Research BRIEFS

NCAP-COALESCE

CarbOnaceous AerosoL Emissions, Source apportionment & ClimatE impacts

Understanding scientific complexities related to carbonaceous aerosols focussing on issues underlying their origin and fate, and their role as drivers of regional climate change over India.

Methodology for identifying regionally representative sites for COALESCE Project

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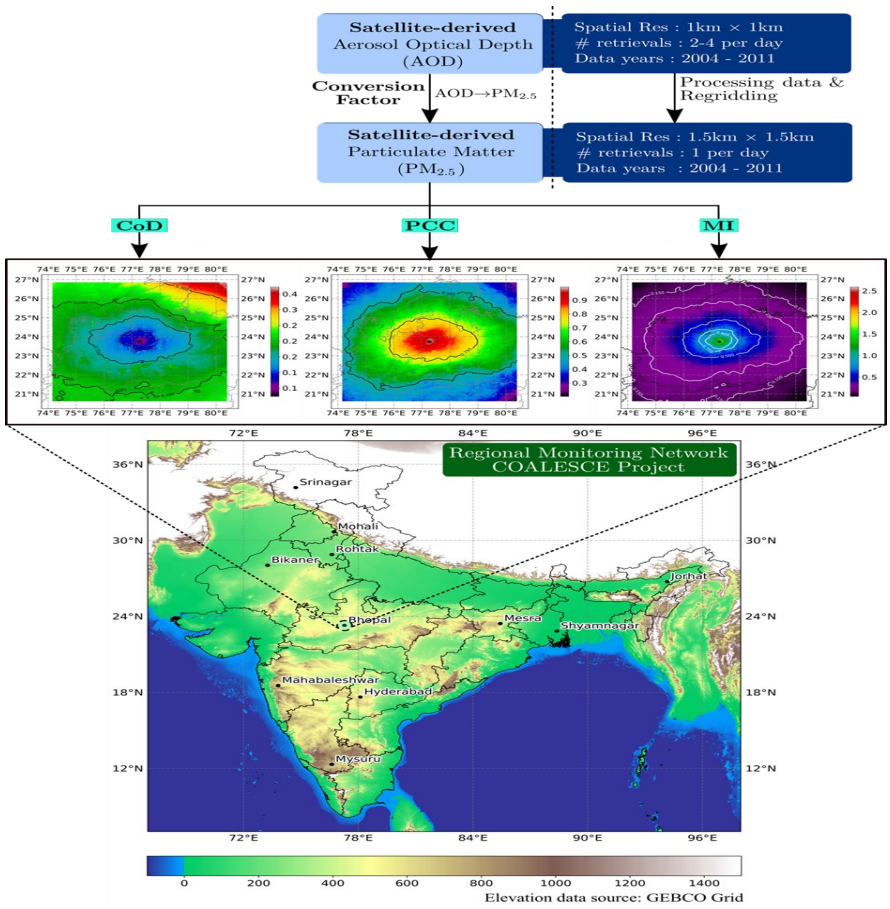

Key highlights:

- A novel method for identifying regional background sites for PM2.5 measurement is developed.
- The methodology includes the use of physical criteria and satellite-derived PM2.5 proxy.
- Satellite-derived PM2.5 using AOD and conversion factors from GEOS-Chem utilized.
- Sites were identified using metrics such as CoD, PCC, and MI to assess homogeneity in PM2.5.
- Identification of 11 regionally representative PM2.5 sampling sites for COALESCE.

Summary:

Identification of appropriate sites is an essential part of setting up an air quality monitoring network. While the approaches available in literature use short term sampling at different candidate sites, long term characteristics of the sites may vary based on the seasonal differences and the frequency of occurrence of episodic events. This study has demonstrated the usefulness of a weight-of-evidence approach in identifying sites for the set-up of a regional PM2.5 network. PM2.5 measurements. With advancing technologies, satellite data is readily

available for long time durations at high spatial resolution compared to what can be obtained from ground-based Various metrics (capturing both linear and nonlinear relationships) have been proposed in this work to assess the site representativeness based on the satellite-derived measurements. The use of satellite-derived
PM2.5 measurements enables saving precious manpower and financial resources for site identification. With air quality standards becoming more stringent across the world, the approach proposed in this work can be used to design and operationalize regional PM2.5 monitoring networks. This approach is especially valuable in countries where background PM2.5 measurements may not be available at reasonable temporal and spatial resolutions, to assist with sampling network design.

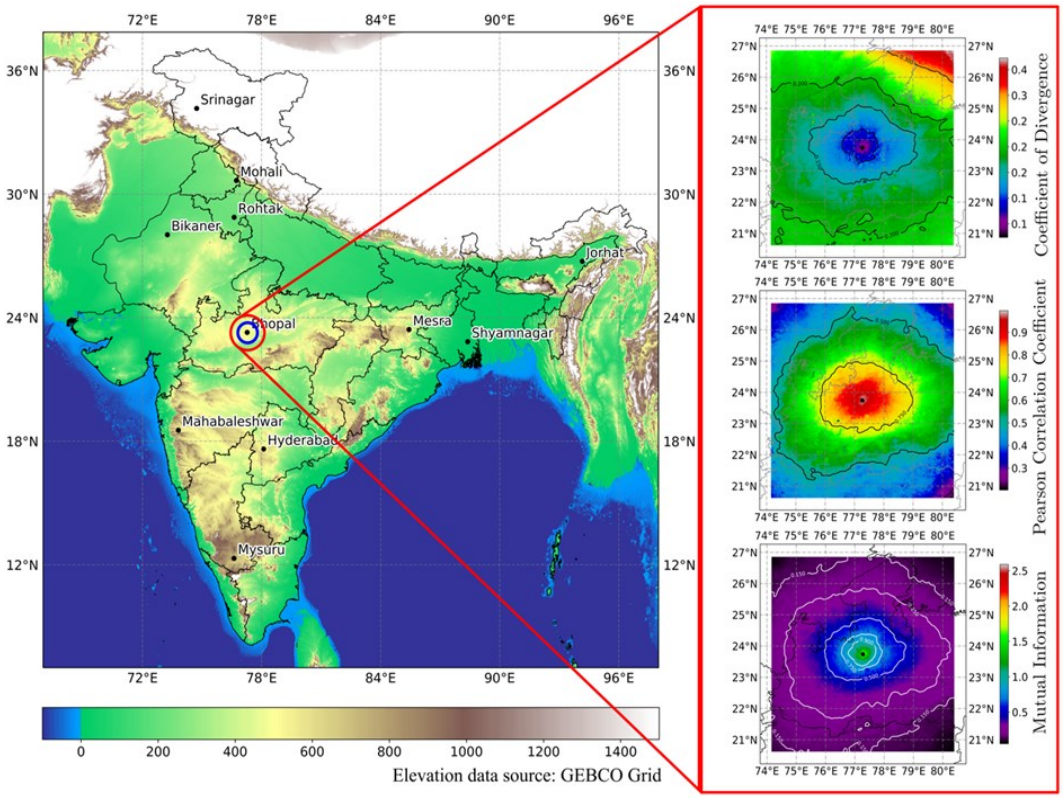

Figure 1. CoD, PCC and MI metrics showing regional representativeness of a potential site at Bhopal.

Major findings :

- Identification of 11 regionally representative sites for the COALESCE Network using satellite-derived AOD and PM2.5 values.
- Back trajectory analysis is used to understand the long-range transport characteristics and the site's meteorology. It also helps understand the potential sources and the region of origin for source apportionment applications.
- Satellite data and Meteorological data is augmented with local information like distance from the nearest of line and point sources of pollution, proximity to the industrial emissions, proximity to water bodies and other geographical features are obtained to make an informed decision on the suitability of the site for sampling.

Research Article

Citation

Lekinwala, N. L., Bhardwaj, A., Raman, R. S., Bhushan, M., Bali, K., & Dey, S. (2020). A framework for setting up a country-wide network of regional surface PM2. 5 sampling sites utilising a satellite-derived proxy–The COALESCE project, India. Atmospheric Environment, 234, 117544.

Link:https://doi.org/10.1016/j.atmosenv.2020.117544

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