Climate Dynamics

Bjerknes compensation mechanism as a possible trigger of the low-frequency variability of Arctic amplification

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Supplementary Figures

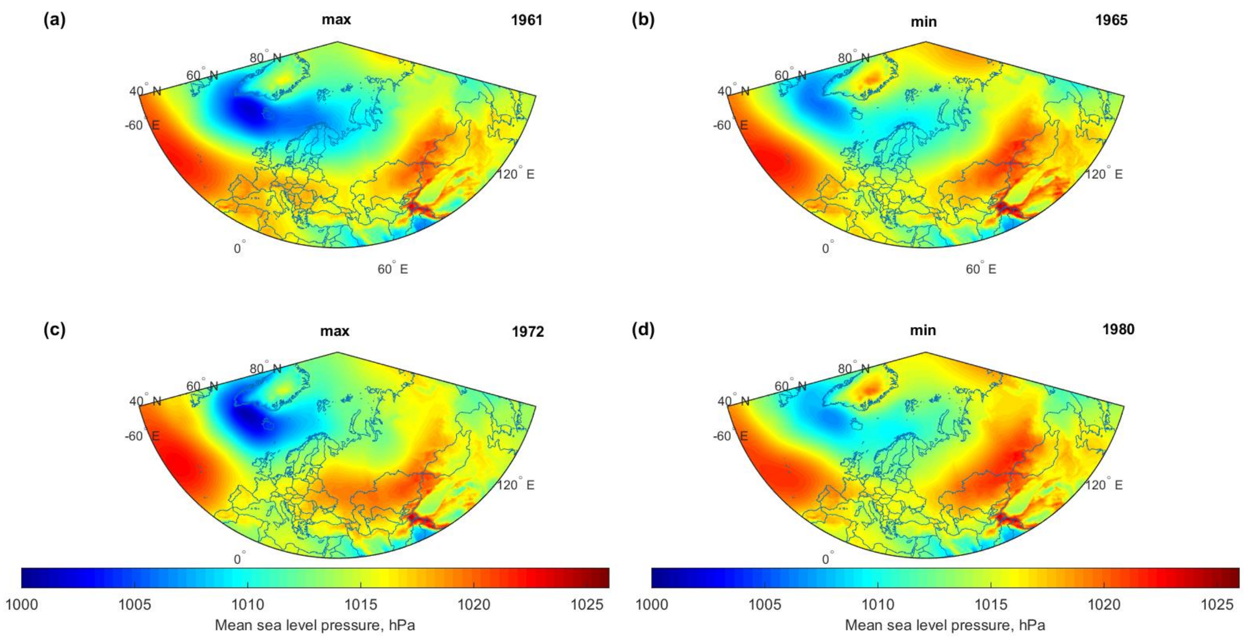

Fig. S1 Composite maps of mean sea level pressure. The maxima in the oceanic heat transport are on the left ((**a**) 1961 and (**c**) 1972), and the minima in the oceanic heat transport are on the right ((**b**) 1965 and (**d**) 1980)

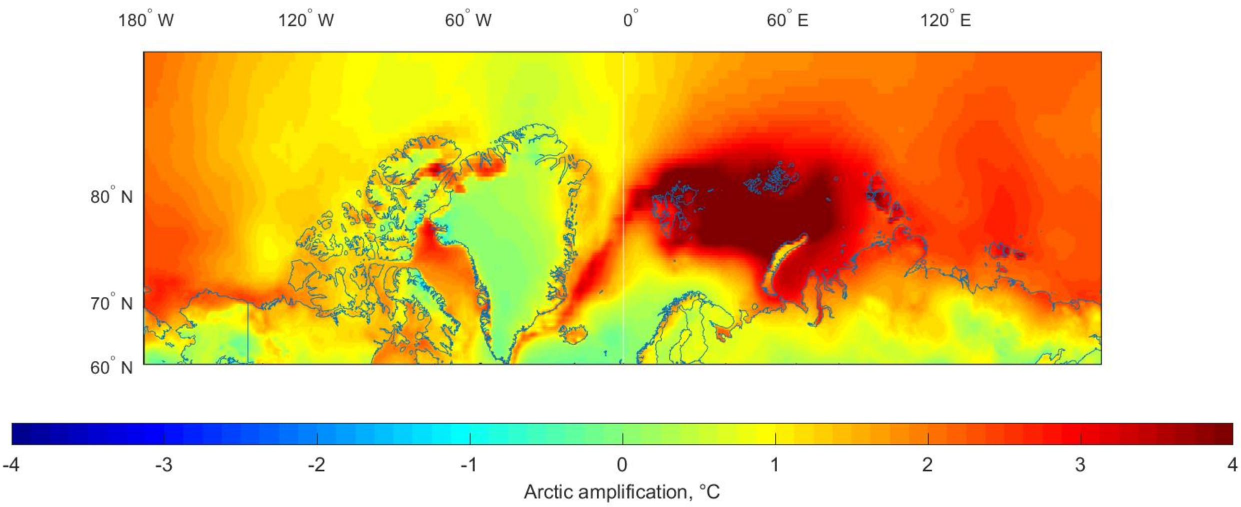

Fig. S2 Mean annual Arctic amplification calculated at every grid point according to the ERA5 reanalysis. The present period is shown with averaging for 2006–2017. Mercator map projection is used

According to Fig. S2, the current Arctic amplification occurs mainly north of 70°N. Fig. S2 also shows important regional features of the intensity of the Arctic amplification. The rate of SAT increase is much higher in the Eastern Hemisphere than in the Western Hemisphere. The maximum intensity of the Arctic amplification is observed in the northern part of the Barents and Kara Seas and in the adjacent areas of the Arctic Ocean, between Spitsbergen and Severnaya Zemlya in the latitudinal range 75°N–82°N (Fig. S2).

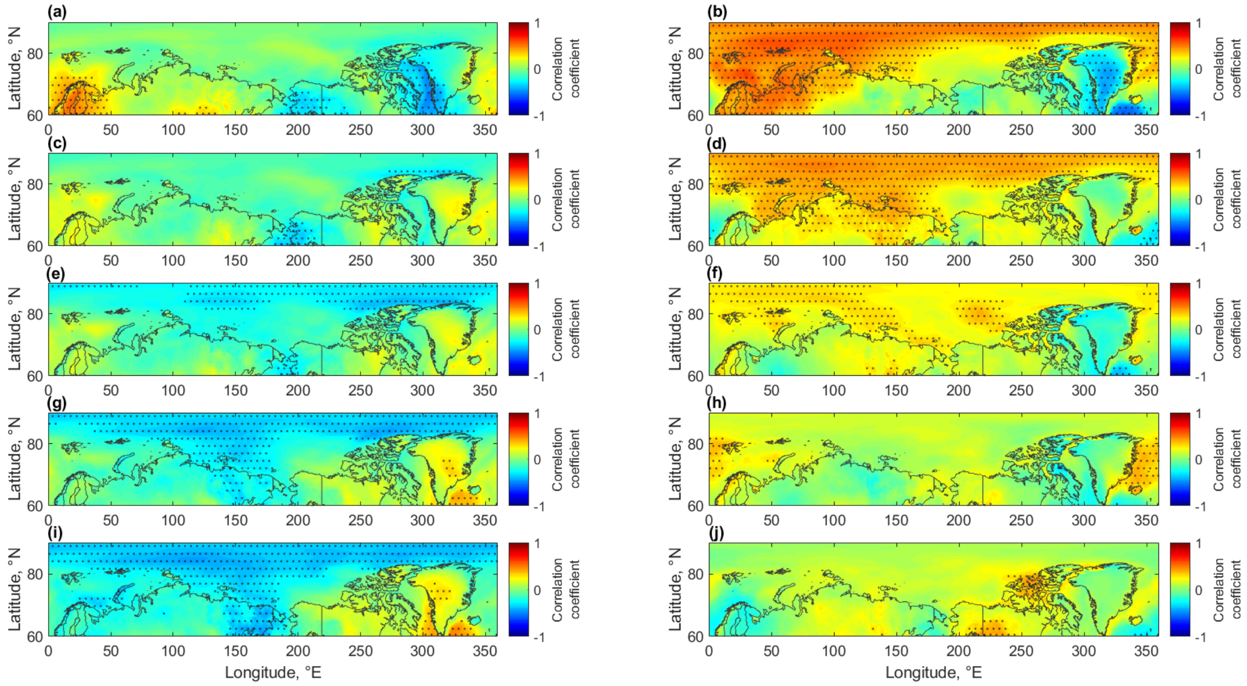

Fig. S3 Correlation coefficients between the Atlantic *oceanic* heat transport at the entrance to the Arctic (across 66.5ºN and -4.5ºE–13.5ºE) and the Arctic amplification at every grid point (*on the left*) and between the *atmospheric* heat transport at the entrance to the Arctic (across 66.5ºN and -5ºE–80ºE) and the Arctic amplification at every grid point (*on the right*) according to the ORAS4 and ERA5 reanalyses data. (**a**) and (**b**) are correlations with zero lag, (**c**) and (**d**) are correlations when the Arctic amplification lags by one year, (**e**) and (**f**) are correlations when the Arctic amplification lags by two years, (**g**) and (**h**) are correlations when the Arctic amplification lags by three years, and (**i**) and (**j**) are correlations when the Arctic amplification lags by four years. The black dots indicate the areas of statistically significant correlation coefficients at the 5% significance level

In Fig. S3i, the highest correlations (-0.45) between the oceanic heat transport and Arctic amplification are observed to the north of the Laptev Sea. In Fig. S3b, the maximum correlation coefficients (0.6) between the atmospheric heat transport and the Arctic amplification are observed to the north of Franz Josef Land and Severnaya Zemlya.

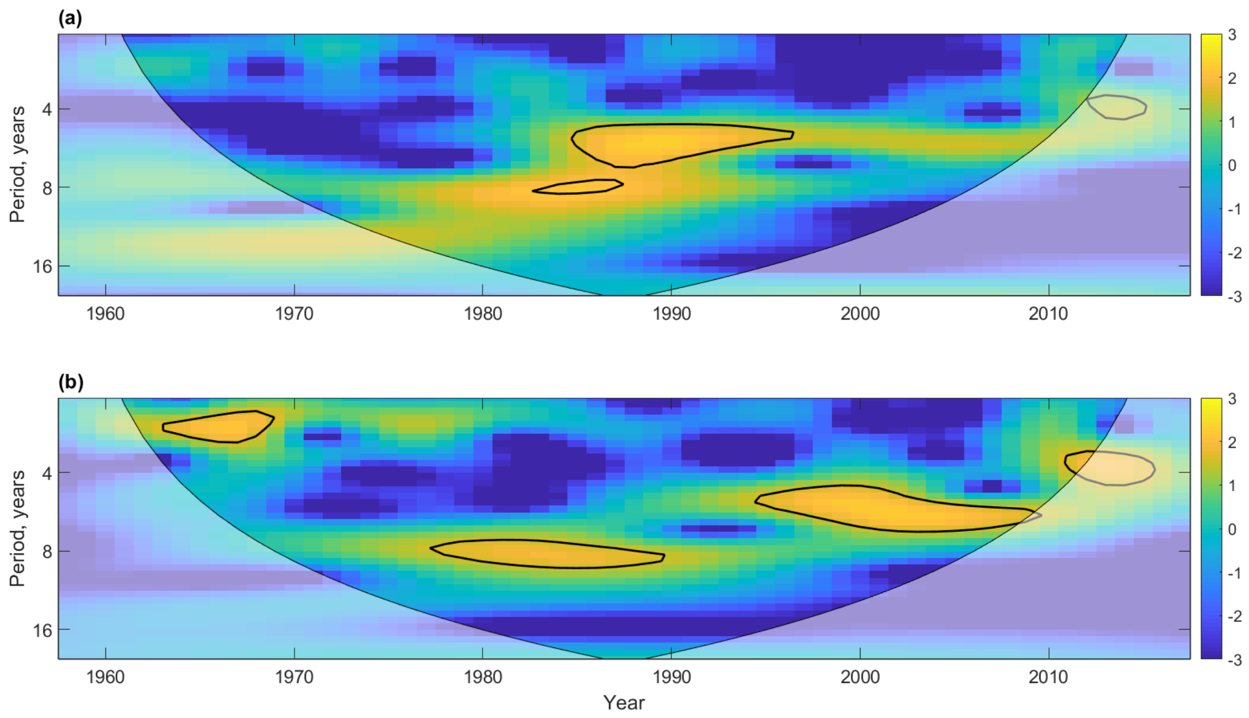

Fig. S4 Wavelet power spectra of the regional Arctic amplification (**a**) and the net (sensible and latent) atmospheric heat transport (**b**). Wavelet power spectra (squares of wavelet amplitudes) are normalized by the variances of the original time series. Yellow areas, confined by the black curves, show significant cycles relative to the red noise spectrum at the 5% significance level. Lighter shade areas show the cone of influence, where oscillations' amplitudes might be distorted by edge effects

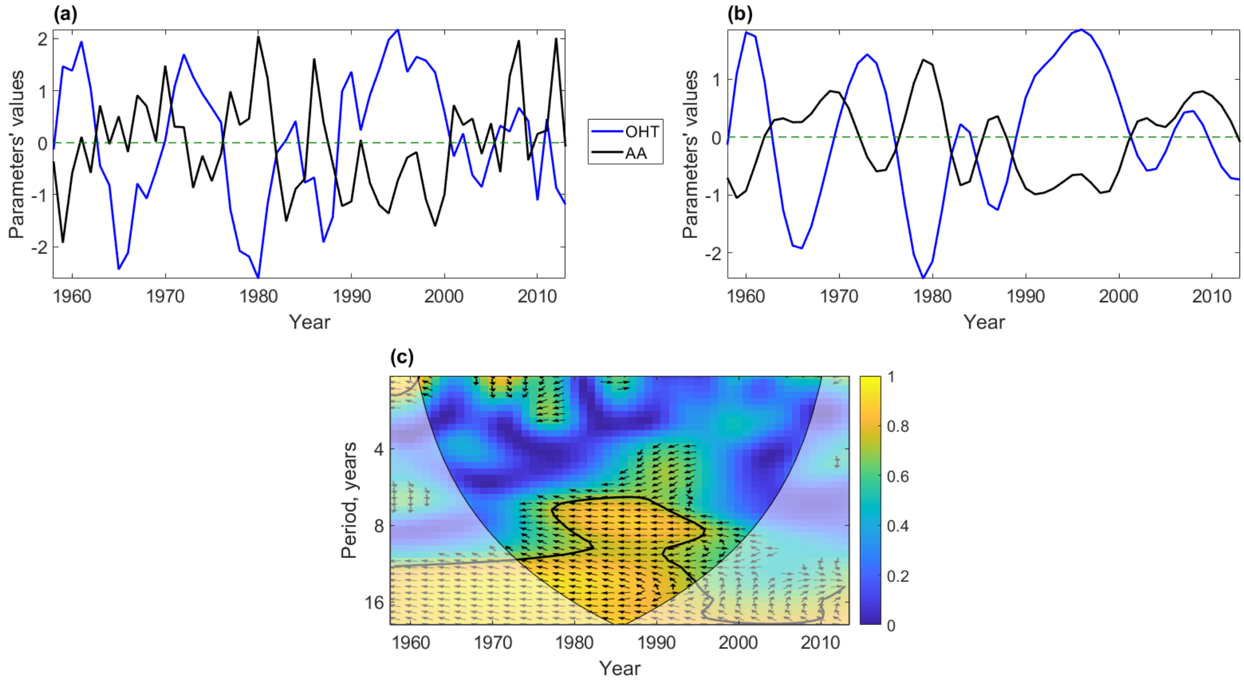

Fig. S5 Time series of the oceanic heat transport (OHT) for the period 1958–2013 and regional Arctic amplification (AA) for the period 1962–2017 with linear trends removed (**a**) and after an application of the low-pass Butterworth filter with a threshold period of six years (**b**); wavelet coherence between the oceanic heat transport and the Arctic amplification with the latter lagging by four years (**c**). The mean annual values of the parameters of the panel (**a**) were used for the panel (**c**). Yellow areas, confined by the black curves, show significant coherences relative to the red noise spectrum at the 5% significance level. Black arrows show the phase angle: directed to the right means in-phase and directed vertically upward means that the Arctic amplification leads the oceanic heat transport by 90° in the given frequency band. Lighter shade areas on the panel (**c**) show the cone of influence, where oscillations' amplitudes might be distorted by edge effects