



Construction of a high resolution precipitation grid over an alpine catchment for multi-scale performance assessment of gridded daily reference data sets.

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Precipitation plays a key role in the hydrological cycle and thus is a crucial variable in the meteo-hydrological modeling chain. Accurate spatial and temporal assessment of precipitation is in this context of utmost importance. Gridded reference data sets for precipitation are also needed to evaluate and bias adjust climate model simulations in order to better represent current regional conditions. Uncertainties in these data sets increase when moving to higher spatial resolution, including small-scale processes, and more complex terrain.

In this study a high resolution reference data set with a grid size of 1km is derived from over 150 observation stations over the mountainous Adige catchment ($\sim 12,000 \text{ km}^2$), located in Northern Italy with elevations up to 3800 m. This gridded product is then applied to evaluate the performance of state-of-the-art reference data sets which are available at various spatial resolutions ranging from several km to climate model scale at 2° . These global or regional data sets stem either directly from observations or re-analysis simulations, with or without assimilated precipitation, or are based remote sensing approaches. The main objective of this study is to address and quantify uncertainties of these coarser data sets. Additionally, whether they perform acceptable on catchment scale and can be applied for bias correction and model calibration, or if regional high resolution data sets outperform these data sets.

Comparison is performed at various spatial resolutions corresponding to those of the applied precipitation data sets. Furthermore, an inter comparison of all of these is conducted at a the coarsest common resolution, where higher resolved data sets are aggregated to the target resolution, allowing for an analysis without penalizing data sets at coarse resolution. Performance assessment of the reference data sets is carried out on daily precipitation statistics for the period 1989 – 2008 using a multitude of indicators.