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The Roles of External Forcings and Internal Variabilities in the Northern Hemisphere Atmosphere Circulation Change from the 1960s to 1990s

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Abstract:

The Northern Hemisphere atmospheric circulation change from the 1960s to the 1990s shows a strong positive NAO and a strengthening of the Aleutian low. Relatively large ensembles of atmospheric general circulation model simulations of the 20th century climate were performed to investigate the roles of SSTs, CO₂, sea ice, stratospheric ozone, as well as the atmospheric natural decadal variabilities. The trend amplitudes that were simulated by the experiments which incorporate all of these driving factors have only improved marginally. Even after taking natural variabilities into account, there is still 20 to 30% of the amplitude which is missing when compared to the observed trend. Model inter-comparisons by other studies show that this problem is not limited to the model used in the present study.