What are the stratospheric windows of opportunity for sub-seasonal forecasts?

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Traditionally, the quality of weather forecasts is assessed on the basis of their average skill over all issued forecasts. As forecasters seek to make forecasts at increasingly longer ranges, into the so-called sub-seasonal timescale, it is increasingly clear that a different approach is needed. Sub-seasonal forecasts typically have skill only during "windows-of-opportunity" (Mariotti et al., 2020) during which long-memory processes in the atmosphere or Earth system provide a physical mechanism for enhanced predictive capability. This project is about developing methods to quantify and understand windows-of-opportunity for one of the main atmospheric systems that has been demonstrated to lead to sub-seasonal skill, variability of the wintertime polar stratosphere. The student will work with archives of operational forecasts and with an operational forecasting model. The project will involve a mix of statistical analysis and dynamical reasoning.

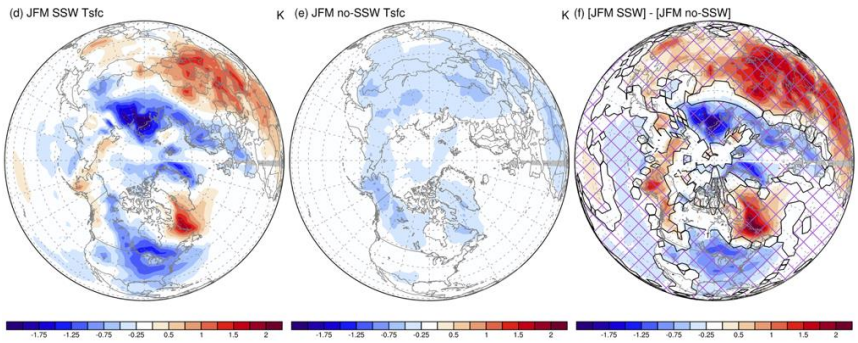

Figure 1 An example of how surface weather conditions change in response to stratospheric variability, taken from Mariotti et al. (2020, doi:10.1175/BAMS-D-18-0326.1). The surface temperature anomaly following Stratospheric Sudden Warming events (left) and for all other days in JFM (centre).

Training opportunities:
The student will spend an average of 1 day per month working with co-supervisors at RWE at their offices in London to understand how medium-range and sub-seasonal forecasts are used in practice at a major European energy company. The project has additional CASE funding provided by RWE. There will also be opportunities to work with colleagues at the European Centre for Medium-Range Weather Forecasts.

Student profile:
This project would be suitable for students with a degree in physics, mathematics or a closely related environmental or physical science. The student will be expected to make a number of connections in the academic and business communities so networking skills will be vital.

Funding particulars:
The project has full CASE support from RWE
https://research.reading.ac.uk/scenario/