

Consistency of observed winter precipitation trends in northern Europe with regional climate change projections

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Often it is claimed that the recent changes in northern European climate are at least partly anthropogenic even though a human influence has not yet been successfully detected. Hence we investigate whether the recent changes are consistent with regional climate change projections. Therefore, trends in winter (DJF) mean precipitation in northern Europe are compared to human induced changes as predicted by an ensemble of four regional climate model simulations.

The patterns of recent trends and predicted changes match reasonably well as indicated by pattern correlation and the similarity is very likely not random. However, the model projections severely underestimate the recent change in winter precipitation by 50 to 80%. That is, the signal-to-noise ratio of the anthropogenic precipitation change is either rather low or the presently used simulations are significantly flawed in their ability to project changes into the future.

European trends contain large NAO-related signals, of which a major unknown part may be unrelated to the anthropogenic signal. Therefore, we also examine the consistency of recent and projected changes after subtracting the NAO signal in both the observations and in the projections. It turns out that even after the removal of the NAO signal, the pattern of trends in the observations are similar to those projected by the models. At the same time, the magnitude of the trends is considerably reduced and closer to the magnitude of the change in the projections.