

Interannual Variability and Trends in Daily Temperature and Precipitation Extreme Indices in Finland in Relation to Atmospheric Circulation Patterns, 1961-2011

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Daily temperature (minimum and maximum) and precipitation datasets applied at regular grid points (10×10 km 2) throughout Finland for 1961-2011 were analyzed with the aim to evaluate variability and trends in weather extremes on both national and spatial scale of the country and their relationships with atmospheric circulation patterns (ACPs). Recommending by the Expert Team on Climate Change Detection and Indices (ETCCDI), the extreme indices considered for daily temperature were frost days (FD), summer days (SD) and ice days (ID); and for daily precipitation were heavy precipitation days (R10), consecutive dry days (CDD), consecutive wet days (CWD), highest 1-day precipitation amount (RX1day), simple daily intensity index (SDII) and precipitation fraction due to 95th percentile of the reference period (R95pTOT). This study used the well-known influential ACPs for Finland climate variability: North Atlantic Oscillation (NAO), Arctic Oscillation (AO), East Atlantic (EA), East Atlantic/West Russia (EA/WR), Polar (POL), Scandinavia (SCA). The non-parametric Mann-Kendall test was used to determine significant historical trends in extreme indices, and the Spearman rank correlation (rho) to identify relationships between extreme indices and ACPs. For daily temperature indices, statistically significant ($p < 0.05$) decreasing trends were found in ID (-0.40 ± 0.34 days/year) and FD (-0.45 ± 0.27 days/year) on a national scale of Finland during 1961-2011. The AO and EA/WR were most significant ACPs affecting variations in ID and FD, with rho = -0.73 and 0.42, respectively. For the daily precipitation extreme indices on the nation-wide of country over the study period (1961-2011), significant trends were only determined in SDII (0.01 ± 0.00 mm/wet days year) and R95pTOT (0.19 ± 0.09 %/year). Both of these indices (SDII and R95pTOT) showed the strongest correlations with the EA/WR pattern, with rho between from -0.42 to -0.34. The EA/WR pattern was also the most influential ACP for variations in RX1day index (rho = -0.30) over the whole Finland. The results for the spatial analyses will be given during the presentation.

Keywords: extreme, temperature, precipitation, trend, atmospheric circulation, Finland