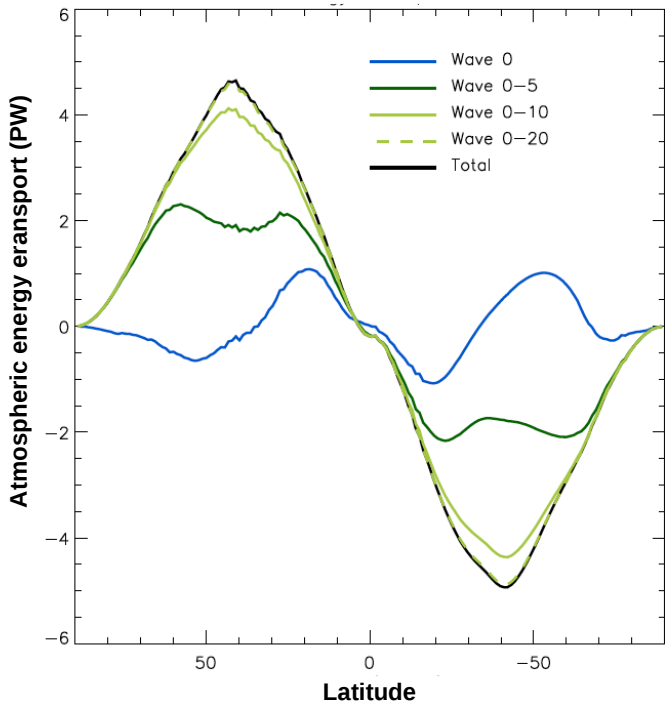
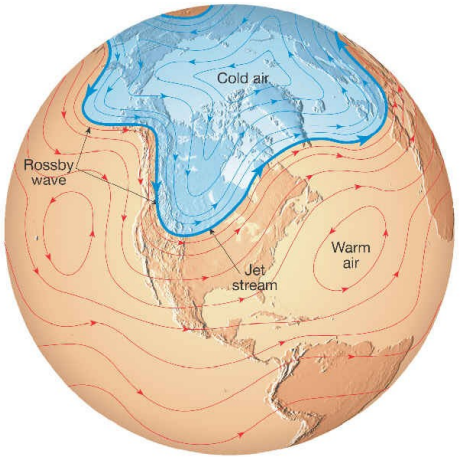
Impact of Rossby waves on Northern-Hemisphere continental climate

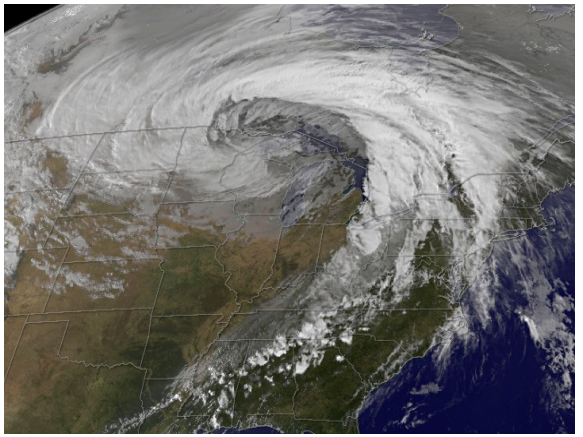
The split of the transport into waves is based on a Fourier decomposition



Garversen and Burtu, Q.J.R.Meteo.Soc., 2016

The atmospheric energy transport is decomposed into parts associated with Rossby waves, cyclones and a zonal-mean circulation.
Divergences of the energy transport impact weather and climate.





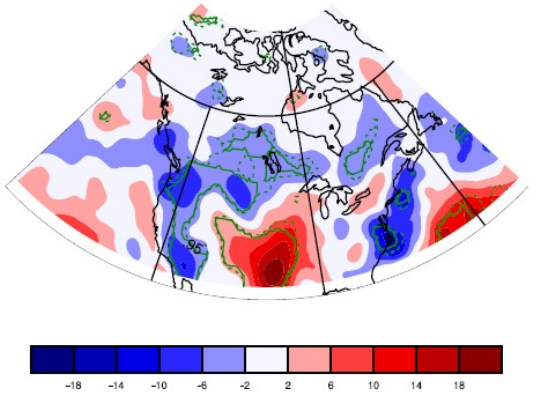
Here follow two examples of Rossby-wave impact ..... ->

Rune Grand Graversen, Department of Physics and Technology, University of Tromsø, Norway

Drought in mid-west US

Drought in the mid-west US is appearent from a change in latent energy-transport divergences.

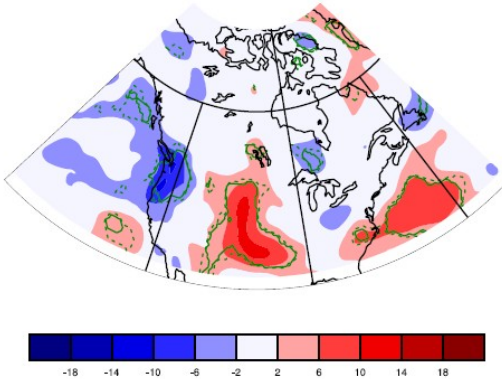
Latent energy transport divergence



Wm-2

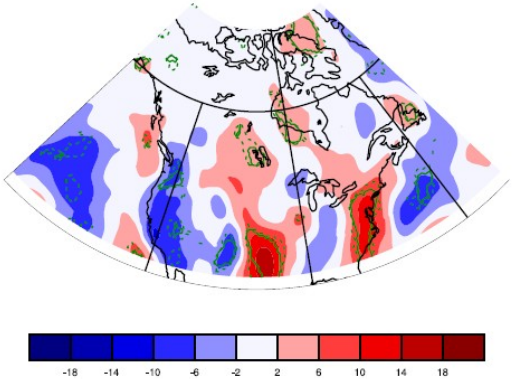
Difference in divergence of latent energy transport between two 15-year periods: 2004-2018 and 1979-1993.

Wave 1



Wm-2

Zonal-mean



Wm-2

The drought appears associated with a shift in Rossby wave 1 and the zonal-mean circulation

Dashed and dotted green lines indicate changes significant on a 95 and 99 % level, respectively

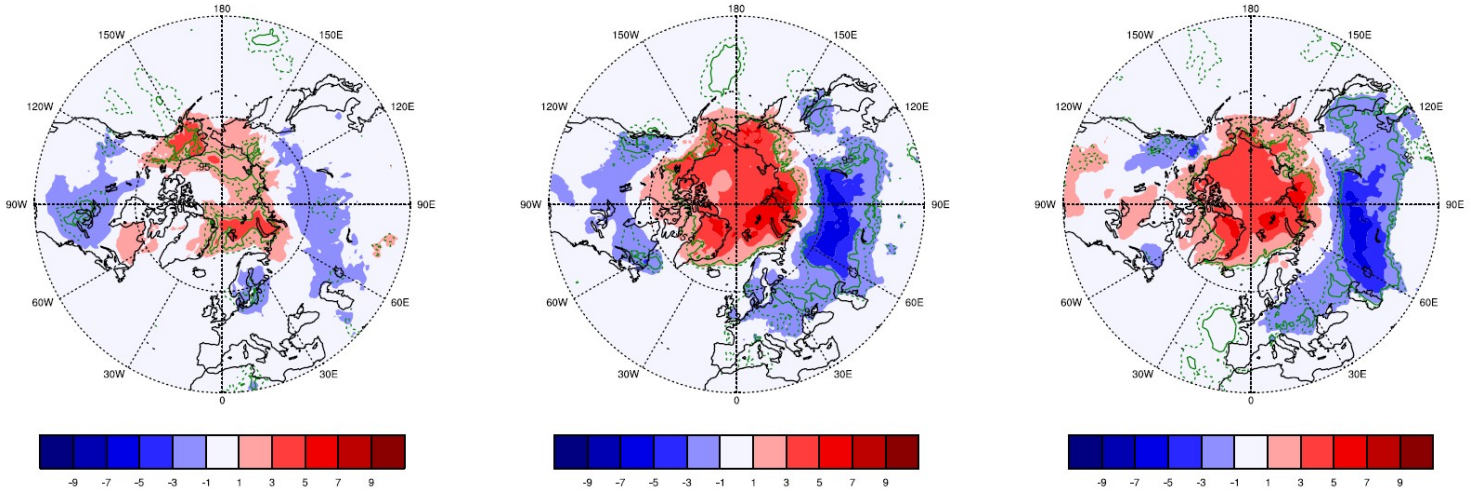
Arctic warming anomalies

Winter (DJF) Arctic warming events

(Composite of events, temperature north of 70 N larger then 1 std, length of events > 4 days)

Lag day -5 | **Lag day 0** | **Lag day 2**

2-metre temperature anomalies

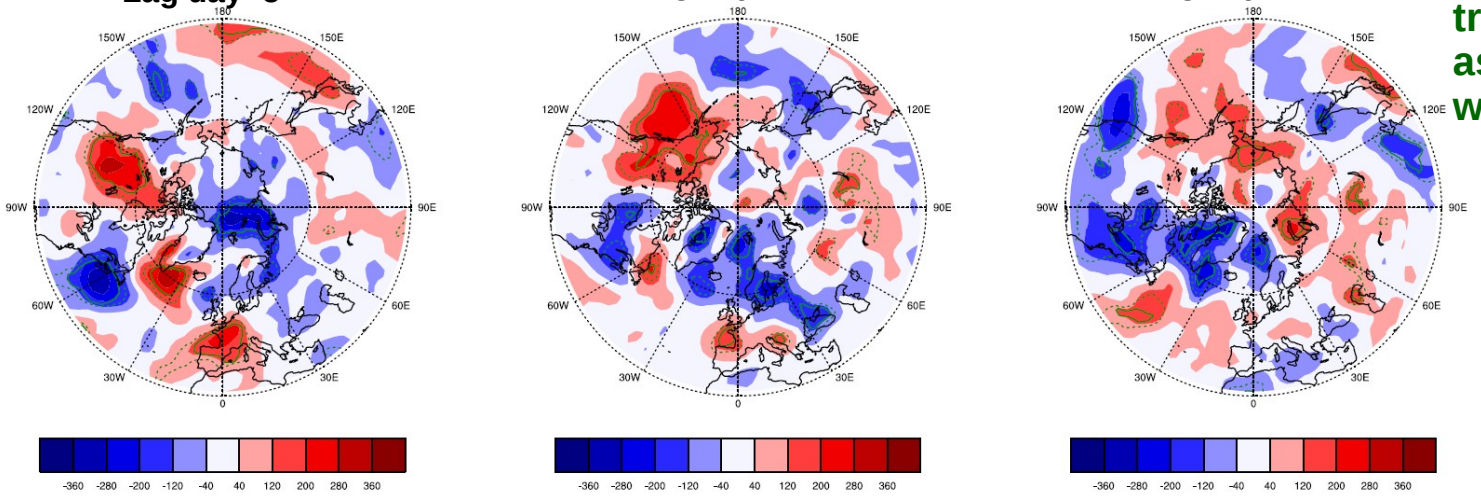


K

Arctic winter warming events are associated with colling at mid-latitude continents, especially in Asia.

Lag day -5 | **Lag day 0** | **Lag day 2**

Divergence of energy transport anomalies associated with Rossby waves



Wm-2

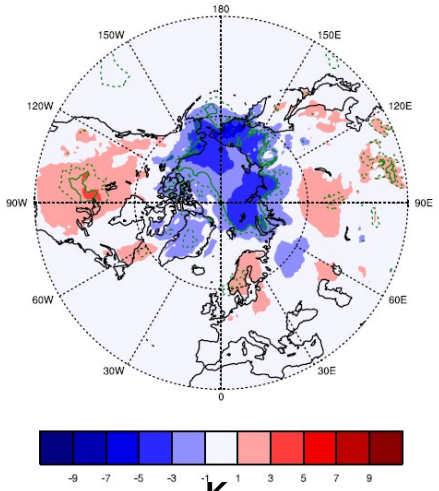
The Arctic warming events are proceeding convergence of Rossby-wave energy transport over the Arctic, and divergence at west part of continents (-5 day lag).

=> Change of Rossby waves leads to Arctic warming and continental cooling

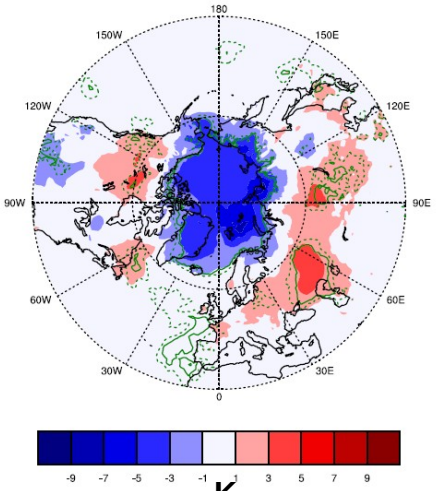
Arctic cooling anomalies

... generally opposite patterns as for warming events

Lag day -5



Lag day 0



Lag day 2