8th International Conference on Fog, Fog Collection and Dew
Taipei, Taiwan, 14–19 July 2019
IFDA2019-91


# Thermo-dynamical, Microphysical and Chemical, Properties of Fog in Megacity Delhi: Results from WIFEX 2015-18

Rachana Kulkarni (1,2), Sachin Ghude (1), Sandip Wagh (1), Deewan singh Bisht (1), Pramod Safai (1), Kaushar Ali (1), Prakash Pithani (1), and Rajendra Jenamani (3)

(1) Indian Institute of Tropical Meteorology, Physics and Dynamics of Tropical Clouds, pune, India (rachana.kulkarni@tropmet.res.in), (2) Dept of Env Sci, Savitribai Phule pune University, Pune, India (rachana.kulkarni@tropmet.res.in), (3) India Meteorological department, New Delhi, India (rjenamani@hotmail.com)

**Context**-By considering the national interests and key research issues it is important to consider how future research on fog modeling and forecasting will be organized so that it will most effectively address the issues that are important for public services in India. Therefore, Ministry of Earth Sciences (MoES), Government of India (GoI) has taken a multi-institutional lead in understanding broad aspects of winter-time haze and fog formation over northern regions of India, and for developing a suitable fog forecasting system that has relevance to all sectors and policy issues.

**Methods**-The main aim of WIFEX was to characterize the fog events occurring in Delhi and monitor simultaneously associated dynamics, thermodynamics, microphysics and chemical composition of the gases, aerosols and fog water phases to understand factors responsible for their genesis, intensity and duration.

**Results**-This study provides results on fog thermo dynamical, microphysical and chemical analysis. We found that the fog particles grew larger and number concentration increased uniformly with time along entire diameter ranges (not shown here) when condition changes from the non-foggy to the foggy condition. Hence it is most likely that the particles grew larger by vapor deposition/collection processes.

**Interpretation**- Data from the aerosol and fog water chemistry collected so far from MARGA and PM analyzer indicate a highly polluted environment in which fog developed and dominance of combustion and vehicular exhaust sources have been noted in the aerosol samples. Secondary inorganic aerosols ($NH_4$, Cl, $So_4$ and $NO_3$) were the dominant ions (60%) in the chemical constituents of the fine particles and were higher during the fog events. The chemical partitioning of fog water samples suggest that Cl (29%), $NH_4^+$ (28%), $NO_3^-$ (24%) and $SO_4^{2-}$ (17%) dominates the chemical composition. The pH of fog water indicates the alkaline (6.91).

**Conclusion**-These results are important for considering role of chemistry and Microphysics in Fog life cycle and very much important for forecasting purpose, to tune the model simulation schemes accordingly to get accurate forecast.