Geophysical Research Abstracts
Vol. 20, EGU2018-9161, 2018
EGU General Assembly 2018

Dispersion modelling for UK emergency response and preparedness in 2017

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Atmospheric dispersion models are versatile and efficient tools for simulating the atmospheric transport of many pollutant gases and aerosols. Their flexibility to be run both forwards and backwards (adjoint) in time means that they can readily be applied to many emergency response scenarios involving both known and unknown locations of emissions. Continued development of parameterisations and model physics over the last 30 years means that the most sophisticated models are now able to simulate the specific properties and reactions of materials such as radionuclides, volcanic ash, reactive gases and even small insects. In the UK, 2017 proved to be a busy year for the use of the NAME atmospheric dispersion model for emergency response, with strange mists appearing on beaches, radionuclide detections across Europe, and ex-hurricane Ophelia bringing red skies and smoke to UK skies, amongst other events. This presentation will illustrate some of the key events and highlight the role that dispersion models and science had in the response and advice provided to central government and other organisations.

In addition to direct response, dispersion models can play an important role in emergency preparedness, in particular for generating scenarios and real-time use for exercises. In 2017, the UK Government's Office for Science conducted a large exercise to explore the country's response to a significant sulphur dioxide and ash emitting eruption in Iceland. The NAME dispersion model was used to generate an extensive dataset of model simulations, pseudo ground observations and simulated satellite imagery to enable a realistic scenario to be played out. At the same time, the International Atomic Energy Agency also carried out a large exercise, based on a severe emergency at a Hungarian nuclear power plant with serious transnational implications. Dispersion models were key for providing realistic data on the transport, dispersion and deposition of radionuclides as part of this exercise. These examples, as well as the challenges involved in such exercises, will be highlighted.