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Modelling mineral dust and airborne micro-organisms with the Danish Eulerian Hemispheric Model

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Sensor systems for bioterror must be able to distinguish natural occurrences from real attacks. For this they require quantitative input about the natural background of micro-organisms and environmental pathogenic traits. However, knowledge of numbers, species, viability and pathogenicity of airborne micro-organisms is extremely scarce, and models to predict background fluctuations are inadequate. Recent studies indicate that significant concentrations of viable micro-organisms are routinely transported by dust and marine aerosols over intercontinental distances (Prospero et al., 2005). The understanding and subsequently modelling of the aerial dispersion of such episodes will improve knowledge with respect to atmospheric transport of micro-organisms and pathogens. However it is not known, which degree of detail is necessary for assessing the risks associated with airborne micro-organisms.
Comprehensive knowledge about the characteristics controlling the process of long-range transport of viable micro-organisms is therefore needed. The AeroBactics project is designed to close these gaps of knowledge. The project started in March 2007 and a short overview of the project-activities will be given in the presentation.

One of the main tasks of the project has been to further develop the Danish Eulerian Hemispheric Model (Christensen, 1997, Frohn et al., 2002) to include emission, transport and deposition of micro-organisms from three different source categories; anthropogenic (applications of pesticides), marine (sea-spray driven emissions) and natural land-based (dust uplift driven emissions).

A dust emission module obtained from the University of Athens (Nickovic et al., 2001) has been implemented in the DEHM model and validations with available dust measurements will be presented. A parameterisation describing the relation between dust uplift and estimated micro-organism concentrations will also be described, together with comparisons between measured and modelled air concentrations of micro-organisms obtained within the project.

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