

PM2.5 measurements around New Delhi City and its suburban areas in India: Observations of extremely high concentrations ($>1000 \text{ ug m}^{-3}$) and spatial distributions

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We focus on Northern India, including rural villages in the Punjab and Haryana states where crop-residue burning is a significant cause of concern, and Delhi and the National Capital Region (Delhi-NCR) where air pollution is a serious problem. In Delhi-NCR, air pollution is especially severe at the beginning of post-monsoon season, from late October through early November, during which farmers in the rural villages of Punjab and Haryana states burn paddy straw (stubble burning) following the rice harvest. As the timing of severe pollution in Delhi corresponds to stubble burning season, it appears that rural areas are generally depicted as perpetrators and urban areas (Delhi-NCR) as victims. This is portrayed without sufficient proof; quantification of the local vs external influences is still under study. Moreover, stubble burning is also an issue of climate change, because the aerosols emitted by biomass burning contain large amounts of black carbon (BC) that absorbs infrared radiation. Firstly, we are going to set up a network of large number of a newly-developed compact PM2.5 instruments for observation covering the states of Punjab, Haryana and Delhi at an unprecedentedly high level of spatial resolution, through collaboration with local researchers. These data will help us to quantify the influence of stubble burning on air pollution in the Delhi-NCR region. Secondly, we care about the health of the farmers who burn rice straw because of the health risk they face by inhaling polluted air. To take this kind of epidemiological approach, we introduce the portable model of the small Pm2.5 sensor, which can synchronize to smartphones, simultaneously record GPS information and PM2.5 values, we can calculate PM2.5 exposure on personal basis. We refer to the recorded data as the "PM2.5 diary." We will promote collaboration with public stakeholders by recruiting more than 300 people living both in farming and urban areas and encouraging them to wear Mobile-CUPI and monitor their health.

We have already gotten initial data about the PM2.5 concentrations in Delhi City for more than 1 year and found very high concentrations of PM2.5 (1000 ug cm^{-3}), We also measured the PM2.5 along the road between New Delhi and Haridwar (200 km North). From these observations, we found the wide range of areas are much polluted with PM2.5. We will presents the observational results in India and our future plans.

Keywords: PM2.5, New Dhelhi, India, Biomass burning