

Antarctic Sea Ice Extent

Prelims: Current events of national and international importance | Geography

Why in News?

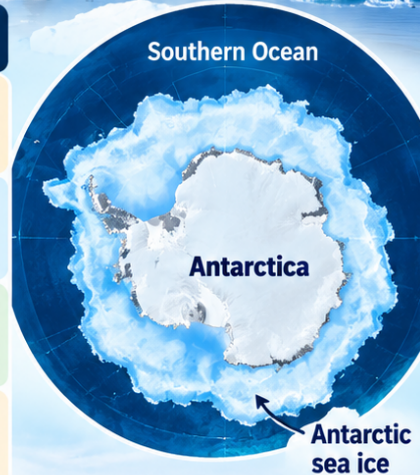
According to NASA and the National Snow and Ice Data Center (NSIDC), Antarctic sea ice likely reached its annual maximum extent on September 14, 2026.

Key Findings

- The maximum extent was estimated at 17.59 million square kilometres, representing the **3rd-lowest maximum** on record.
- This value is approximately **1 million square kilometres below the long-term average**.
- The four lowest annual maximum extents have occurred within the past four years, suggesting a potential long-term shift in Antarctic sea ice patterns.

ANTARCTIC SEA ICE ❄️

Feature	Antarctic sea ice
 Location	Southern Ocean surrounding Antarctica
 Annual maximum	Usually in September
 Annual minimum	Usually in February
 Maximum season	End of Southern Hemisphere winter
 Minimum season	End of Southern Hemisphere summer
 Long-term trend	Increased slightly from 1979 to 2014 , followed by substantial declines from 2016
 Record low maximum and minimum	Both occurred in 2023



- Sea ice consists of frozen seawater that forms, grows, and melts within the ocean environment.
- Sea ice differs from ice sheets and glaciers, which originate primarily from accumulated snowfall on land.
- Sea ice remains afloat on the ocean surface and undergoes seasonal expansion and retreat.

• Significance

- **Marine Ecosystem Support** - It provides critical habitat and sustains Antarctic food webs, especially krill-dependent ecosystems.

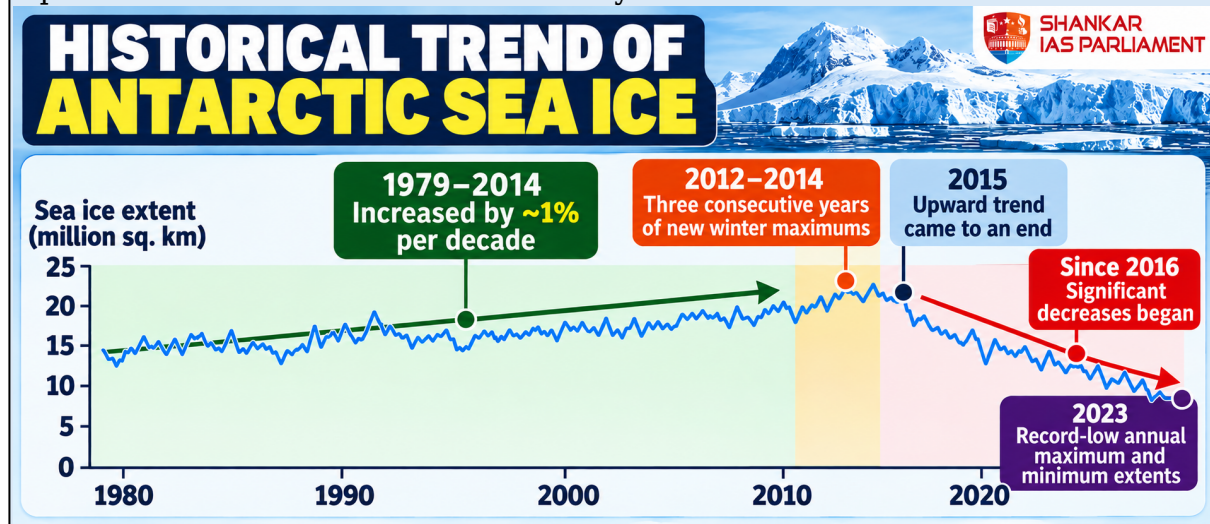
- **Albedo Regulation** - It reflects solar radiation, limiting ocean heat absorption and moderating warming.

- **Climate and Ocean Circulation** - It controls ocean-atmosphere heat exchange and influences salinity-driven deep-water formation.

Note - Melting of floating sea ice does not significantly contribute to sea level rise, in contrast to the melting of land-based glaciers and ice sheets.

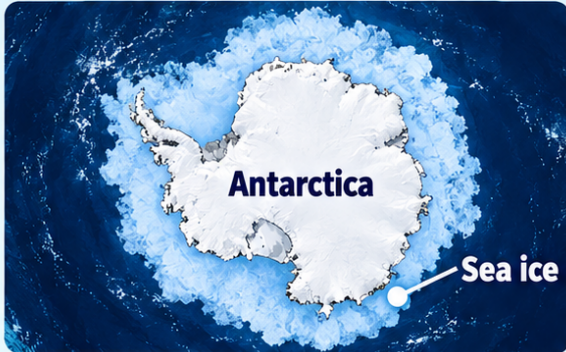
Historical Trend

- In recent years, repeated low winter maximums have raised concerns regarding a potential shift in the Antarctic sea ice system.



ANTARCTIC VS ARCTIC SEA ICE

ANTARCTIC



A **continent** surrounded by ocean.



Sea ice can **expand outward** into the surrounding ocean during winter.



Expanding ice can reach relatively **warmer latitudes**.



ARCTIC



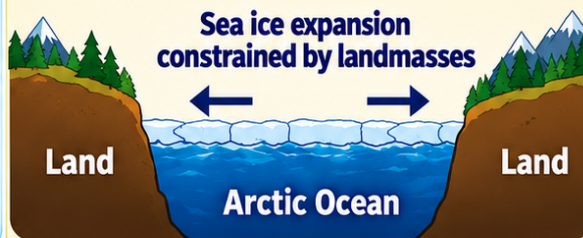
An **ocean basin** surrounded by land.



Landmasses **constrain** the expansion of sea ice.



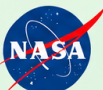
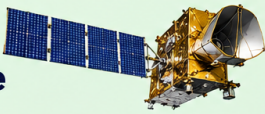
Sea ice is also affected by **ocean warming** and **atmospheric circulation**.



Methods for Measuring Sea Ice Extent

- Satellites equipped with **passive microwave sensors** are utilized to monitor sea ice extent.
- These sensors detect naturally emitted microwave energy from the Earth's surface.
- Sea ice and open water exhibit distinct microwave emission characteristics, which enables differentiation between the two.
- Microwave signals penetrate cloud cover, permitting observations regardless of atmospheric conditions.

IMPORTANT SATELLITES AND AGENCIES

Satellite / Programme		Significance
 NASA's Nimbus-7 		 Satellite record began in late 1978 .
 Defence Meteorological Satellite Program (DMSP) 		 Observations began in 1987 .
 NASA's Aqua satellite 		 Observations used during 2002–2011 .
 Japan's GCOM-W 		 Observations began being used in 2025 .

Reference

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