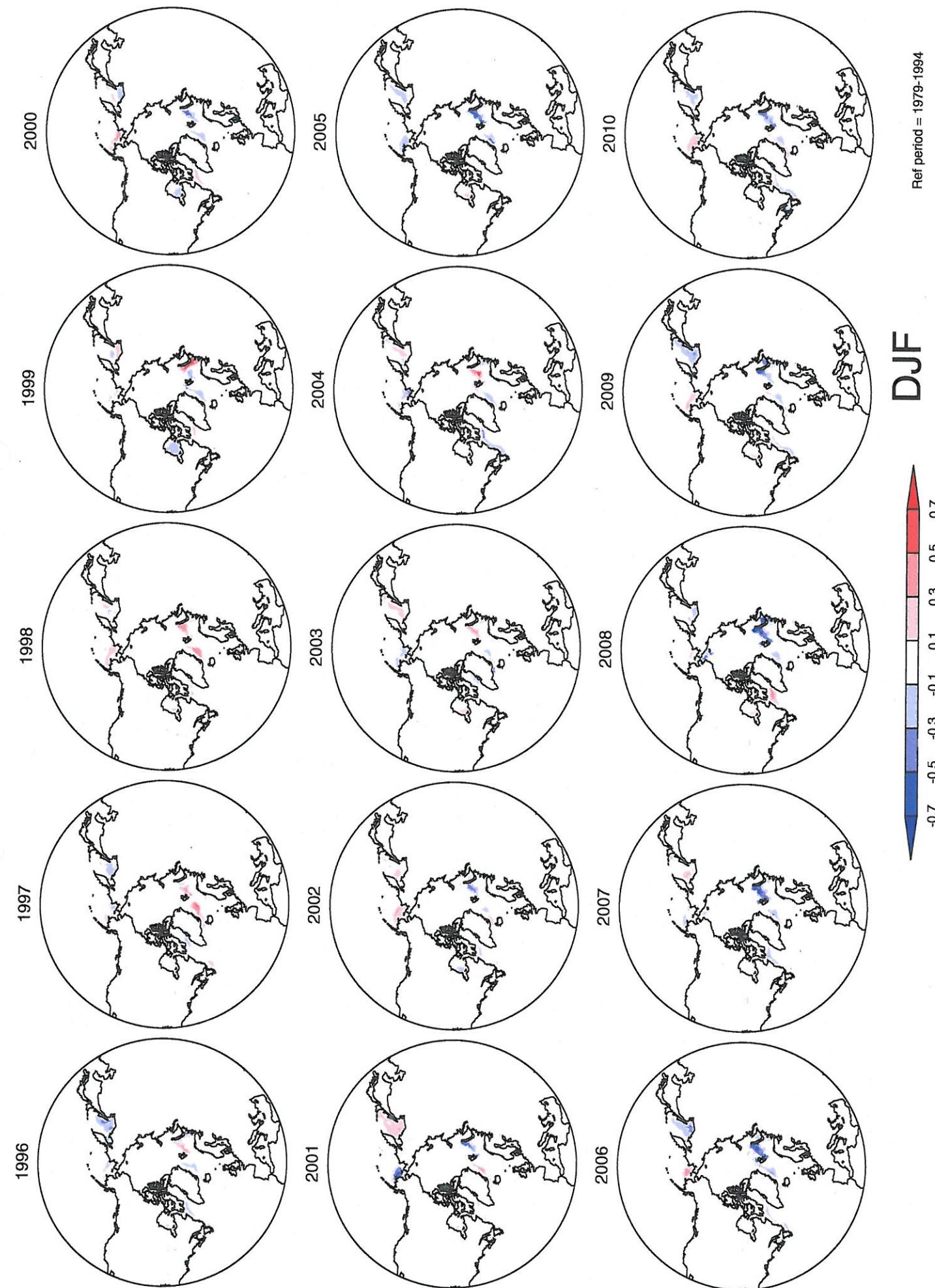
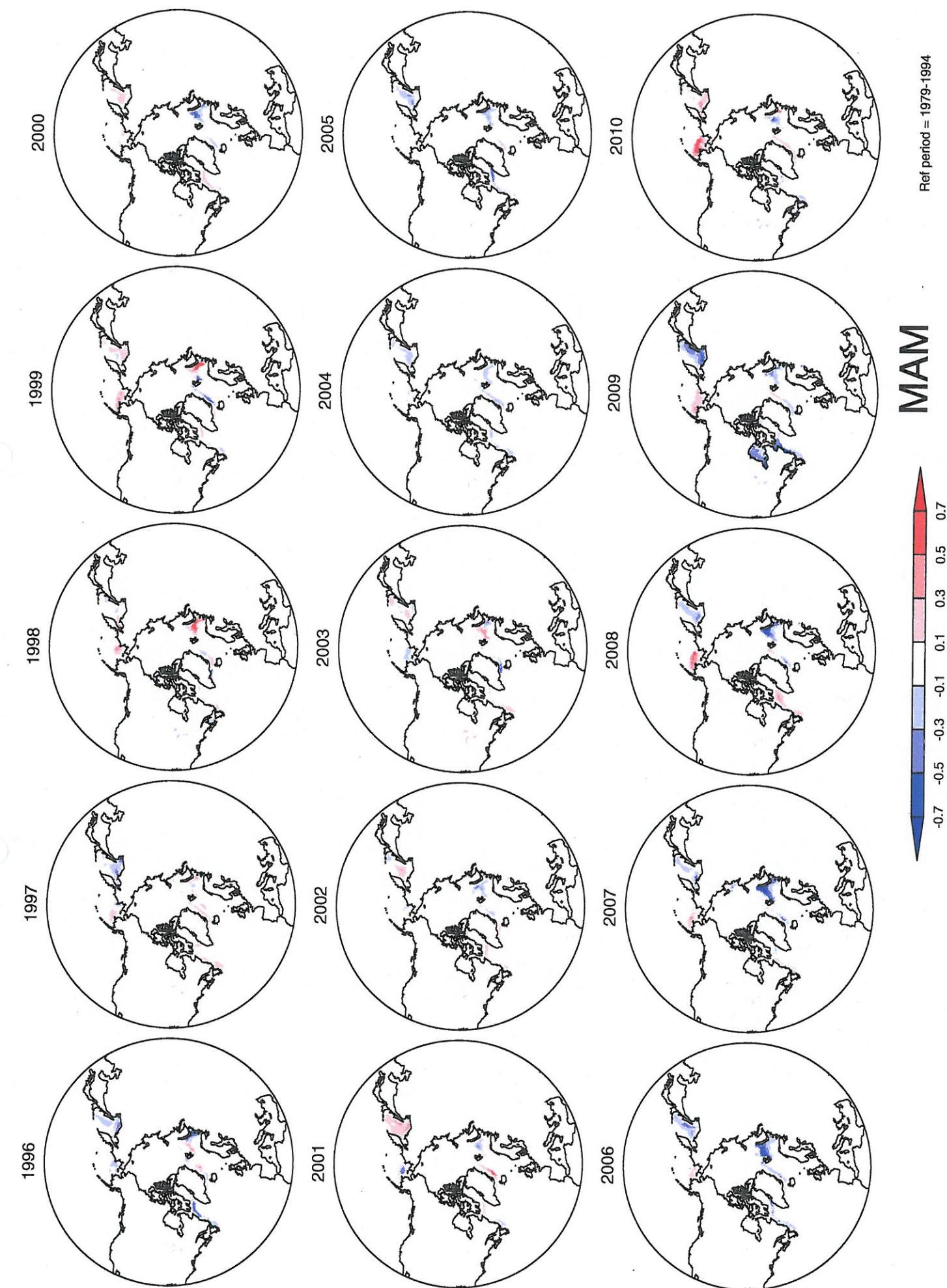


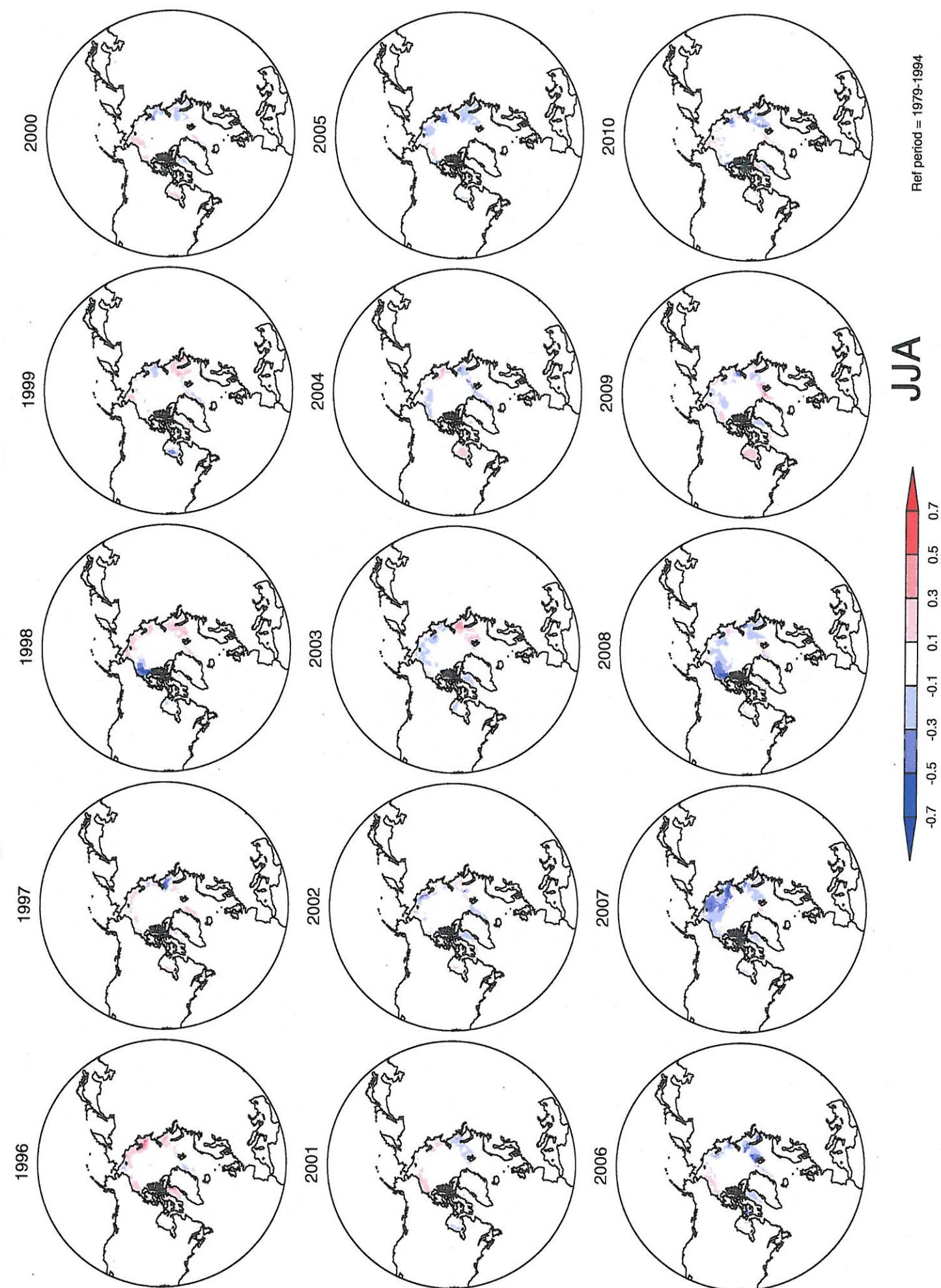
HadISST seaice seasonal anomalies relative to 1979-1994 climatology for DJF



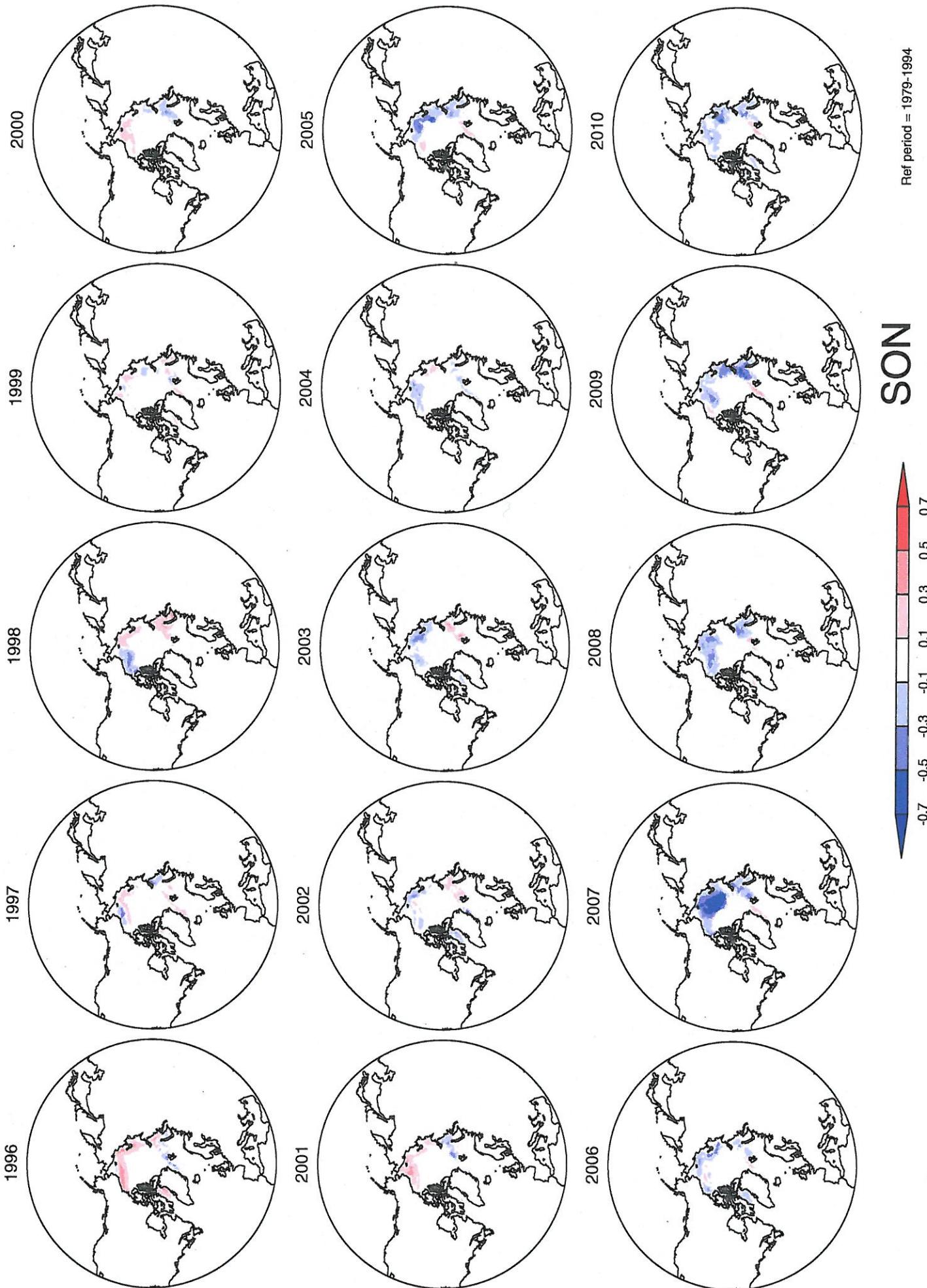
HadISST seaice seasonal anomalies relative to 1979-1994 climatology for MAM



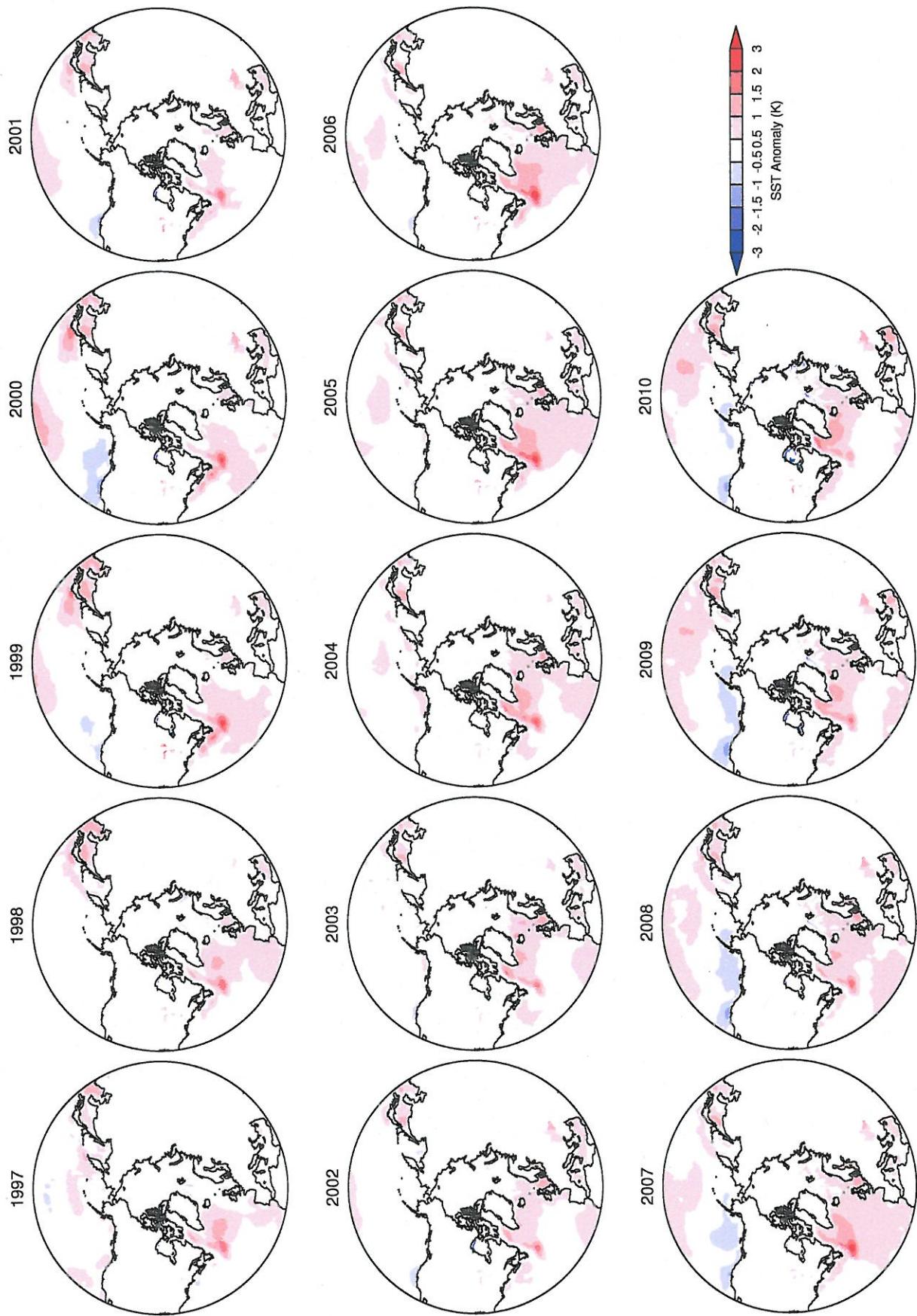
HadISST seaice seasonal anomalies relative to 1979-1994 climatology for JJA



HadISST seaice seasonal anomalies relative to 1979-1994 climatology for SON

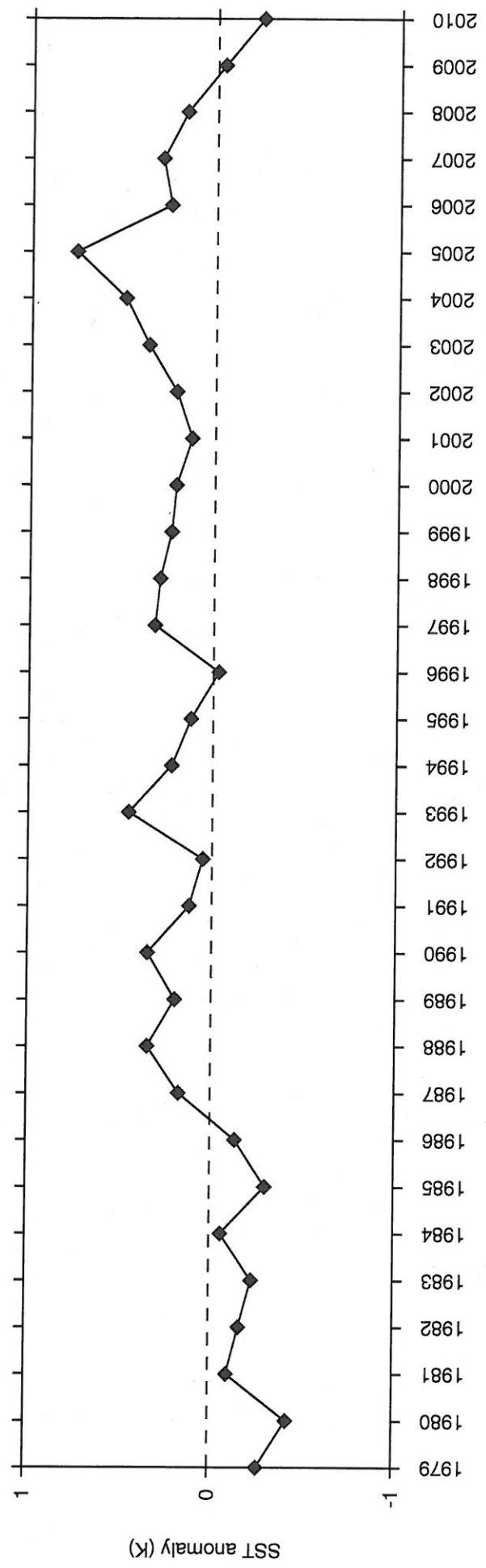


HadISST SST centred three year running mean anomalies relative to 1979-1994 climatology

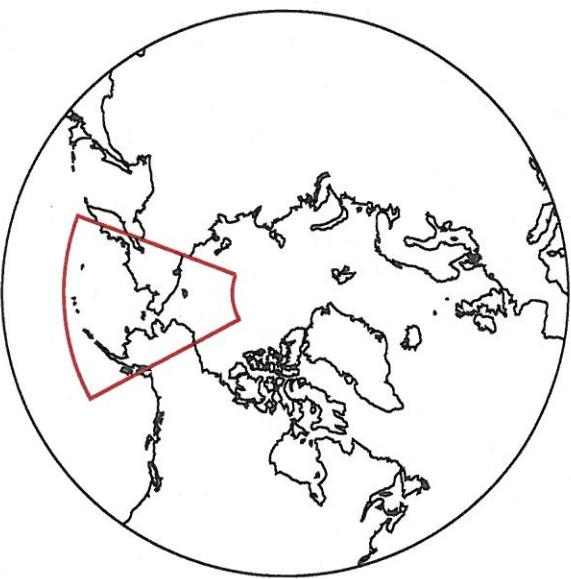


Anomalies from reference period 1979-1994

Time series of SST from HadISST

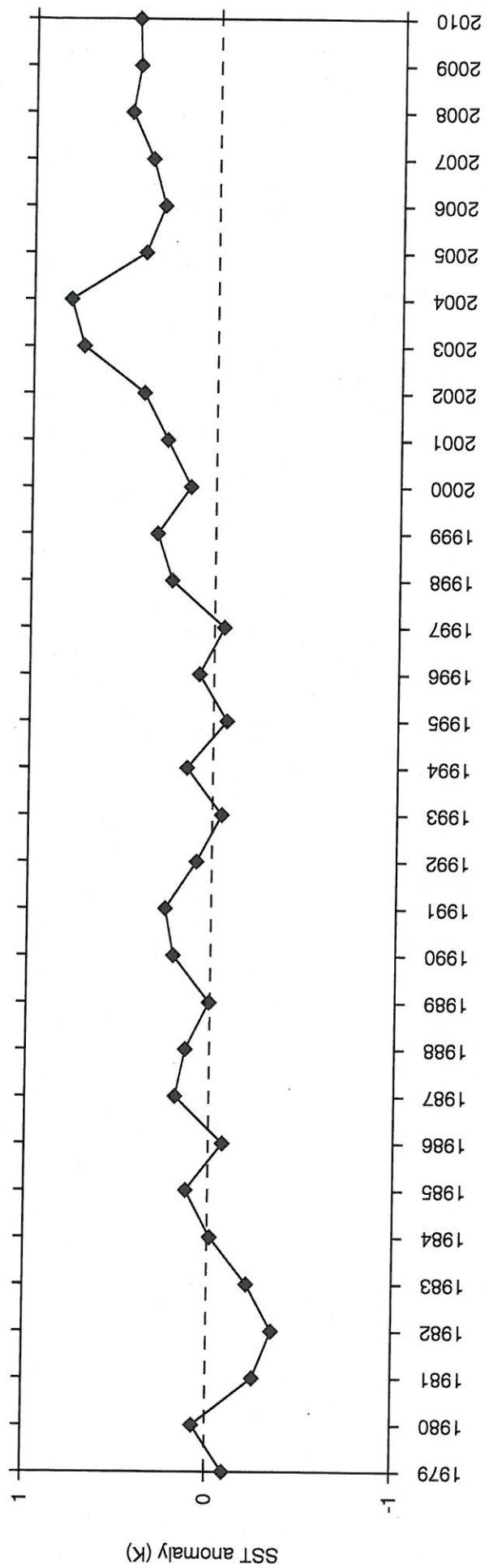


Region of interest

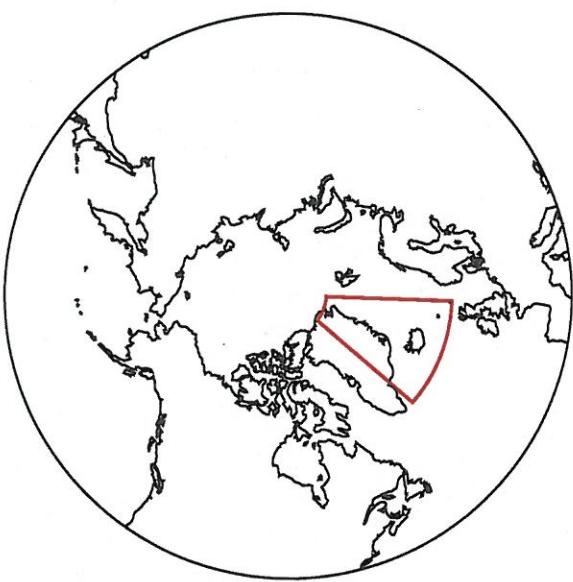


Anomalies from reference period 1979-1994

Time series of SST from HadISST

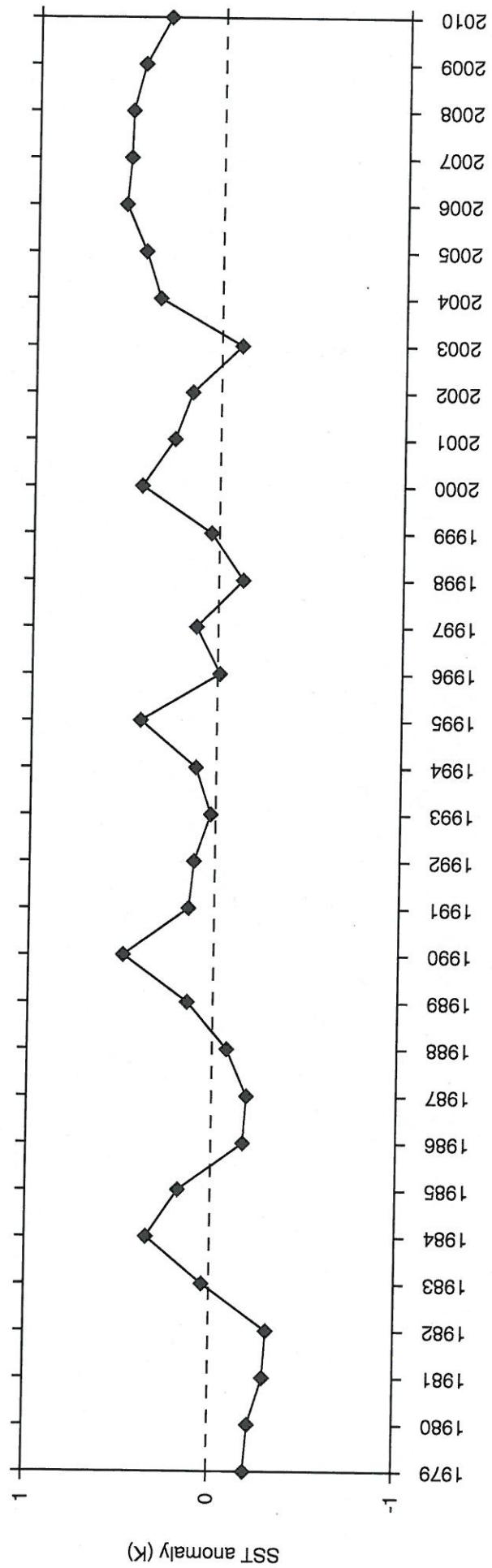


Region of interest



Anomalies from reference period 1979-1994

Time series of SST from HadISST

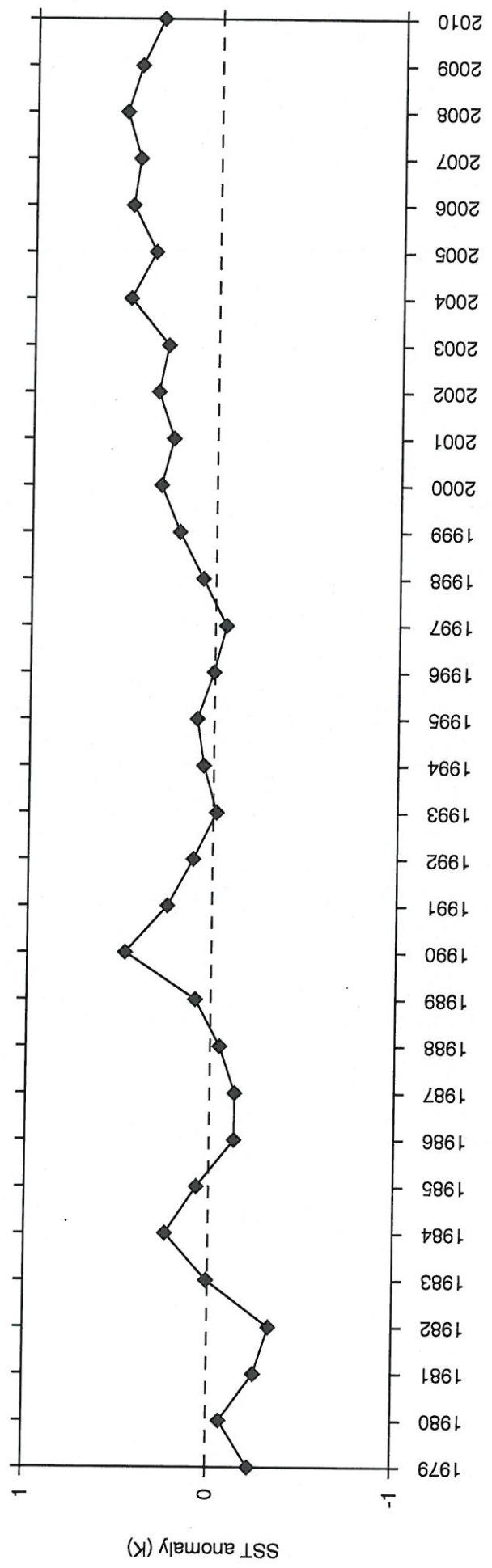


Region of interest

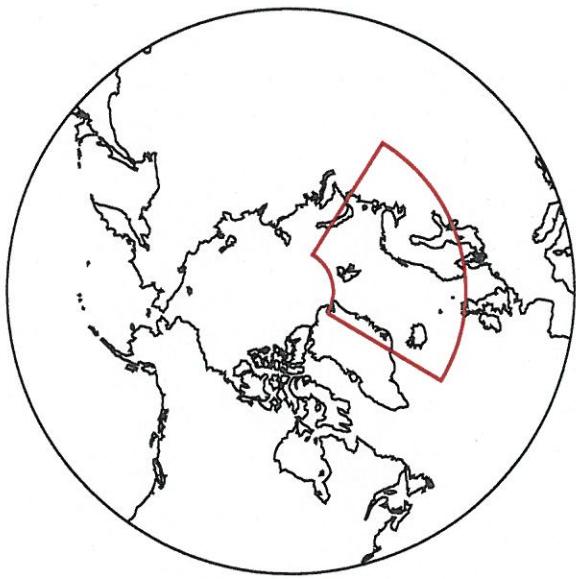


Anomalies from reference period 1979-1994

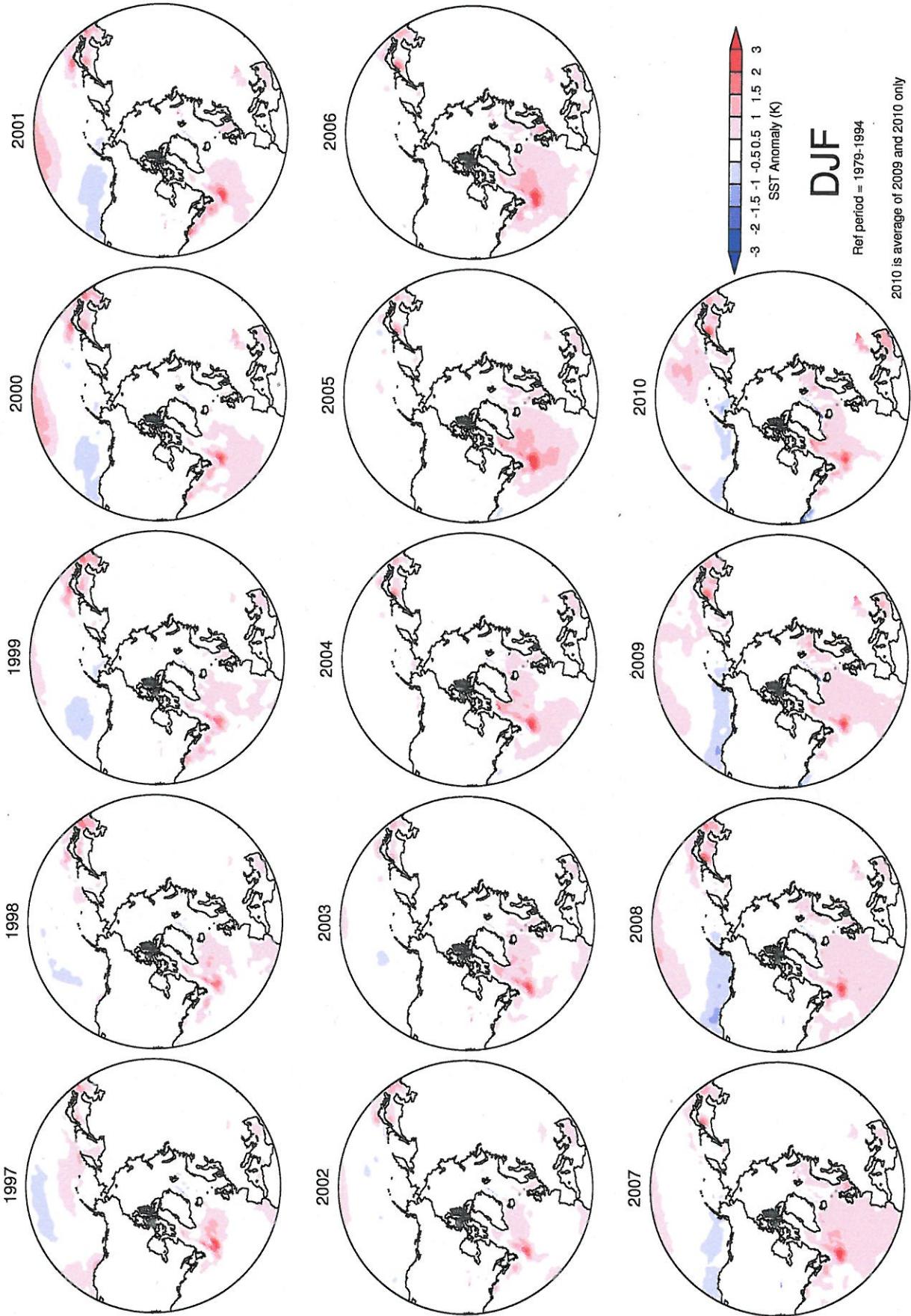
Time series of SST from HadISST



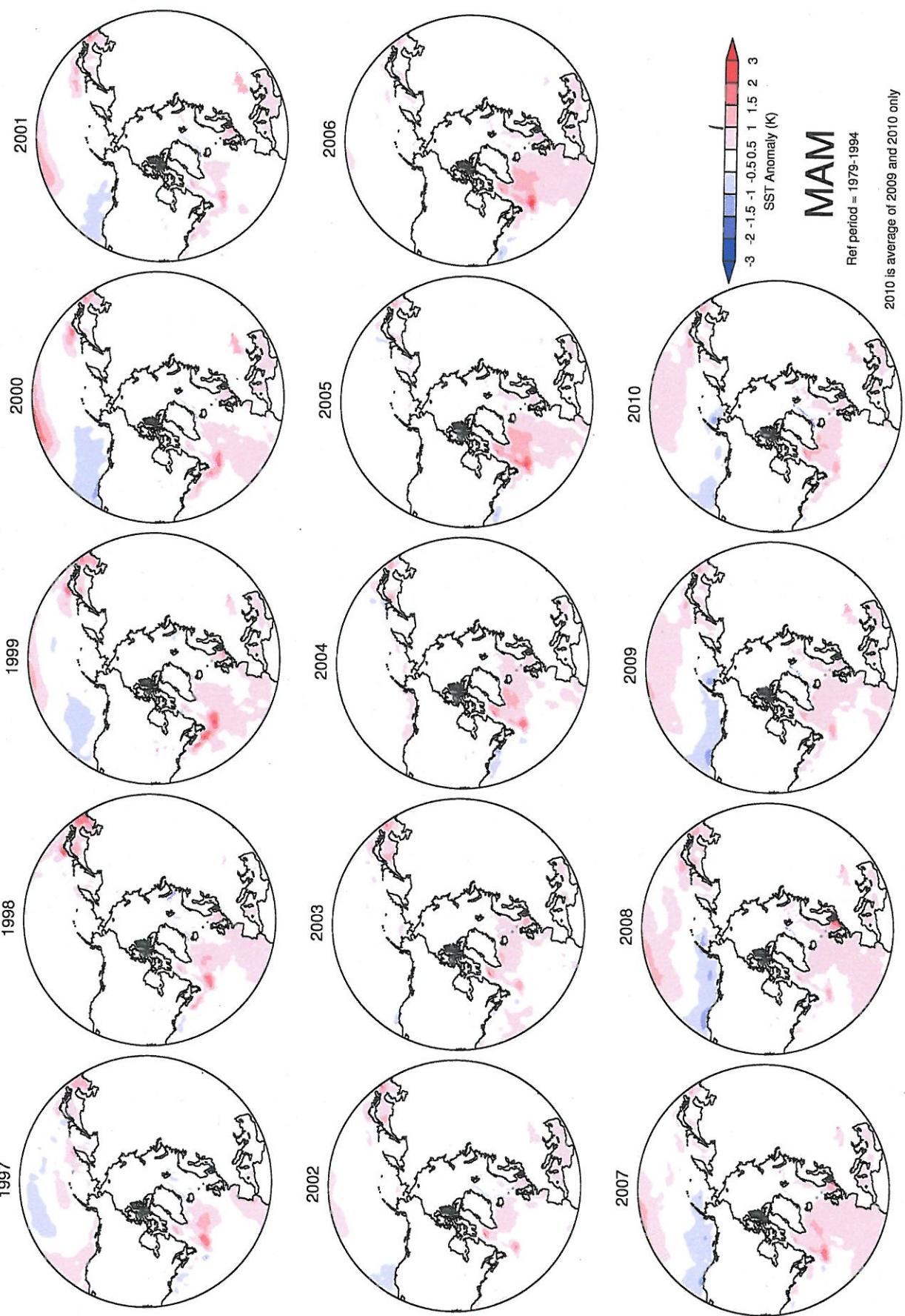
Region of interest



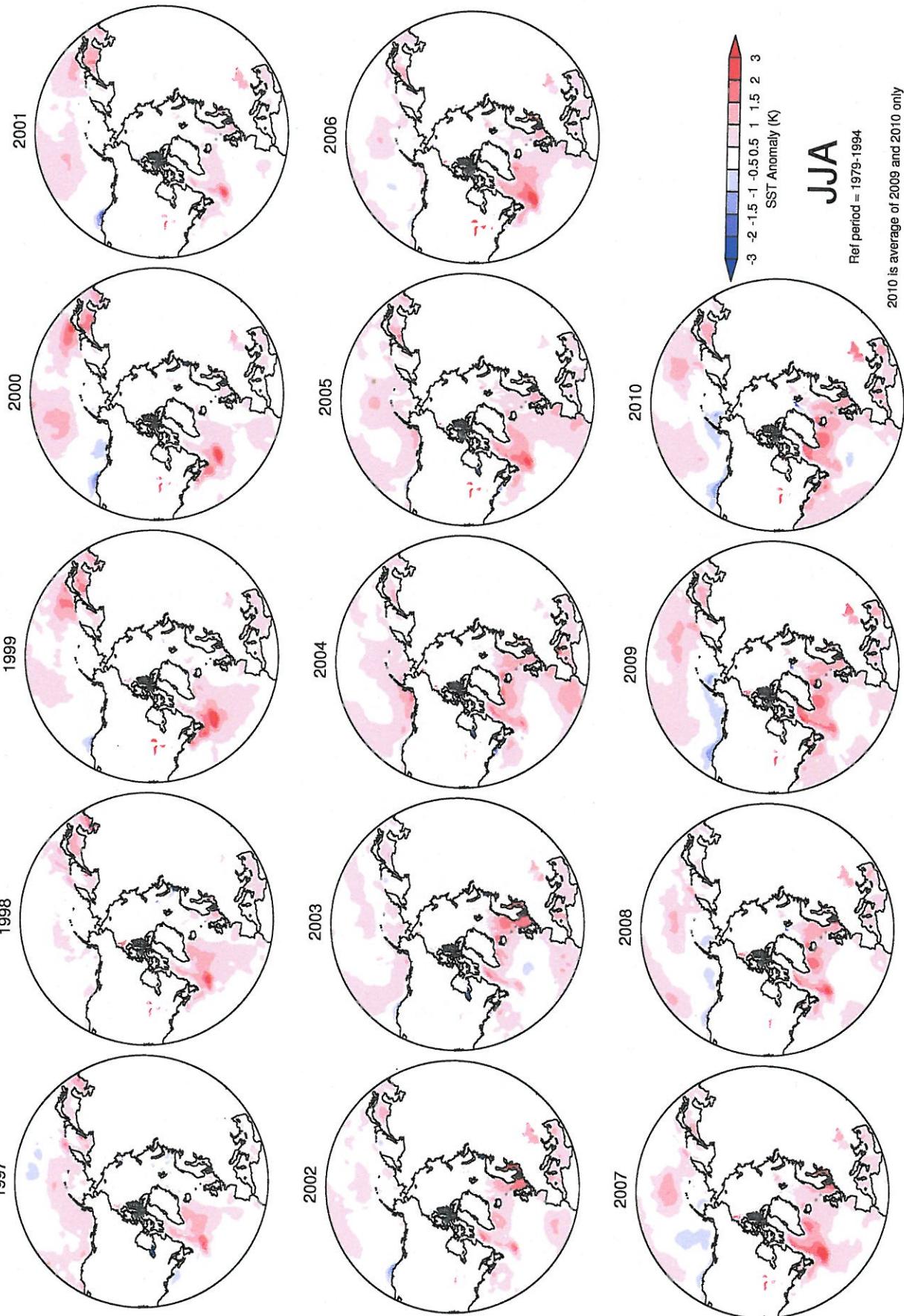
HadISST SST centred three year running mean anomalies relative to 1979-1994 climatology for DJF



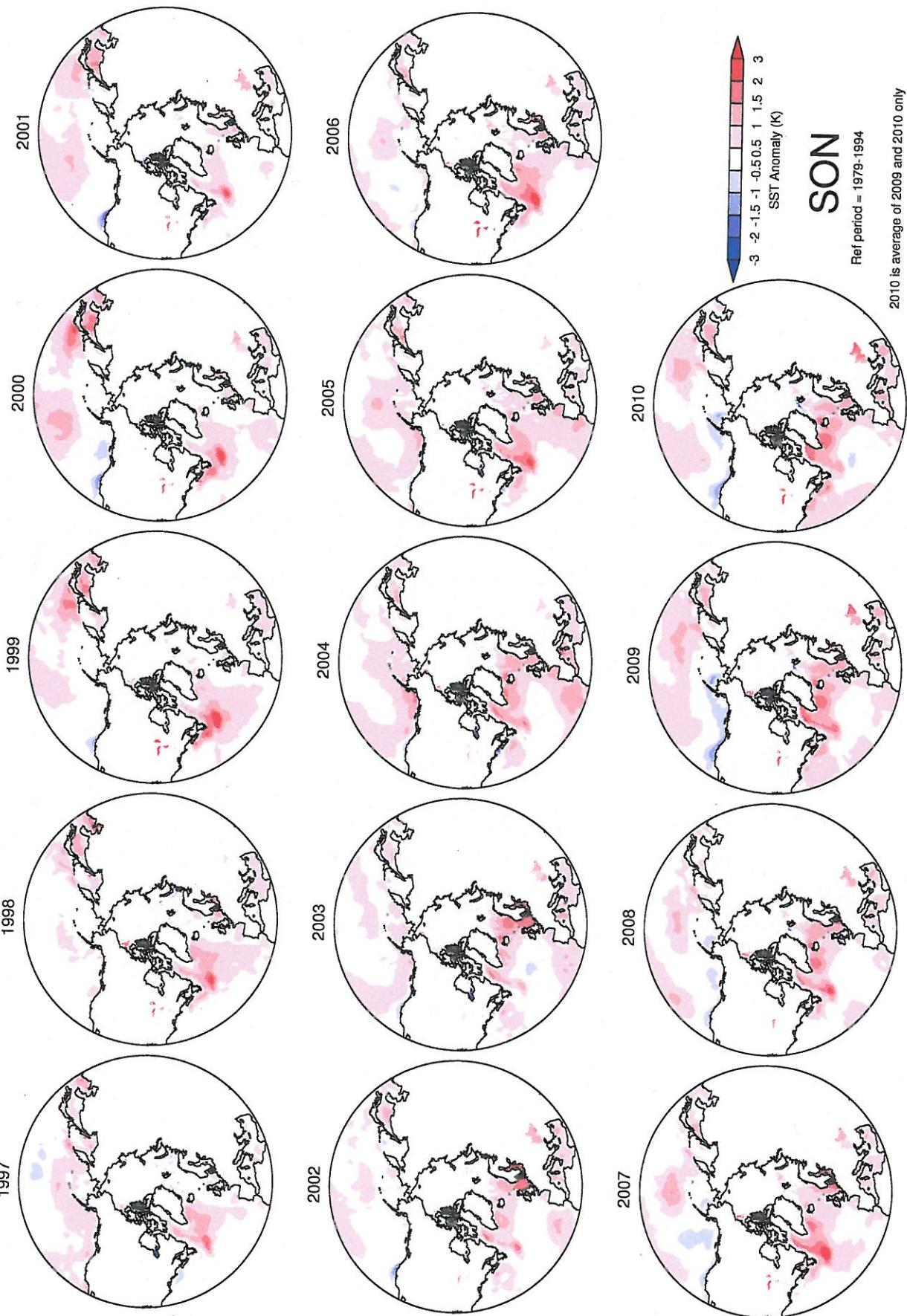
HadISST SST centred three year running mean anomalies relative to 1979-1994 climatology for MAM



HadISST SST centred three year running mean anomalies relative to 1979-1994 climatology for JJA



HadISST SST centred three year running mean anomalies relative to 1979-1994 climatology for SON

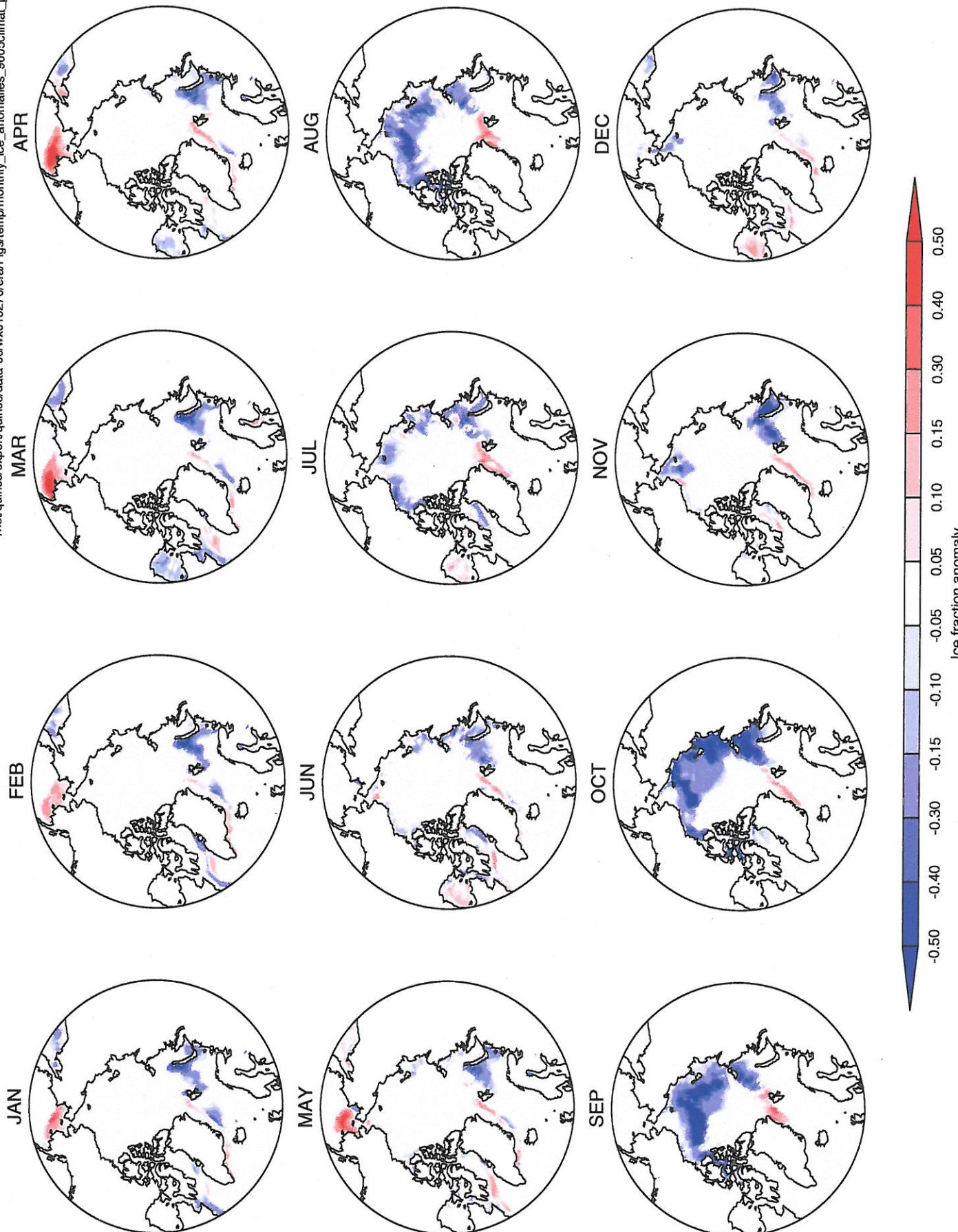


Ref period = 1979-1994
2010 is average of 2009 and 2010 only

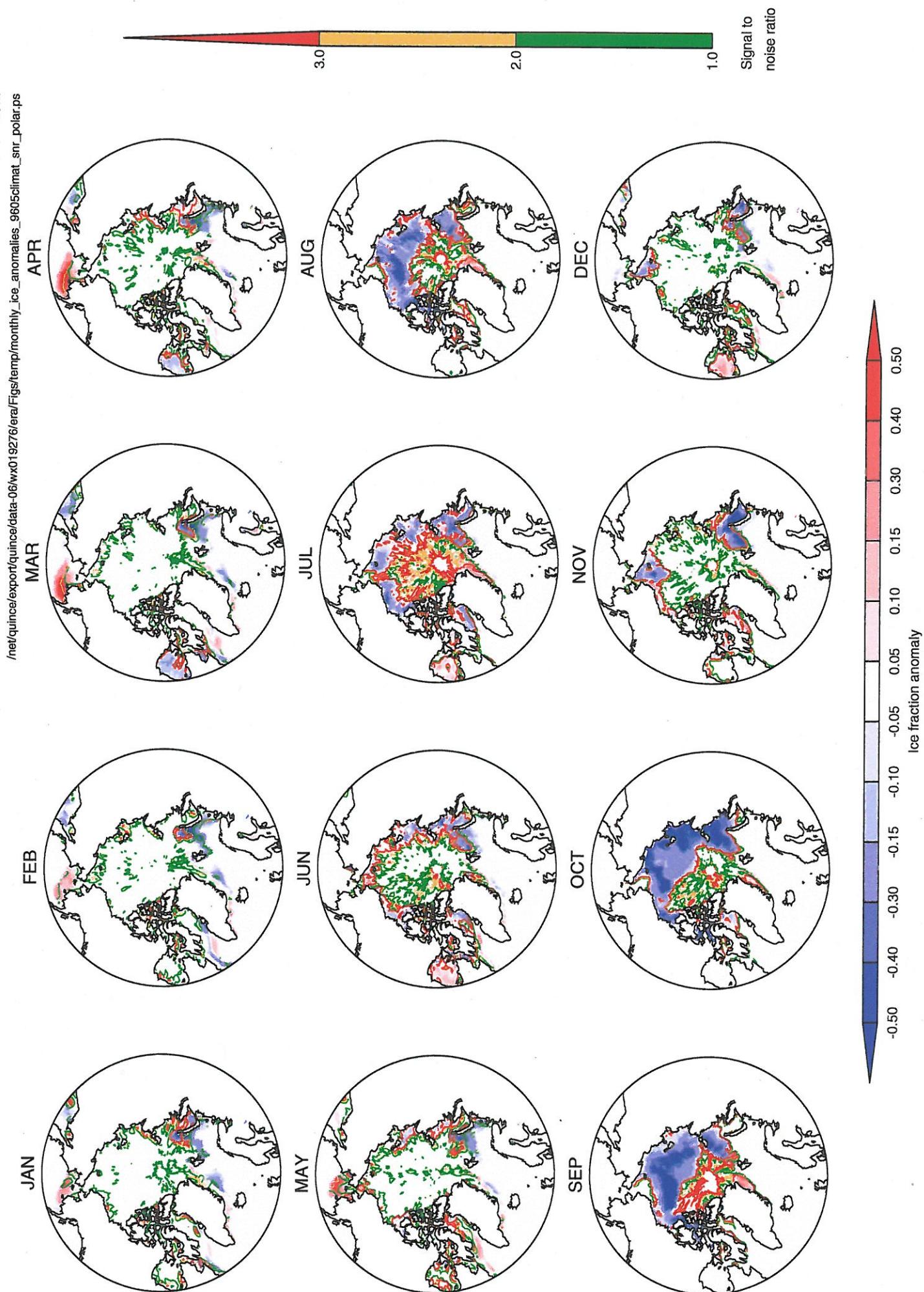
SON

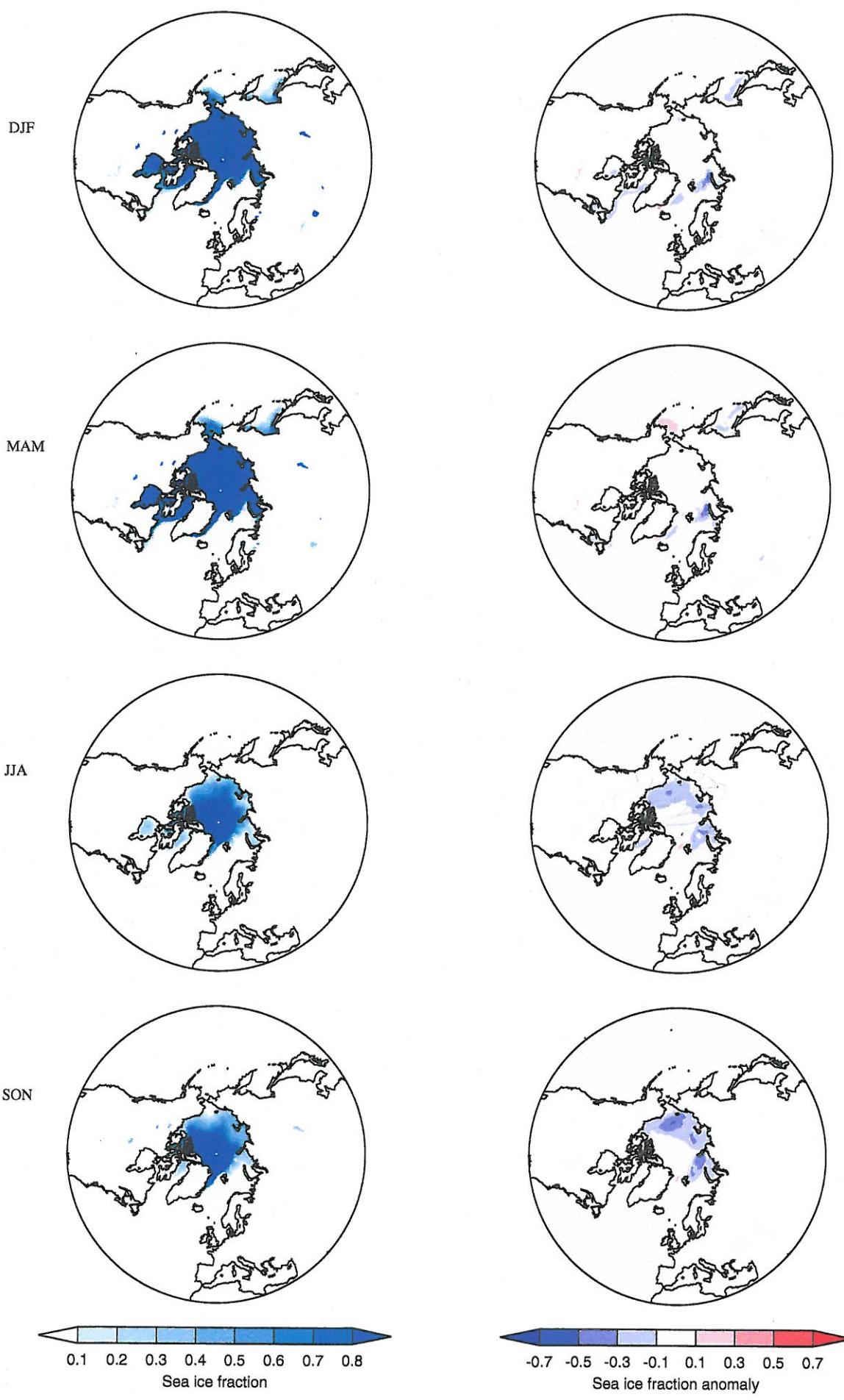
HadISST monthly ice anomalies (2007-2011) - (1996-2005)

Fri Nov 30 13:21:03 2012
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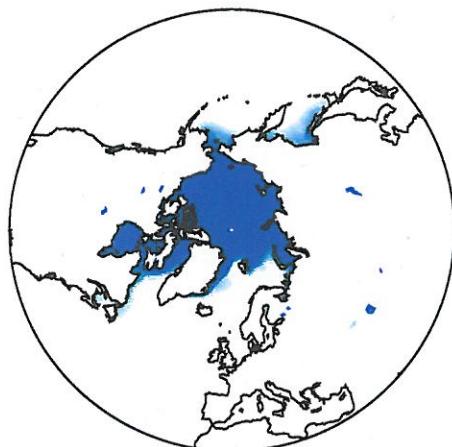


HadISST monthly ice anomalies (2007-11) - (1996-2005)

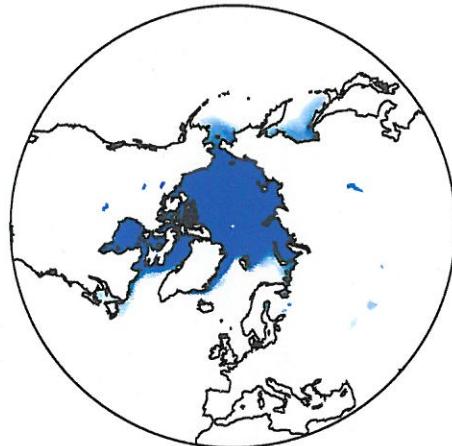




DJF



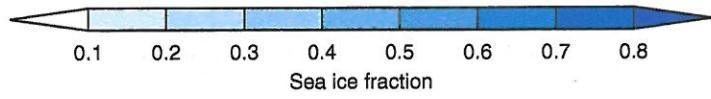
MAM



JJA



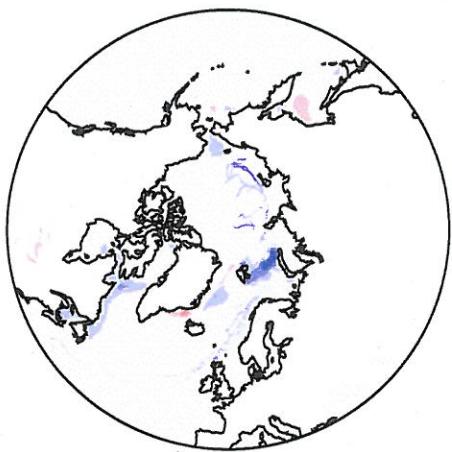
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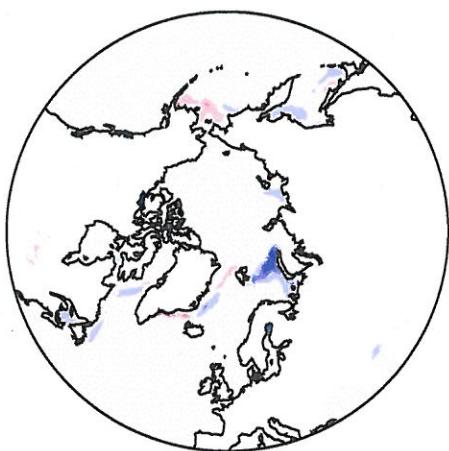
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ERA-Interim seasonal sea ice cover anomalies relative to 1986 - 2005 average Tue May 1 11:48:20 2012

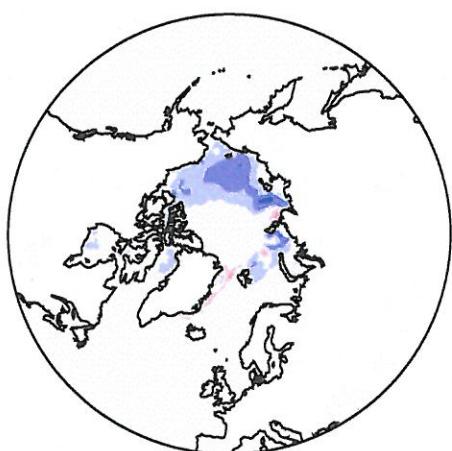
DJF



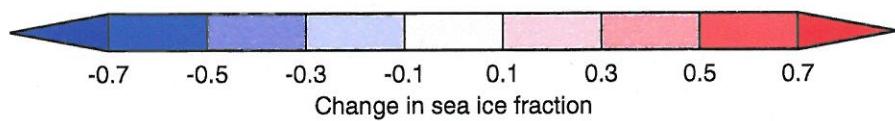
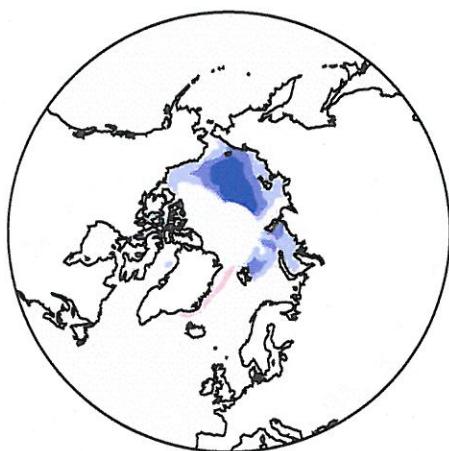
MAM



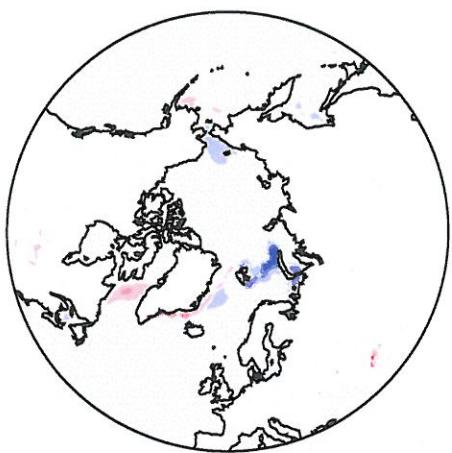
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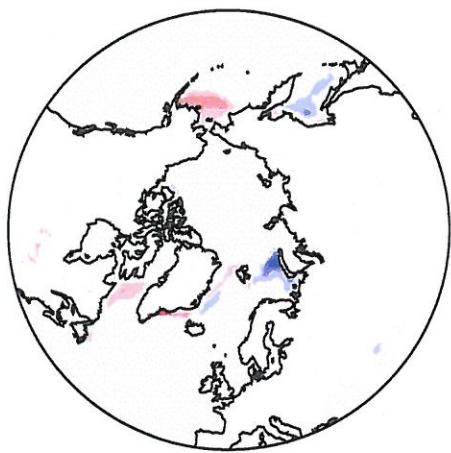
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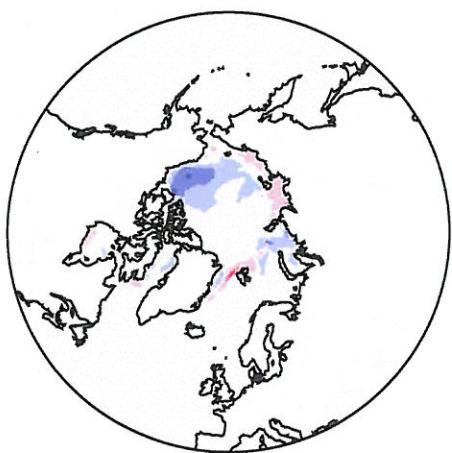
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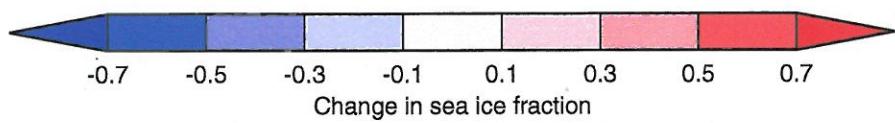
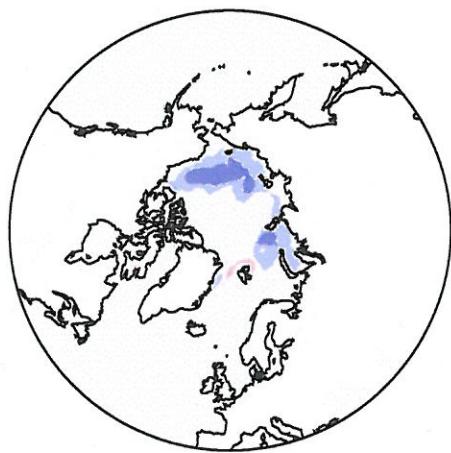
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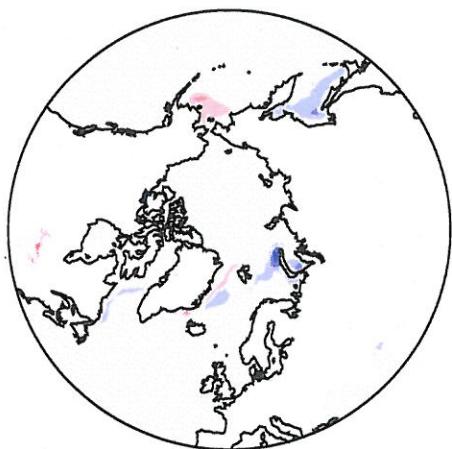
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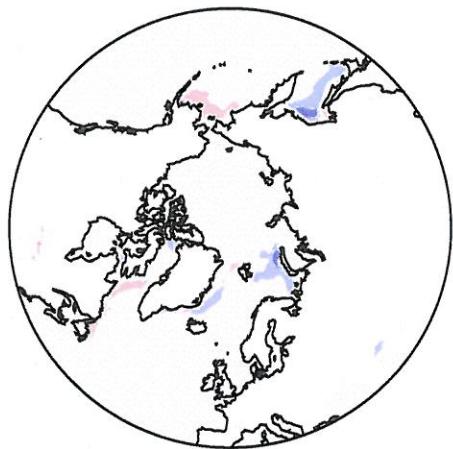
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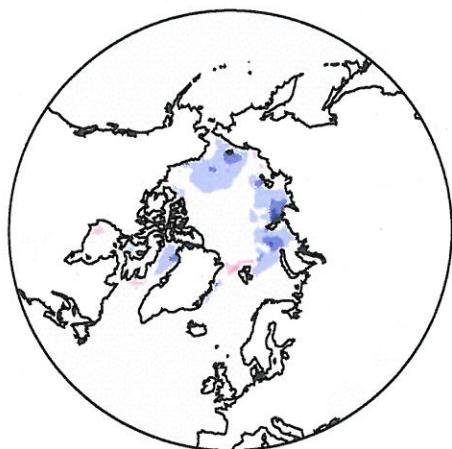
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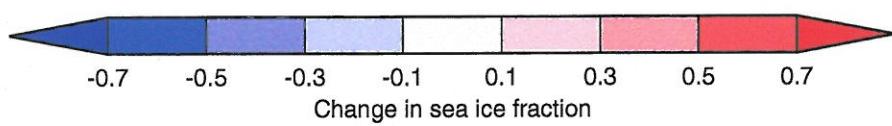
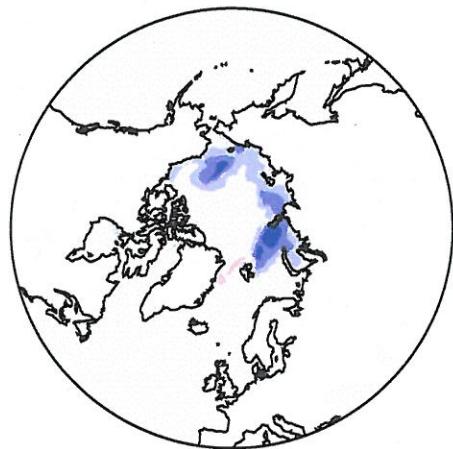
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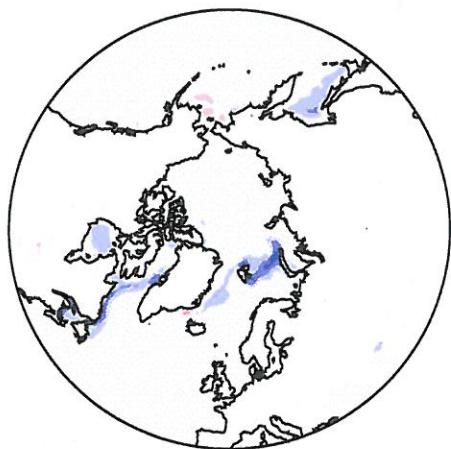
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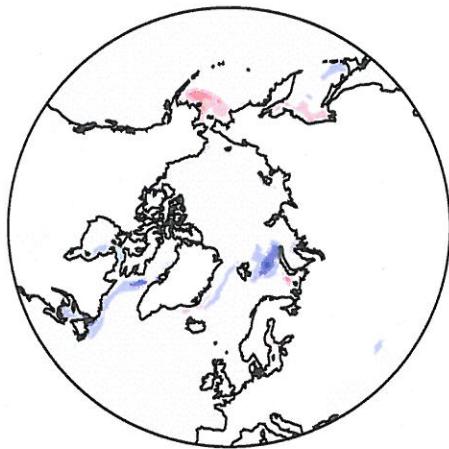
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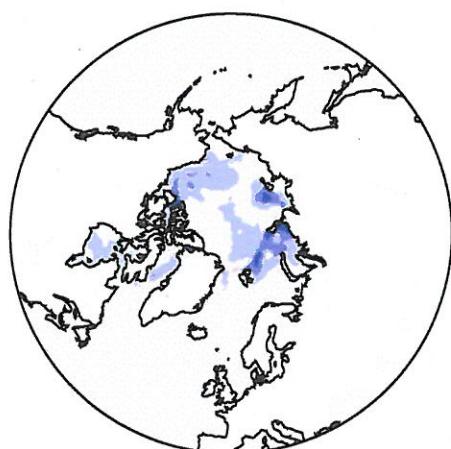
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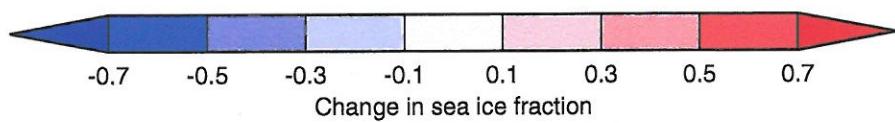
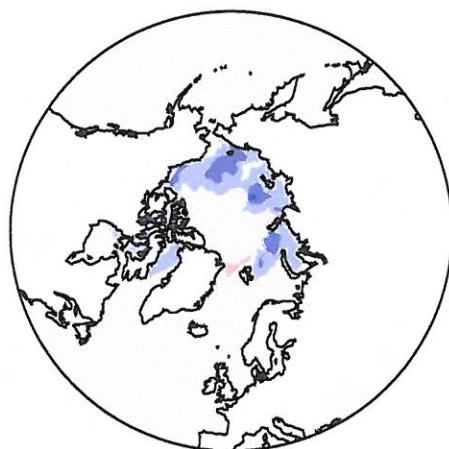
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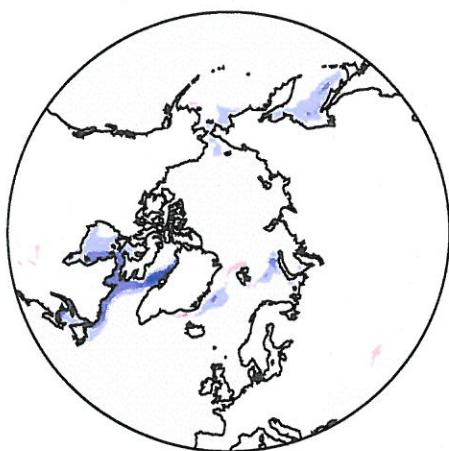
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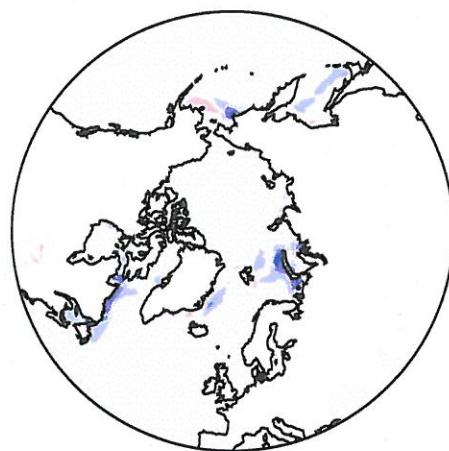
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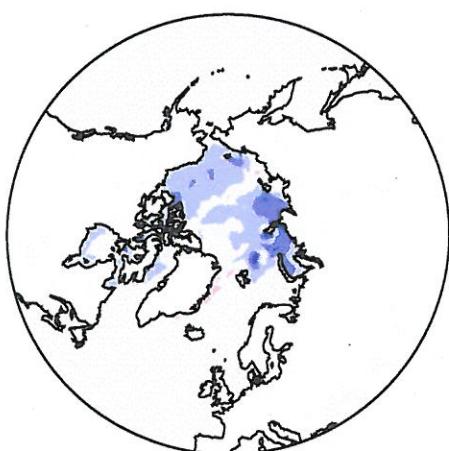
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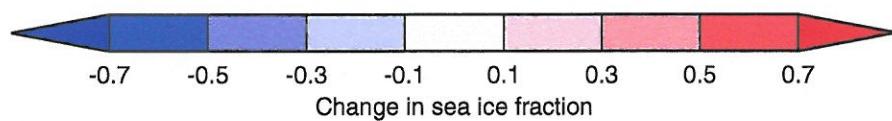
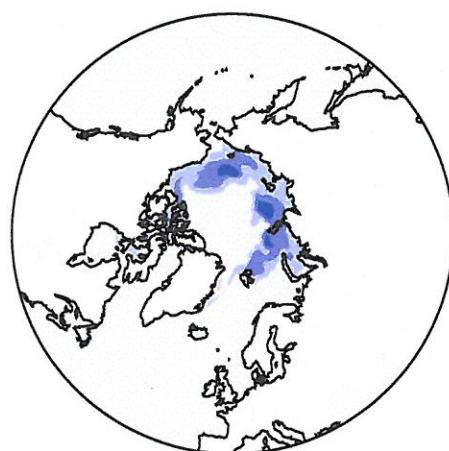
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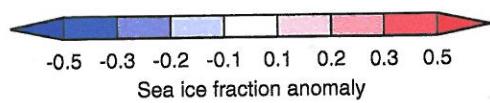
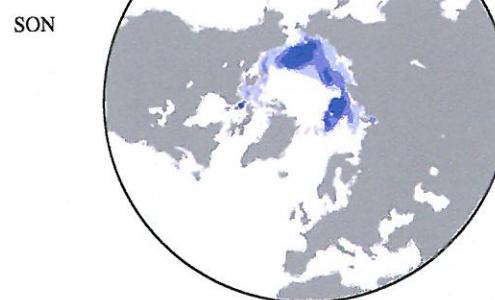
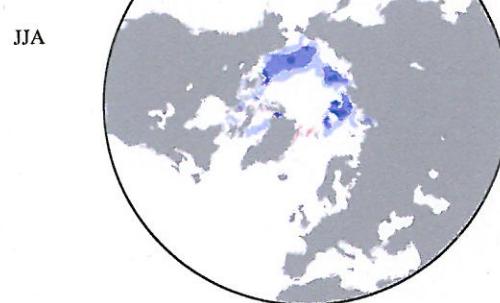
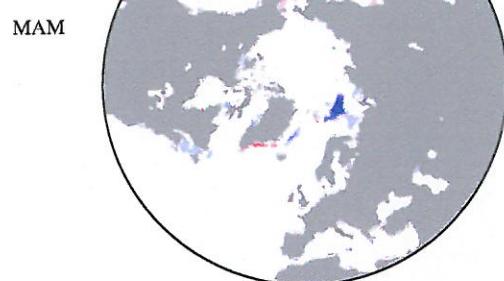
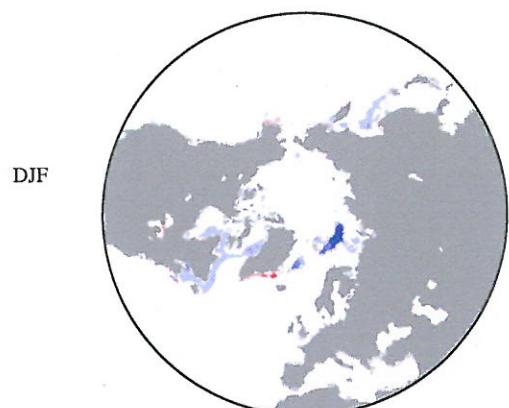
JJA



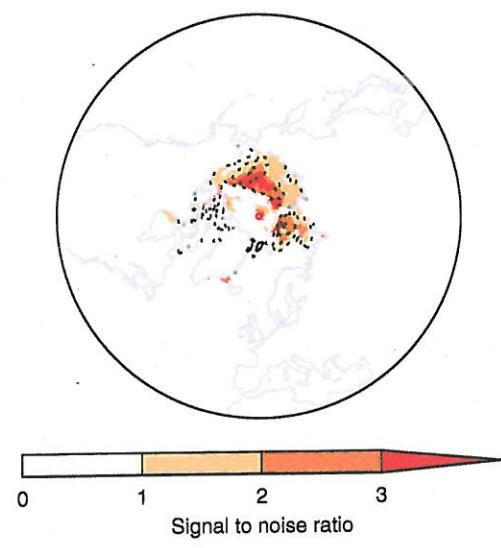
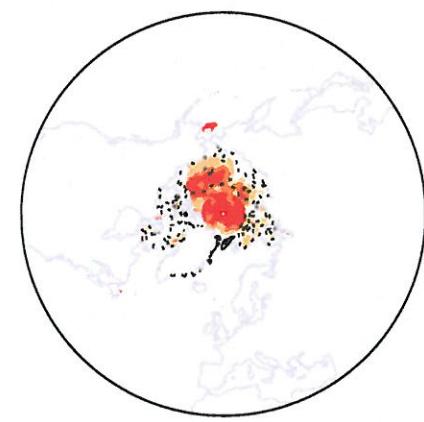
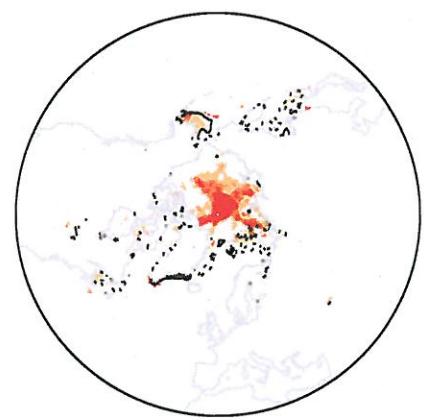
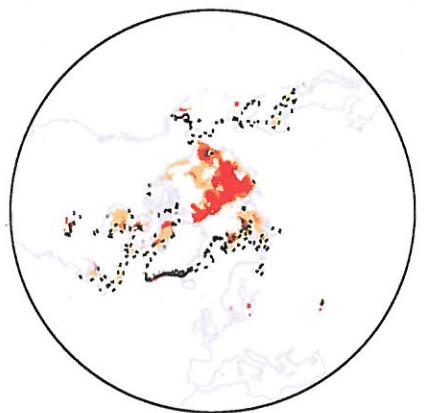
SON



Anomalies relative to 1986-2005 average
2007-2011 mean sea ice anomaly

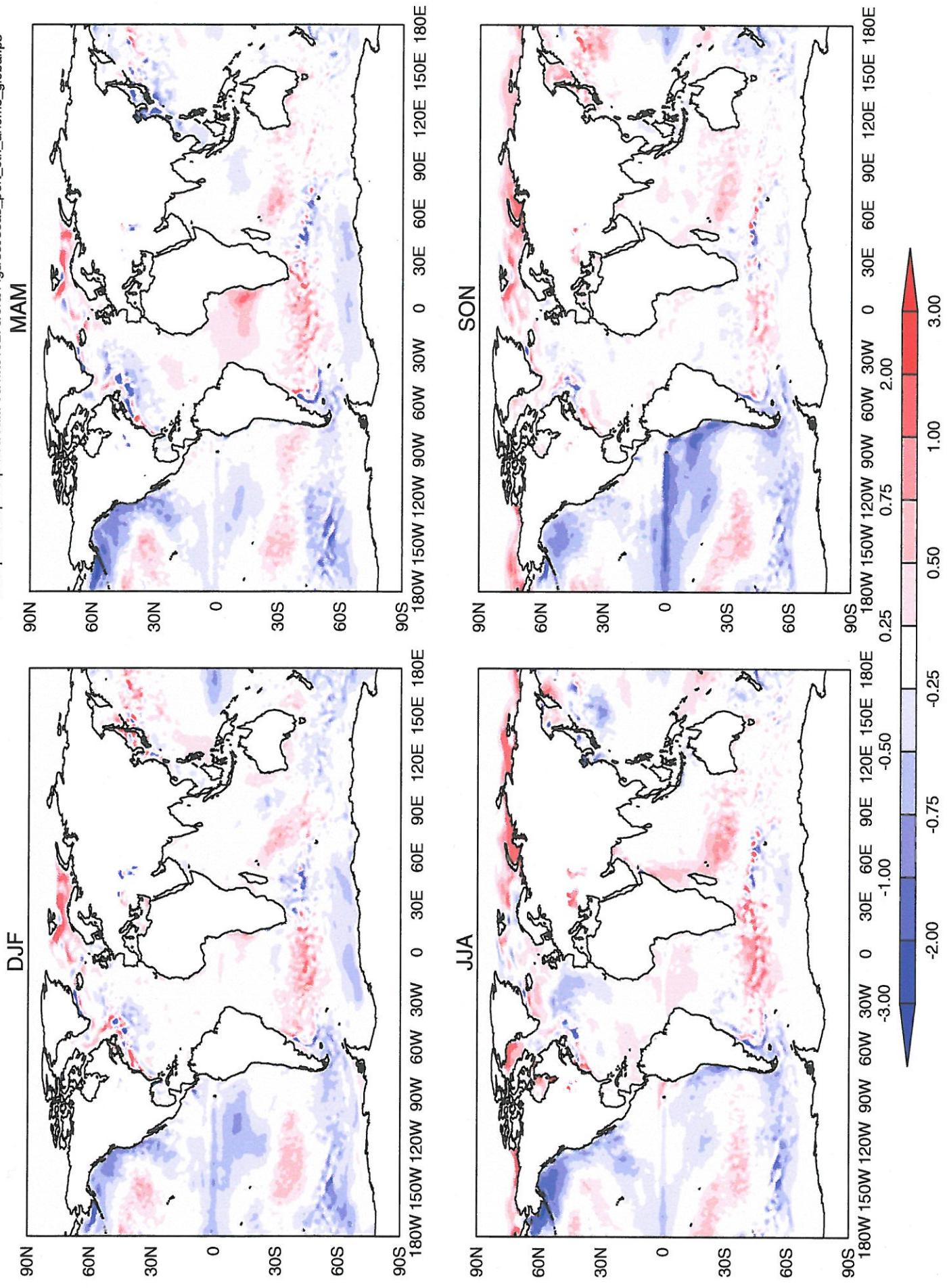


Tue May 8 16:49:26 2012
2007-2011 seaice mean anomaly



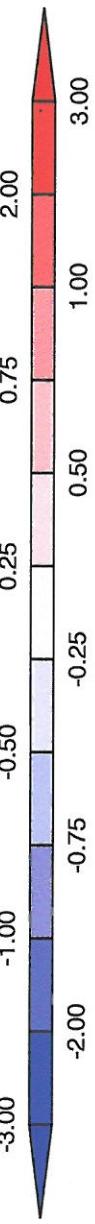
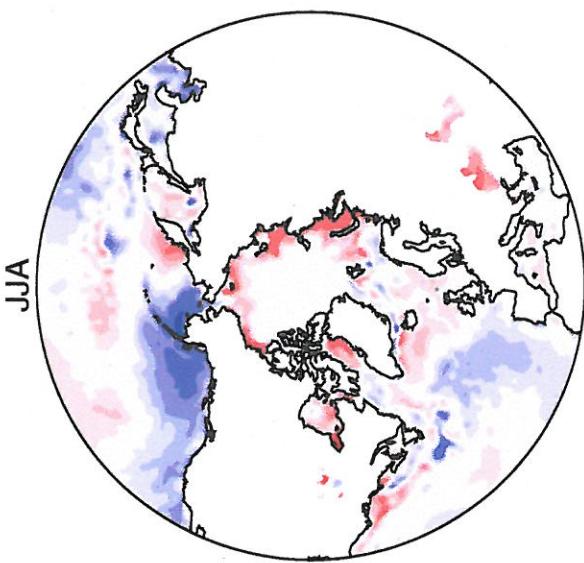
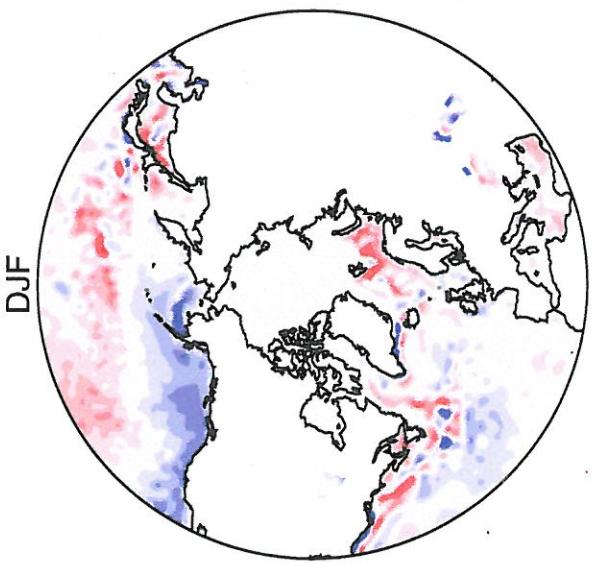
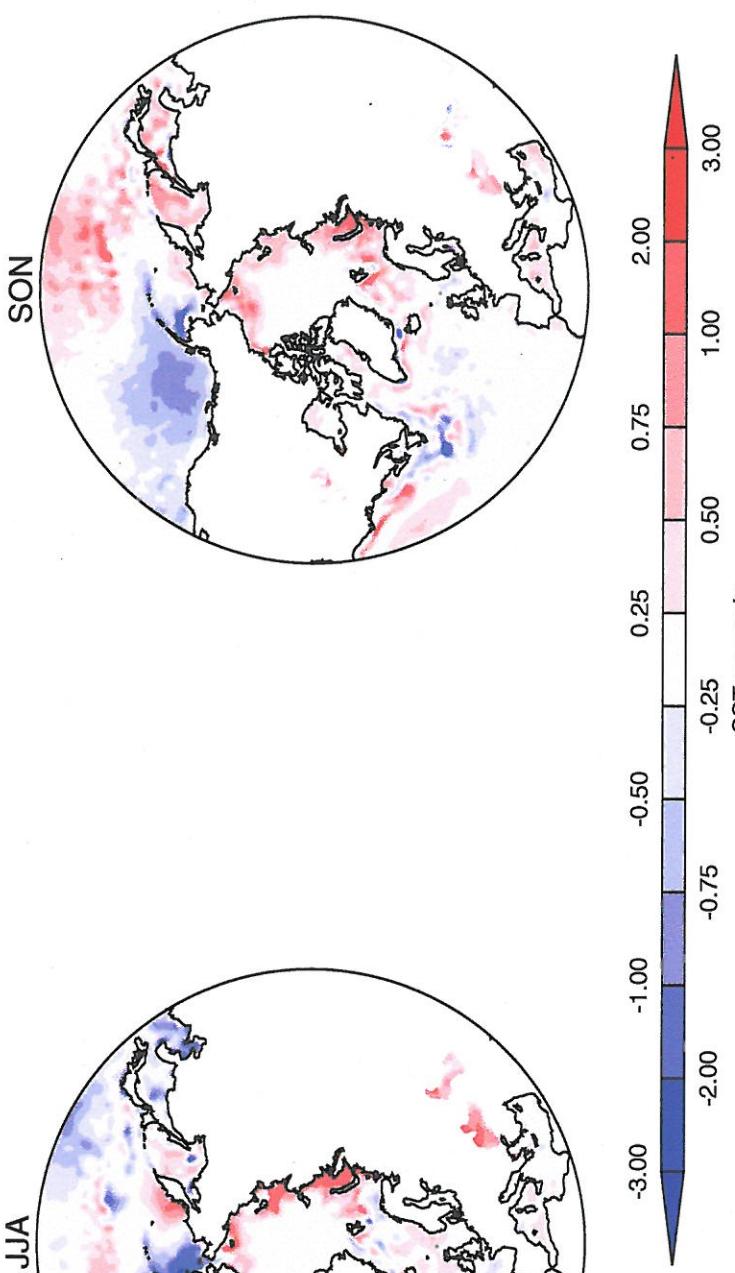
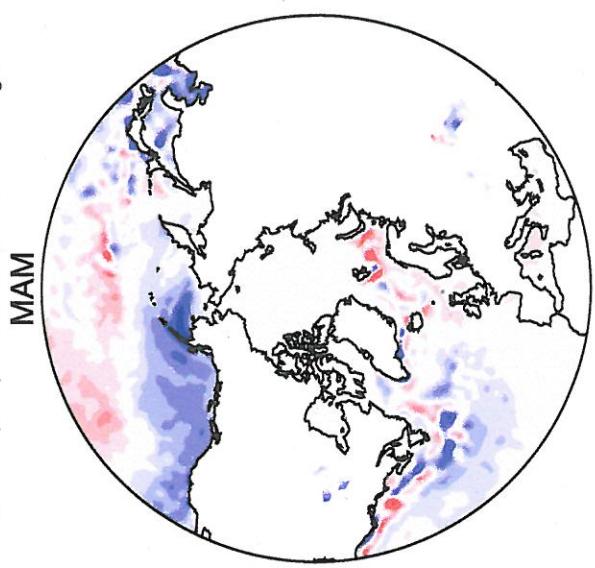
ERA-Interim SST anomalies: PEF ('1996-2005) - CTRL(2007-2011).

Mon Nov 12 16:38:45 2012
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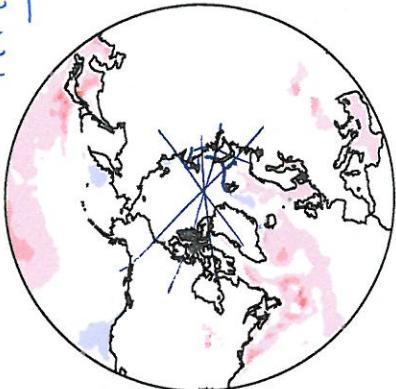
ERA-Interim SST anomalies: PEF (1996-2005) - CTRL(2007-2011)

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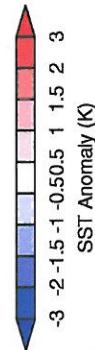
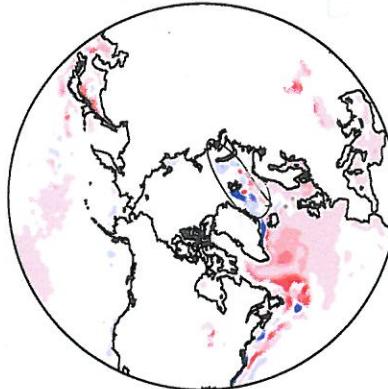


Reference period

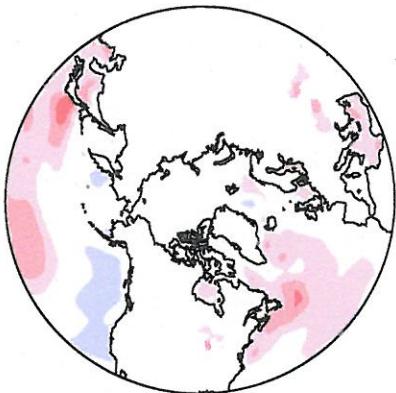
2002



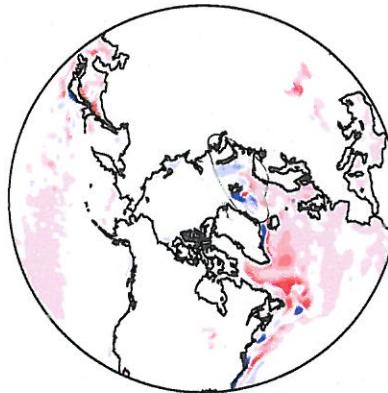
2007



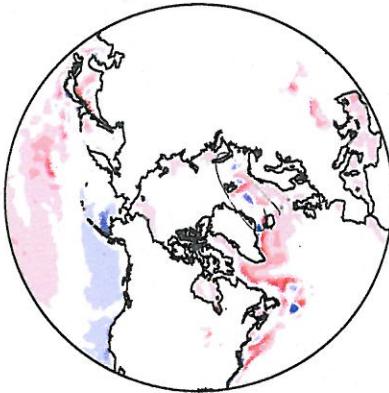
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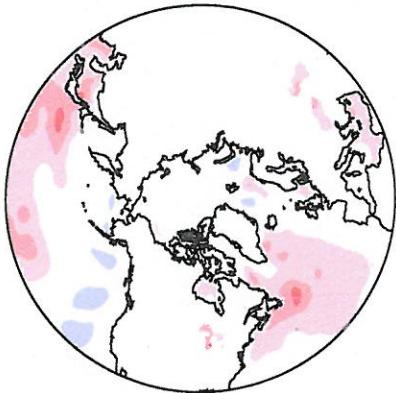
2006



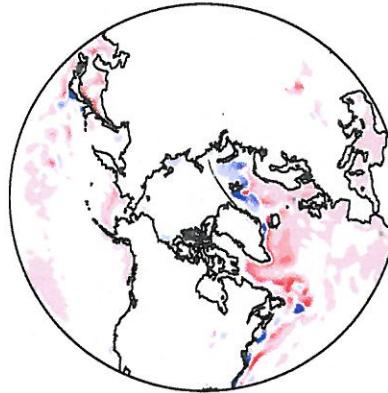
2011



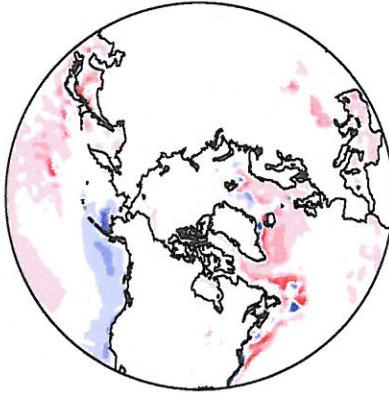
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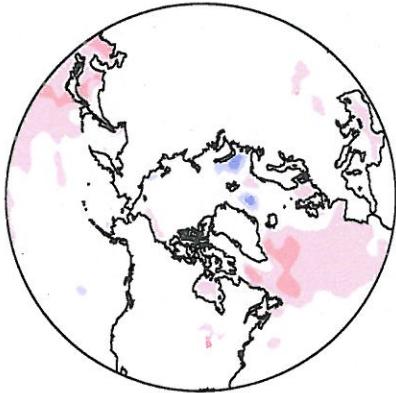
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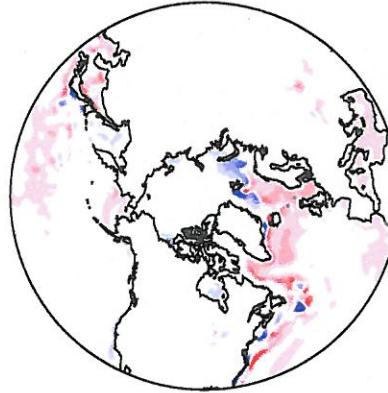
2010



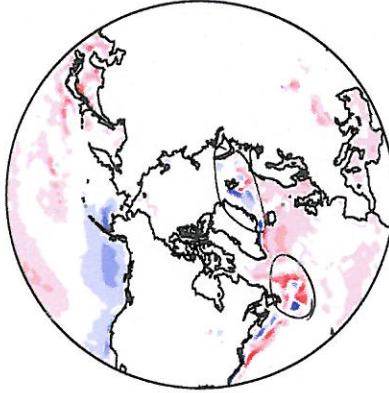
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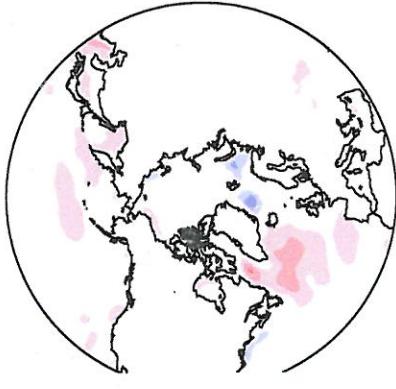
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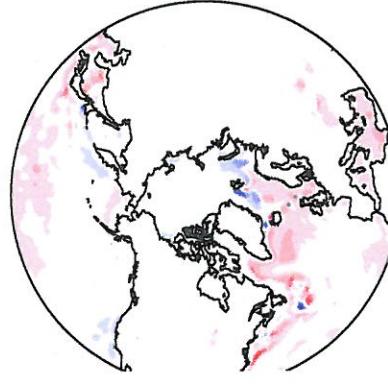
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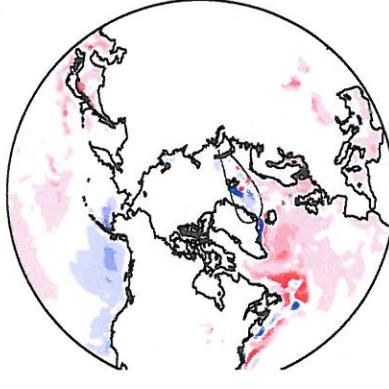
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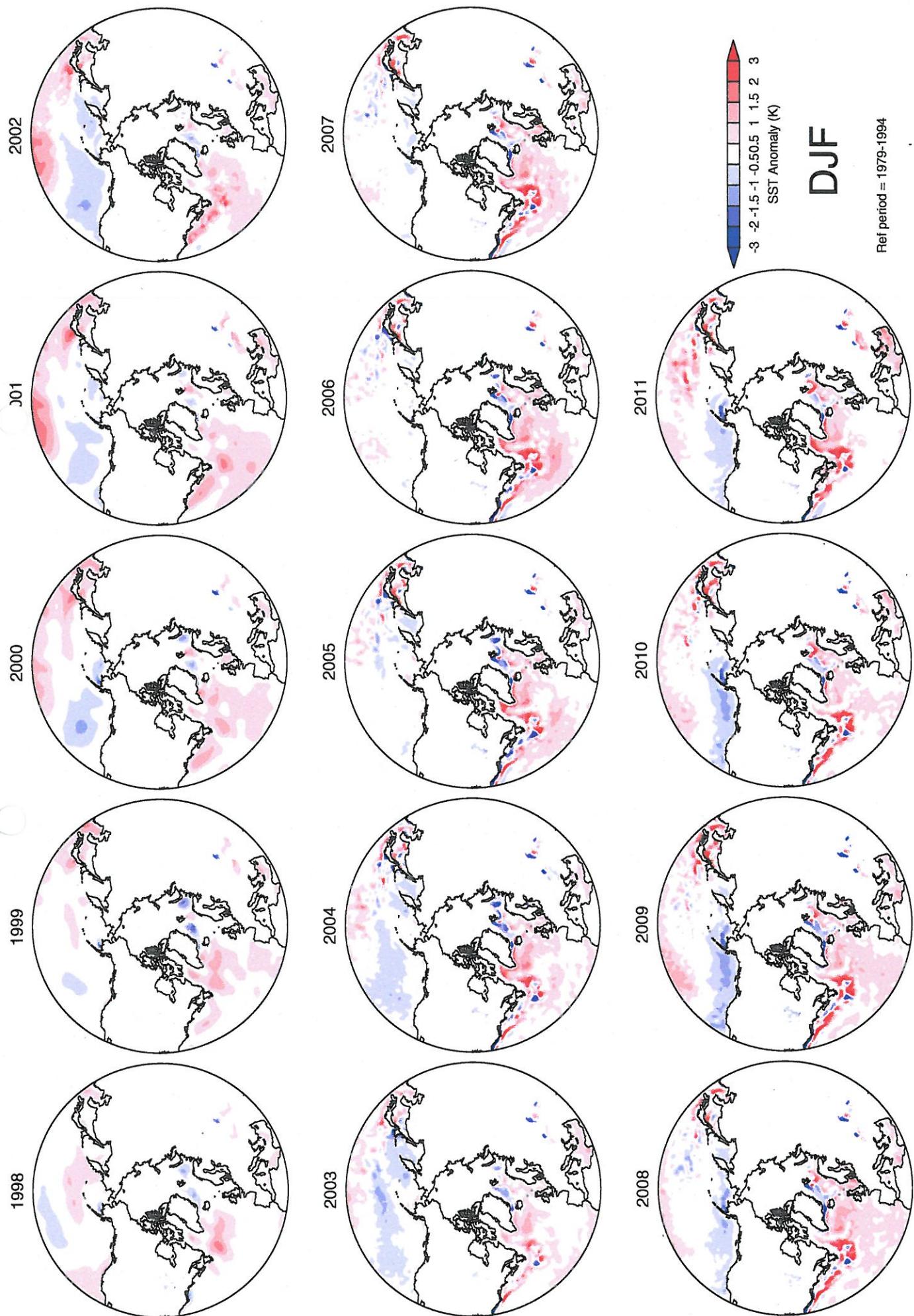


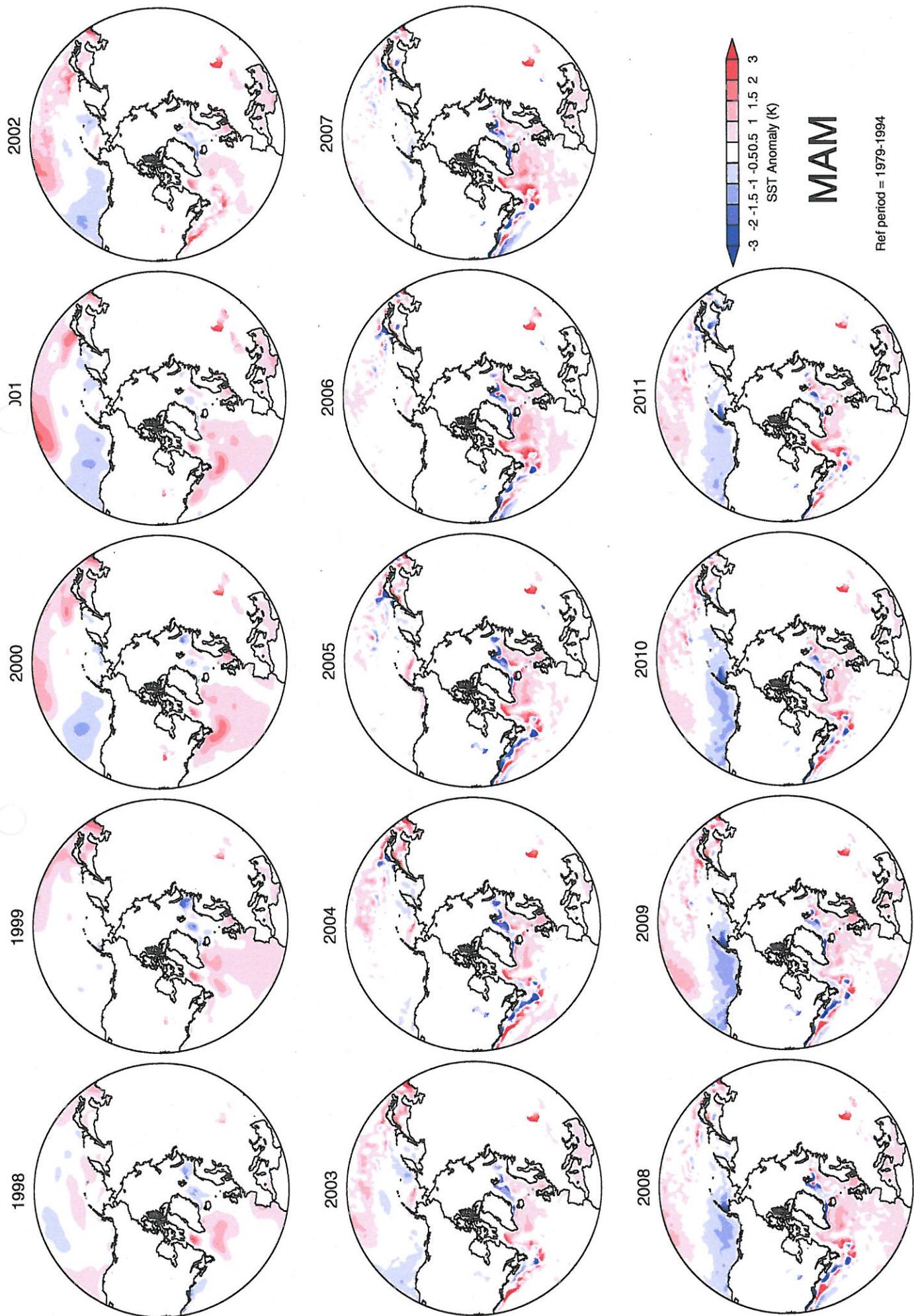
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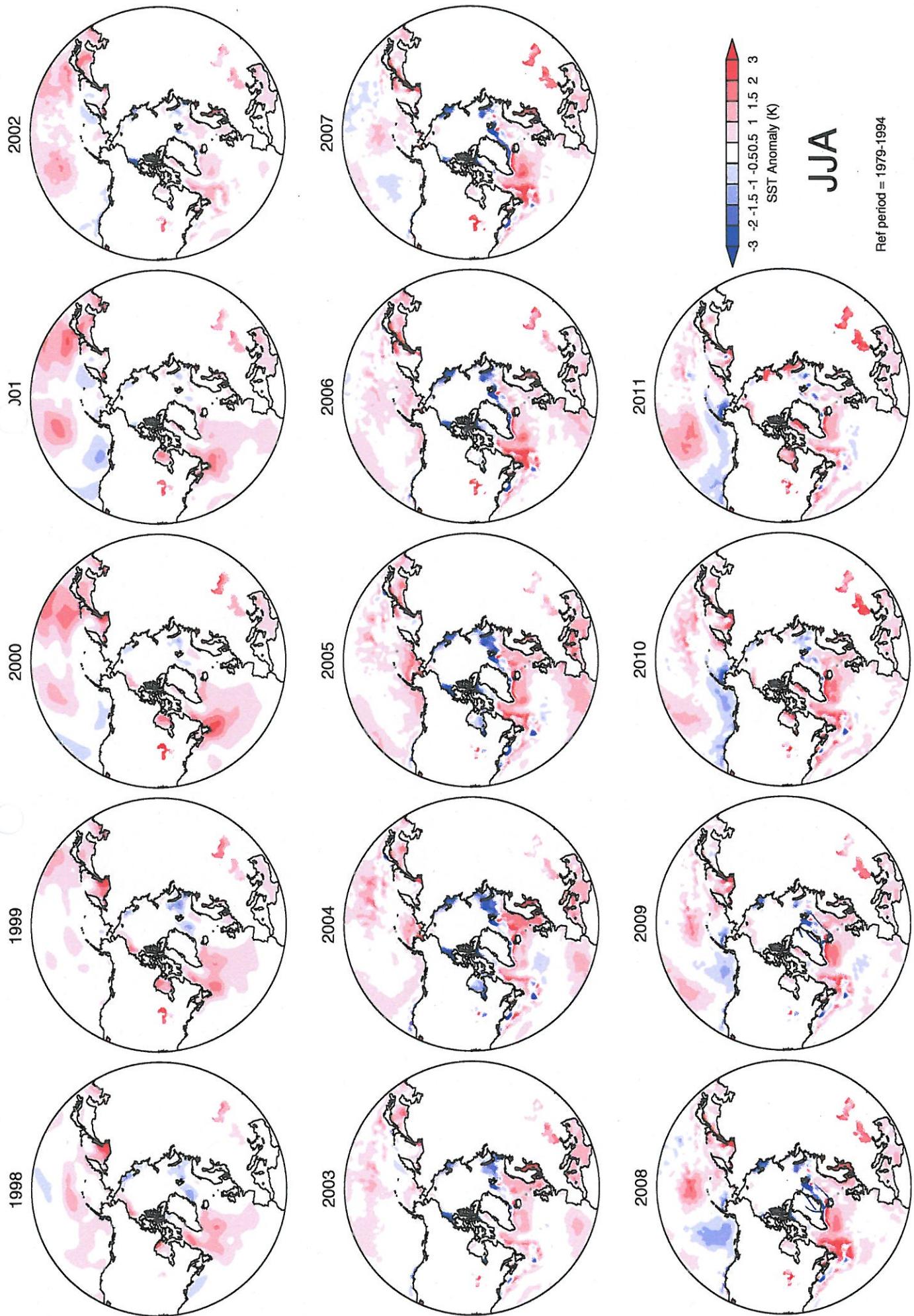


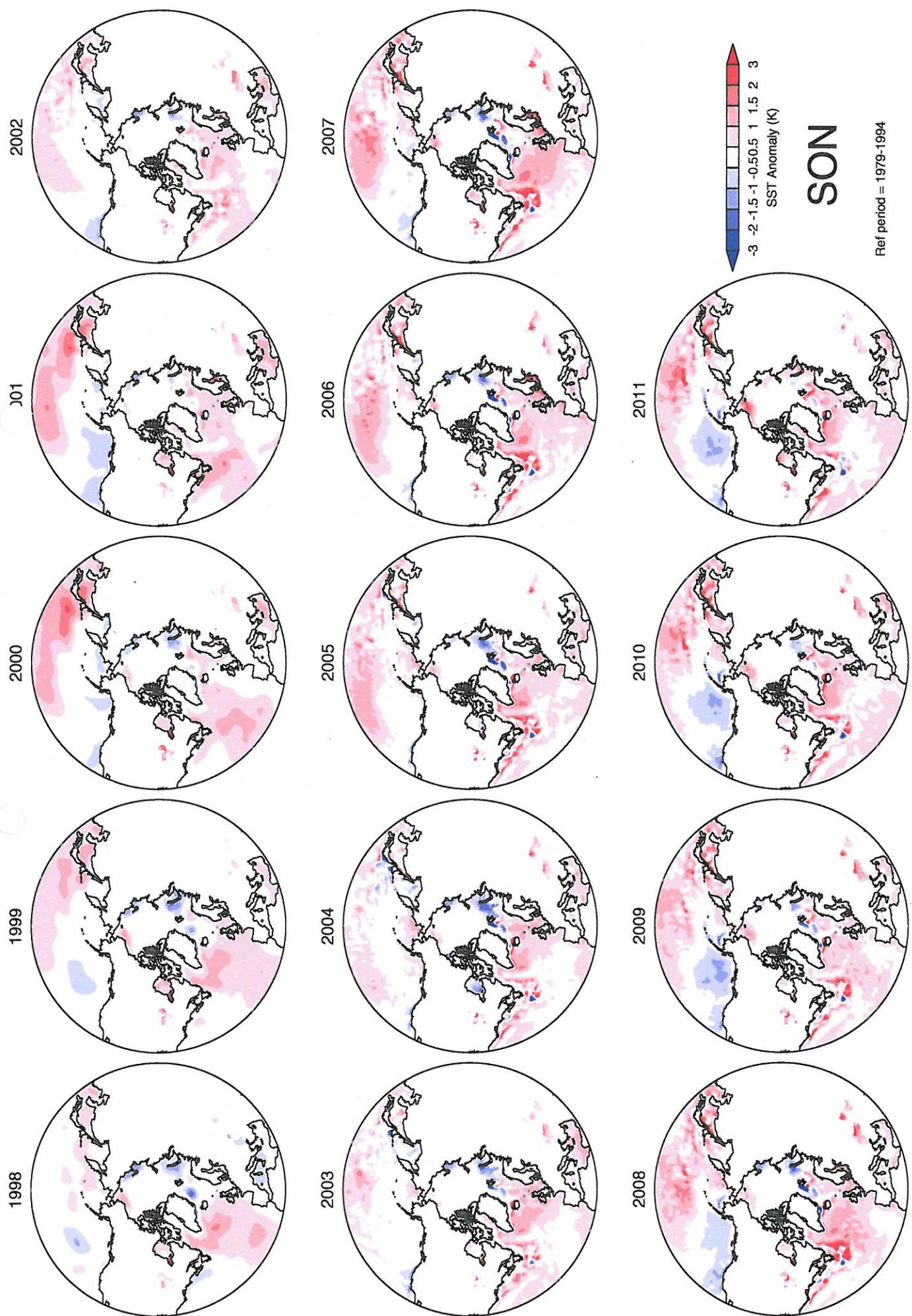
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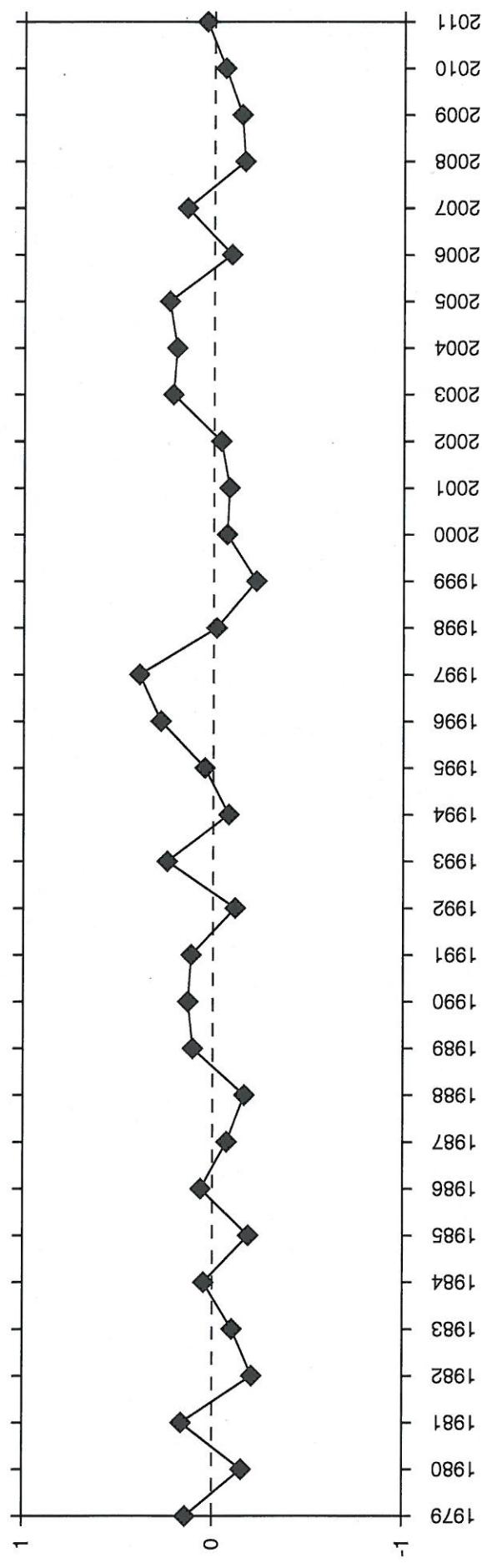






Anomalies from reference period 1979-1994

Time series of SST from ERA-I

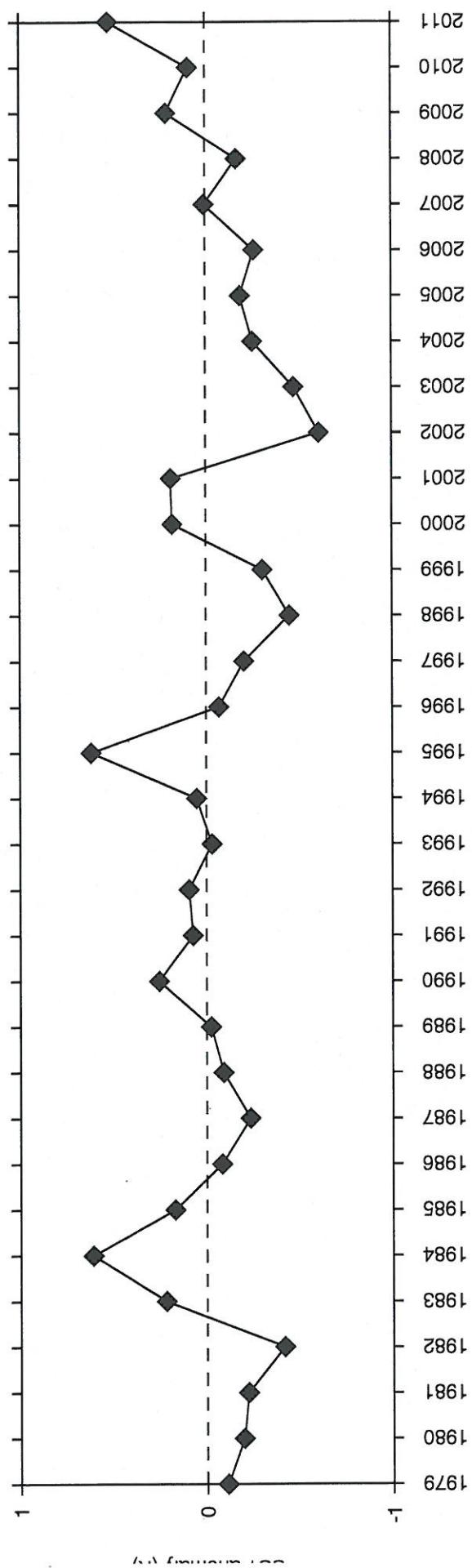


Region of interest



Anomalies from reference period 1979-1994

Time series of SST from ERA-I

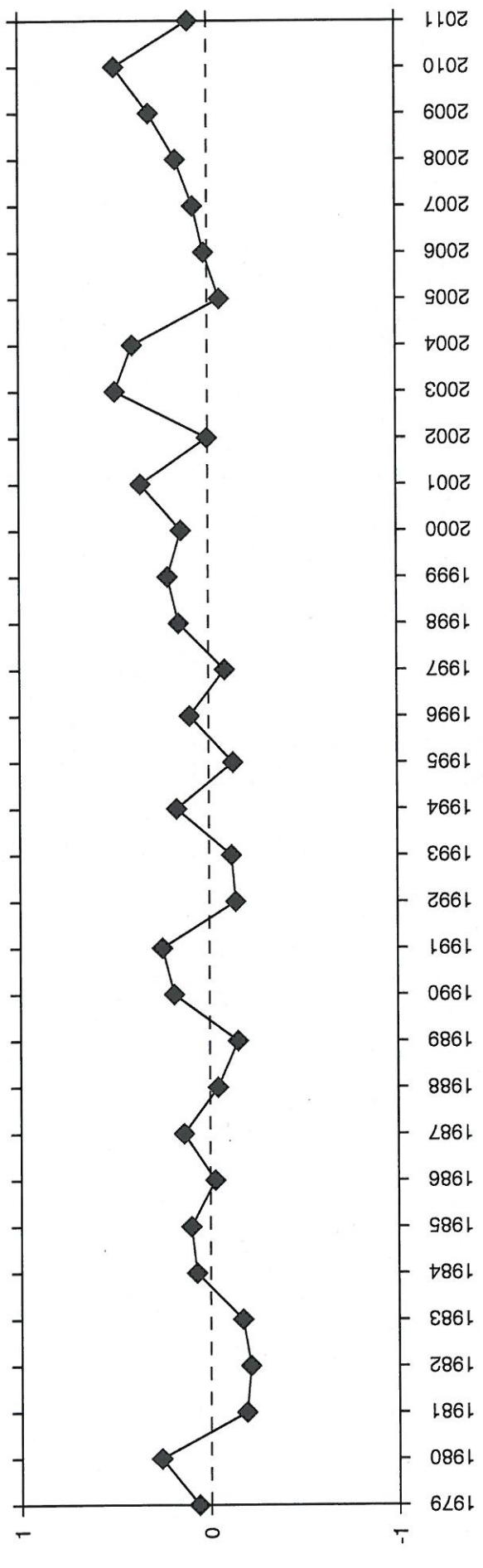


Region of interest

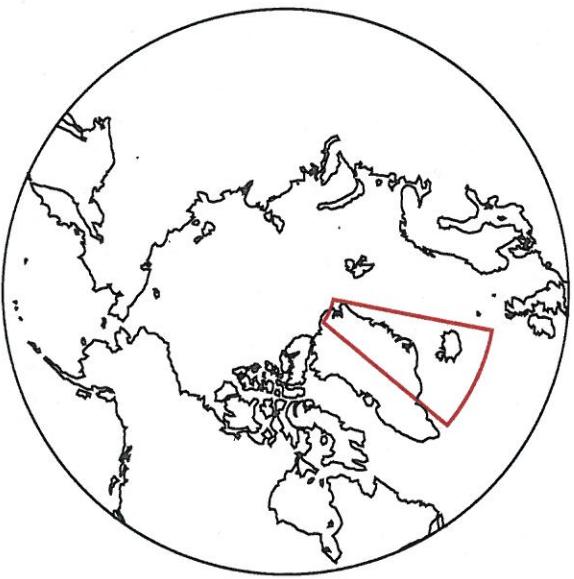


Anomalies from reference period 1979-1994

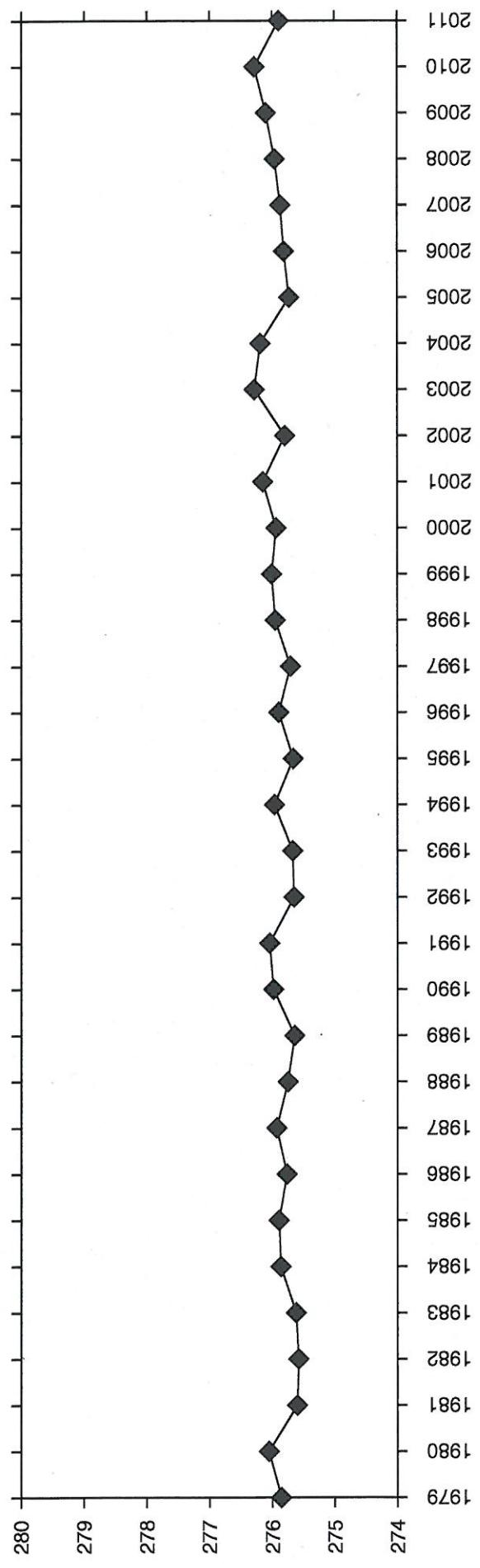
Time series of SST from ERA-I



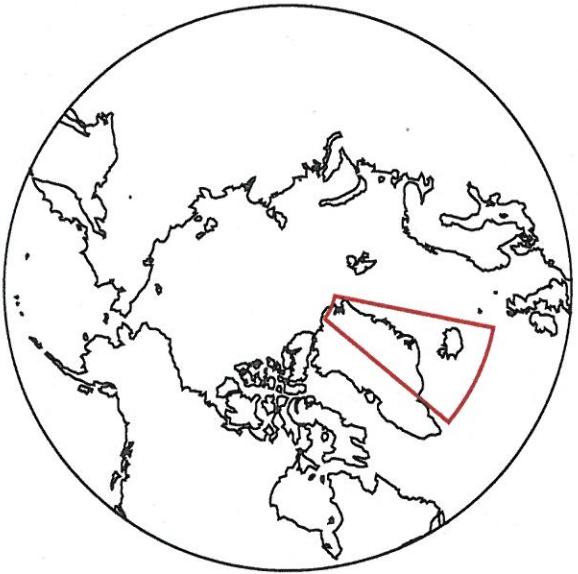
Region of interest



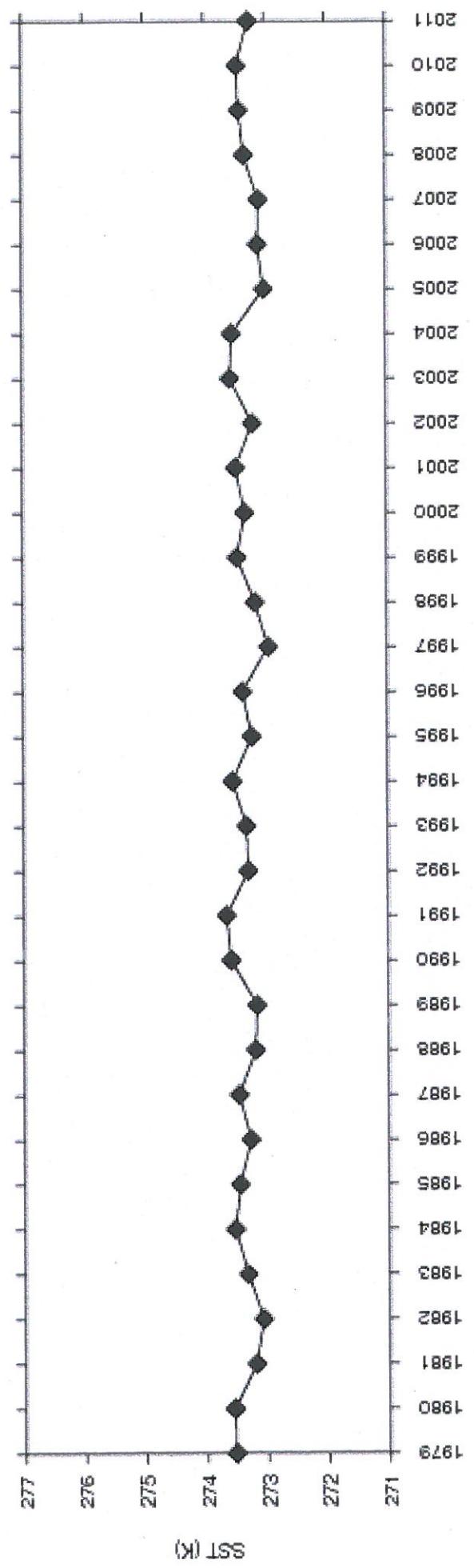
Time series of SST from ERA-I



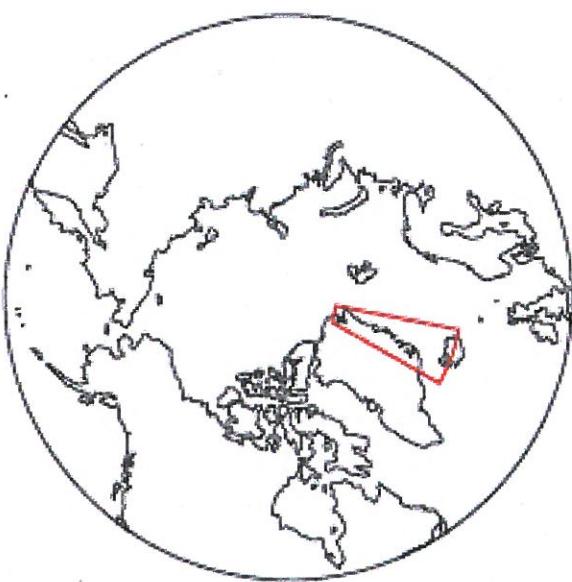
Region of interest

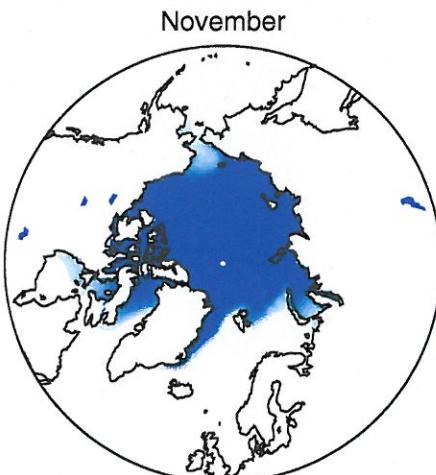
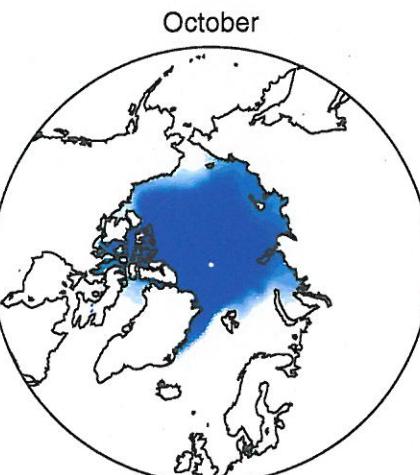
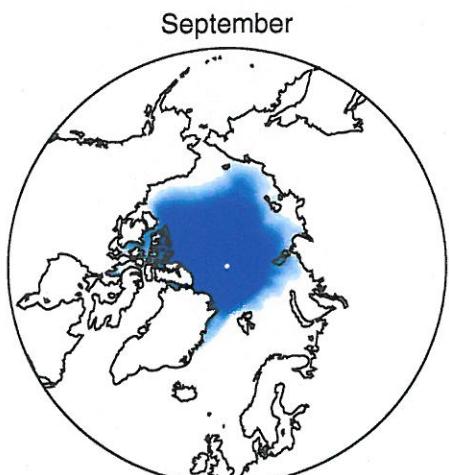
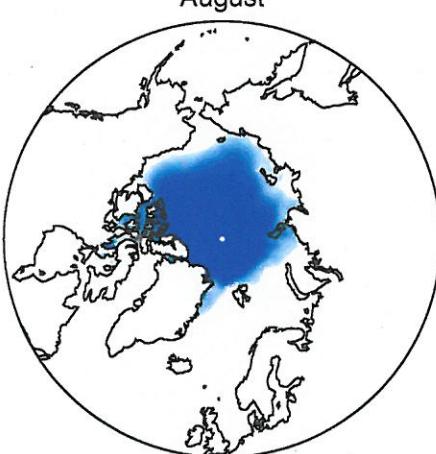
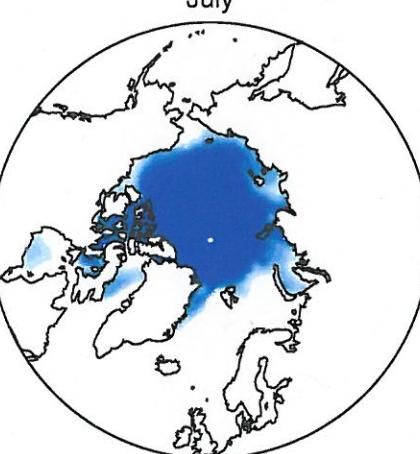
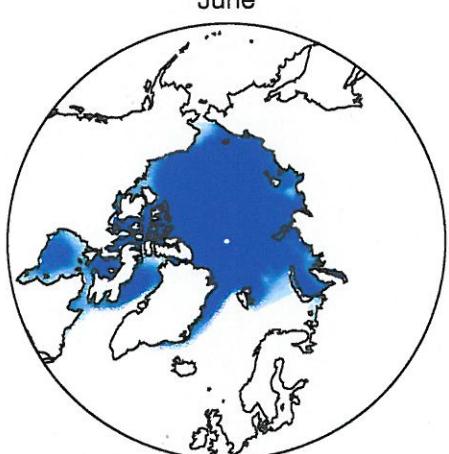
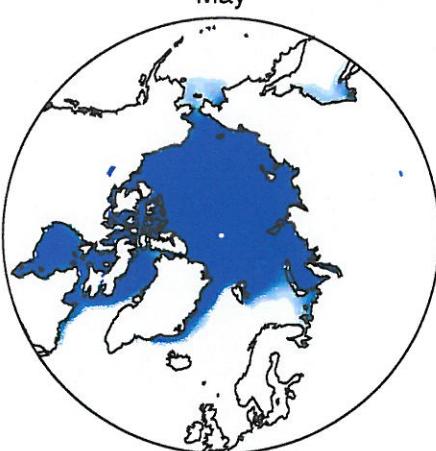
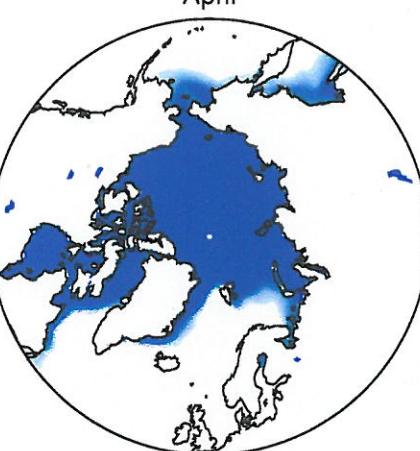
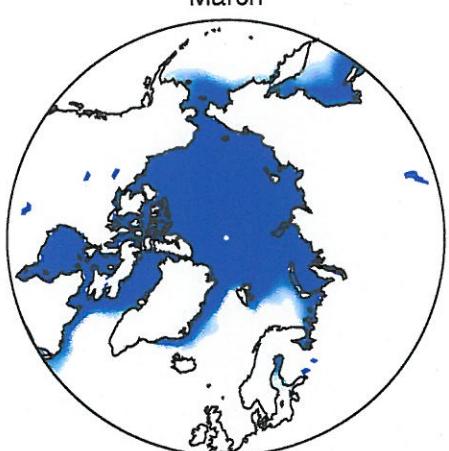
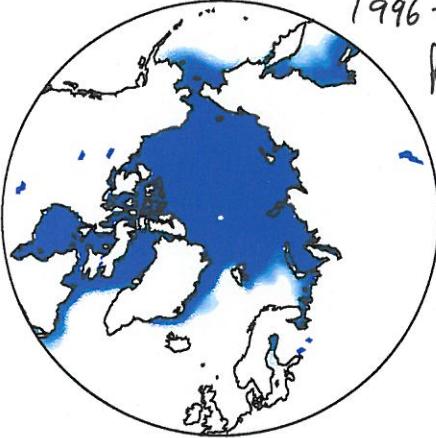
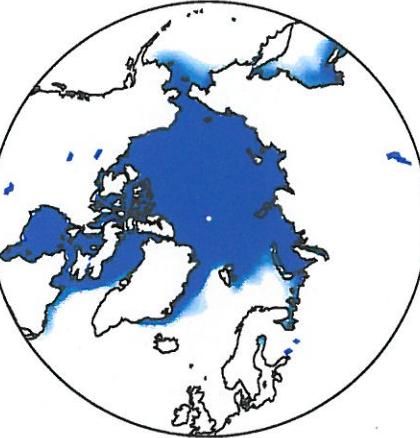
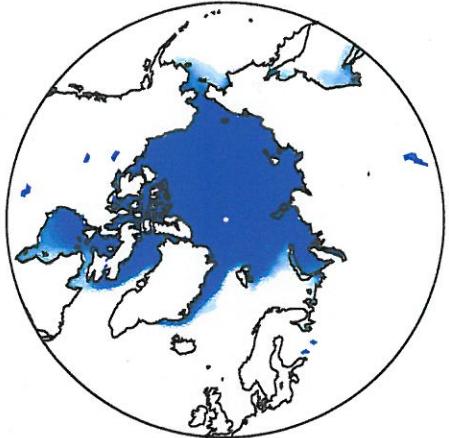


Time series of SST from ERA-I



Region of interest





INVESTIGATING THE IMPACTS OF REDUCTIONS IN ARCTIC SEA-ICE ON THE ATMOSPHERIC CIRCULATION

EXPERIMENTAL DESIGN

MAY 2012

Questions

A non-exhaustive list of potential questions:

1. What are the atmospheric responses/adjustments to sea ice loss?
- including stratospheric?
2. There has been sea-ice loss in each season with the most pronounced losses in JJA and SON. Despite the Summer/Autumn losses being the largest there may be an important increase in heat flux ^{over ocean} in winter. What is the size of the winter heat flux and what is the impact of this? *Strongest warming occurs in winter.*
3. The lagged response: in which season is the response felt? Studies have focused on the winter response to the previous summer/autumn depletion however there may be responses which are felt in summer?
2 is this true.
4. What are the physical process which drive the responses?
- long - instantaneous - concentrated evidence for delayed response
5. What are the potential impacts on European climates of a seasonally ice free Arctic, e.g. droughts, snowfall, ... ?
6. *What is the relative importance of sea-ice loss and changes in the SST in the atmospheric responses?*
7. *What is the sensitivity to location and magnitude of loss of sea ice, e.g. Barents-Kara Seas vs Siberian (Laptev, East Siberian Seas) vs Beaufort Sea.*
8. *Since the dramatic loss of sea-ice in 2007 the spatial distribution of sea-ice loss appears to be consistent from one year to the next, is there some form of memory in the system which is influencing the distribution of the depletion?*

interesting local and remote response & coupled response

Experimental design

Control run: For the reference period generate a seasonal cycle of sea-ice. Using this seasonal cycle of sea-ice integrate HadGEM3 over a given period using the HadISST SSTs.

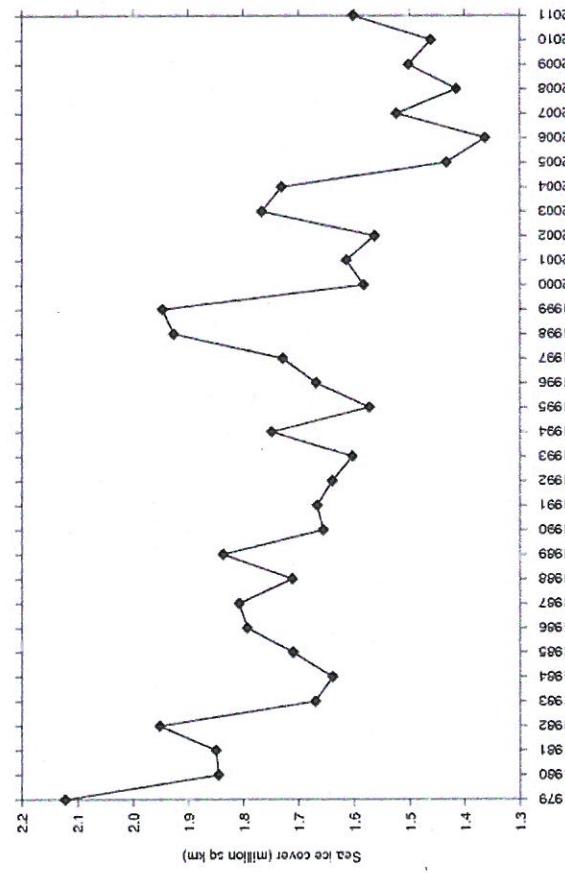
Light ice cover experiment: Choose a light ice period (2007-2011 ?) generate a seasonal cycle of sea-ice distributions. Integrate HadGEM3 over the same integration period using the same prescribed SSTs.

Projected loss experiment: Prescribe a seasonal cycle of sea-ice distribution from a projected sea-ice loss scenario which has a seasonally ice-free Arctic. Again integrate HadGEM3 using the same prescribed SSTs.

If the seasonal cycle removes sea ice where it would otherwise have been present set the SST to -1.8°C .

Sea ice cover

DJF average sea ice cover in Greenland and Barents sea area

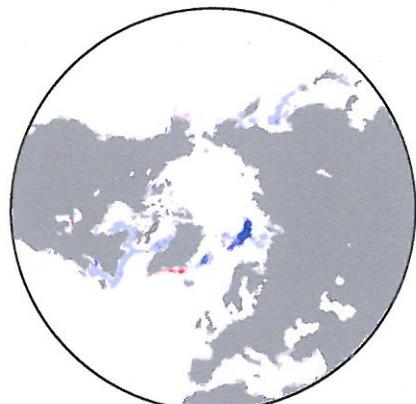


*Fig. 1
Dual transport from Plan 9r.*

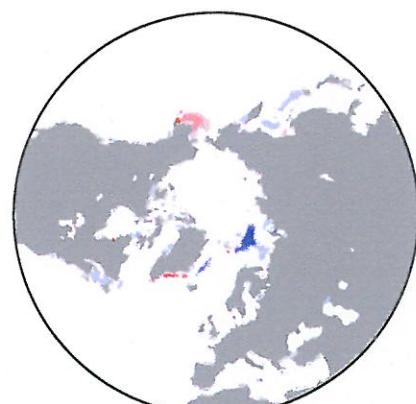
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Anomalies relative to 1986-2005 average
2007-2011 mean sea ice anomaly

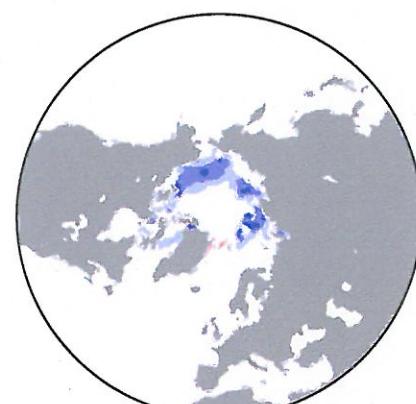
DJF



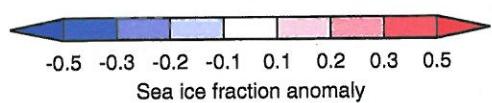
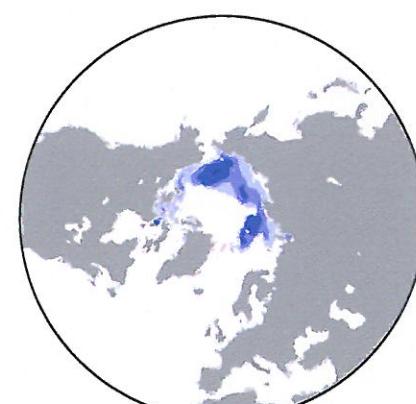
MAM



JJA



SON



Wed May 9 12:44:57 2012
2007-2011 mean SST anomaly (K)

