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The added value of scatterometer ocean surface wind for limited area models in extreme weather events

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Research activities at KNMI include the assimilation of scatterometer ocean surface winds in the high-resolution non-hydrostatic limited area model HARMONIE. This is beneficial in particular for extreme weather events with socio-economic impact where short-range weather forecasts with rapid update cycles provide information as fast and accurate as possible to guide decision makers and first responders on taking action.

Space borne scatterometers provide a global coverage of atmospheric wind speed and direction near the ocean surface from measurements of the electromagnetic backscatter by the wind-roughened ocean surface. Scatterometer wind information is organised in wind vector cells projected on the instrument swath. The typical swath size is 1000 to 2000 km with sampling resolution ranging from 12.5 to 50 km, depending on the instrument characteristics.

The increasing number of launched satellites over the last decade carrying scatterometers and improved processing techniques of the measurements has increased the spatial and temporal resolution of ocean surface wind observations substantially. The optimal use of high-resolution observations in high-resolution limited area models is an area of active research. For the first time scatterometer observations have been assimilated in HARMONIE for a number of selected cases with extreme wind and storm surge as part of the EU funded MyWave (mywave.eu) project. Impact experiments have been conducted with the 3D-Var assimilation scheme to assess the added value of scatterometer. A range of settings have been tested to determine how to optimally exploit the scatterometer observation information content for NWP. These settings include (i) the assimilation window length (1, 3 and 6 hour cycling has been tested) and (ii) observation thinning and/or error inflation strategies to avoid negative impact of densely spaced observations with correlated errors.

Results from the various impact experiments will be presented.