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Evaluation of interpolation procedures to input turbulence fields from a prognostic model to a diagnostic mass consistent model

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An appropriate description of the meteorology in highly complex terrain encompasses atmospheric processes characterized by all scales of motion, from synoptic scale fronts and waves, through mesoscale mountain-valley circulations and gravity waves, till very small scale turbulence.
To study the regional and local circulation at high resolutions (around 100 m) in complex terrain, we often couple a prognostic model (RAMS) to a mass-consistent diagnostic model (MINERVE). This downscaling approach allows representing both the mesoscale forcing and the peculiarities of the local flow in complex topography, since it combines the 3D gridded prognostic fields with local available measurements and it gives the possibility to include a high-resolution detailed topography, thus providing more spatially detailed meteorological fields.
Diagnostic atmospheric mass-consistent models generally are used together with turbulence parameterisations defined for flat terrain, thus in principle not able to catch the variability of the turbulence field induced by the presence of complex terrain and inhomogeneous conditions. The possibility of using prognostic turbulence fields produced accounting for the topography is then an appealing approach in inhomogeneous conditions. In this work we investigate whether a proper interpolation from the coarser-resolution prognostic 3D-gridded turbulence fields, like diffusion coefficients, turbulent kinetic energy and its dissipation, might be used in mountainous and inhomogeneous terrain. The final goal is to evaluate if the shortcoming of using parameterised turbulent fields might be overcome when coupling the mass consistent model with a module calculating the turbulence fields at the high-resolution diagnostic grid points, by interpolating from the coarser prognostic grid.