Teleconnections and the Arctic Oscillation observed in the Barotropic component of the Atmosphere

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Teleconnections are known as simultaneous correlations between temporal fluctuations in meteorological parameters. For example, the North Atlantic Oscillation (NAO), Pacific/North American (PNA) pattern, and Arctic Oscillation (AO) were studied as teleconnection patterns in Northern Hemisphere. The NAO is a negative correlation between the Iceland low and broad east-west belt centered near 40^oN in winter, carries important impact in the Europe. It is said that the origin of the PNA pattern is abnormality sea surface temperature in tropical zone of the Pacific sector, and this pattern reaches to North America. The AO always is argued as a combination of the NAO and the PNA pattern.

The AO is a north-south seesaw of air pressure between the Arctic and middle latitudes and is defined as the EOF-1 of the time variation in sea-level pressure by Thompson and Wallace (1998, GRL).

The focus of the argument about the AO is whether the AO is a dynamical mode or statistical illusion as lapping the PNA pattern and the NAO. Tanaka and Matsueda (2005, JMSJ) shows that the AO is a singular eigenmode of the barotropic component of the atmosphere. Also, the structure of EOF-2 is similar to the PNA pattern (Tanaka 2003, JAS).

In this study, analysis for barotropic component of the s-model atmosphere, and NCEP/NCAR reanalysis is conducted. Then, there is a resemblance between those teleconnectivity defined by Wallace and Gutzler (1981, MWL). In teleconnectivity, we can't show the AO, but, the PNA pattern and NAO are shown.

Next, we show the one point correlation map in northern atmosphere for PNA pattern and AO. The results show activity points of the PNA pattern and the AO. And, we look for the PNA pattern by the linearized S-model (Tanaka 2003, JAS). But, we can't find that the PNA pattern is a dynamical eigenmode.