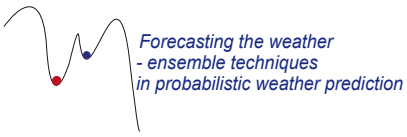
EMS Annual Meeting Abstracts
Vol. 8, EMS2011-317, 2011
11th EMS / 10th ECAM



A drag parameterization for extreme wind speeds that leads to improved hurricane simulations

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Current numerical weather prediction (NWP) models often underestimate the strength of hurricane winds. This underestimation is strongly related to the uncertainty in the the surface momentum flux. Most NWP models determine the surface momentum flux using a drag coefficient that is based on the Charnock relation. According to this relation, the drag coefficient increases with increasing wind speed. However, both theoretical and observational evidence indicates that the the drag coefficient levels off at a wind speed of about 30 m/s and then starts to drop. Hence, for hurricane wind speeds the surface drag in NWP models is overestimated and the intensity of hurricane winds underestimated.

We have tested a new drag parameterization that accounts for the observed reduction at extreme wind speeds in the NWP model HIRLAM (High Resolution Limited Area Model). This parameterization is based on the relation proposed by Makin (2005). The default drag parameterization in HIRLAM uses the Charnock relation. We have compared simulations of the tropical storms Ivan (2004) and Katrina (2005) in the Caribbean that use the default and the new drag relation. Our results indicate that hurricane intensity is much improved with the new drag parameterization.