

Northern Hemisphere Continental Snow Cover Extent: 2020 Update

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Annual snow cover extent (SCE) over Northern Hemisphere (NH) lands averaged 24.1 million sq. km in 2020. This is 1.0 million sq. km less than the 51-year average (mapping extends back to late 1966, however three early years in the record were incomplete) and ranks 2020 as having the 4th least extensive cover on record (Table 1). This is 0.7 million sq. km less than the 2019 mean extent. SCE over both NH continents, including the Greenland ice sheet, was considered in this analysis. Monthly SCE in 2020 ranged from 46.4 million sq. km in January to 2.3 million sq. km in August. The only years in the satellite record with less NH SCE than in 2020 were, from lowest upward, 1990, 1988, and 2007.

The first half of 2020 found SCE well below average across the NH. Monthly rankings ranged from 17th least extensive of the 54 year record in January to 3rd least extensive in February. NH spring (March–May) SCE ranked 4th lowest on record, indicative of a generally persistent earlier snow melt in recent decades. Rankings of 2nd to 4th least extensive cover occurred across Eurasia from February to June. North American rankings were below average in five of the first six months of 2020, the exception being April, where a delayed melt resulted in the 14th most extensive cover.

NH SCE was above average in October and November, ranking 10th and 12th most extensive, respectively. The past nine falls (September–November) have had average SCE exceeding 20.0 million sq. km, while only eight of the previous 41 years have exceeded that mark. December SCE was close to average. The excessive cover was primarily driven by conditions in North America, where October cover was the largest on record and November, which ranked 13th. December SCE was close to average in Eurasia while a major turnaround occurred across North America, with SCE ranking 19th lowest.

SCE over the contiguous United States during the first half of 2020 saw monthly rankings of 3rd to 20th least extensive, with the exception of April which saw the 22nd most cover of the 54-year record. October had the most extensive SCE on record, with November 25th most and December 14th least.

SCE is calculated at the Rutgers Global Snow Lab from daily SCE maps produced by meteorologists at the National Ice Center (a United States joint NOAA, Navy, and Coast Guard facility), who rely primarily on visible satellite imagery to construct the maps. 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 (<https://snowcover.org>).

References

Estilow, T. W., A.H. Young, and D.A. Robinson (2015) A long-term Northern Hemisphere snow cover extent data record for climate studies and monitoring. *Earth Syst. Sci. Data*, 7, 137–142, doi:[10.5194/essd-7-137-2015](https://doi.org/10.5194/essd-7-137-2015).

Figures

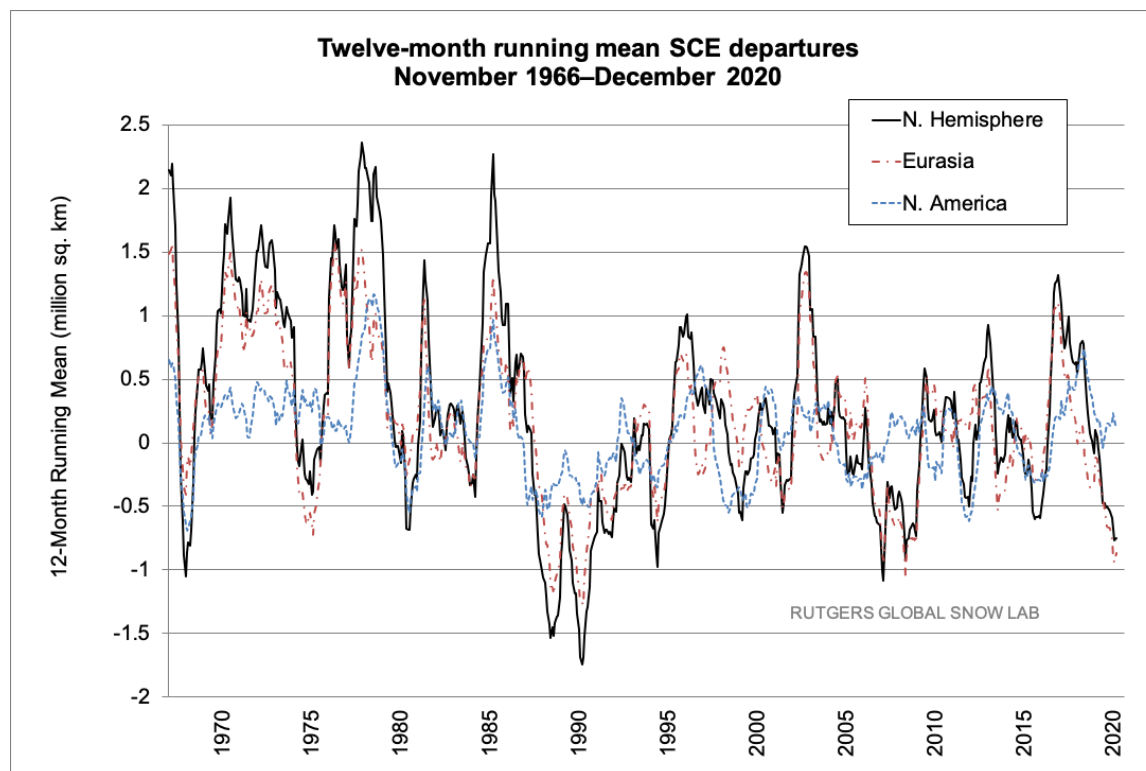


Figure 1. Twelve-month running anomalies of monthly snow cover extent over Northern Hemisphere lands as a whole and Eurasia and North America separately plotted on the 7th month using values from November 1966 to December 2020. Anomalies are calculated from NOAA snow maps. Mean hemispheric snow extent 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 during 1968, 1969, and 1971 in order to create a continuous series of running means. Missing months fall between June and October, no winter months are missing.

Tables

	Yrs	Mean	Std. Dev.	2020	2020 NH rank	2020 Eurasia rank	2020 NA rank
Jan	54	47.2	1.5	46.4	37	39	33
Feb	54	46.0	1.8	43.5	52	52	39
Mar	54	40.4	1.9	37.7	50	51	32
Apr	54	30.5	1.7	29.1	42	52	14
May	54	19.2	2.0	16.7	49	52	28
Jun	53	9.4	2.5	6.0	49	52	43
Jul	51	3.9	1.2	2.4	50	51	50
Aug	52	3.0	0.7	2.3	50	52	42
Sep	52	5.4	0.9	4.5	42	50	22
Oct	53	18.6	2.7	21.2	10	19	1
Nov	55	34.3	2.1	36.0	12	17	13
Dec	55	43.7	1.8	43.7	32	26	37
Ann	51	25.1	0.8	24.1	48	49	26

Table 1. Monthly and annual climatological information on Northern Hemisphere (NH) and continental snow extent between November 1966 and December 2020. Included are the numbers of years with data used in the calculations, NH means, standard deviations, 2020 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 (NA) includes Greenland. Ranks are from most extensive (1) to least (ranges from 51 to 55 depending on the month).

Datasets used and their URLs

Robinson, D.A., Estilow, T.W., and NOAA CDR Program, 2012: NOAA Climate Data Record (CDR) of Northern Hemisphere (NH) Snow Cover Extent (SCE), Version 1. NOAA National Centers for Environmental Information. doi:[10.7289/V5N014G9](https://doi.org/10.7289/V5N014G9).

<https://snowcover.org>

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Summary bullet points

- Annual snow cover extent (SCE) over NH lands averaged 24.1 million square kilometers in 2020. This is 1.0 million sq. km less than the 51-year average and ranks as the 4th least extensive cover on record of the satellite era.
- SCE continues a general trend of early spring melt, particularly at higher latitudes, while fall SCE continues a recent decadal run of above normal conditions.
- Over the past decade, SCE has been consistently below average in spring and above average in fall.