



## **Sensitivity studies of numerical simulations of a downslope windstorm**

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A severe windstorm downstream of Mt. Öraefajökull in Southeast Iceland is simulated on a grid of 1 km horizontal resolution by using the PSU/NCAR MM5 model and the Advanced Research WRF model. Both models are run with a new, two equation planetary boundary layer (PBL) scheme as well as the ETA/MYJ PBL schemes. The storm is also simulated using six different micro-physics schemes in combination with the MYJ PBL scheme in WRF. Output from a 3 km MM5 domain simulation is used to initialise and drive both the 1 km MM5 and WRF simulations. Both models capture gravity-wave breaking over Mt. Öraefajökull, while the vertical structure of the lee wave differs between the two models and the PBL schemes. The WRF simulated downslope winds, using the MYJ PBL scheme, are in good agreement with the strength of the observed downslope windstorm, whilst using the new two equation scheme surface winds are considerably less than observed winds. On the contrary, the MM5 simulated surface winds, with the new two equation model, are in better agreement to observations than when using the ETA scheme. Micro-physics processes are shown to play an important role in the formation of downslope windstorms and lifting of the upslope isotherm layer from mountain height to about 1.3 times the mountain height leads to a significant increase in the downslope windstorm.