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Department of Meteorology

Climate and the general circulation (MO7021)

The Arctic Climate

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1 Introduction

The Arctic and the Antarctic are two unique regions on Earth that are characterized by extreme cold temperatures, vast ice sheets, and unique ecosystems. The Arctic is located in the northern hemisphere and is centred around the North Pole.

Sea ice make the sea surface act more like land. In between ocean and land.

1.1 Background

When dealing with the Arctic, it is important to define the region. The Arctic is commonly defined as the area north of the Arctic Circle, which is located at approximately $66^{\circ}33''$ N latitude [National Snow and Ice Data Center, 2026, Serreze and Barry, 2014]. However, others define the Arctic based on the extent of the Arctic ecosystem, which requires a July mean temperature under 10°C [National Snow and Ice Data Center, 2026]. Using this definition, the Arctic can be divided into two main sub-regions, including the Arctic maritime region and the Arctic continental region according to National Snow and Ice Data Center [2026].

The Arctic maritime region includes the Arctic Ocean and its surrounding seas such as the Bering and Greenland Seas, as well as the Labrador Sea and Bafin Bay. This region is sometimes described as a mediterranean type ocean due to its limited connection to the Atlantic Ocean and the Pacific Ocean [I. L. Danilov, 2000]. Looking at the bathymetry of the Arctic ocean one can observe that the Bering strait, but also the Canadian archipelago and the Barents sea, is shallow with a depth of hundreds of meters. Comparing this with the Fram strait between Svalbard and Greenland it is much deeper, allowing a bottleneck water flow between the Arctic and the Atlantic [Jakobsson et al., 2003]. Thus it is very reasonable to view this ocean as a semi isolated ocean, just like the mediterranean.

The Arctic continental region consists of the places like Svalbard, northern Canada, Russia and the Nordic Countries. However the main landmass is Greenland, covering an area of

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2 Data and Methods

describe through which observations or techniques the data is constructed, as well as the methods you have used to analyse and present the data graphically. Here, it is important to discuss the reliability and limitations of the data as well as the analyses you have used.

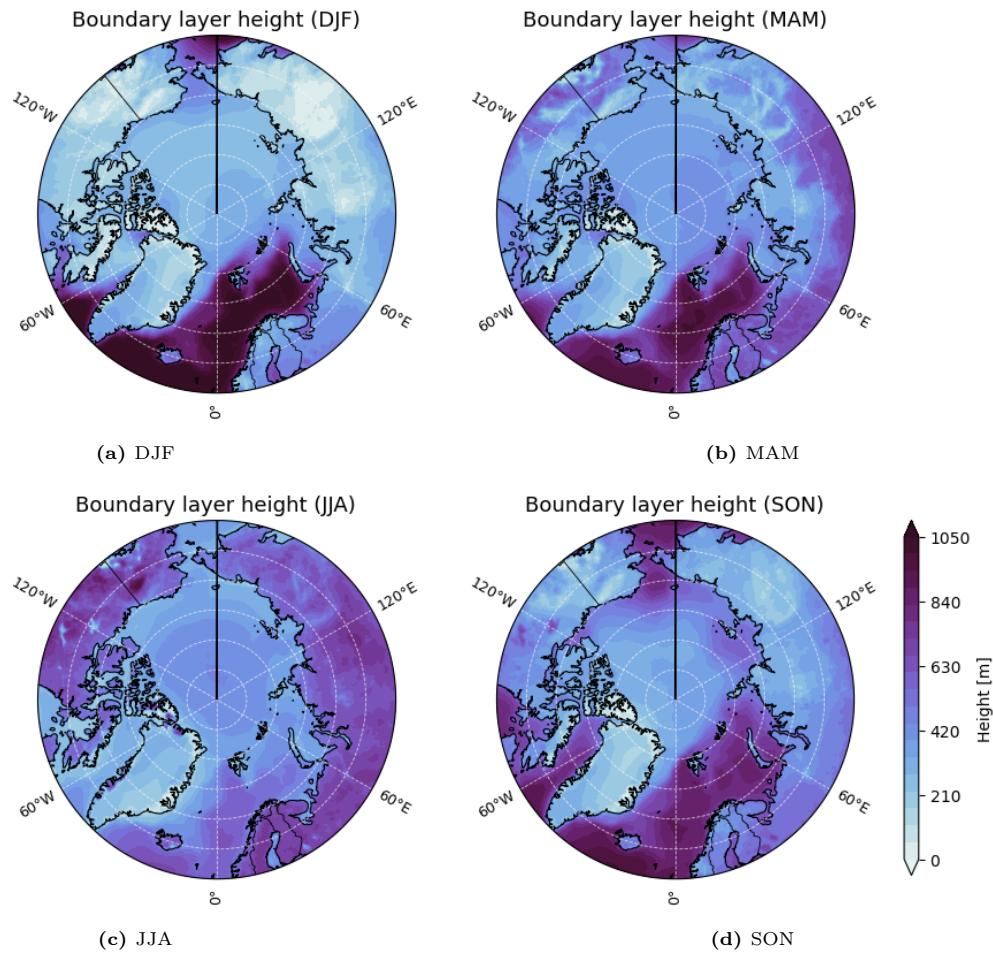


Figure 1: Seasonal mean boundary layer height (m) for 2012–2021 for DJF, MAM, JJA, and SON.

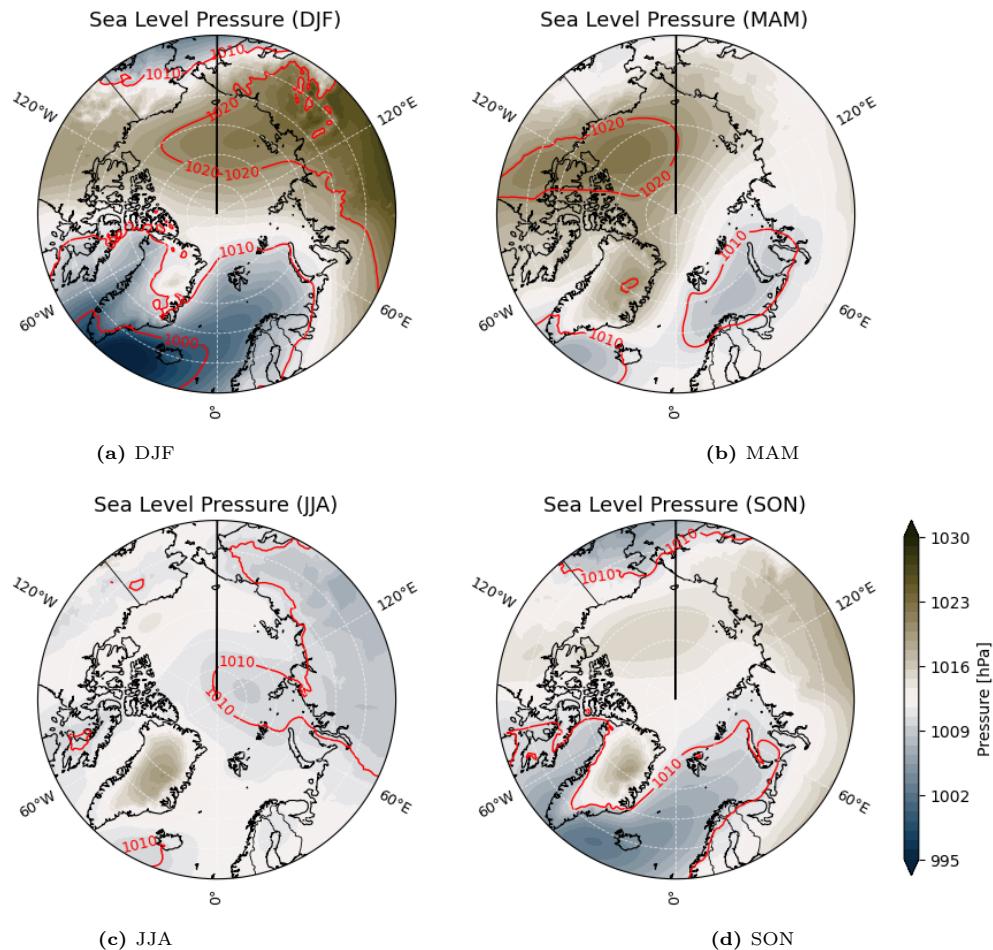


Figure 2: Seasonal mean sea level pressure (hPa) for 2012–2021 for DJF, MAM, JJA, and SON.

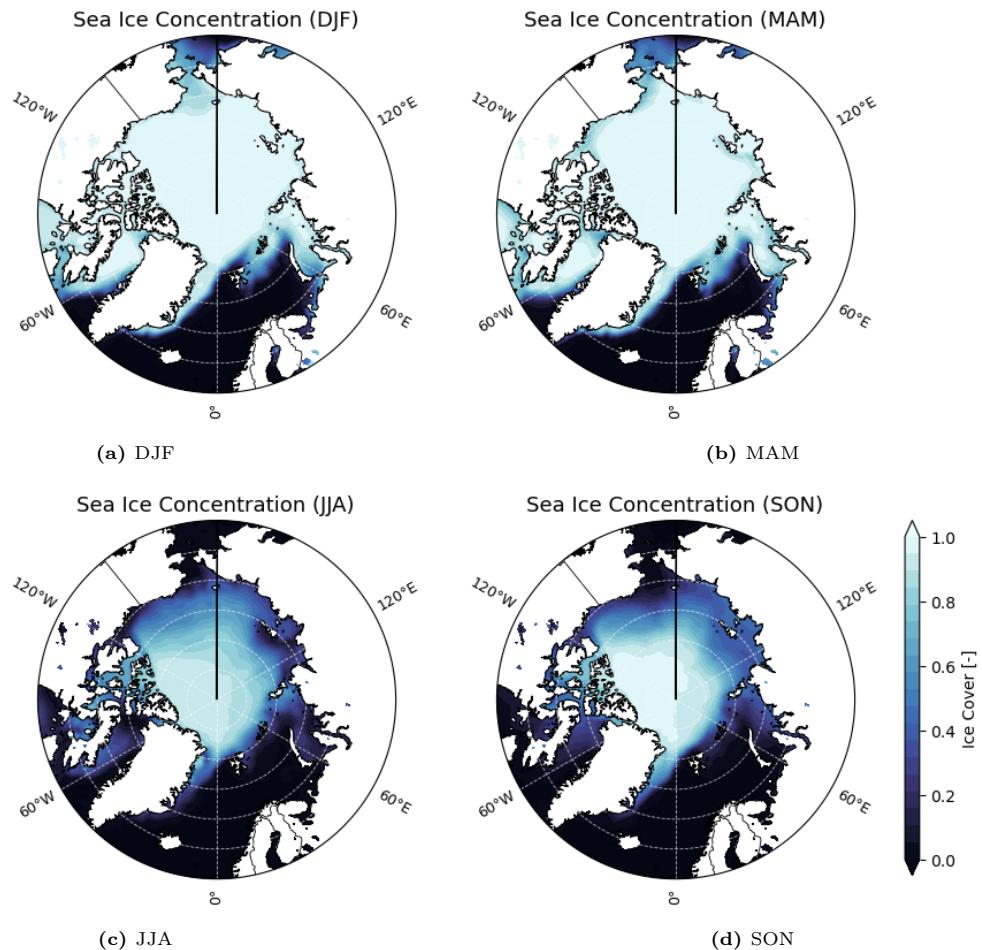


Figure 3: Seasonal mean sea ice concentration (-) for 2012–2021 for DJF, MAM, JJA, and SON.

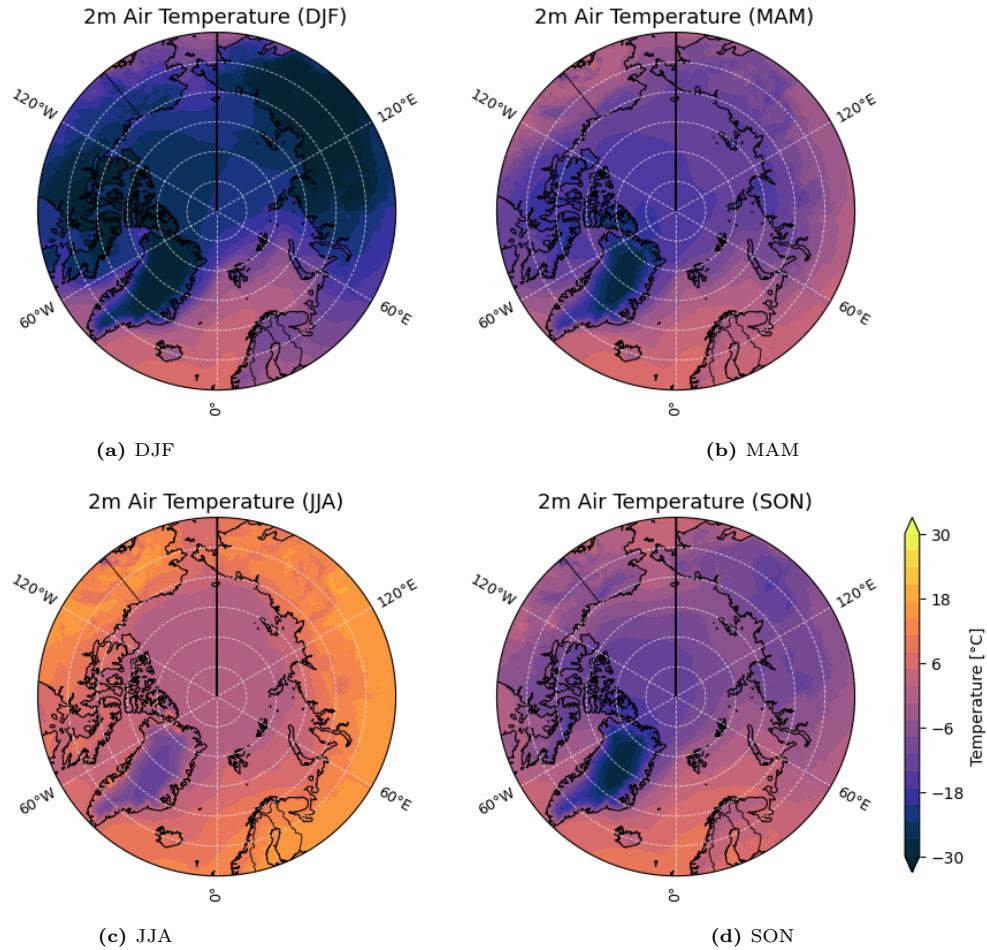


Figure 4: Seasonal mean 2m air temperature ($^{\circ}\text{C}$) for 2012–2021 for DJF, MAM, JJA, and SON.

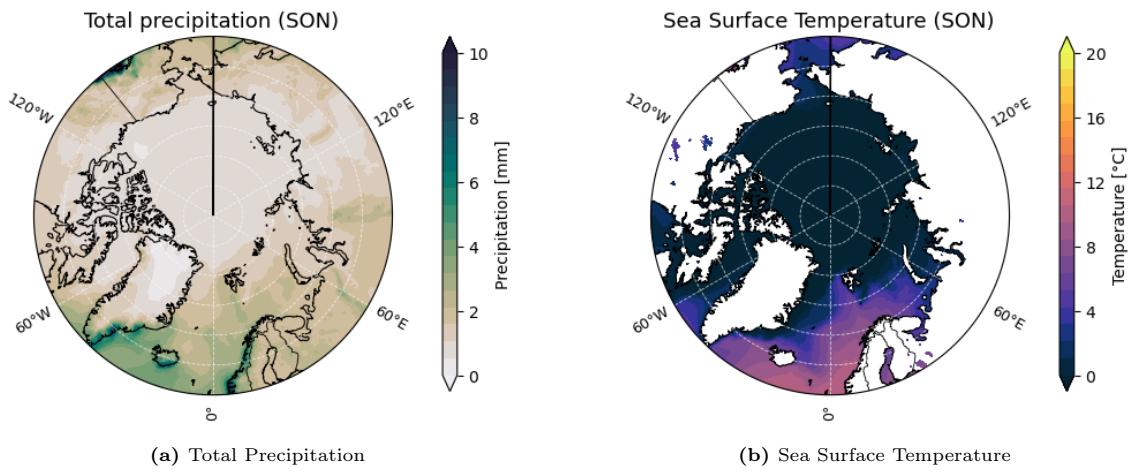


Figure 5: Annual mean total precipitation and sea surface temperature for 2012–2021.

3 The Regional Climate and the General Circulation

Sea ice: part of the hydrological cycle Maximum sea ice extent during the spring. Maximum during the spring equinox nad minimum autumn equinox.

Something that also affects the climate region is the drainage of large river systems such as the Mackenzie, Lena, Yenisey and Ob rivers [Serreze and Barry, 2014].

3.1 Things to write bout

1. Köppen characteristics
2. Cryosphere
3. Geographical features, the atmospheric general circulation, regional weather patterns, and ocean currents
4. Based on the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (available online) account briefly for ongoing and future **climate change** in your study area
5. human society (ethical aspects)

4 Regional Climate and the General Circulation

5 Climate Changes: Ongoing and Projected for the Future

6 The Climate Impact on Societal Activities

7 Conclusion

References

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- Martin Jakobsson, Arthur Grantz, Yngve Kristoffersen, and Ron Macnab. Physiographic provinces of the Arctic Ocean seafloor. *GSA Bulletin*, 115(12):1443–1455, December 2003. ISSN 0016-7606. doi: 10.1130/B25216.1.
- National Snow and Ice Data Center. Arctic Weather and Climate. <https://nsidc.org/learn/parts-cryosphere/arctic-weather-and-climate>, 2026.
- Mark C. Serreze and Roger G. Barry. *The Arctic Climate System*. Cambridge Atmospheric and Space Science Series. Cambridge University Press, New York, NY, USA, second edition edition, 2014. ISBN 978-1-107-03717-5.