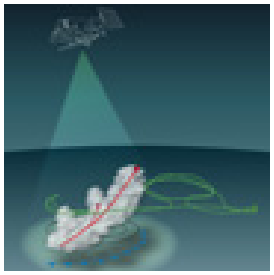

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# Impact of different microphysics on the warm conveyor belt of a deep extratropical cyclone observed during the NAWDEX campaign and on its associated ridge building.

*Wednesday, 11 March 2020 13:30 (20 minutes)*

The present study investigates diabatic processes along the Warm Conveyor Belt (WCB hereafter) of a deep extratropical cyclone, called the Stalactite Cyclone, observed during the NAWDEX field campaign in fall 2016 over the North Atlantic. The ridge building during the development of the cyclone led to the formation of a large-scale Scandinavian blocking. It is therefore particularly important to study heating rates along the WCB as it directly affects the ridge building and blocking formation. To do so, two simulations of the French research model Méso-NH with a 2.5-km resolution are performed with two different microphysics schemes: the one-moment scheme ICE3 and the two moment scheme LIMA. The LIMA scheme includes a prognostic evolution for the hydrometeor concentrations while the ICE3 scheme does not, and there is also a difference in the treatment of ice supersaturation. Both simulations show a good representation of the dynamic of the Stalactite Cyclone in comparison with NAWDEX observations (Doppler cloud radar on board the SAFIRE Falcon-20, dropsondes and satellite data). However, the model seems to produce less cold species (ice, snow, graupel) than the observations show and differences are noticed between the two simulations (as shown with reflectivities on the figure). They are then compared by computing WCB Lagrangian trajectories and analyzing the budget of the diabatic heating rate along them. Largest differences in the heating rate between the two simulations come from the microphysical processes and the relative concentration of the cold species. The LIMA scheme produces less ice but more snow and graupel, leading to a different vertical profle of latent heat release compared to the ICE3 scheme. More WCBs are found to reach the upper troposphere for ICE3 simulation compared to LIMA simulation and this already creates PV differences along the edge of the tropopause between the two simulations after 24 hour. Smaller PV values are found in the WCB outflow regions for the ICE3 simulation which have some consequences for the ridge building. However, both simulations tend to underestimate the ridge building compared to the Arpège operational analysis.

**Primary author:** Dr MAZOYER, Marie (CNRM, Météo-France/CNRS, Toulouse, France)

**Co-authors:** Dr RICARD, Didier (CNRM, Météo-France/CNRS, Toulouse, France); Dr RIVIÈRE, Gwendal ( LMD, Paris, France); Dr ARBOGAST, Philippe (CNRM, Météo-France/CNRS, Toulouse, France); Dr DELANOË, Julien (LATMOS, Guyancourt, France ); Dr VIÉ, Benoit (CNRM, Météo-France/CNRS, Toulouse, France); Dr LAC, Christine (CNRM, Météo-France/CNRS, Toulouse, France)

**Presenter:** Dr MAZOYER, Marie (CNRM, Météo-France/CNRS, Toulouse, France)

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