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Hayashi spectra of the northern hemisphere mid-latitude atmospheric variability in the NCEP and ERA 40 reanalyses

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We compare 45 years of the reanalyses of NCEP-NCAR and ECMWF in terms of their representation of the mid-latitude winter atmospheric variability for the overlapping time frame 1957-2002. We adopt the classical approach of computing the Hayashi spectra of the 500hP geopotential height fields. Discrepancies are found especially in the first 15 years of the records in the high-frequency-high wavenumber propagating waves and secondly on low frequency-low wavenumber standing waves. This implies that in the first period the two datasets have a different representation of the baroclinic available energy conversion processes. In the period starting from 1973 a positive impact of the aircraft data on the Euro-Atlantic synoptic waves has been highlighted. Since in the first period the assimilated data are scarcer and of lower quality than later on, they provide a weaker constraint to the model dynamics. Therefore, the resulting discrepancies in the reanalysis products may be mainly attributed to differences in the models' behavior.