



## **Anthropogenic influence on wintertime jet stream strength in the Atlantic sector. Is it real? Is it Atlantic SST mediated?**

**Jacek Piskozub**

Institute of Oceanology PAS, Physical Oceanography, Sopot, Poland (piskozub@iopan.gda.pl)

Wintertime variability of both the strength of the jet stream and the North Atlantic Oscillation (NAO) index have been correlated in decadal time scale. Both have positive trends since the 1960s which have been recently proposed to be connected to anthropogenic global warming. At the same time there is a rich literature explaining both the observed variability and also the discrepancy with circulation models in which the variability is usually much smaller. Among the proposed mechanisms were “tug-of-war” between the tropics and the Arctic lower troposphere and surface temperatures, Arctic amplification, polar vortex strength. However, none of those forcing can not explain the trends in all the studied period.

The motivation behind the present study is to find a mechanism which can explain the variability and trend in the whole period of accelerated global warning, that is since the middle of the previous century. One possible candidate can be warming of the troposphere and cooling of the stratosphere, both well established results of the increase in greenhouse gas forcing. Together with the lowering of the tropopause altitude with increasing latitude, this results in warming south of the jet stream and cooling north of it, increasing the very gradient which sustains a thermal wind such as the jet stream.

The results of early analysis show that the greenhouse related tropospheric warming / stratospheric cooling is a plausible candidate for the driver of changes in the wintertime jet stream strength and related NAO changes supporting the notion that NAO may head towards constant positive values. However the question remains why such changes are only visible in the Atlantic sector and not elsewhere in the mid-latitudes of the Northern Hemisphere. The multidecadal wintertime NAO changes seemed related with the AMO/AMV variability of North Atlantic SST values at least until the 1990s. This leaves the possibility that both Atlantic SSTs and greenhouse gas forcing are drivers of the variability in the wintertime jet stream strength.