Northern Hemisphere Continental Snow Cover Extent: 2025 Update

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Annual snow cover extent (SCE) over Northern Hemisphere (NH) lands averaged 23.7 million km^2 in 2025. This was 1.2 million km^2 less than the 1991-2020 mean and 1.3 million km^2 below the full period of record (1967-2025) mean (Table 1). This ranks 2025 as having the 3rd least extensive annual cover on record. Monthly SCE in 2025 ranged from 45.5 million km^2 in February to 2.9 million km^2 in both July and August. Twelve-month running mean SCE departures over all NH lands have not been as low as they were to end 2025 since July 1990 (Figure 1). Annual mean SCE in Eurasia (EUR) ranked 4th least extensive in 2025 and North America (NA) ranked 8th least extensive. Weekly NH SCE in 2025 was below long-term means for a large majority of weeks throughout the year (Figure 2). Exceptions being near normal values in the summer low period, when cover is mainly confined to the Greenland ice sheet, and during the fall onset of the snow season. There were a few weeks of above normal SCE in late winter.

January 2025 saw NH SCE rank 4th least extensive of the 59-year record. February SCE fell into the middle tercile. March through June found NH SCE ranking between 1st and 15th least extensive. January saw the 4th least extensive SCE over the NH, led by a 2nd least extensive ranking for EUR, while SCE over smaller NA was above normal, ranking 38th least (22nd most) extensive. April set the record NH minimum, surpassing the previous record low in 2024. As in January, this was driven by the 2nd least extensive EUR April SCE, with NA just 23rd least extensive. Both continents ranked between 10th and 16th least extensive in May and June. The new snow season began with September and October NH SCE ranking in the middle tercile due to a combination of EUR SCE running on the high side and NA on the low end. Rankings of 15th (November) and 5th (December) least extensive NH SCE were mostly a function of low EUR SCE, with NA SCE in the middle tercile. The contiguous United States (US) SCE ranked in the middle tercile in January and February 2025. Spring months ranked from 10th (April) to 2nd (May) least extensive. Over Canada (CAN), the year started with above average SCE in January and February before declining to the middle tercile in March and April. Ranks fell further to 13th and 6th least extensive, respectively, in May and June, which in conjunction with US spring SCE demonstrated an early melt. CAN fall SCE was in the lower tercile in September and October, rising to 57th least extensive in December.

SCE is calculated at the Rutgers Global Snow Lab (GSL) from daily SCE maps produced by meteorologists at the US National Ice Center, who rely primarily on visible satellite imagery to construct the maps (Estilow et al. 2015). Maps depicting daily, weekly, and monthly conditions, anomalies, and climatologies may be viewed at the GSL website (https://snowcover.org).

In recent years, the contrast between sharply declining spring SCE and steadier autumn SCE (with EUR above average and NA below average early in the 2025

onset season) reflects the differing seasonal behavior of the record. A recent analysis indicates that part of the long-term increase in autumn SCE in the NH record arises from a gradual increase in the sensitivity of the operational snow charts to thin and ephemeral snow cover over the period of record, an effect most pronounced from September through November (Chereque et al. 2025), consistent with earlier comparisons against independent satellite and modeled products (Brown and Derksen 2013). A distinct regional increase in autumn SCE over central EUR, which contributed to the above-average EUR onset in 2025 and other post 2000 years, has an independent physical basis in changing atmospheric circulation, including enhanced moisture transport linked to reduced Arctic sea ice and a strengthened Siberian high (Allchin and Déry 2020; Li et al. 2025). Quantifying the relative roles of evolving map sensitivity and circulation-driven change in onset-season SCE trends remains an active area of investigation.

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://snowcover.org

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Summary bullet points

- Annual snow cover extent (SCE) over NH lands averaged 23.7 million km^2 in 2025. This is 1.3 million km^2 less than the 1991-2020 average and ranks as the 54^{th} most extensive cover on record during the satellite era.
- SCE continues a general trend of early spring melt, particularly at higher latitudes, while fall and early winter SCEs do not show the above normal conditions seen over many of the past fifteen years.

Figures

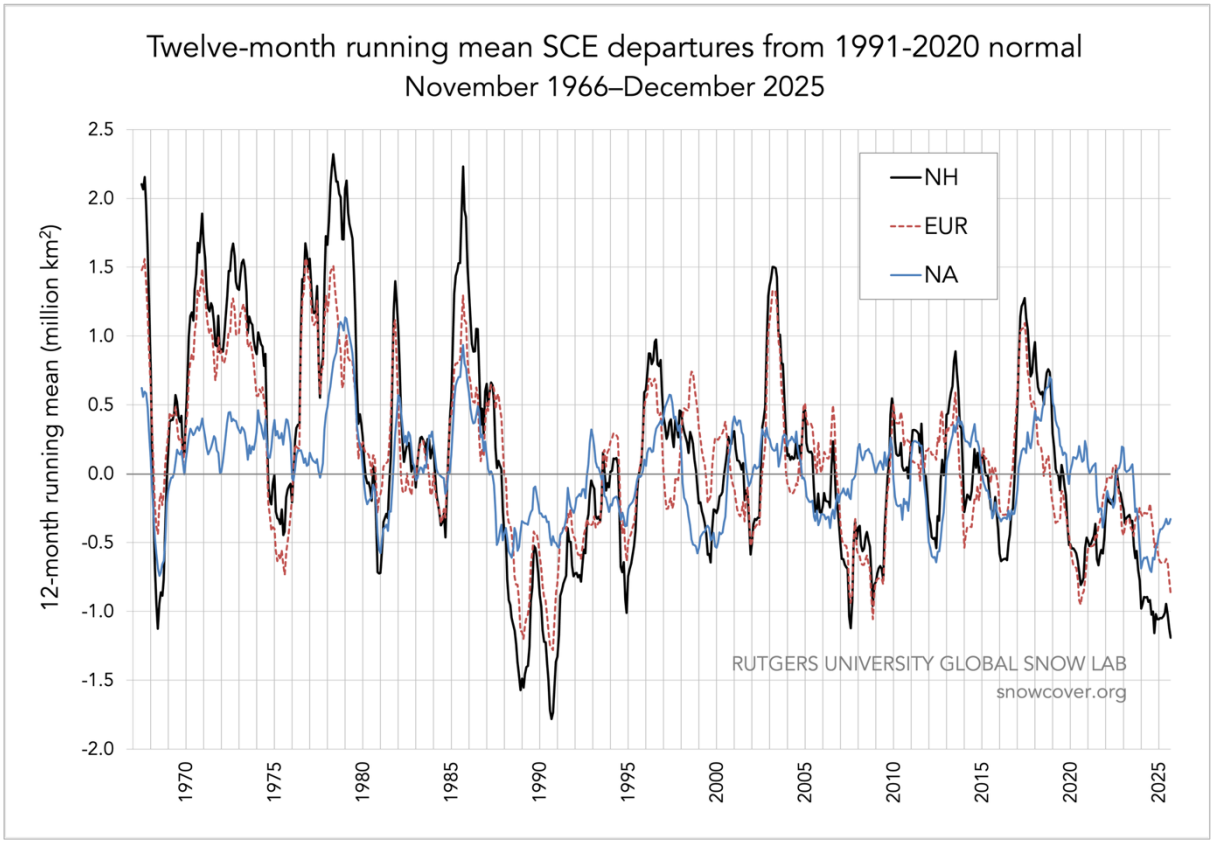

Fig 1. Twelve-month running anomalies of monthly SCE over NH lands as a whole and EUR and NA separately plotted on the 7th month using values from November 1966 to December 2025. Anomalies are calculated from NOAA snow maps. Mean NH SCE is 25.1 million km^2 for the full period of record. Monthly means for the period of record are used for 9 missing months during 1968, 1969, and 1971 to create a continuous series of running means. Missing months fall between June and October.

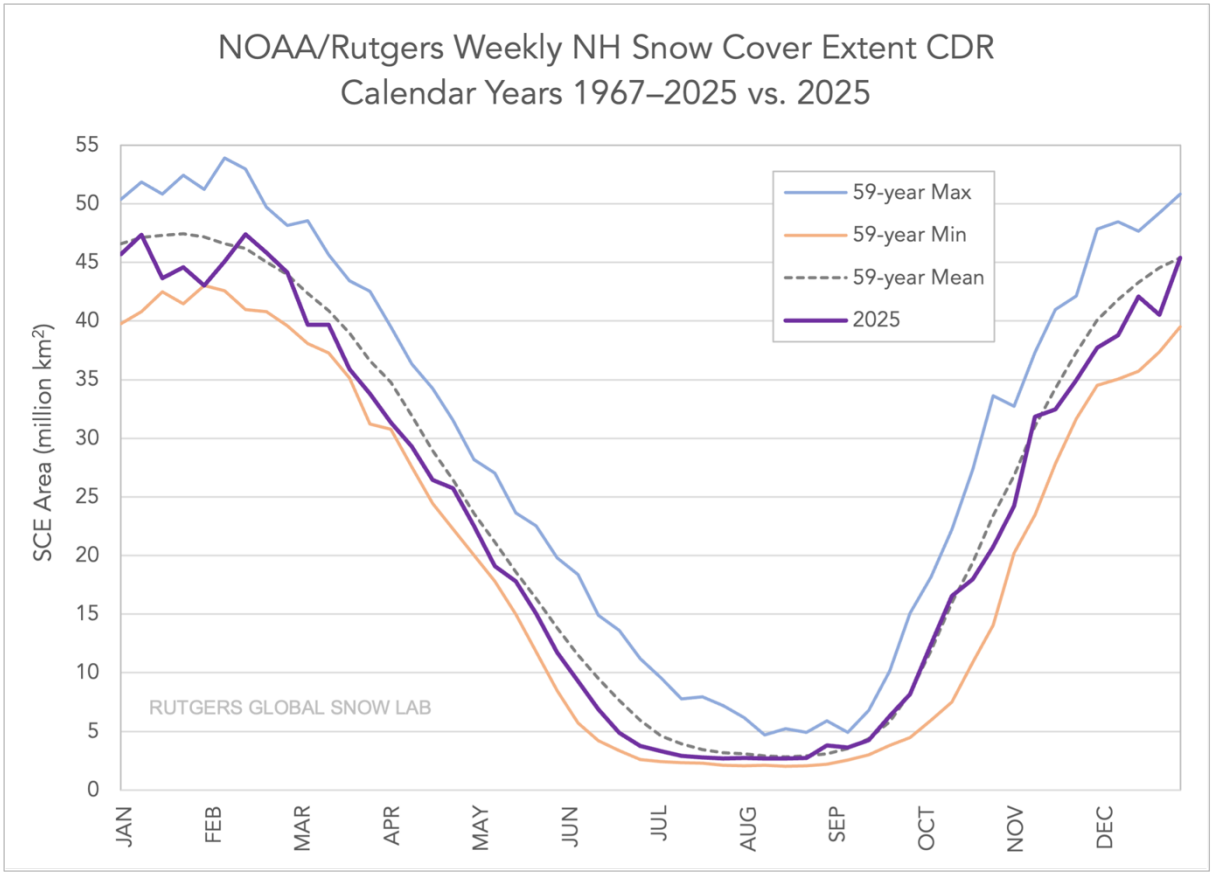

Fig 2. Weekly NH SCE for 2025 (purple) plotted with the mean (grey dashed line), maximum (blue), and minimum (orange) SCE for each week. Mean weekly SCE and extremes are calculated using the 59-year record from January 1967–December 2025. Weekly means for the period of record are used for 4, 21, and 12 missing weeks during 1968, 1969, and 1971 respectively. Weekly data granules represent SCE for each 7-day period ending on Monday.

Table

	POR Yrs.	2025 NH Anomaly	POR NH Mean	POR NH Std. Dev.	2025 NH rank	2025 EUR rank	2025 NA rank
Jan	59	-2.1	47.1	1.5	56 (4)	58 (2)	22 (38)
Feb	59	-0.4	45.9	1.8	35 (25)	31 (29)	31 (29)
Mar	59	-2.4	40.3	1.8	53 (7)	52 (8)	42 (18)
Apr	59	-2.6	30.4	1.7	59 (1)	58 (2)	37 (23)
May	59	-1.7	19.0	2.0	45 (15)	44 (16)	50 (10)
Jun	58	-2.6	9.2	2.5	47 (12)	45 (14)	48 (11)
Jul	56	-0.9	3.8	1.2	42 (15)	47 (10)	34 (23)
Aug	57	0.0	2.9	0.7	22 (36)	49 (9)	11 (47)
Sep	57	+0.3	5.4	0.9	21 (37)	12 (46)	43 (15)
Oct	58	-0.6	18.6	2.6	32 (27)	22 (37)	54 (5)
Nov	60	-1.2	34.3	2.1	46 (15)	45 (16)	32 (29)
Dec	60	-1.8	43.7	1.8	56 (5)	56 (5)	35 (26)
Ann	56	-1.3	25.1	0.8	54 (3)	53 (4)	49 (8)

Table 1. Monthly and annual climatological information on NH, EUR, and NA SCE between November 1966 and December 2025. Included are the numbers of years with data used in the period of record (POR) calculations, 2025 NH anomalies, POR NH means, POR NH standard deviations, 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. NA includes Greenland. Ranks are from most to least extensive (least to most in parentheses).

References

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