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Variations of mesoscale precipitation in the Alps 1901-2008: Maintaining long-term consistency despite network variations

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Variations in the density and configuration of station networks can affect the long-term consistency of grid datasets and they can lead to spurious signals in trends calculated from these datasets. In this study we examine and illustrate a methodology of spatial interpolation that can maintain climate consistency despite variations in network density and without discarding the high-resolution information of more recent decades. The methodology builds on a multivariate reconstruction principle (Reduced Space Optimal Interpolation) that interweaves high-resolution data over a short period with coarser resolution data over a long period. The method is applied to produce a monthly mesoscale-resolving precipitation dataset for the entire Alpine region and extending back to 1901.
A detailed evaluation of the procedure, withholding high-resolution information on purpose, reveals that mesoscale patterns and interannual variations of monthly precipitation can be accurately reproduced. The explained variance fraction is larger than 0.7, except in areas with a very coarse station spacing. The method is also verified to reproduce realistic patterns of precipitation trends that are consistent with high-resolution data but largely unaffected by variations in station density. Apart from a rigorous assessment of the methodology, the presentation will discuss results from the new long-term dataset, such as trends in seasonal mean precipitation.