Extreme Variability Within the Northern Hemisphere Snow Extent Season

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Northern Hemisphere Snow Cover Extent and Variability

Northern Hemisphere (NH) continental snow cover extent (SCE) during the 2009/10 winter was the second most extensive during the satellite era and most extensive over North America (NA). This was followed by the 4th least extensive spring 2010 NH SCE and least extensive NA cover. Declining spring NH SCE has been observed over the last decade satellite record.

Comparisons between climatologies of the first 33 years of coarse-scale weekly NASA maps and the most recent 11 years of finer daily IMS maps, and a two-year overlap of independently-produced weekly products and IMS maps were used to generate a consistent, seamless SCE CDR. This included applying the finer spatial resolution IMS maps to the older weekly map resolution (far left map).

Water (above top graph) and Spring (above bottom graph) seasonal composite analysis for week ending Feb. 28, 1999

Based on the PCA score time series, snow area composite for years falling either +1 or -1 PC were created. Preliminary results for Northern Hemisphere snow composite analysis based on positive PC year displays greater area extent, in excess of 4 x 10^6 km2. Mid-tropospheric geopotential height anomalies based on +1 or -1 PC were created. Each component identified based on monthly component loadings (right table below).

Results from the Northern Hemisphere PCA analysis showing the % of variance explained (left table) and the individual component loadings (right table) by month for the first 3 components.

Results for components 1 & 2 explain close to 60% of variance (left table below), with individual months for each component identified based on monthly component loadings (right table below).

Snow Map Reanalysis

Snow cover extent (SCE) climate data record (CDR) has been derived from a thorough reanalysis of NASA visible satellite-derived maps of Northern Hemisphere (NH) continental SCE maps that date back to late 1966.

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Snow and Ice Mapping System (IMS) transitioned to Interactive Multisensor Snow and Ice Mapping System (IMS) maps (far right).

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