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## **No evidence for climate change in the unprecedented Summer 2018 flow over Europe**

**Carley Iles** and Robert Vautard

IPSL, LSCE, Gif-sur-Yvette, France ([carley.iles@lsce.ipsl.fr](mailto:carley.iles@lsce.ipsl.fr))

The summer of 2018 was characterised by prolonged heatwaves over North-Eastern Europe, associated with persistent blocking over Scandinavia, and a jet stream that resided unusually far north on average over this sector. Whilst most event attribution studies tend to focus on the probability or intensity of extreme temperatures themselves, we instead examine whether anthropogenic climate change has affected the likelihood of the circulation pattern that lead to the 2018 hot summer. We examine trends and variability in jet latitude and blocking frequency over the Scandanavian sector in reanalyses, CMIP5 historical simulations, and in two large ensembles of HadGEM3-A simulations with and without anthropogenic forcing. Both the number of blocked days, and the average jet location for last summer were unprecedented in the observational record, and also very rare in climate model simulations. A number of the CMIP5 models examined were able to simulate realistic blocking frequency distributions. Last summer's circulation did not appear to be part of any systematic increasing trends in blocking frequency or jet latitude in this sector. Instead, this circulation anomaly appears to be explained by a particularly large deviation of natural variability. We will then extend the analysis to examine the western European heatwaves of summer 2019 which were associated with a very different atmospheric circulation pattern –a high pressure ridge which transported warm air northwards from Northern Africa.