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Developing a new gridded daily climatology for Finland (Young Scientist Award Lecture 2017)

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Long-term time series of key climate variables with a relevant spatiotemporal resolution are essential for environmental science. Here we conducted a comprehensive spatial interpolation scheme where seven climate variables (daily mean, maximum, and minimum surface air temperatures, daily precipitation sum, relative humidity, sea level air pressure, and snow depth) were interpolated over Finland at the spatial resolution of 10 $\times$ 10km2. More precisely, (1) we produced daily gridded time series ("FMI_ClimGrid") of the variables covering the period of 1961–2010, with a special focus on evaluation and permutation-based uncertainty estimates, and (2) we investigated temporal trends in the climate variables based on the gridded data. National climate station observations were supplemented by records from the surrounding countries, and kriging interpolation was applied to account for topography and water bodies. For daily precipitation sum and snow depth, a two-stage interpolation with a binary classifier was deployed for an accurate delineation of areas with no precipitation or snow. A robust cross-validation indicated a good agreement between the observed and interpolated values especially for the temperature variables and air pressure, although the effect of seasons was evident. Permutation-based analysis suggested increased uncertainty toward northern areas, thus identifying regions with suboptimal station density. Finally, several variables had a statistically significant trend indicating a clear but locally varying signal of climate change during the last five decades.