NORTHERN HEMISPHERE CONTINENTAL SNOW COVER EXTENT: 2016 UPDATE

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Annual snow cover extent (SCE) over Northern Hemisphere (NH) lands averaged 24.6 million square kilometers in 2016. This is 0.5 million sq. km. less than the 47-year average, and ranks 2016 as having the 12th least extensive (or 36th most extensive) cover on record (table 1). It is almost identical to the 2015 mean extent. This evaluation considers snow over NH continents, including the Greenland ice sheet. SCE in 2016 ranged from 48.8 million sq. km. in January to 2.6 million sq. km. in July and August. Monthly SCE is calculated at the Rutgers Global Snow Lab from daily SCE maps produced by meteorologists at the National Ice Center (a US joint NOAA, Navy and Coast Guard facility), who rely primarily on visible satellite imagery to construct the maps.

SCE across the NH started off 2016 on the high side, ranking 9th in January for Eurasia (EU) and North America (NA) combined. This changed quickly, with February NH extent ranking 3rd lowest of the past 50 years. The dearth of snow cover continued throughout the late Winter and Spring, with rankings of 1st-4th least extensive continuing throughout. Monthly NH anomalies of SCE were between 2.4 million sq. km. and 3.3 million sq. km. below average from February through June. During this period, SCE over the individual continents ranked 38th or lower. This continued the lower spring extents that have occurred in the second half of the satellite record compared to the first. Also the particularly notable early depletion of snow cover in May and June over the past decade.

Much as in the previous three years, snow arrived early over NH continents during Fall 2016. October SCE was 4.7 million sq. km. above average, ranking 3^{rd} most extensive. November came in as 5^{th} most extensive and December 8^{th} . Throughout these months, EU coverage was well above average, while over NA there was pronounced back and forth anomalies, with October 2^{nd} greatest, November 12^{th} lowest and December 11^{th} most extensive.

SCE over the contiguous United States in January 2016 was 7th most extensive of the past half century, but declined precipitously to 38th largest in February and a meek 49th (of 50) in March. The extensive October 2016 SCE across NA was due almost entirely to a 1st place ranking in Canada. Meanwhile further south, U.S. October cover ranked just 33rd largest. SCE remained at a 33rd ranking over the U.S. in November, before jumping to 13th most extensive in December.

Maps depicting daily, weekly and monthly conditions, daily and monthly anomalies, and monthly climatologies for the entire period of record may be viewed at the Rutgers Global Snow Lab website (http://snowcover.org). Monthly SCE for the NH, EU, NA, contiguous US, Alaska and Canada are also posted, along with information on how to acquire weekly areas and the weekly and monthly gridded products.

	Yrs	Mean	Std.	2016	2016	Eurasia	N. Am.
			Dev.		N.Hem. rank	rank	rank
Jan	50	47.1	1.6	48.8	9	13	6
Feb	50	46.0	1.8	43.5	48	47	38
Mar	50	40.5	1.9	37.2	49	46	48
Apr	50	30.5	1.7	27.9	50	46	40
May	50	19.2	2.0	16.3	47	42	49
Jun	49	9.6	2.4	5.6	47	48	47
Jul	47	4.0	1.2	2.6	42	41	42
Aug	48	3.0	0.7	2.6	29	37	23
Sep	48	5.4	0.9	5.7	18	20	13
Oct	49	18.3	2.7	23.0	3	3	2
Nov	51	34.1	2.1	36.9	5	2	40
Dec	51	43.7	1.9	45.4	8	12	11
Ann	47	25.1	0.8	24.6	36	30	37

Table 1. Monthly and annual climatological information on Northern Hemisphere and continental snow extent between November 1966 and December 2016. Included are the numbers of years with data used in the calculations, means, standard deviations, 2016 values and rankings. Areas are in millions of square kilometers. 1968, 1969, and 1971 have 1, 5, and 3 missing months respectively, thus are not included in the annual (Ann) calculations. North America (N. Am.) includes Greenland. Ranks are from most extensive (1) to least (ranges from 47 to 51 depending on the month).



Figure 1. Twelve-month running anomalies of monthly snow cover extent over Northern Hemisphere lands as a whole and Eurasia and North America separately plotted on the 7th month using values from November 1966 to December 2016. Anomalies are calculated from NOAA snow maps. Mean hemispheric snow extent is 25.1 million sq. km. for the full period of record. Monthly means for the period of record are used for 9 missing months between 1968 and 1971 in order to create a continuous series of running means. Missing months fall between June and October, no winter months are missing.