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Long-term variability and trends in annual snowfall/total precipitation ratio in Finland and the role of atmospheric circulation patterns

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Highlights

- Annual snowfall to total precipitation (S/P) ratio declined in Finland in 1909-2008
- Significant decreases in snowfall play the key role in declined annual S/P ratio
- Both annual snowfall and S/P ratio showed non-linear trend behaviours in 1909-2008
- AO, EA, EA/WR and SCA patterns affected snowfall in Finland during 1959-2008

Abstract

This study evaluated variabilities and trends in annual snowfall to total precipitation (S/P) ratio at Sodankylä, Kajaani and Kaisaniemi weather stations in northern, central and southern Finland during 1909-2008. Annual S/P ratio was estimated using daily precipitation and temperature records as input to a calibrated and validated temperature-index snowmelt model developed to simulate snowpack accumulation and melt processes in Finland. Factors controlling variations in annual S/P ratio and their relationships with large-scale atmospheric circulation patterns (ACPs) were also studied. The results show that there were significant declines in annual S/P ratio during 1909-2008,