

ACG033-P02

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## Estimation of global warming trend without the contributions from decadal variability of the Arctic Oscillation

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Climate change associated with recent global warming is most prominent in the Arctic and subarctic. The Arctic Oscillation (AO) is a dominant atmospheric phenomenon in the Northern Hemisphere characterized as opposing atmospheric pressure patterns between the middle and high latitudes. Decadal variability of surface temperature associated with the Arctic Oscillation Index (AOI) shows high correlation with recent global warming trend.

In this study, recent global warming trend is separated in contributions from increasing anthropogenic greenhouse gas and decadal variabilities by the AO.

It is found that the AO is an atmospheric eigenmode with zero eigenvalue, excited mostly by internal nonlinear dynamics. AO may thus be regarded as a natural variability which is basically unpredictable. According to our analysis, the global mean temperature decreased during 1940-1970 associated with the negative AOI. The global warming pattern in the Northern Hemisphere shows that the rapid warming during 1970-1990 contains a large fraction of natural variability due to the AO. Conversely, the period 1990-2010 indicates a clear negative trend AOI. The global warming seems to have ceased in response to the recent negative trend of the AOI. There is a considerable decadal variability of the global mean temperature associated with the natural variability due to the AO.

However, it is found in this study that the AO has large amplitude in local as EOF-1, but the AO is almost dynamically orthogonal to the global warming component for the global mean. The AO can be related to the decadal variability of the global mean temperature only through the feedback by climate sub-systems.

Keywords: Arctic Oscillation, Global warming, Decadal variability