Geophysical Research Abstracts, Vol. 7, 01873, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01873

Burrough's fractal dimension for assessing models for long-range dispersion

G. Dubois, S. Galmarini

Institute for Environment and Sustainability, Joint Research Centre, European Commission, Ispra (VA), Italy (gregoire.dubois@jrc.it / FAX: +39 (0)332 785466)

The surface concentration data collected during the European Tracer Experiment (ETEX, Girardi et al., 1998) have been recently analysed for the first time by means of geostatistical techniques (Dubois et al., 2005). The self-consistency of the data gathered at various stations and time intervals could be better assessed and the spatial structure of the measurements could be more easily characterised than originally. In this work, Burrough's fractal dimension D (Burrough, 1981) was the key parameter used to summarise information provided by semivariogram plots that are generally used to describe spatial structures. In particular, D was used to describe the evolution in time of the short-scale spatial correlation of the tracer, and for different concentration values.

The study presented here extends previous work by comparing the fractal dimension D calculated from results of long-range atmospheric dispersion model simulations of the ETEX release with those obtained with the observed data. This approach provides useful insight into the models' capacity to simulate the event in a way that classical, statistics-based model evaluation would disregard. The paper will discuss the potential use of Burrough's fractal dimension for model evaluation and present the application to the ETEX case study.

Keywords:

ETEX, atmospheric dispersion, geostatistics, fractals, model comparison

References:

Burrough, P. A., 1981. Fractal dimensions of landscapes and other environmental data. Nature 294, 240-242.

Dubois G., S. Galmarini, M. Saisana, 2005, Geostatistical Investigation of ETEX-1: Structural Analysis. Accepted for publication in Atmospheric Environment.

Girardi, F., Graziani, G., van Veltzen, D., Galmarini, S., Mosca, S., Bianconi, R., Bellasio, R. and Klug, W. (eds.), 1998. The ETEX project. EUR Report 18143 EN. Office for Official Publications of the European Communities, Luxembourg, 108 pp.