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Title: *MODELING HIGH WIND EVENTS IN A REGIONAL ARCTIC SYSTEM MODEL*

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As climate model resolution increases from the order of 100 km to the order of 10 km the details of high wind events, such as Greenland tip jets, are becoming increasingly well resolved. The impact of small-scale high wind events on the climate system are not well known but observations from these events indicate localized large heat, moisture, and momentum transfer between the atmosphere and the underlying ocean or sea ice. To better understand the role of high wind events in forcing ocean and sea ice processes, such as deep ocean convection, a series of uncoupled and coupled model experiments have been designed. The model used for these experiments is the Regional Arctic System Model (RASM), based on the WRF atmospheric model, the POP ocean model, the CICE sea ice model, the VIC land model including dynamic vegetation, and the CISM ice sheet model.

Initial efforts to characterize the impact of increased resolution on high wind events has focused on several case study simulations of high wind events along the southeast coast of Greenland. In these experiments a stand-alone version of WRF was run with horizontal grid spacing of 100, 50, 25, and 10 km. The 10 km resolution simulations best matched available in-situ observations from the GFDEx field campaign. For the 10 km simulation wind speeds were up to 150% greater, sensible heat fluxes were up to 340% greater, and latent heat fluxes were up to 225% greater than in the 100 km simulation. Multi-year WRF simulations on a large pan-Arctic model with horizontal grid spacing of 50 and 10 km have also been performed and the climatology of high wind events across this domain will also be presented.

Future work will include stand-alone ocean-ice model simulations forced with ERA-Interim, WRF 50 km, and WRF 10 km atmospheric data. These simulations will be analyzed for differences in mixed layer depth and deep ocean convection occurrence. Finally, fully coupled RASM simulations at 50 and 10 km atmospheric model grid spacing will be performed and analyzed for feedbacks between the atmosphere, ocean, and sea ice during high wind events.