A new algorithm for the downscaling of 2-dimentional atmospheric near-surface fields that adds both explained and not explained small-scale variability

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Fields from dynamical models often have an insufficient resolution and need to be disaggregated. In our case we have atmospheric fields at 2.8 km (coarse) resolution and would like to couple these with a soil module running at 400 m (high) resolution. To avoid biases in the computation of the fluxes between the surface and the atmosphere we need to add small-scale variability to the atmospheric variables in the lowest atmospheric model level.

The algorithm starts by converting the coarse fields to the higher resolution using a spline interpolation algorithm that preserves the coarse means. In this way gradients at the coarse scale can be accounted for.

In the second step, physical disaggregation rules are applied that depend on high-resolution surface properties and the current atmospheric conditions.

In a third step, we add the remaining variability that could not be explained as temporally correlated noise. We will present the algorithm and show some first tests.

The model used in this work is the COSMO-model. Training and validation of the scheme is based on a number of high-resolution model runs with the fully coupled model, i.e. runs in which also the atmosphere has a grid spacing of 400 m.