Evaluating the use of Aeolus satellite observations in a regional NWP model over the Nordic countries

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The impact of using wind speed data from the Aeolus satellite in a limited area Numerical Weather Prediction (NWP) system is being investigated using the limited area NWP model Harmonie-Arome over the Nordic region. We assimilate the Horizontal Line of Sight (HLOS) winds observed by Aeolus using a 3D-Var data assimilation for two different periods, one in Sept-Oct 2018 when the satellite was recently launched, and a later period in Apr-May 2020 to investigate the updated data processing of the HLOS winds. We find that the quality of the Aeolus observations have degraded between the first and second experiment period over our domain. However observations from Aeolus, in particular the Mie winds, have a clear impact on the analysis of the NWP model for both periods whereas the forecast impact is neutral when compared against radiosondes. Results from evaluation of observation minus background and observation minus analysis departures based on Desroziers diagnostics show that the observation error should be increased for Aeolus data in our experiments, but the impact of doing so is small. We also see that there is potential improvement in using 4D-Var data assimilation with the Aeolus data.