

Wet Deposition In A Stochastic Particle Dispersion Model

An Algorithm For Modelling Wet Deposition In A Stochastic Particle Dispersion Model: Comparison With Deposition Data From The Fukushima Daiichi Nuclear Power Plant Accident

A global/regional stochastic particle model (Pello) developed by the Swedish Defence Research Agency (FOI) and in use through the ARGOS system by the Swedish Radiation Safety Authority (SSM) has been updated with new wet deposition routines.

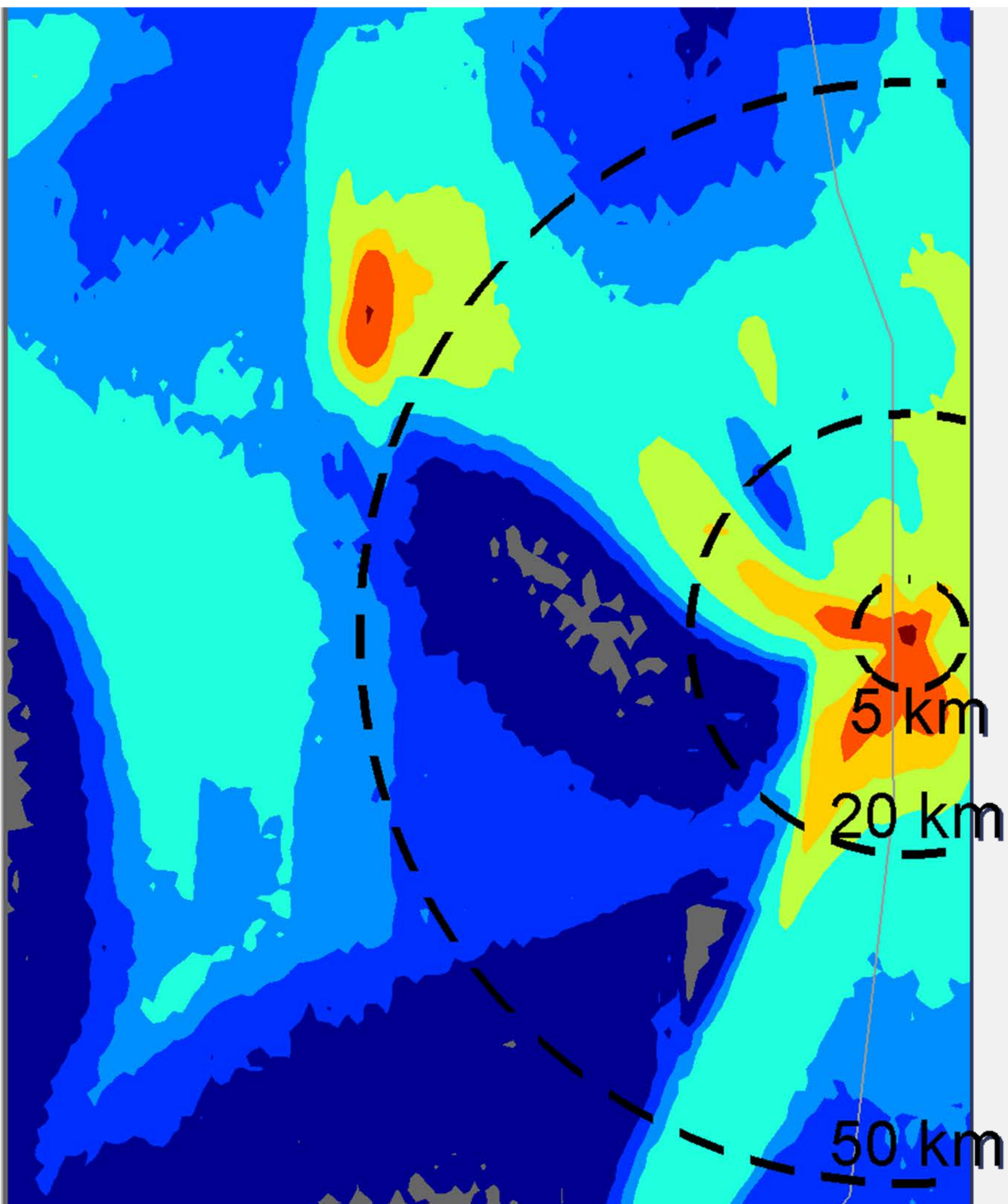
Precipitation from the NWP (ECMWF global model), a parameter defined only at ground level, was distributed into model levels at different heights. This was done using the parameters specific cloud liquid water content and specific cloud ice water content. By doing this the particles affected by wet deposition were only the particles within and below the precipitating clouds. The new wet deposition routines were compared with measurements from the Fukushima Daiichi NPP accident in 2011 (JAEA 2014). The source description was taken from Katata et. al. 2014 with the assumption that the released ^{137}Cs was distributed on the particle surface of a rural aerosol distribution.

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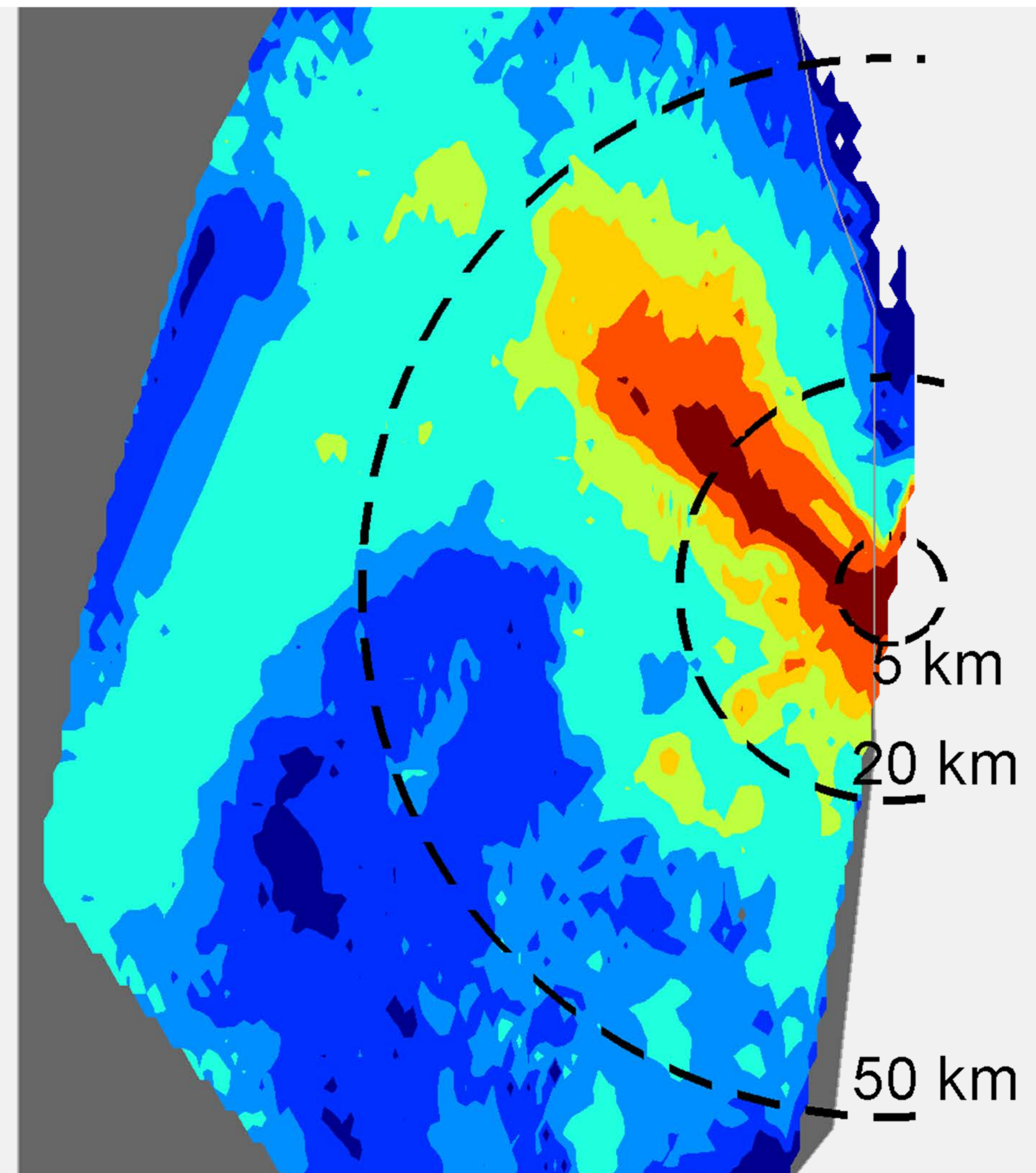
NWP – Numerical Weather Prediction model
ECMWF – European Centre for Medium-Range
Weather Forecasts
NPP – Nuclear Power Plant
JAEA – Japan Atomic Energy Agency

10 30 60 100 300 600 1000 3000 10000
[Deposition kBq/m²]



Deposition from Dispersion Model Pello

Wet and dry deposition of ^{137}Cs after the release from the NPP accident in Fukushima Daiichi 2011. Calculation using the new wet deposition scheme.



Deposition from Measurements

Measurements of the total deposition of ^{137}Cs after the release from the NPP accident in Fukushima Daiichi 2011.

Conclusion

The new wet deposition routine was validated against ground level measurements of deposited particulate ^{137}Cs following the Fukushima Daiichi NPP accident in 2011. A comparison of the simulated deposition of particulate ^{137}Cs and ground measurements of particulate ^{137}Cs is shown.

The model captures many features of the deposition measurements such as maximum peak values and horizontal distribution, however there are discrepancies e.g. the total deposition is underestimated in the high level areas.

For further improvements to the wet deposition routines It would be desirable to have access to more height distributed parameters from the NWP models.