



Implementation of routine ash predictions using a general purpose atmospheric dispersion model (HYSPLIT) adapted for calculating ash thickness on the ground.

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GNS Science currently produces twice-daily forecasts of the likely ash deposition if any of the active or recently active volcanoes in New Zealand was to erupt, with a number of alternative possible eruptions for each volcano. These use our ASHFALL program for calculating ash thickness, which uses 1-D wind profiles at the location of each volcano derived from Numerical Weather Prediction (NWP) model output supplied by MetService.

HYSPLIT is a hybrid Lagrangian dispersion model, developed by NOAA/ARL, which is used by MetService in its role as a Volcanic Ash Advisory Centre, to model airborne volcanic ash, with meteorological data provided by external and in-house NWP models. A by-product of the HYSPLIT volcanic ash dispersion simulations is the deposition rate at the ground surface. Comparison of HYSPLIT with ASHFALL showed that alterations to the standard fall velocity model were required to deal with ash particles larger than about 50 microns, which make up the bulk of ash deposits near a volcano. It also required the ash injected into the dispersion model to have a concentration based on a typical umbrella-shaped eruption column, rather than uniform across all levels. The different parameters used in HYSPLIT also caused us to revisit what possible combinations of eruption size and column height were appropriate to model as a likely eruption.

We are now running HYSPLIT to produce alternative ash forecasts. It is apparent that there are many times at which the 3-D wind model used in HYSPLIT gives a substantially different ash deposition pattern to the 1-D wind model of ASHFALL, and the use of HYSPLIT will give more accurate predictions.

ASHFALL is likely still to be used for probabilistic hazard forecasting, in which very large numbers of runs are required, as HYSPLIT takes much more computer time.