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New non-hydrostatic polar regional climate model HCLIM-AROME: analysis of the föhn event on 27 January 2011 over the Larsen C Ice Shelf, Antarctic Peninsula

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Recently, the climate version (HCLIM) of the regional numerical weather prediction model system ALADIN–HIRLAM of the ACCORD consortium, has been set up for the Arctic and Antarctic domains. Within the PolarRES project, HCLIM will be run, along with other regional climate models such as RACMO, MetUM, and MAR, to study the interactions between the atmosphere, oceans, and sea ice in the Arctic and Antarctic. For the Antarctic Peninsula, kilometre-scale horizontal resolution and non-hydrostatic model dynamics are essential to accurately resolve the complex topography and to capture small-scale processes such as the föhn winds that occur over ice shelves on the Antarctic Peninsula.

Here, we present an analysis of the föhn event on 27 January 2011 over the Larsen C Ice Shelf, Antarctic Peninsula. The output of the non-hydrostatic HCLIM-AROME model, run at 2.5 km resolution, is evaluated against automatic weather station and radiosonde measurements and simulations of the non-hydrostatic regional climate model MetUM. We analyse the modelled air pressure, near-surface and tropospheric temperatures, wind speed and wind direction, and other atmospheric variables, demonstrating the strengths and weaknesses of the HCLIM-AROME model for this polar application.