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Comparison between the Influence of AO and the NAO Towards the Northern Hemisphere Flow Pattern and the Surface Condition of the Eurasian Continent (Extended Abstract)

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Recent studies have shown that the leading EOF mode of the northern hemisphere, or the annular mode, (known as the Arctic Oscillation) has a very similar structure to the NAO (North Atlantic Oscillation), a regional dipole pattern in the North Atlantic. While annular mode is recognized as being the more relevant structure in the atmosphere, its teleconnectability, especially between the Atlantic and the Pacific sector is weak and questionable (Deser, 2000).

While annular mode can be seen as a circumpolar atmospheric pattern which influences the 'average' westerly regime of the northern hemisphere, NAO and the NPO (North Pacific Oscillation) can be seen as a reginal atmospheric variability. From this standpoint, a comparison has been made between the annular mode and the regional dipoles. The influence of these dipoles towards the Eurasian continent was studied also.

As a proxy index of the annular mode, difference between the zonal-mean, area-averaged SLP for mid-latitude and the polar cap is used. This index focuses on the average zonal state of the hemisphere and has a correlation of 0.89 against the original annular mode index made by EOF analysis as in Thompson-Wallace (2000). Similar area-averaged indices were made for both NAO and NPO.

Correlation shows that AO and NAO has a correlation of 0.52 annually, and is strong as 0.72 in February. The correlation drops significantly in April to 0.21 where the surface temperature composite for NAO now has a cooling effect towards the eastern Siberian region. In many cases AO and NAO is indistinguishable.

However, there are significant number of cases where NAO is strong while the AO is weak. Composite for such 'pure' NAO cases reveils a surface temperature anomaly which is shifted westward towards Europe and western Siberia rather than the eastern Eurasian continent. Similar analysis were made for NPO, the weak dipole pattern of the North Pacific. Composite of surface temperature now reveils an anomaly shifted towards the eastern half of the continent.

Composite of SLP in the 'pure' NAO cases shows a distinct wave-like pattern across the atlantic and western Siberia. Similar composite for NPO shows a dipole pattern not only in the Pacific sector, but in the Atlantic also suggesting a possible link of the Pacific towards the Atlantic.

Results in the surface temperature also suggests that different mechanisms may take place in east and western half of the Eurasian continent, where NAO having a strong regional influence on the western half and NPO acting on the eastern half.