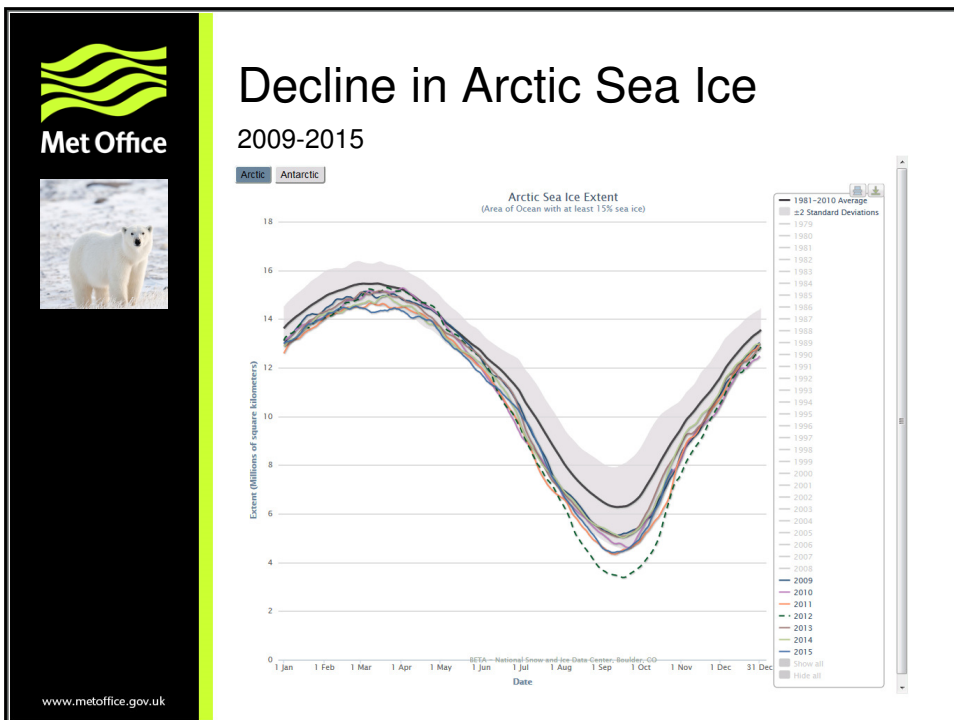
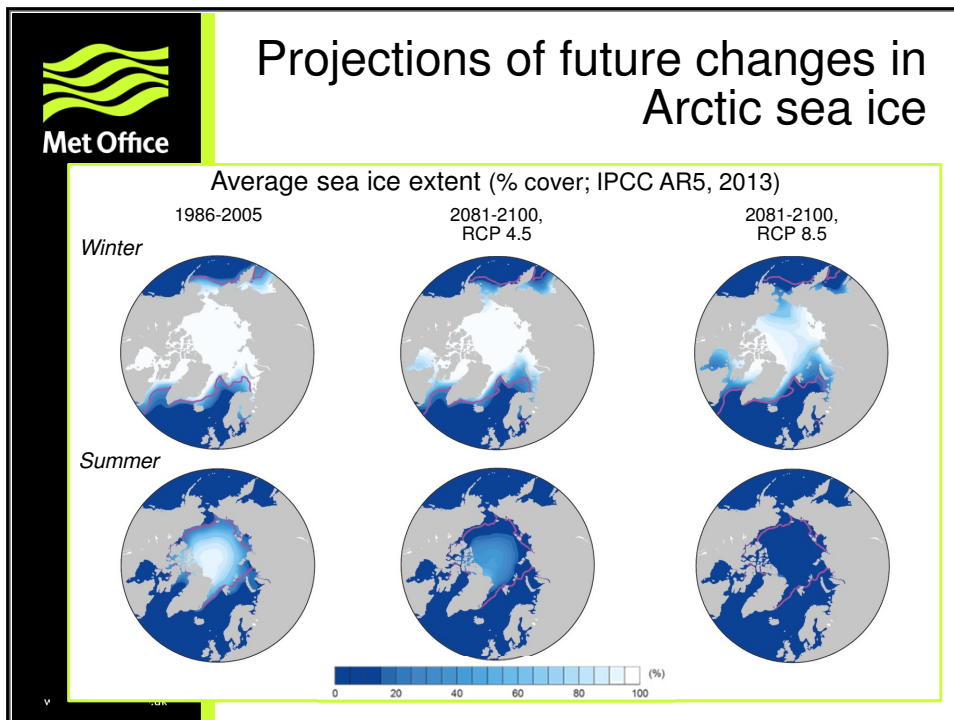
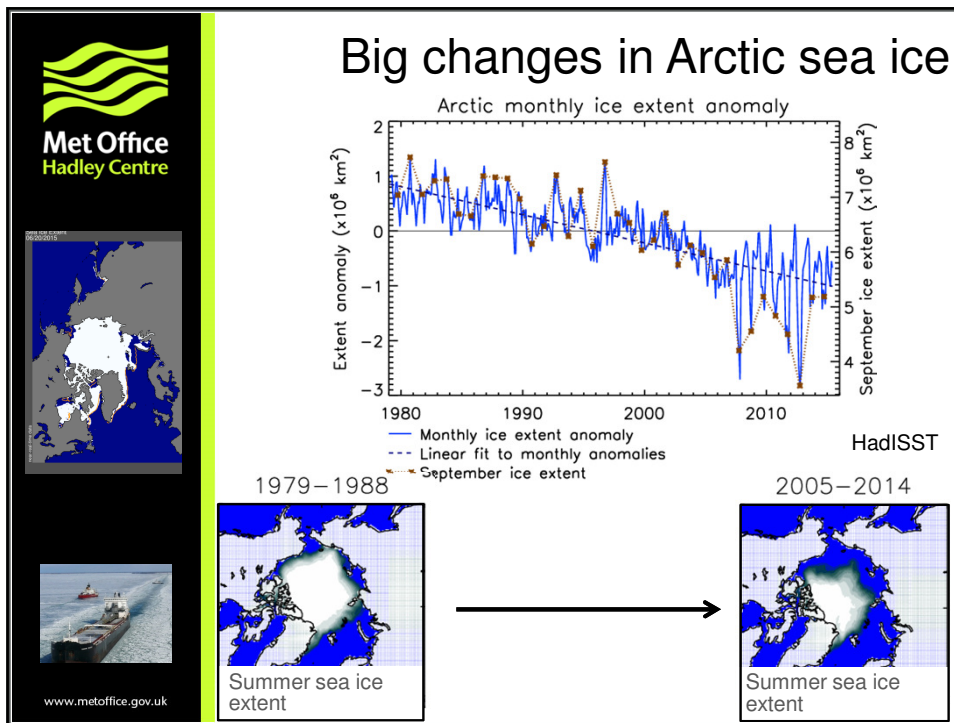



The Role of the Arctic in the Climate System

Professor Dame Julia Slingo
Met Office Chief Scientist

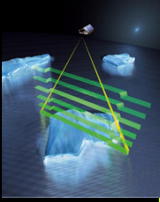




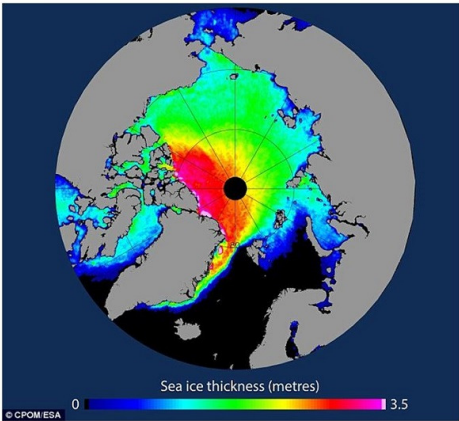


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Major Advances: Measuring sea ice thickness from space



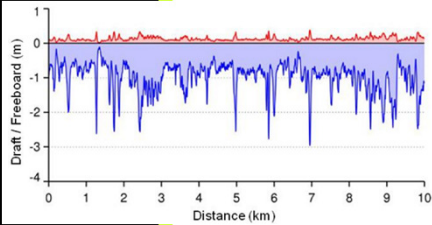
Sea ice thickness know the sea ice volume, and improve our understanding of Arctic mass and energy balances



Sea ice thickness (metres)


0 3.5

© CPOM/ESA



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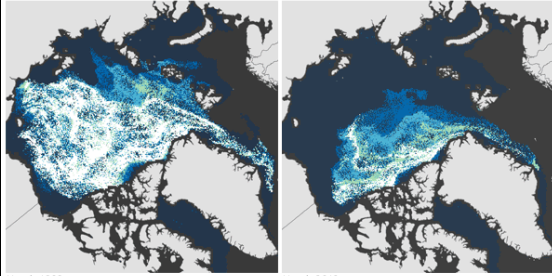
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Reduction in ice thickness and multi-year ice

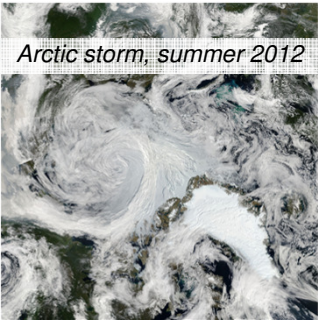
Thin single-year ice is less strong and more likely to break up in severe weather conditions, causing more annual variation in sea ice extent.



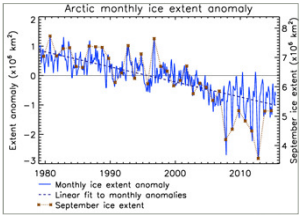
March 1988 March 2013

Sea ice age (years)

open water 1 2 3 4 5+



Arctic storm, summer 2012




Arctic monthly ice extent anomaly

Extent anomaly ($\times 10^6$ km²) September ice extent ($\times 10^6$ km²)

1980 1990 2000 2010

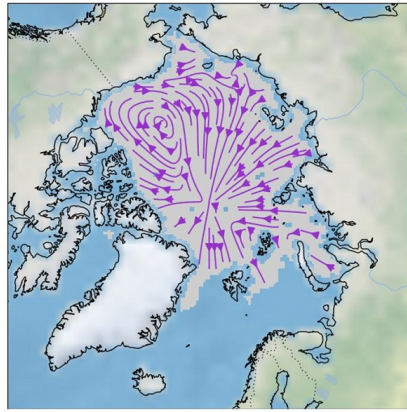
— Monthly ice extent anomaly
--- Linear fit to monthly anomalies
••• September ice extent

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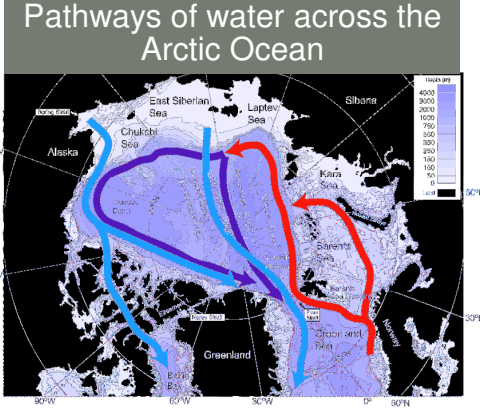


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Movement of ice within the Arctic climate system




Pathways of water across the Arctic Ocean



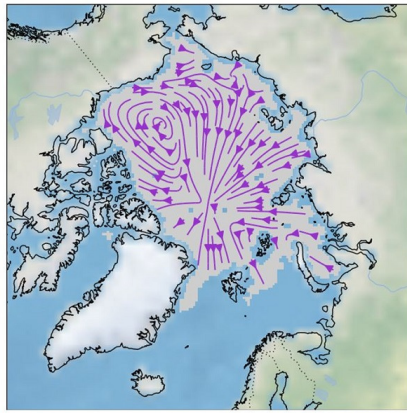
Strongly influenced by bathymetry

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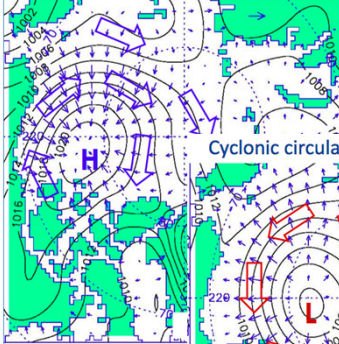


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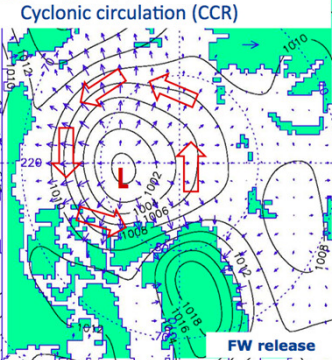
Influence of atmospheric circulations on Arctic sea ice and fresh water budgets



Anti-cyclonic circulation (ACCR)

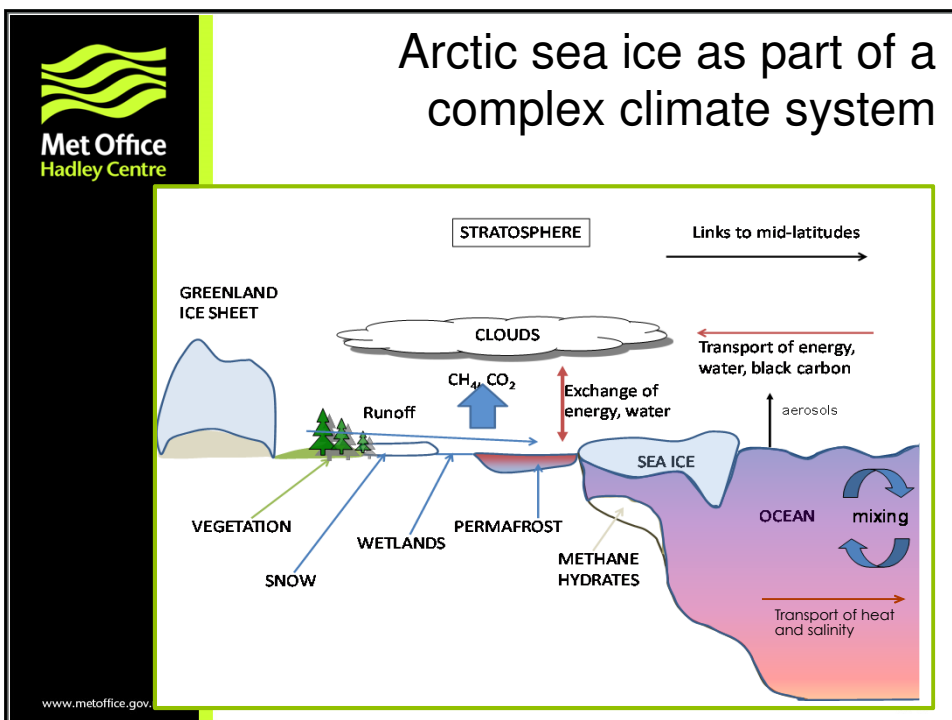
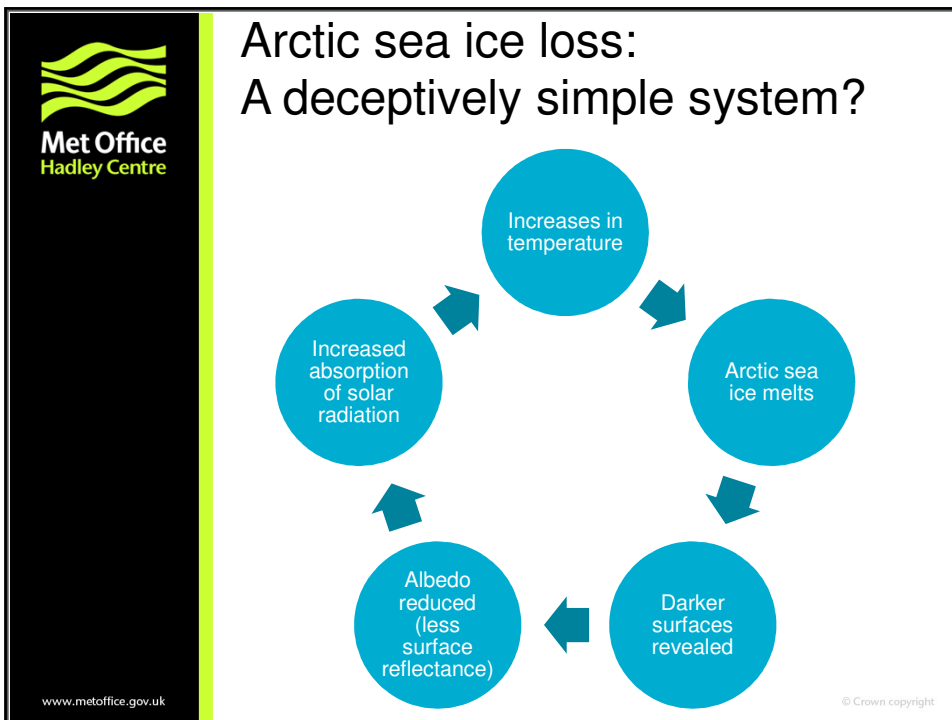


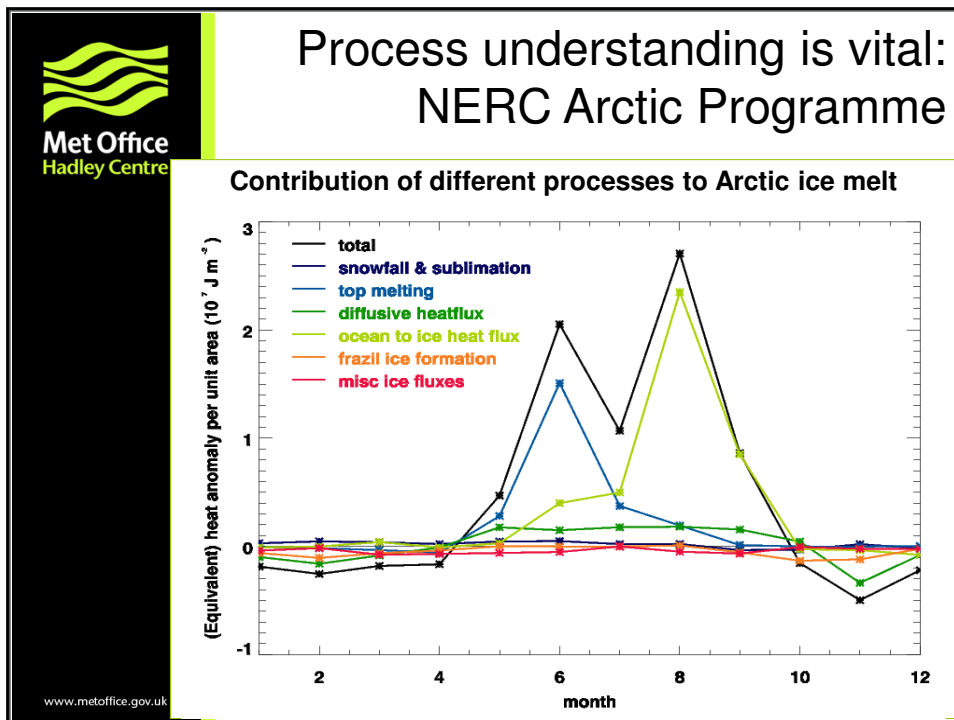
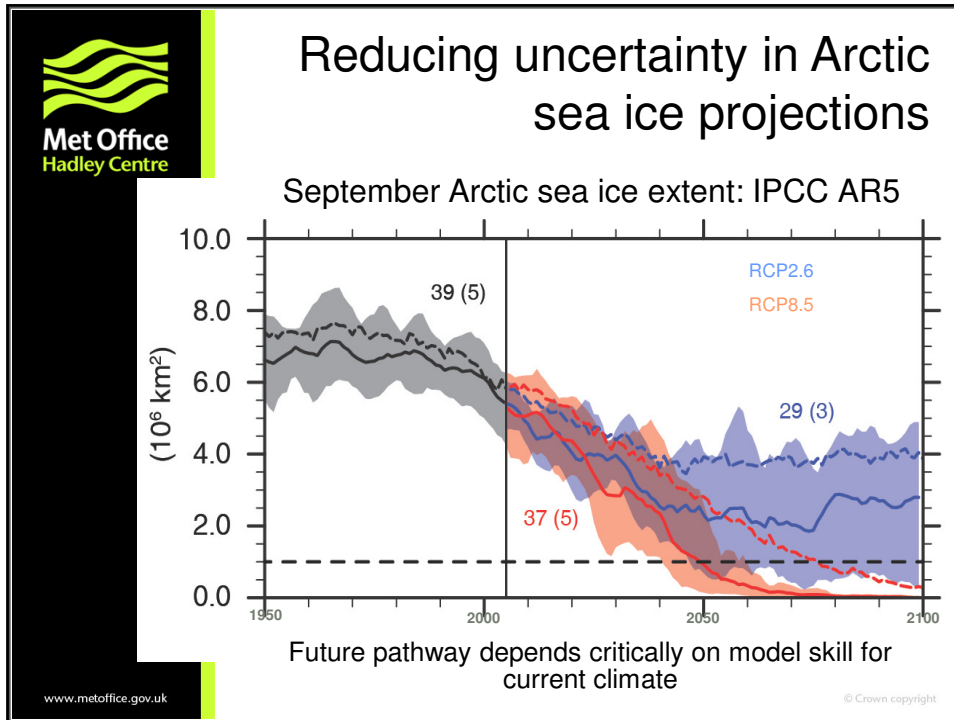
Cyclonic circulation (CCR)




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Andrey Proshutinsky FW release



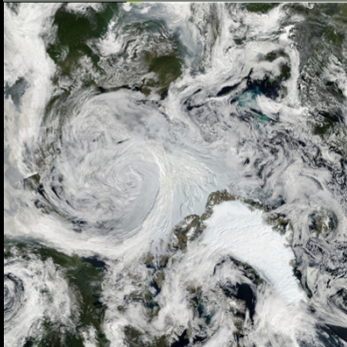


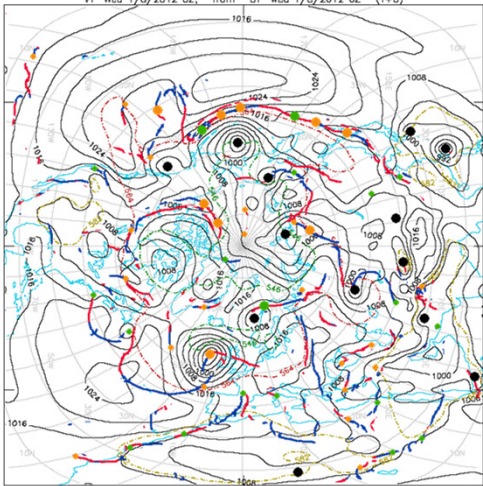


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Prediction of ice extent can provide valuable information for transportation and Arctic exploitation


1-10 AUG 2012
Development of the Arctic Storm





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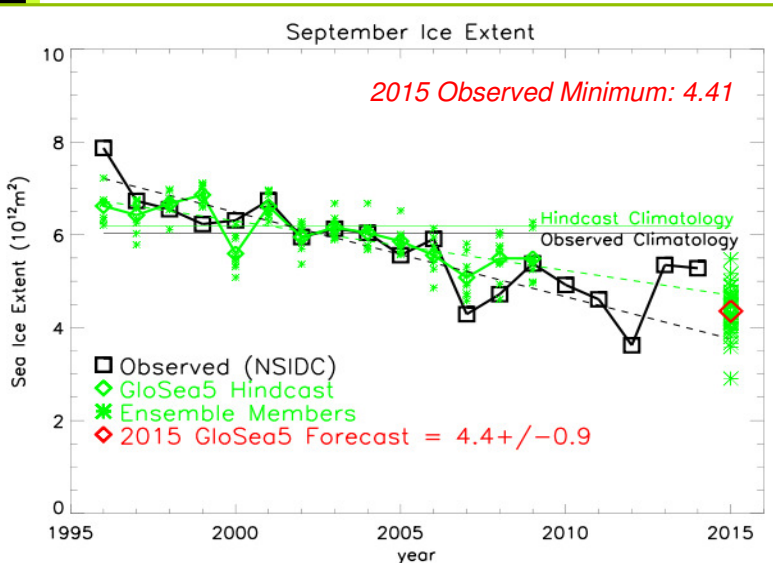
WMO Polar Prediction Project




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Emerging skill in forecasting a season ahead

September Ice Extent



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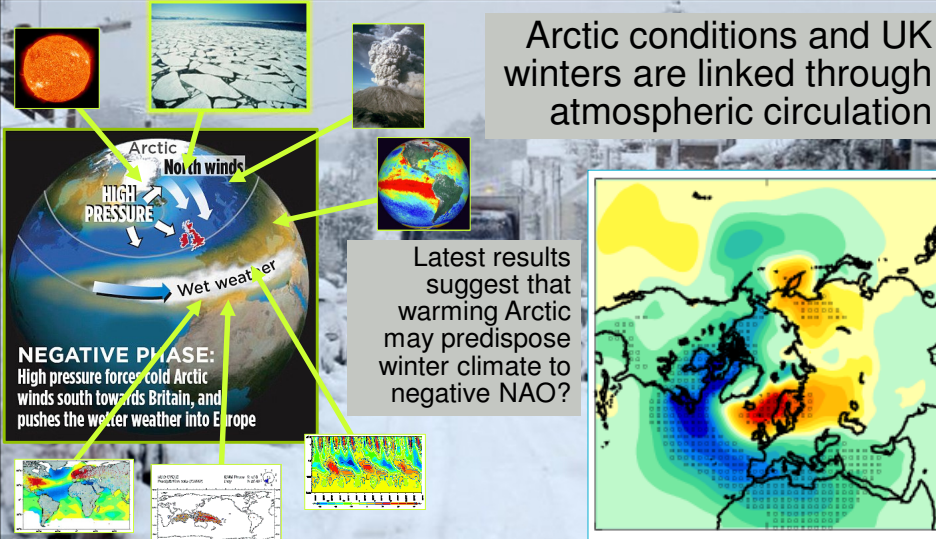
Is there an impact of declining Arctic sea ice on UK weather?

Arctic conditions and UK winters are linked through atmospheric circulation


Arctic
North winds
HIGH PRESSURE
Wet weather

Latest results suggest that warming Arctic may predispose winter climate to negative NAO?

NEGATIVE PHASE:
High pressure forces cold Arctic winds south towards Britain, and pushes the wetter weather into Europe



© EPA


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Summary

- The Arctic is a very complex system which has seen significant changes commensurate with global warming.
- Advances in observations and modelling have improved our understanding of the Arctic and our ability to predict short-term variations and long-term changes.
- Further changes are expected in years to come as the planet continues to warm.
- Changes in the Arctic are likely to have impacts further afield.
- Understanding the links between the Arctic and UK weather and climate is becoming increasingly important and is an active area of research.

