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# New F/T ESDR Summary Quad Chart: Integrated Satellite Data Records Reveal Strong Coupling Between Recent Pan-Arctic Frozen Season and Snow Cover Changes

Youngwook Kim

John S. Kimball  
*University of Montana - Missoula*

David A. Robinson  
*State University of New Jersey*

C. Derksen

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# 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<sup>-1</sup> ( $p < 0.01$ ) 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<sup>-1</sup> & occurring primarily at lower latitudes; **3)** results indicate widespread changes to northern ecosystems from continued climate warming, including changes to snow, soil & permafrost.

