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Changes to North American Snowpacks from 1979-2004 based on the Snow Water

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Changes to the North American (NA) Snowpacks from 1979-2004 based on the Snow Water Equivalent (SWE) values retrieved from the SMMR & SSM/I Passive Microwave data were analyzed using the non-parametric Kendall's test, given that significant decrease in snow cover has been observed in the Northern Hemisphere since the 1980s and drastic increase in the surface temperature of NA has been observed since the 1970s. About 30 % of detected decreasing trends in SWE for 1979-2004 are statistically significant at ?/2 = 0.05, which is about 3 or more times more frequent than detected increasing trends in SWE. Significant decreasing trends in SWE are more extensive in Canada than in the US, where such decreasing trends are mainly found along the American Rockies. The overall mean trend magnitudes are about -0.4 to -0.5 mm/year which means an overall reduction of snow depth of about 10 to 13 cm (assuming a snowpack density of 0.1) which can have significant impact to regions relying on spring snowmelt for water supply. The PC1 of NA's SWE are found to be significantly correlated to the Pacific Decadal Oscillation (PDO) index, marginally correlated to the Pacific North American (PNA) pattern, but not much related to El Nino Southern Oscillation (ENSO). To assess the possible impact of climatic change to the snowpack of NA, the SWE-air temperature relationships are also analyzed.