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The PreViBOSS project: study the short term predictability of the visibility change during the Fog life cycle, from surface and satellite observation

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Fog prejudices major activities as transport and Earth observation, by critically reducing atmospheric visibility with no continuity in time and space. Fog is also an essential factor of air quality and climate as it modifies particle properties of the surface atmospheric layer. Complexity, diversity and the fine scale of processes make uncertain by current numerical weather prediction models, not only visibility diagnosis but also fog event prediction.
Extensive measurements of atmospheric parameters are made on the SIRTA since 1997 to document physical processes over the atmospheric column, in the Paris suburb area, typical of an environment intermittently under oceanic influence and affected by urban and industrial pollution. The ParisFog field campaign hosted in SIRTA during 6-month in winter 2006-2007 resulted in the deployment of instrumentation specifically dedicated to study physical processes in the fog life cycle: thermodynamical, radiative, dynamical, microphysical processes. Analysis of the measurements provided a preliminary climatology of the episodes of reduced visibility, chronology of processes was delivered by examining time series of measured parameters and a closure study was performed on optical and microphysical properties of particles (aerosols to droplets) during the life cycle of a radiative fog, providing the relative contribution of several particle groups to extinction in clear-sky conditions, in haze and in fog.
PreViBOSS is a 3-year project scheduled to start this year. The aim is to improve the short term prediction of changes in atmospheric visibility, at a local scale. It proposes an innovative approach: applying the Generalised Additive Model statistical method to the detailed and extended dataset acquired at SIRTA. This method offers the opportunity to explore non linear relationships between parameters, which are not yet integrated in current numerical models. Emphasis will be put on aerosols and their impact on the fog life cycle. Furthermore, the data set of ground-based measurements will be completed by spaceborne observation of visible and infra red radiance performed by the METEOSAT mission.