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PROMOTE

PROCESS ANALYSIS,
OBSERVATIONS &
MODELLING

Integrated Solutions for Cleaner Air for

DELHI

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CONSORTIUM PARTNERS

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PROMOTE will conduct innovative process based investigations to characterize both local and regional scale influences on air pollution over Delhi. It will deliver fresh scientific understanding of aerosol and pollution processes in this subtropical environment to support planning of effective mitigation solutions.



BACKGROUND

“ Delhi is one of the largest megacities of the world with a current population of over 18 million. The National Capital Region (NCR), which includes the surrounding conurbations, has a population of around 46 million.

As part of the Indo-Gangetic Plain (IGP), Delhi is subject to air pollution from a complex mixture of local and regional sources including domestic biofuel, traffic, windblown dust, industry, coal based power plants and long-range transport (LRT) from agricultural residue, biomass burning and desert dust from far of regions.

As a consequence of the complex emissions and meteorology of the region in a landlocked Delhi geography, particulate matter (PM₁₀ and PM_{2.5}) and black carbon (BC) remain elevated, often surpassing National Standards and peak in winter season, sometime leading to pollution emergencies.

Gaseous pollutants like Ozone, nitrogen oxides, sulfur dioxide, carbon monoxide and VOCs have also started to show an increase in Delhi.

Dense fog affects transport services resulting in huge economic loss. Fog formation is associated with heavy loading of particulate matter as well as formation of secondary aerosols under certain weather conditions.

Air pollution is 2nd leading risk factors in India responsible for disability-adjusted life-year and the annual socio-economic impact attributed to air pollution over Delhi as health cost of Rs. 990 Crores (£110 million). ”

OBJECTIVES

- ❑ To examine the contribution of secondary aerosols to the pollution burden in Delhi during distinct meteorological seasons by developing a new representative model scheme for subtropical urban environments.
- ❑ To investigate how boundary layer interactions, lead to high air pollution events during pre-monsoon and stable winter fog periods affecting Delhi.
- ❑ To quantify local, urban and regional contributions to Delhi's air quality through an improved understanding of aerosols, long-range transport and boundary layer processes.
- ❑ To undertake an operational and diagnostic evaluation of the SAFAR air quality forecasting system for Delhi incorporating improved organic aerosol, aerosol-fog and boundary layer process representations.
- ❑ To develop the first coupled local-urban-regional modelling system for predicting high resolution concentrations of PM_{2.5}, PM₁₀, NO₂ and other pollutants with source attribution to assist with developing effective mitigation strategies for Delhi and providing datasets for exposure and health studies.
- ❑ To synthesize and translate the outcomes of PROMOTE with other APHH projects and contribute to a roadmap for implementing effective local and regional mitigation strategies for meeting compliance and health requirements in Delhi and NCR for current and future years.

DELIVERABLES



- ✓ Development of city specific secondary aerosol and Volatile compound schemes to enhance prediction skill of extreme pollution events and Fog conditions.
- ✓ Quantification of long range transport contributions to the air quality of Delhi during different seasons.
- ✓ A framework for the development of Street Level Air Quality Prediction for exposure and Health Studies.
- ✓ Advancement in Prediction Skill of existing SAFAR Forecasting System.
- ✓ Quantification of the role of global emission changes in atmospheric composition and climate for improving air pollution mitigation for Delhi.
- ✓ Development of air pollutant sensitivities for optimal emission control options and mitigation scenarios leading to a Roadmap and Science based Air Pollution Action Plan for Delhi.