Regional data-driven weather forecasting with a global stretched-grid approach

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Data-driven models (DDMs) are emerging as a competitive alternative to numerical weather prediction (NWP) models. Using only an initial state, these models can provide full 3D simulations of the atmosphere forward in time. At the global scale, these models have been shown to match the accuracy of state-of-the-art NWP models, requiring only a fraction of the computational cost to run.

At MET Norway, we are developing a DDM to support our forecasting needs for the Nordics, which is our region of interest. The DDM is a global stretched-grid model with a high resolution (2.5 km) mesh over the Nordics and lower resolution (0.25°) mesh elsewhere. The model builds on top of components from ECMWF's toolbox Anemoi, which is a flexible framework for developing and training DDMs. The model uses a graph neural network and is trained on ERA5 and past operational analyses from the MetCoOp ensemble prediction system.

In this presentation, we compare the stretched-grid DDM to state-of-the-art global and regional NWP models and analyze the model's ability to reproduce fine-scale features and the overall climatology of the Nordics.