Geophysical Research Abstracts,
Vol. 11, EGU2009-8295, 2009
EGU General Assembly 2009

Optimal Reduction of the BDQA Network for Ozone Assessments Over France

L. Wu (1,2) and M. Bocquet (1,2)

(1) Université Paris-Est, CEREA, joint laboratory Ecole des Ponts ParisTech - EDF R&D, France (Lin.Wu@cerea.enpc.fr), (2) INRIA, Paris-Rocquencourt research center, France

Ozone is a harmful air pollutant at the ground level, and observational networks are constructed for its estimations. Due to the heterogeneous nature of ozone fields, the way how ozone is observed does matter. The evaluation of the networks is thus of both theoretical and practical interests. In this study, we assess the efficiency of the BDQA (Base de Données sur la Qualité de l Air) network, by investigating a network reduction problem. We examine how well a subset of the BDQA network can represent the full network. The performance of a subnetwork is taken to be the root mean square error (rmse) of the hourly ozone mean estimations over the whole network given the observations from that subnetwork. Spatial interpolations are conducted for the ozone estimation taking into account the spatial correlations. Several interpolation methods, namely ordinary kriging, simple kriging, kriging about means, and consistent kriging about means, are compared for a reliable estimation. It is found that the statistical information about the means improves significantly the kriging results. Exponential models are employed for the spatial correlations, and it is necessary to consider the correlation model to be hourly-varying but daily stationary. The network reduction problem is solved using the simulated annealing algorithm. Significant improvements can be obtained through optimization from 10% to 50% of rmse depending on the size of the subnetworks. Redundant stations in the urban agglomerations around Paris and Nice are removed. However, the network remains dense within these regions with respect to the rest of French territory. More stations are selected in the frontier regions, because these regions are sensitive to the change of ozone flux entering and leaving France. For the large rural regions, the stations are uniformly distributed. The redundant stations can be thus neglected to save maintenance costs. Alternatively, the equipments of those redundant stations might be reallocated for a more efficient network.