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Dependence of benefits of convection permitting models on large-scale conditions

Danijel Belusic[1], Petter Lind[1], Oskar Landgren[2], Dominic Matte[3], Rasmus Anker Pedersen[4], Erika Toivonen[5], Felicitas Hansen[1], and Fuxing Wang[1]

[1]Swedish Meteorological and Hydrological Institute, Rossby Centre, Norrkoping, Sweden (danijel.belusic@smhi.se)
[2]Norwegian Meteorological Institute, Oslo, Norway
[3]University of Copenhagen, Copenhagen, Denmark
[4]Danish Meteorological Institute, Copenhagen, Denmark
[5]Finnish Meteorological Institute, Helsinki, Finland

Current literature strongly indicates large benefits of convection permitting models for subdaily summer precipitation extremes. There has been less insight about other variables, seasons and weather conditions. We examine new climate simulations over the Nordic region, performed with the HCLIM38 regional climate model at both convection permitting and coarser scales, searching for benefits of using convection permitting resolutions. The Nordic climate is influenced by the North Atlantic storm track and characterised by large seasonal contrasts in temperature and precipitation. It is also in rapid change, most notably in the winter season when feedback processes involving retreating snow and ice lead to larger warming than in many other regions. This makes the area an ideal testbed for regional climate models. We explore the effects of higher resolution and better reproduction of convection on various aspects of the climate, such as snow in the mountains, coastal and other thermal circulations, convective storms and precipitation with a special focus on extreme events. We investigate how the benefits of convection permitting models change with different variables and seasons, and also their sensitivity to different circulation regimes.