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Downscaling of GCM forecasts to streamflow over Scandinavia.

P. Nilsson(1), C. Uvo(1)

(1) Department of Water resources Engineering, Lund University, Lund, Sweden

A seasonal forecasting technique to produce probabilistic forecast statement of categorized (above-normal, near-normal and below-normal) streamflow totals at the inlets of Scandinavian dams is developed in this work. The average May-June streamflow predictand was chosen for being representative of the discharge resultant from the spring melting in the investigated basins. The ECHAM4.5 atmospheric GCM was forced with prescribed sea-surface temperature anomalies producing 10 ensemble members for the December-February (DJF) season. Several candidate large-scale fields (i.e., 700 hPa moisture, sea level pressure, etc.) produced by the GCM are optimally downscaled to streamflow values using a non linear approach called Neural Networks. Probabilistic forecast skill (RPSS) of the forecasts is assessed using a 1-year-out cross-validation approach. Highest RPSS values were found for basins located in the south-western Norway. It was found that the non linear approach was more beneficial compared to the linear canonical correlation analysis (CCA) method which gives that the association between the GCM large scale and observed streamflow anomalies is highly non linear in the Scandinavian area.