



An Evaluation of Integrated Cloud Condensate in the HARMONIE-AROME NWP Model

Emily Gleeson (1), Kristian Pagh Nielsen (2), Conor Sweeney (3), Eadaoin Doddy (3), and Bjarne Amstrup (2)
(1) Met Éireann, Research, Environment and Applications, Dublin 9, Ireland (emily.gleeson@met.ie), (2) Danish Meteorological Institute, Copenhagen, Denmark, (3) School of Mathematics & Statistics, University College Dublin, Ireland

We have carried out an evaluation of the integrated cloud water and ice in the HARMONIE-AROME Numerical Weather Prediction Model. In particular, we used data from a high resolution climate reanalysis for Ireland, called MERA, and operational NWP model runs by Met Eireann and the Danish Meteorological Institute. MERA was run on 2.5 km horizontal grid using cycle 38h1.2 of HARMONIE-AROME. The Irish and Danish operational runs were performed with a newer release of HARMONIE-AROME which includes upgrades to the cloud liquid optical property parametrization in the shortwave radiation scheme, the cloud inhomogeneity factor, the cloud microphysics and the surface physics. Using Irish and Danish solar radiation observation data, we firstly evaluated the modelled solar irradiance compared to observations for both versions of HARMONIE-AROME. Global horizontal irradiance provides an objective and quantitative measure for evaluating cloud forecasts during daylight hours. We used the clear-sky index (Perez et al., 1990) and the Stein et al., 2012 variability indices for this purpose. We also merged both the CSI and VI to test the GHI forecasts under specific cloud conditions in order to identify weaknesses in the model. This analysis was further enhanced by comparing the modelled cloud condensate with MSG and other satellite datasets.

Perez, R.; Ineichen, P.; Seals, R.; Zelenka, A. Making full use of the clearness index for parameterizing hourly insolation conditions. *Solar Energy*, 1990, 45 (2), 111–114, doi:10.1016/0038-092X(90)90036-C.

Stein, J.; Hansen, C.; Reno, M. The Variability Index: A New and Novel Metric for Quantifying Irradiance and PV Output Variability. WREF Conference, 2012.