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Moisture advection to the Arctic : forecasted, analysed and observed

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Besides its contribution to the Arctic hydrological budget, moisture imports from mid-latitudes are also influential on shorter time scales since water vapour advection tends to occur together with extratropical cyclones. Influx of moisture to the Arctic cause the formation of clouds that have an immediate impact on the surface energy budget especially in winter. In the long run, inaccuracies in the description of cloud cover and phase lead to temperature biases in CMIP5 models.

The ECMWF workshop on polar prediction has highlighted moisture advection as one of the problematic physical processes limiting the quality of forecasts. Verifying the accuracy of medium-term forecasts is of interest beyond weather prediction : it points to the ability of models to bring adequate quantities of moisture to the Arctic when they are less constrained by observations than in analyses.

In this study, we have compared forecasted moisture flux fields with analyses and observations over the period 2000-2010. ECMWF's ERA-Interim provided the forecasts, extending to ten days. For the analyses, in addition to ERA-Interim, we used the Arctic System Reanalysis whose forecast model is optimized for the polar regions and runs at high resolution (30 km). Finally, the Integrated Global Radiosonde Archive data over the Arctic allowed a validation by observations.