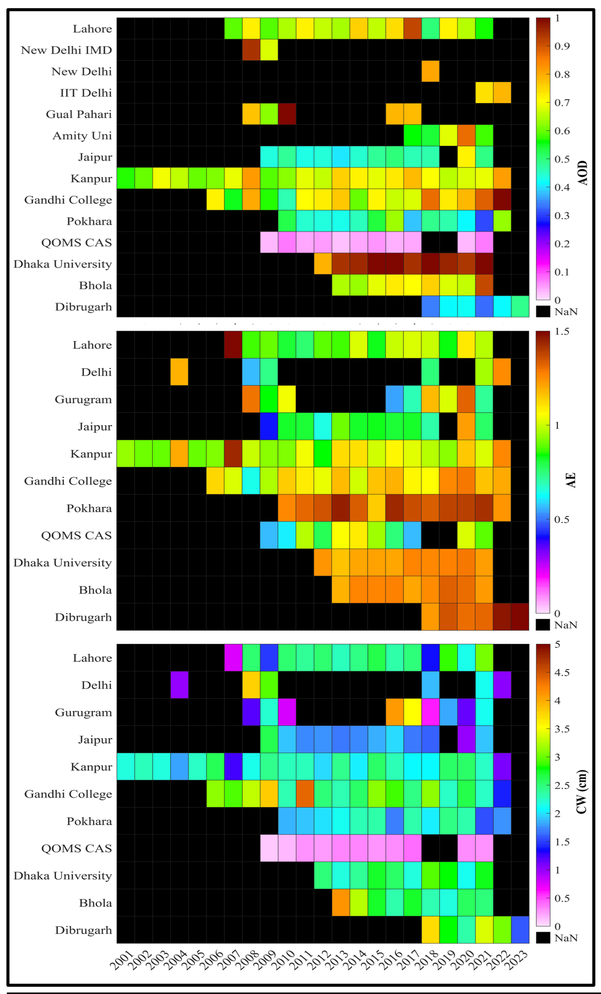
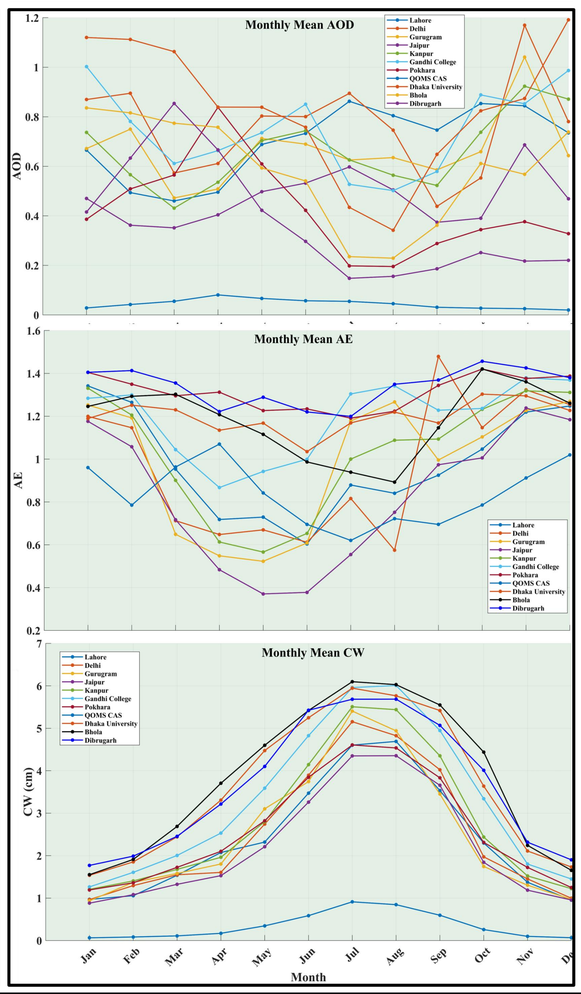
Understanding the dynamics of aerosol properties at different locations and their long-term impacts is crucial in the context of climate change. The Indo-Gangetic Plain (IGP) is one of the most volatile regions due to its dense population and numerous sources of aerosols and pollutants, including long-range dust transport, crop-residue burning, thermal power plants, mining, brick kilns, vehicular emissions, and forest fires.

We have analyzed the aerosol optical properties using data from AERONET stations across India, Pakistan, China, and Bangladesh, and present our initial findings here. The study examines the dynamics of aerosol properties over more than two decades of data from AERONET stations. As this work is ongoing, we are presenting limited results at this stage.

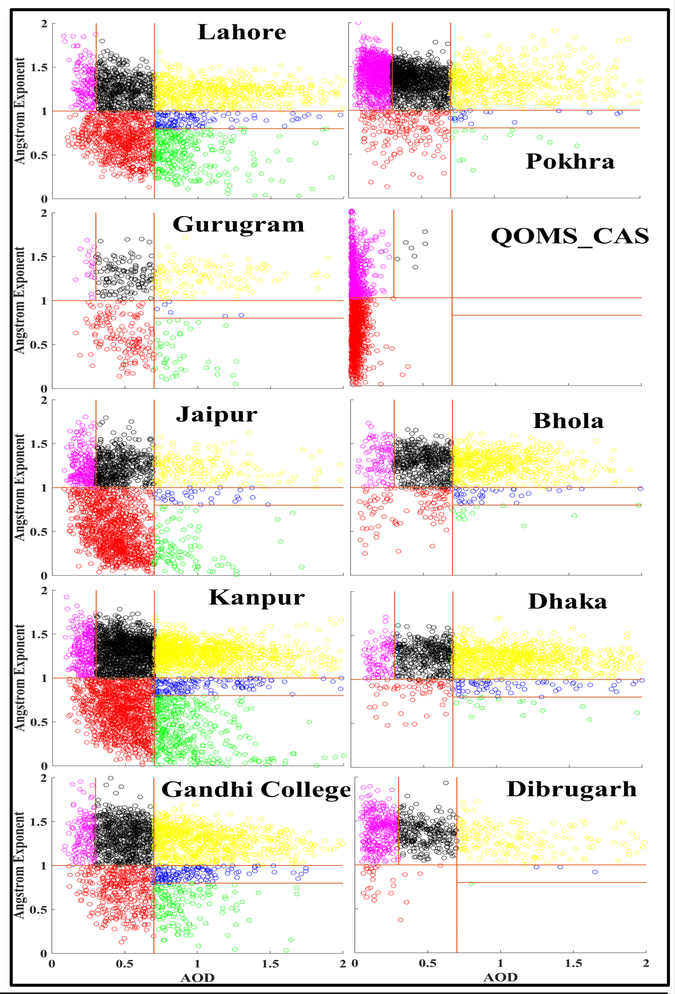
Annual variations of AOD, AE and Column Water



Monthly variations of AOD, AE and Column Water

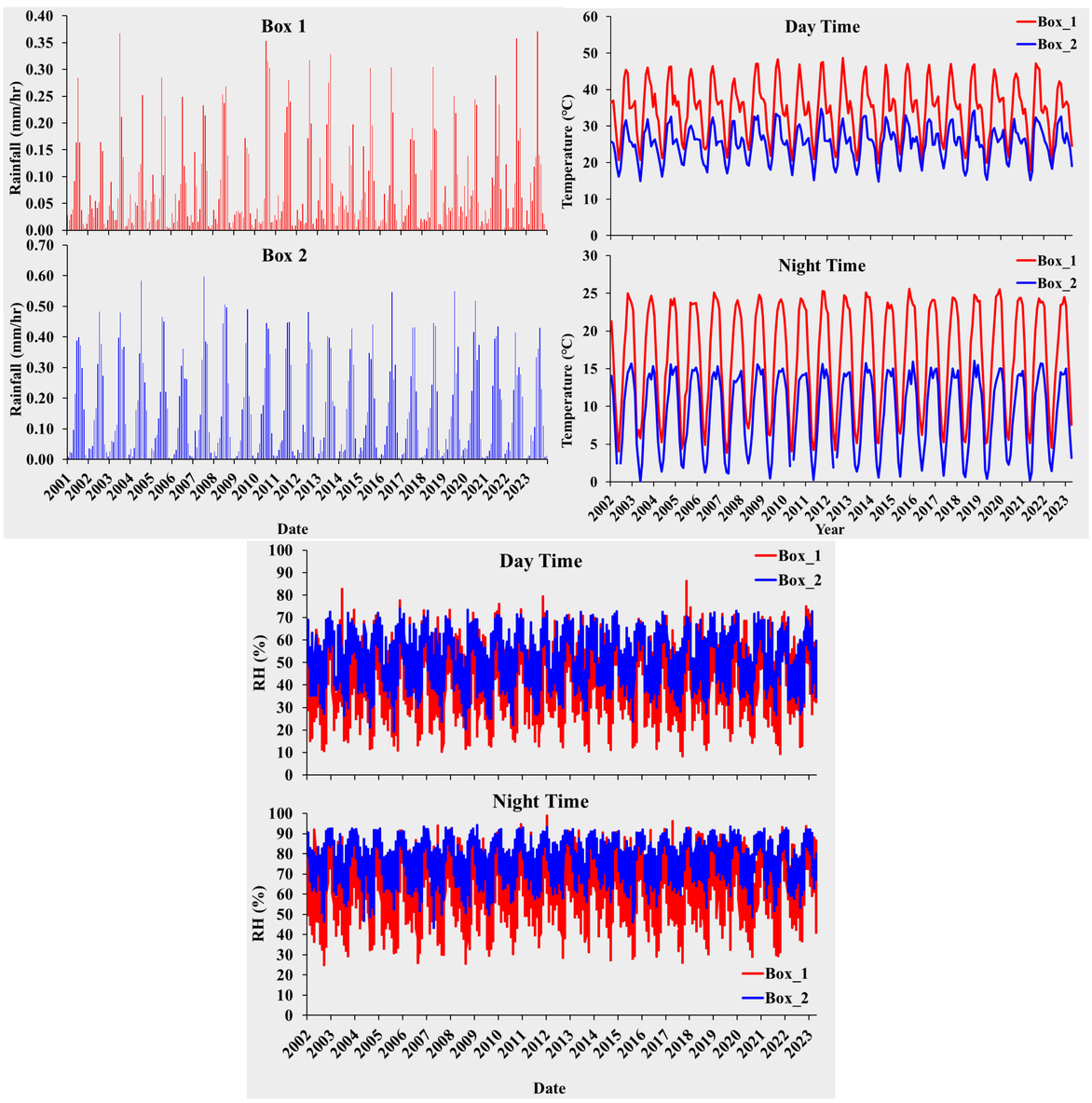


AOD vs AE Characteristics



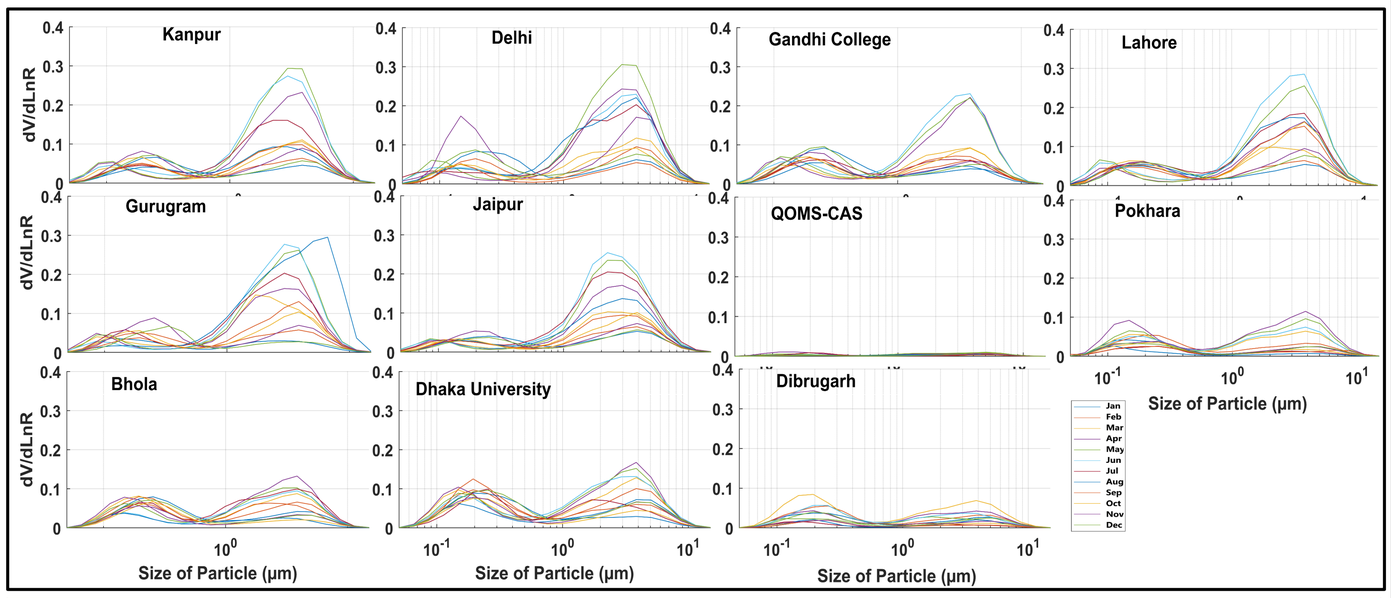
We observe strong spatial and seasonal variability of aerosols across the Indo-Gangetic Plain (IGP). Bhola, Gandhi College, and Dhaka University exhibit the highest values of Aerosol Optical Depth (AOD) and Ångström Exponent (AE). Cloud Water (CW) values peak during the monsoon season, with the highest at Bhola and the lowest at the QOMS-CAS station in China. Stations in Lahore, Kanpur, Gurugram, Jaipur, and Gandhi College are predominantly influenced by dust aerosols and biomass-burning aerosols, while Pokhara, Bhola, Dhaka University, and Dibrugarh are mainly affected by biomass-burning aerosols. All the station in western IGP are suffering with higher density of coarse particles whereas the higher density of fine aerosols is observed in easter IGP, Nepal and Dibrugarh.

Meteorology

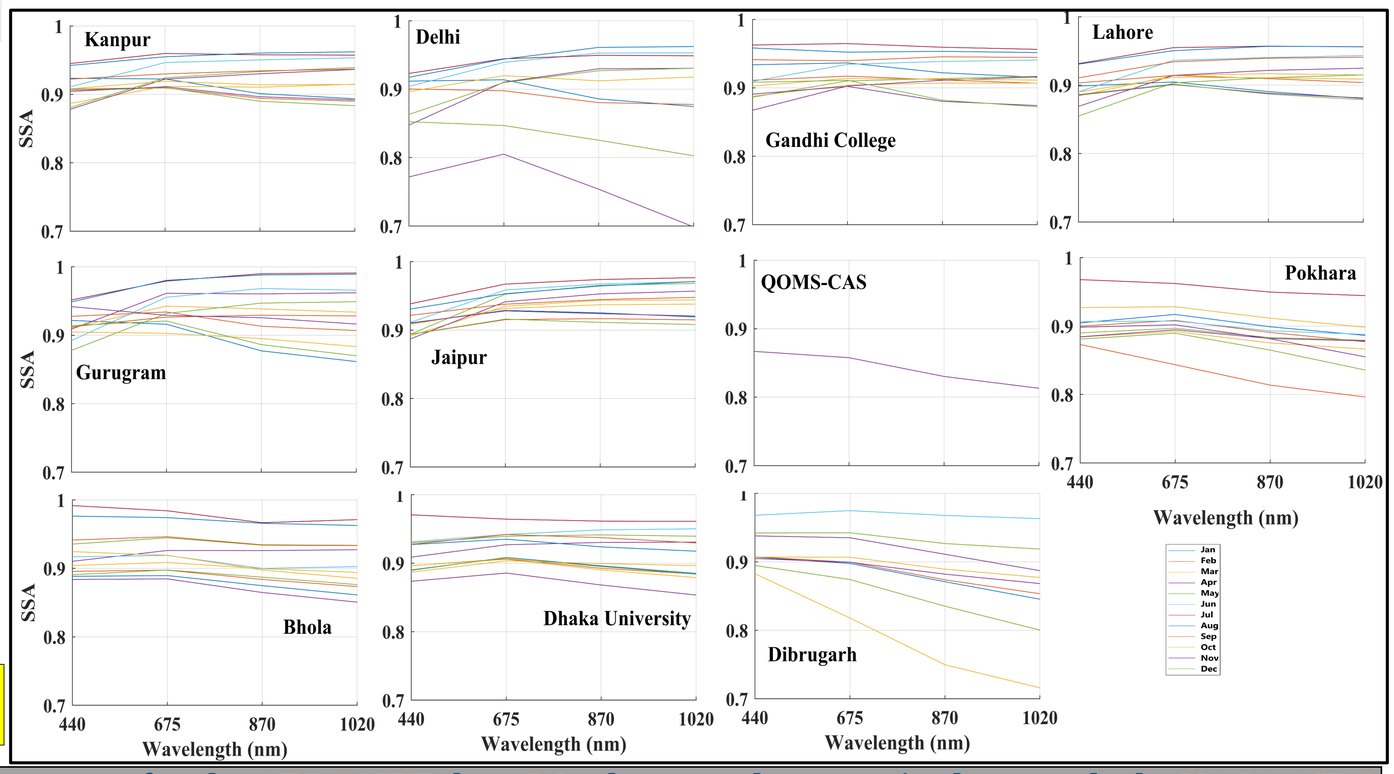


Meteorology plays a key role in the variability of aerosol properties. Here, we have shown the variability of rainfall, relative humidity, and temperature, as these are key parameters available through continuous measurements from the GPM and AIRS satellites. We will further study their relationship to assess the impact on aerosol properties.

Monthly mean variability of Size of Particle



Monthly mean variability of SSA



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