Geophysical Research Abstracts
Vol. 17, EGU2015-4025, 2015
EGU General Assembly 2015

Declining Spring Snow Cover Extent over Northern Hemisphere Lands

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Annual snow cover extent (SCE) over Northern Hemisphere (NH) lands averages close to 26 million square kilometers. It ranges from an average of 47 million sq. km. in January to 3 million sq. km. (mostly atop the Greenland Ice Sheet) in August. SCE is calculated at the Rutgers Global Snow Lab from daily SCE maps produced by meteorologists at the National Ice Center, who rely primarily on visible satellite imagery to construct the maps.

The Rutgers SCE climate data record (CDR) shows that since the late 1980s annual SCE over NH lands has averaged lower than earlier in the satellite era, which for SCE monitoring began in 1967. This is most evident from late winter through spring, being exceedingly pronounced this past decade at high latitudes in May and June. The most recent five Mays have been amongst the lowest seven in terms of NH SCE on record, with Eurasian (EUR) SCE at a record low in 2013. North American (NA) SCE achieved a record minimum in May 2010, but of late has not been as consistently low as over EUR. The past seven Junes have seen record minimum SCE over the NH, and six of the seven lowest over EUR and NA. The recent early timing of arctic snowmelt appears to be occurring at a pace equivalent to if not exceeding the loss of summer Arctic sea ice extent. In situ station observations suggest that spring snow is presently the least extensive in the past century. Possible reasons behind the early melt appear to be associated with atmospheric circulation patterns and overall warming.

This presentation, while focusing on SCE variability utilizing the Rutgers SCE CDR, will also include discussion of a new merged snow extent and melt state CDR that includes data from NH continents, Greenland, and Arctic sea ice. Visible and microwave satellite data are employed in these efforts. The merged product is available in netCDF format from the National Snow and Ice Data Center. This includes 25 km (1999-2010) and 100 km (1967-2010) resolution versions using the Equal-Area Scalable Earth Grid 2.0. Extensive metadata accompany the datasets, which are already proving valuable to a broad user community of researchers and stakeholders.