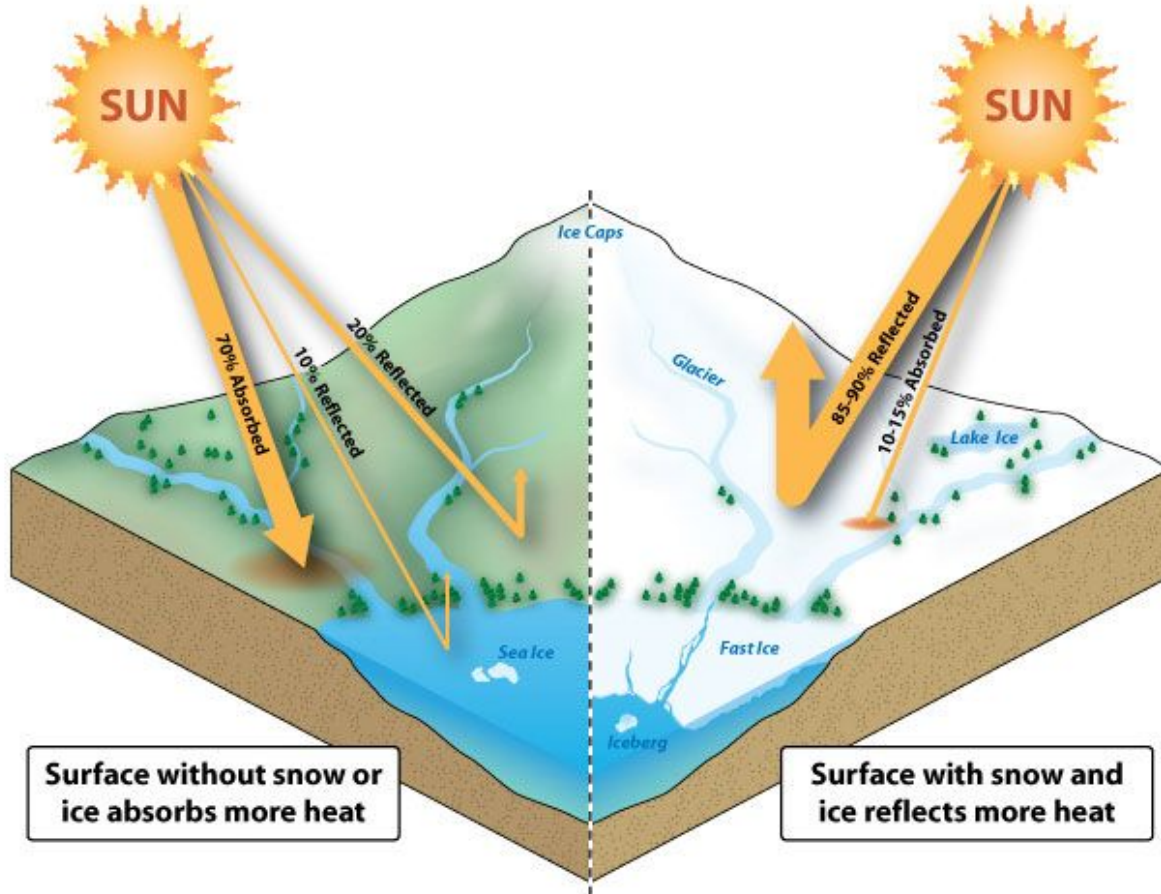


Still frozen, but how long?

by Aany, Katharina and Mila

Climatologist



- Arctic sea ice is an important indicator of global climate change
- Important input parameter for climate models (radiation balance)

Polar bears protection organization (Hudson Bay)



- The polar bear needs a platform of ice for hunting the seals
- They cannot easily switch to other prey because it doesn't provide enough calories

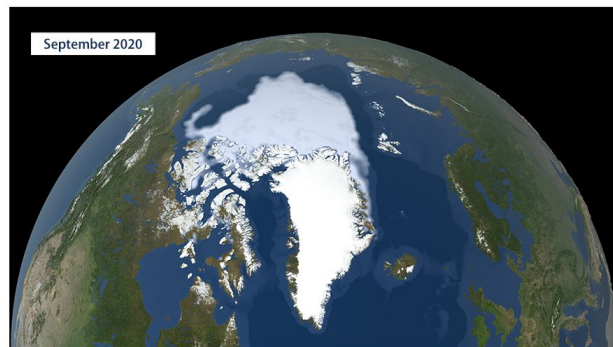
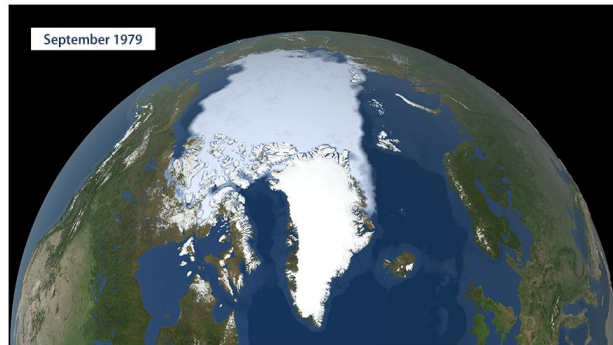
Fishermen (Sea of Okhotsk)



Ice fishing in winter



Fishing in summer



- The extent of sea ice around the polar regions since 1978 for the whole northern hemisphere
- Data for single regions since 2006
- Generated from brightness temperature data from NASA

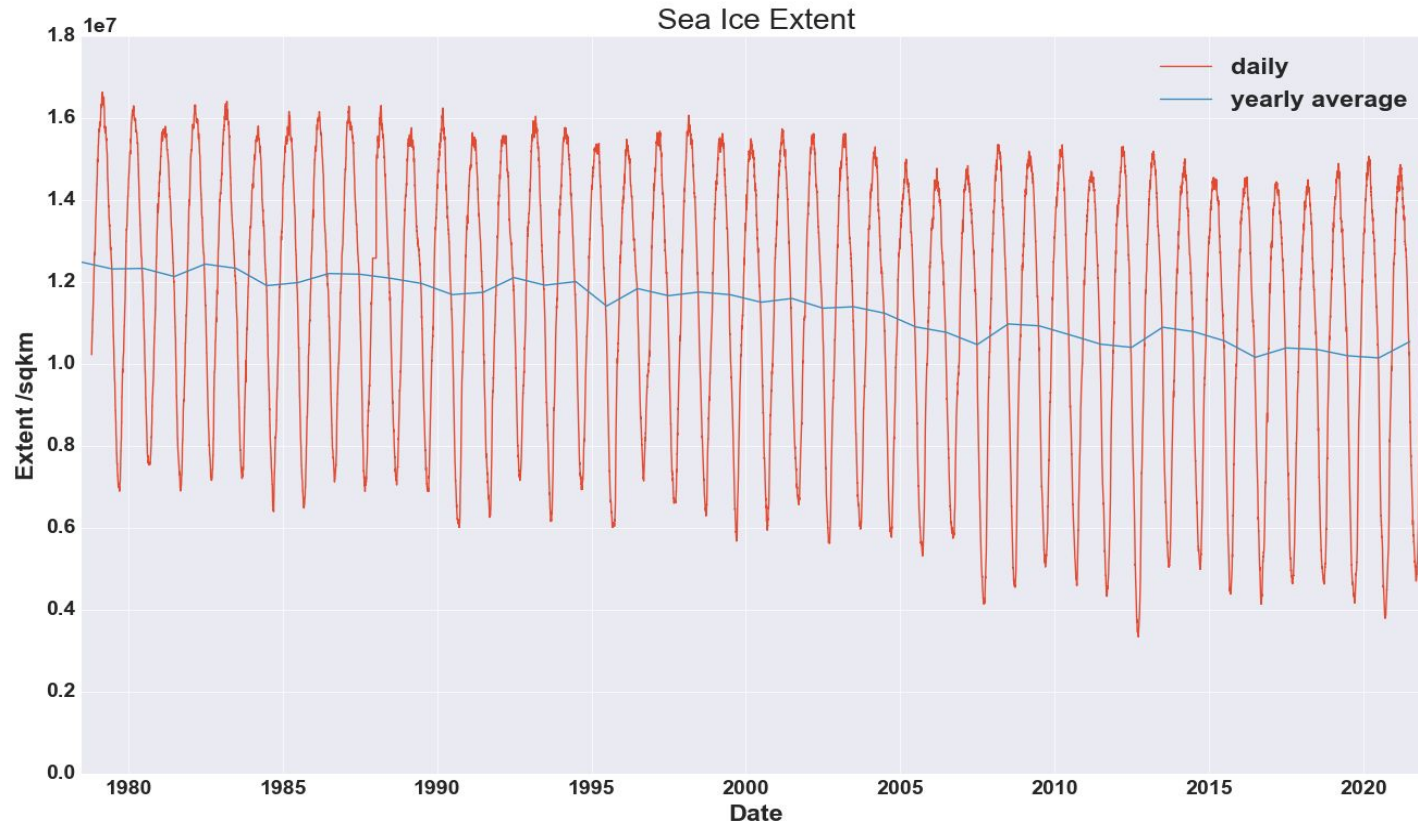


Citation:

Cavaleri, D. J., C. L. Parkinson, P. Gloersen, and H. J. Zwally.

doi: <https://doi.org/10.5067/8GQ8LZQVL0VL>

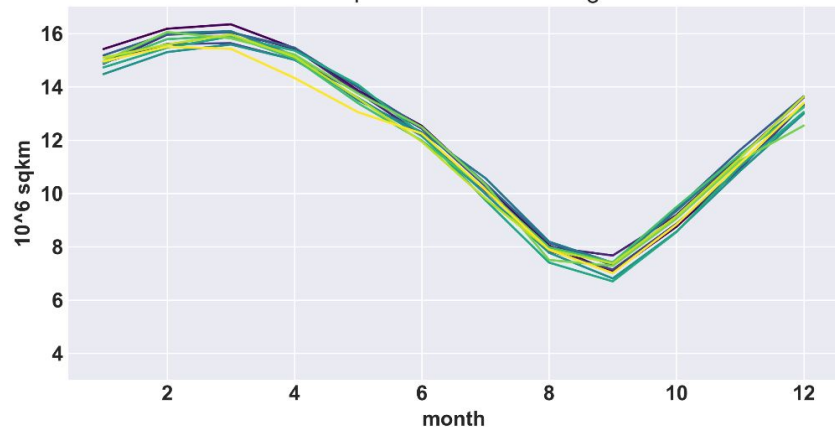
Northern hemisphere



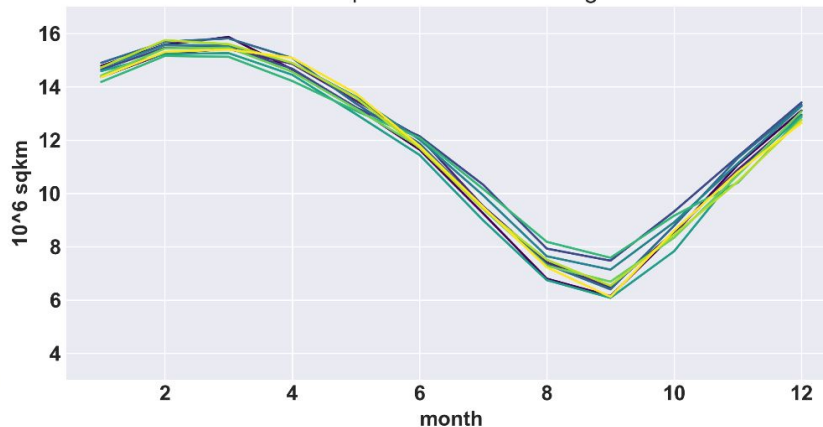
- Seasonal variability
- Decreasing trend

Northern hemisphere (4 decades)

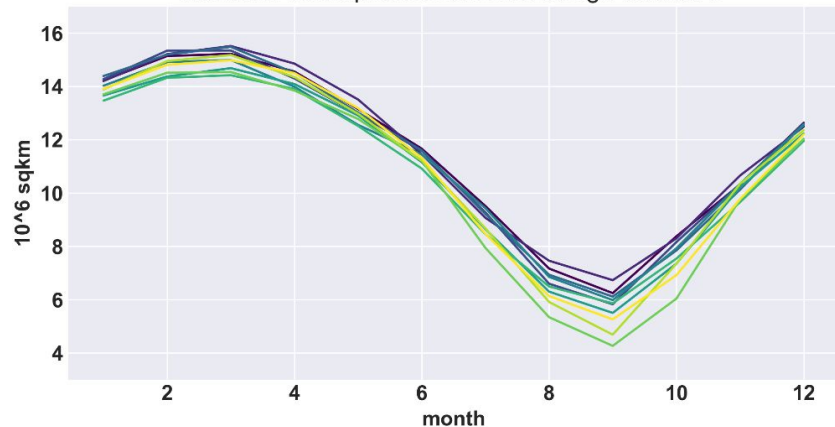
Northern hemisphere sea ice coverage decade 1



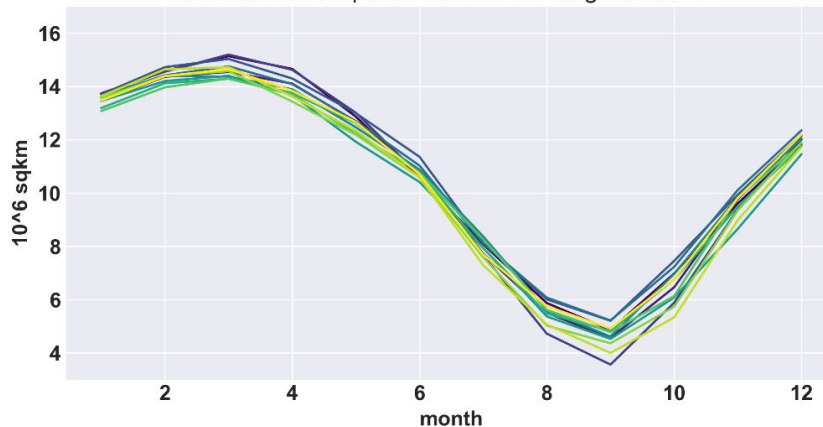
Northern hemisphere sea ice coverage decade 2



Northern hemisphere sea ice coverage decade 3

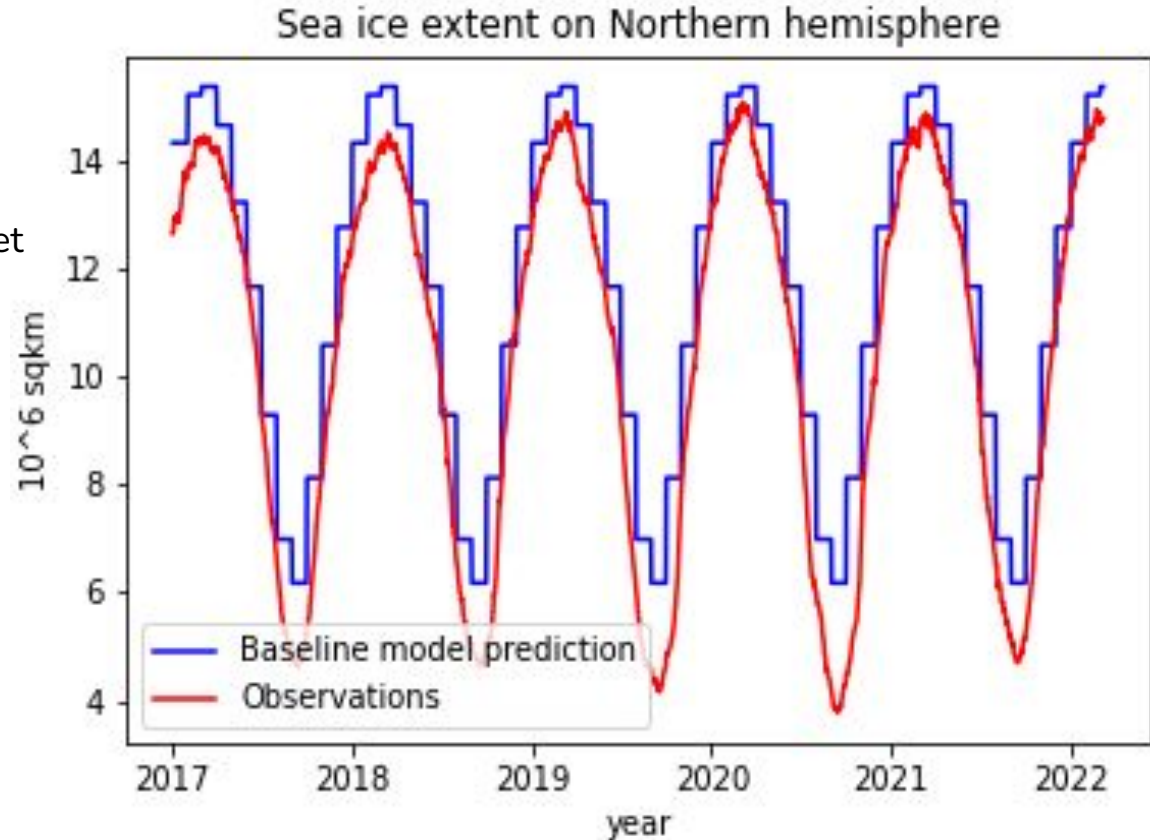


Northern hemisphere sea ice coverage decade 4

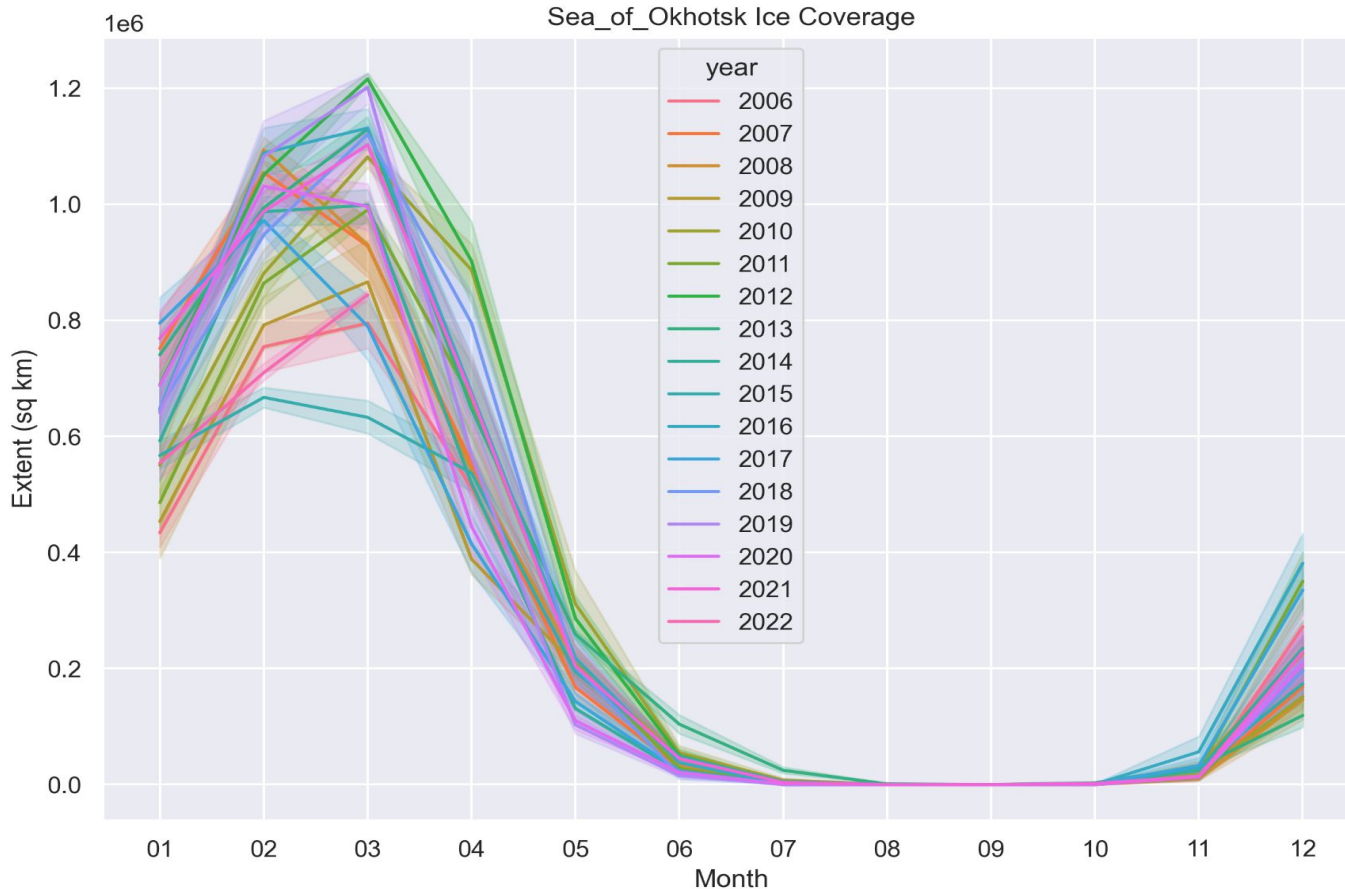


Baseline model

- Monthly average for the train dataset (until 2016) as annual variation
- RMSE 1,361 (in 10^6 sqkm)

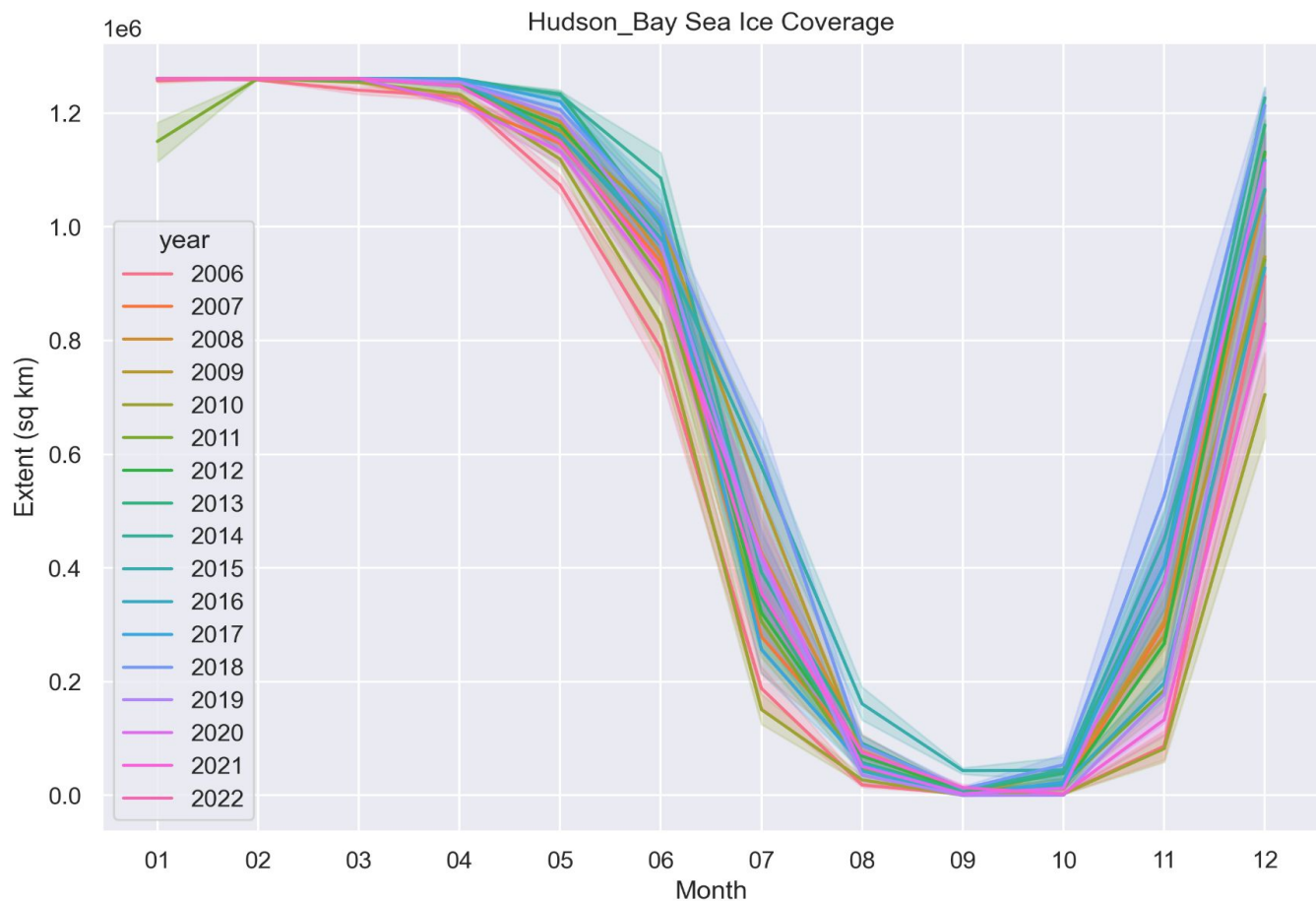


Sea of Okhotsk



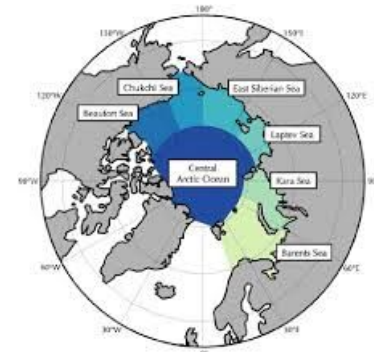
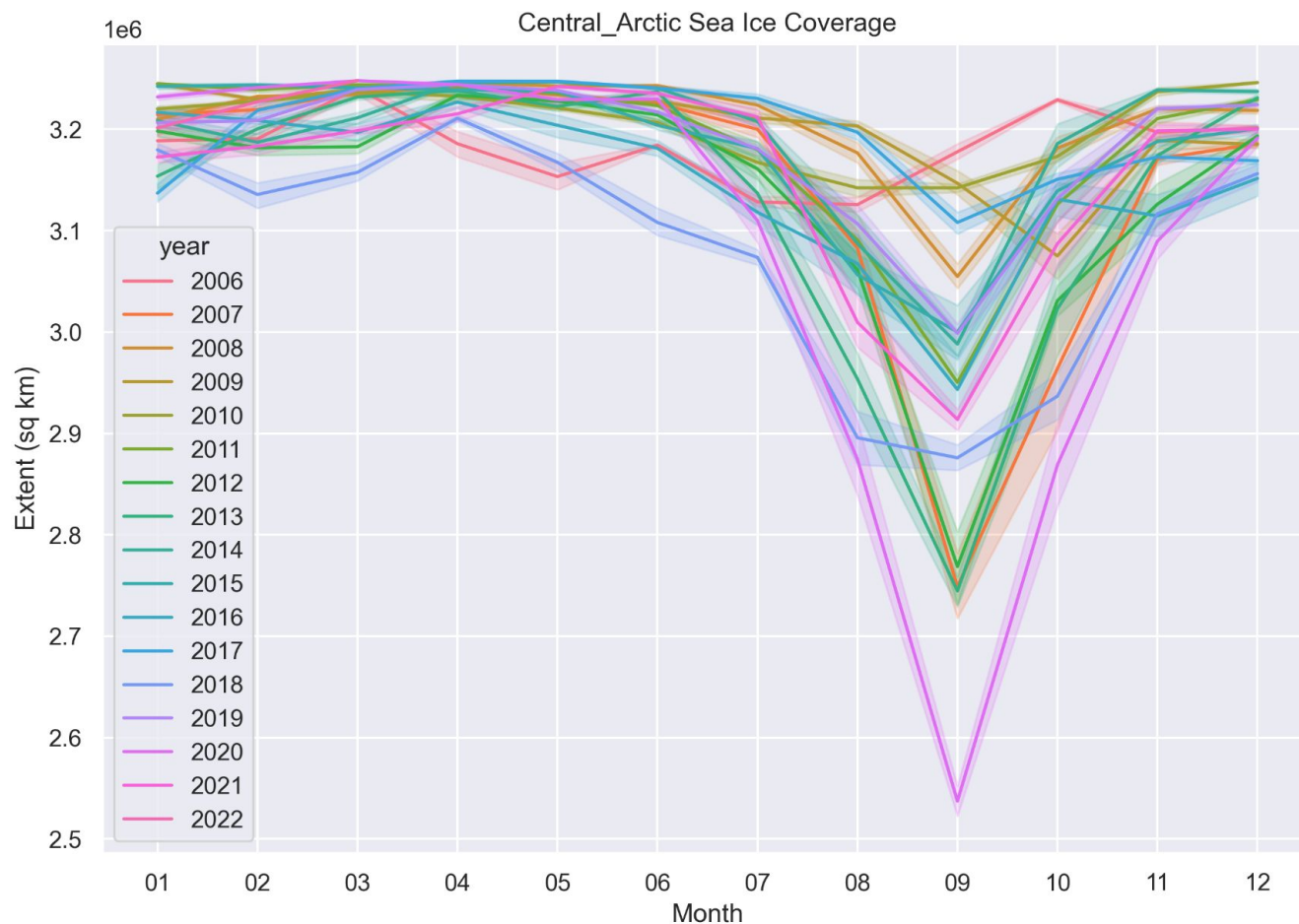
- Year-dependent deviation
- 2012 highest and 2015 lowest extent in winter
- Ice free in summer (July/August to October)

Hudson Bay



- Year-dependent deviation
- Nearly ice free in summer (August to October)
- Plateau in winter (February - March/Apr)

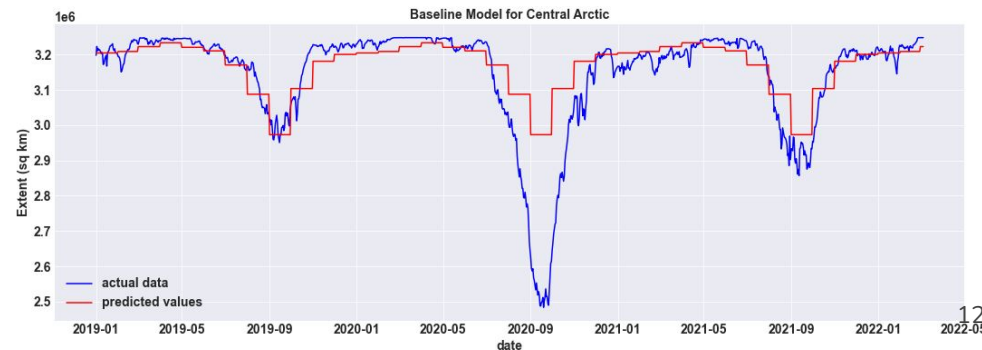
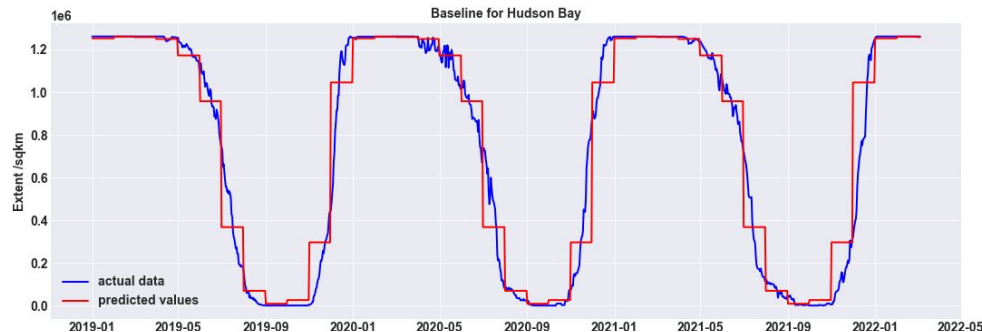
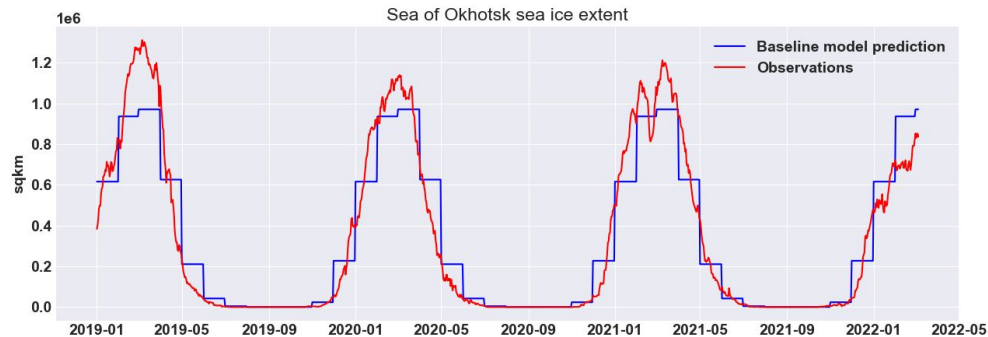
Central Arctic



- High variation of ice coverage in summer
- Lowest sea ice in september 2020

Baseline models for regions

- Monthly average for the train dataset (until 2018) as annual variation
- RMSE (Sea of Okhotsk): 121600 sqkm
- RMSE (Hudson Bay): 120400 sqkm
- RMSE (Central Arctic): 100200 sqkm



Outlook

- SARIMAX
- Prophet (ice free northern hemisphere)
- (LSTM (Long Short Term Memory Network)) if there is time
- Visualization of data

A satellite image of the Earth from space, showing the Arctic region. A large, light blue ice sheet covers the northern pole and surrounding landmasses. The surrounding oceans are a deep blue. The curvature of the Earth is visible on the left and right sides of the frame.

Thank you