



Integrated Satellite Data Records Reveal Strong Coupling Between Recent Pan-Arctic Frozen Season & Snow Cover Changes

Youngwook Kim, J. S. Kimball, D. A. Robinson, and C. Derksen, 2015. *ERL* 10, 084004

Project: Continuity & Enhancement of the Freeze/Thaw ESDR

Satellite data used: Freeze/Thaw ESDR from NOAA DMSP SSM/I & SMMR; NOAA snow chart CDR from combined visible band sensors including NASA EOS MODIS, NOAA AVHRR;

Method: Integrated analysis of satellite environmental data records documenting frozen (FR) season & snow cover extent (SCE) changes from 1979 to 2011 over the pan-Arctic;

Findings: **1)** Longer annual snowmelt season from 1.3 to 3.3 days decade⁻¹ ($p < 0.01$) is occurring largely in autumn & coinciding with regional warming; **2)** duration of frozen ground in the absence of insulating snow cover is declining up to 1.3 days decade⁻¹ & occurring primarily at lower latitudes; **3)** results indicate widespread changes to northern ecosystems from continued climate warming, including changes to snow, soil & permafrost.

