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# The Roles of Microphysics and Dynamics on Strong Winds in Two Intense Extratropical Storms

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Extratropical cyclones are an integral part of the weather in north-western Europe and can be associated with heavy precipitation and strong winds. While synoptic-scale aspects of these storms are often satisfactorily forecast several days in advance, mesoscale features within these systems such as bands of heavy rain or localized wind maxima are significantly less well understood and predicted by operational forecasts. The improvement of our knowledge and the predictability of these features is one of the key goals of the UK consortium project DIAMET (DIAbatic influences on Mesoscale structures in ExtraTropical storms).

This study focuses on two cases from the DIAMET field campaigns occurring on the 1st and 8th December 2011 (DIAMET IOPs 6 and 8, respectively). Both these cases exhibit rapidly deepening cyclones, which passed close to, or over Scotland and developed areas of intense winds. In the case of IOP8 significant damage and disruption was caused across Scotland. High-resolution simulations with the WRF (Weather Research and Forecasting) model are used to investigate the role of microphysics within these storms and the dynamics responsible for the areas of intense winds. Modelling results will be compared to observational data to validate the WRF simulations. Results from IOP8 show mesoscale regions of very high winds with trajectory analysis exhibiting evidence of sting jets occurring within the storm. The microphysical sensitivity tests show that despite earlier suggestions, evaporational cooling does not affect the formation of these strong winds in the model. The role of a strong mid-level PV (potential vorticity) strip and effects of inertial oscillation on the wind field will also be discussed. Initial simulations of IOP6 show similar wind speeds and mid-level PV strip than in IOP8, but a different distribution of surface wind maxima, the causes of which are currently investigated.