

Long-term trends of regional snow cover extent in the Northern Hemisphere derived from polar-orbiting satellite optical sensors

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Snow cover extent (SCE) is an important geophysical variable to be observed from space for monitoring the effect of the global warming on the Arctic climate change. We have analyzed the long-term trends of SCE in the Northern Hemisphere as a whole and detected negative SCE trends in all seasons (Hori et al., 2017). Then, in this study, we analyzed long-term trends of SCEs in six regions defined as follows; 1) EU and non-EU countries, 2) western Russia (western part of the longitude line of 90 degree East), 3) eastern Russia (eastern part of the 90 degree East line), 4) the contiguous United States, 5) Alaska, and 6) Canada. Figure 1 indicates the derived regional trends of SCE in spring season (MAM: March, April and May) from 1982 to 2020. Among the analyzed regions, SCEs of the contiguous US and Canada exhibit positive trends although the trends are not statistically significant, whereas SCEs of other regions exhibit negative trends. The positive trends of spring SCE seen in the US and Canada were enhanced when the analysis period was reduced to the 20 years from 2000 to 2020 (not shown). In winter season (DJF: December, January, and February), however, the trends of the regional SCEs in the contiguous US and Canada are negative. These features suggest that the shrinkage of SCE in the Northern Hemisphere occurs not uniformly but heterogeneously in space and time.

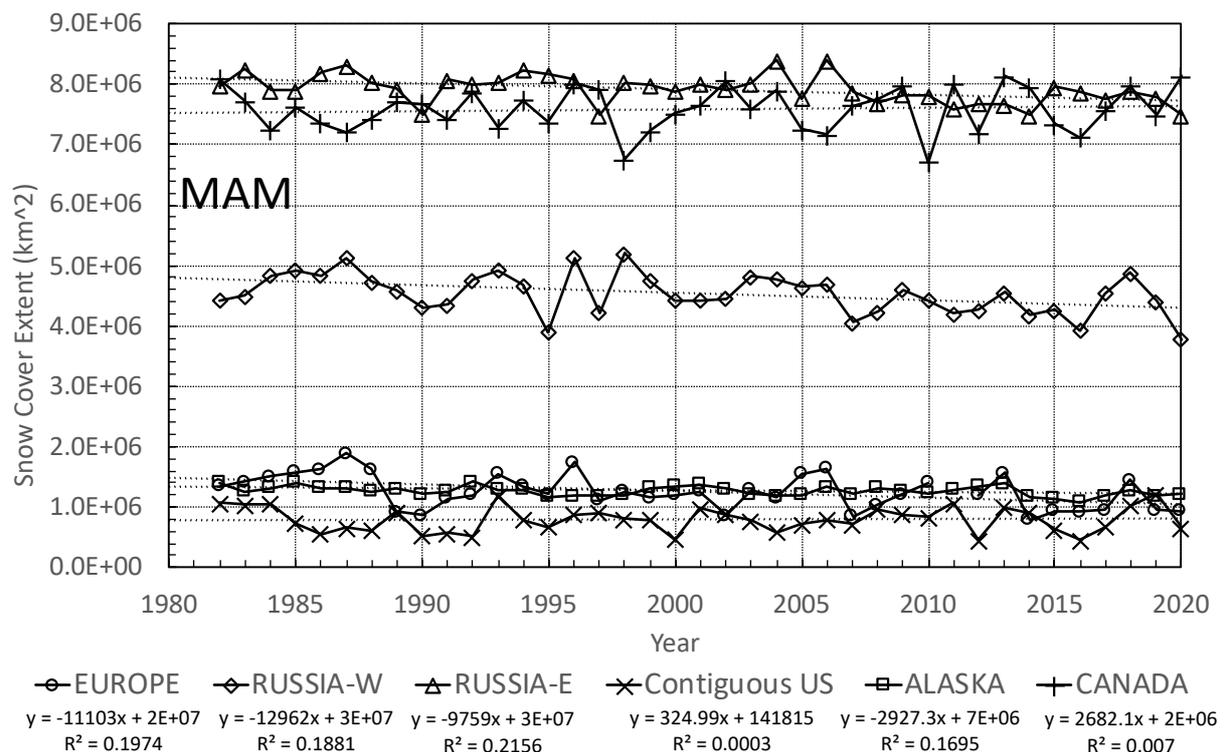


Figure 1. Long-term (39-year) trends of spring snow cover extent derived for the six regions in the Northern Hemisphere (Europe, western Russia, eastern Russia, the contiguous United States, Alaska, and Canada).

References

Hori, M., K. Sugiura, K. Kobayashi, T. Aoki, T. Tanikawa, K. Kuchiki, M. Niwano and H. Enomoto, A 38-year (1978–2015) Northern Hemisphere daily snow cover extent product derived using consistent objective criteria from satellite-borne optical sensors, *Remote Sensing of Environment*, 191, 402–418, <https://doi.org/10.1016/j.rse.2017.01.023>, 2017.