

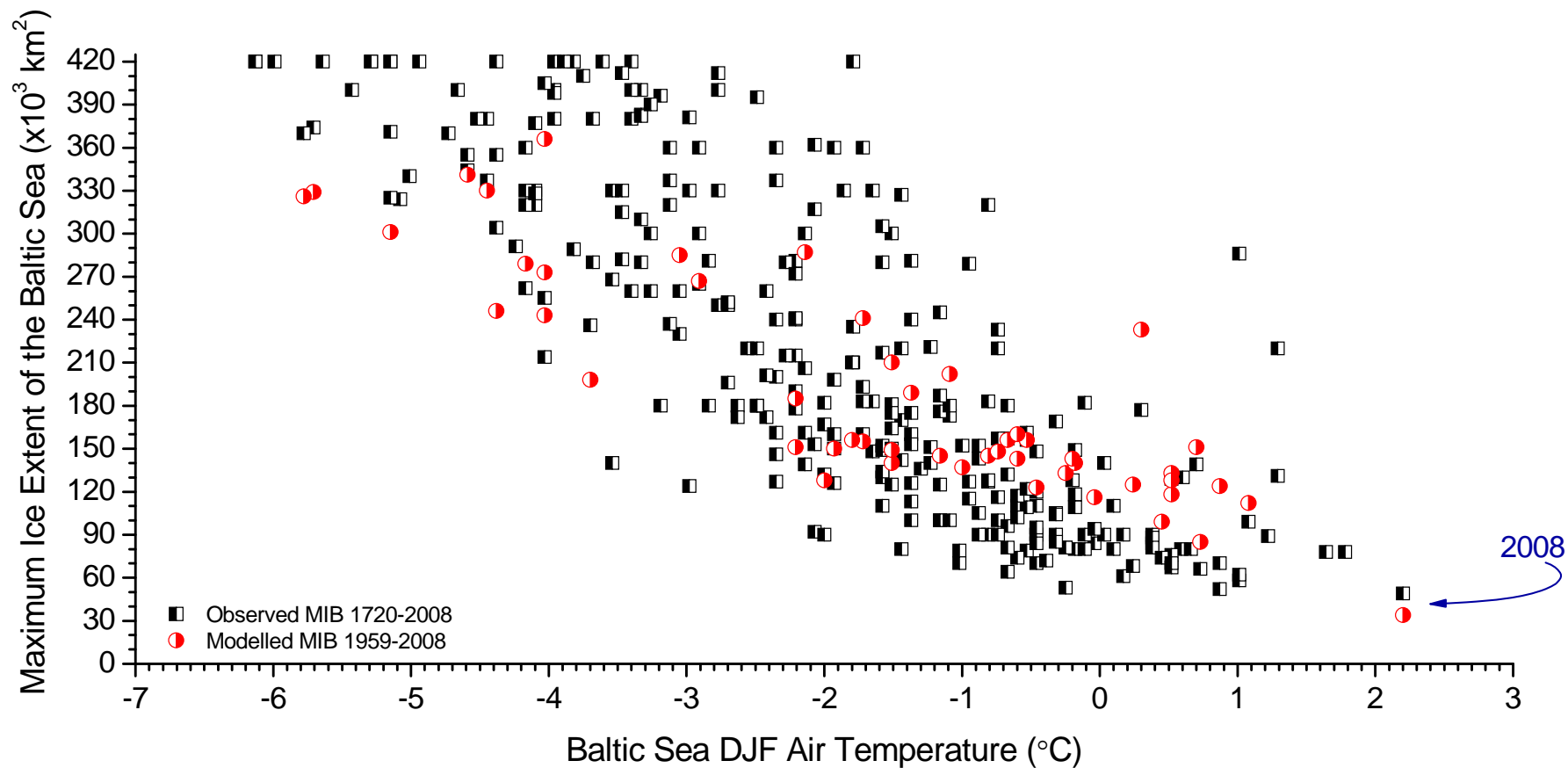


Have mild ice winters in the Baltic Sea increased during the last century?

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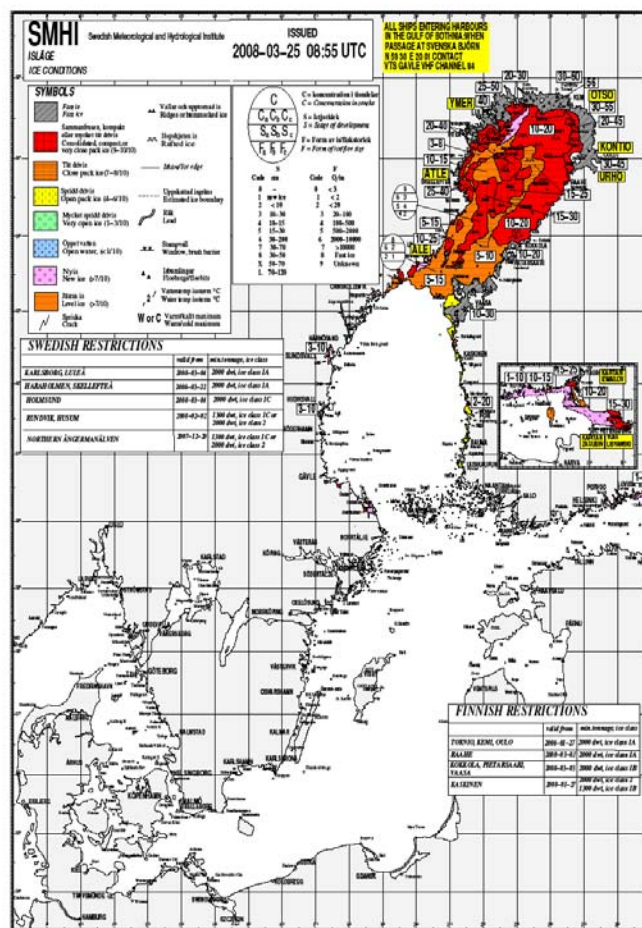


Observations (1720 – 2008) and model results (1958 – 2008)





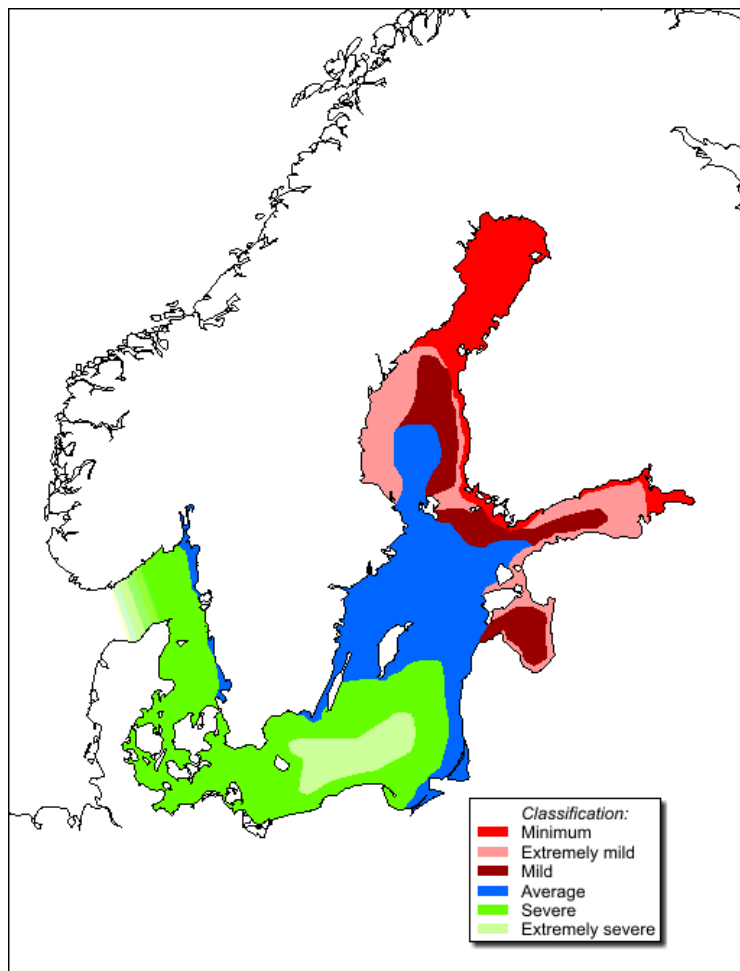
Annual maximum ice extent 2008



Minimum ice extent top 10 since 1720

Year	10^3 km^2
2008	49
1989	52
1961	53
1930	58
1939	61
1949	62
1944	64
1992	66
1990	67
1995	68

Sea ice classifications



Observed ice series ($\times 10^3 \text{ km}^2$)

0 – 81 = extremely mild

82 – 139 = mild

140 – 279 = average

280 – 382 = severe

383 – 420 extremely severe

Modelled ice series ($\times 10^3 \text{ km}^2$)*

0 – 145 = extremely mild

146 – 166 = mild

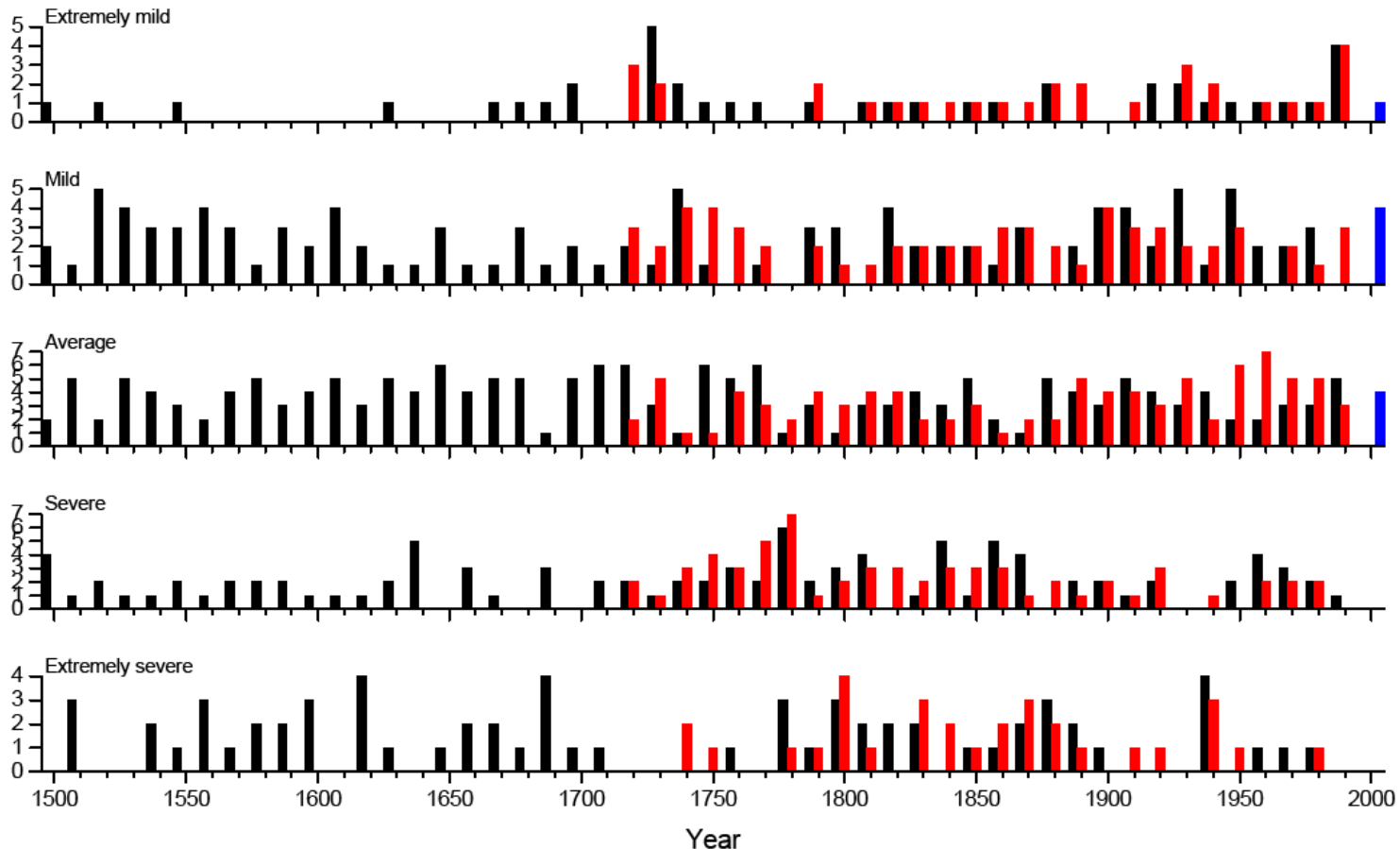
166 – 314 = average

315 – 365 = severe

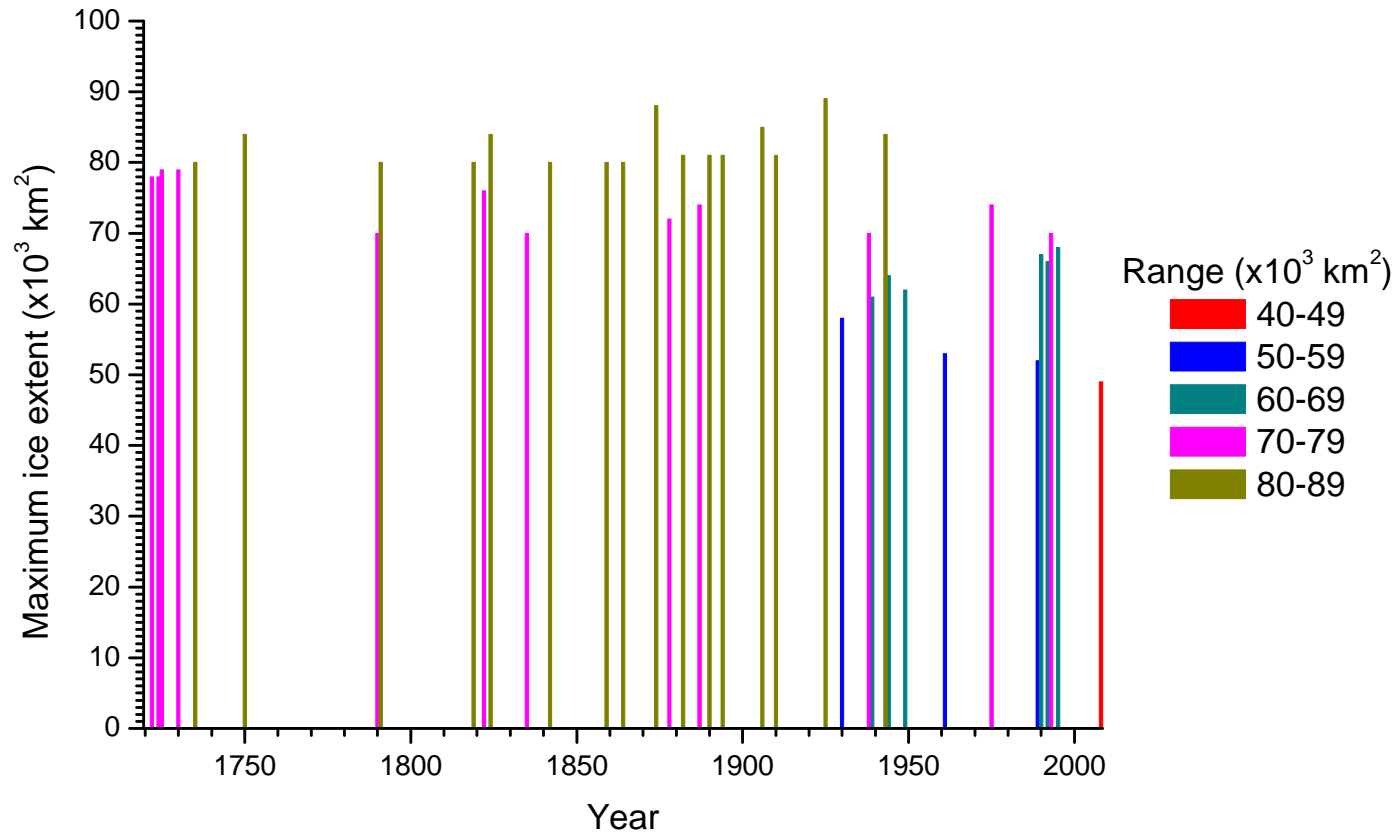
366 – 420 = extremely severe

*Based on the method of classification of Seinä & Palosou (1995)

Decadal ice winter classifications using observational and modelled data



Occurrence of extremely mild winters



Ice extent less than $70\,000 \text{ km}^2$ took place for the first time in 1930. A true change or due to data quality?



Conclusion



- The ice winter of 2008 was the mildest since 1720. The need for operational ice service was limited.
- The 10 mildest winters took place during the 20th and 21st century. Five of them has occurred since 1989.
- Larger variability among the extremely mild ice winters since 1930.
- In 1930 and 1990, no severe or extremely severe ice winter was recorded.
- It is not likely that the ice winter of 2009 will be severe or extremely severe (seasonal forecast of temperature!). If so, this will be the first time since 1500 that two decades in a row has no severe or extremely severe ice winters.



Conclusion

- There is a tendency towards more extremely mild ice winters. The change is *not* statistically significant.
- There is also a tendency towards fewer mild ice winters. The trend is *not* statistically significant.
- No change in average ice winters has occurred, although an increase has occurred since the 1720s.
- There is a tendency towards fewer severe ice winters. The decrease *is* significant since 1720, but not since 1500.
- There is a tendency towards fewer extremely severe ice winters, although *not* statistically significant.
- The outcome of the ice winter 2009 will not affect these results.