

# Three-decade decline in reflectivity of Arctic sea ice

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The reflectivity of Arctic sea ice, or albedo, regulates the solar radiation balance. A diminishing albedo affects the melt rate of Arctic sea ice.

According to a study done by the Finnish Meteorological Institute, the albedo (reflectivity) of Arctic sea ice has declined over the past three decades. The study was published in the prestigious *Nature Climate Change* journal on 4 August 2013. During summer months, the albedo in the Arctic sea ice zone regulates the [radiation balance](#) in the region, which is why albedo is crucial to the Arctic climate. A decline in albedo means that a greater percentage of solar [radiation energy](#) is absorbed by the ice, thus accelerating its melt rate.

The study examined a 28-year time series (1982-2009), which was comprised of measurements taken by [weather satellites](#) passing over the polar region. The time series was produced in the European Organization for the Exploitation of Meteorological Satellites Satellite Application Facility on Climate Monitoring (EUMETSAT CM SAF) project. The Finnish Meteorological Institute is a partner on the project, overseeing development of the albedo time series.

The trends revealed by the data were clear: The average albedo in the northern area of the Arctic Ocean, including open water and sea ice, is declining in all summer months (May-August). This is primarily due to a shrinking of the ice cap. When the analysis was confined to the area covered by ice, an equivalent decline in albedo was found during June-August. This means that the average reflectivity of remaining sea ice has

also declined during the study period. The rate of decline in albedo in the sea ice zone during August was approximately 3% per decade.

The study also determined what factors had the greatest impact on the decline in sea ice albedo. The findings revealed that a reduction in ice cap concentration was the most significant factor. Other major factors were an increase in air temperatures and longer melting periods. A diminishing albedo in Arctic sea ice can be considered both the cause and effect of changes in sea ice.

**More information:** Riihela, A., Manninen, T. and Laine, V. (2013): Observed changes in the albedo of the Arctic sea-ice zone for the period 1982 to 2009. *Nature Climate Change*. DOI: [10.1038/NCLIMATE1963](https://doi.org/10.1038/NCLIMATE1963) , [www.nature.com/nclimate/journal/2/11/nclimate1963.html](http://www.nature.com/nclimate/journal/2/11/nclimate1963.html)

Provided by Finnish Meteorological Institute

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