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# Ensemble postprocessing and verification of the vertical structure of the atmosphere

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The vertical structure of the atmosphere has large impact on mesoscale processes like convective storms and heavy precipitation events. Convective instabilities are governed by vertical profiles of temperature and humidity, and more precisely the equivalent potential temperature profile. Due to downdrafts within convective structures, surface wind gusts can occur related to those instabilities. On the other hand, wind peaks at the surface are partly generated by deflection of high momentum air into the lower boundary layer. Therefore, knowledge about the vertical wind profile is of great importance.

Since model errors and uncertainties are significant, statistical postprocessing and hence reliable probabilistic forecasting of the vertical structure of the atmosphere is necessary. We present first steps towards a statistical model for radiosonde profiles that applies to non-Gaussian variables, incorporates information from model simulations and is suitable to capture vertical and between variable dependence.

Vertically non-stationary marginals of radiosonde variables are modelled by vertical normal modes, whereas the non-stationarity in time is accounted for by including covariates. These covariates originate from 12h-forecasts of the non-hydrostatic, convection-permitting ensemble prediction system COSMO-DE-EPS operated by the German meteorological service, DWD.