

## 4.135 Atmospheric Chemistry and Climate Trends in the North Atlantic Over The Period 1970-2017. .

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Abstract:

Major changes are occurring across the North Atlantic climate system: in the ocean and atmosphere temperatures and circulation, in sea ice thickness and extent, and in key atmospheric constituents such as ozone, methane and aerosols. Many of the changes that are being observed here are unprecedented in the instrumental records and provide a vital test of coupled chemistry climate models.

In this presentation we will highlight the results from simulations with the UK community chemistry-climate model (UKCA). We will focus our analysis on evaluating the performance of the model over the North Atlantic basin over the period 1970-2017. A comparison of the performance of the model for 2010 shows that it agrees well with recent HTAP-2 and CCMI multi model mean data in terms of the global tropospheric ozone burden (325 Tg). A comparison against new observations generated as part of the NASA ATom and NERC ACSIS aircraft campaigns in the Atlantic have enabled improved insight into the models ability to simulate trends in key species such as carbon monoxide and ozone and an improved understanding of model biases in the North Atlantic. Whilst an analysis of 12 years of satellite data highlights strong anticorrelation between tropospheric ozone column and the North Atlantic Oscillation (NAO) index. A key determinant of this relationship is found to be the impacts of the NAO on changing the amount of STE of ozone in the region.

The combined analysis of satellite, aircraft and ground based data has enabled the most comprehensive evaluation of the UKCA model over the North Atlantic and provides new insight into the factors controlling the evolution of key trace gases in the region and how they are coupled to regional climate processes and trends.