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Benchmarking Northern Hemisphere midlatitude atmospheric synoptic variability in centennial reanalysis and numerical simulations

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The representation of midlatitude winter atmospheric synoptic variability in centennial reanalysis products, which assimilate surface observations only, and atmospheric model simulations constrained by observation-based datasets is assessed. Midlatitude waves activity in twentieth century reanalyses (20CR, ERA-20C) and atmospheric model simulations (ERA-CLIM AMIP) are compared with those estimated from observationally-complete reanalysis products.

All reanalyses are in good agreement regarding the representation of the synoptic variability during the last decades of the twentieth century. This suggests that the assimilation of surface observations can generate high-quality extratropical upper-air fields. In the first decades of the twentieth century a suppression of high frequency variability is apparent in the centennial reanalysis products. This behaviour does not have a counterpart in the atmospheric model integrations. Since the latter differ from one of the reanalysis products considered here (ERA-20C) only in the assimilation of surface observations, it seems reasonable to attribute the high frequency variability suppression to the poor coverage of the observations assimilated.