

Second interim report on state of the Arctic winter stratosphere 2007/08

(4th March 2008)

The Arctic polar stratosphere cooled down as usual in November / December 2007 as the Arctic vortex grew in strength. By mid-December temperatures at 10 hPa were below those necessary for Polar Stratospheric Clouds to form, an unusual occurrence at these altitudes - the observed temperatures were among the lowest in the 50 year record. At lower altitudes the temperatures were not so unusual though they were slightly below average. The PSC formation temperature was reached at the start of December and the minimum temperatures inside the vortex remained below it until late February 2008. PSCs were indeed observed above several ground stations in the Arctic. Since mid January the upper stratosphere has been subject to a number of relatively strong but transient dynamical disturbances (minor warmings). But these were connected with only relative minor and transient warmings of the temperatures in the lower stratosphere. But the series dynamical disturbances cumulated in a major stratospheric warming in late February. The strong dynamical activity during the days before the main warming pulse led to extremely low temperatures in the lower stratosphere over much of Europe, leading to many reports of visual PSC sightings from accidental observers in Europe. The polar vortex remained intact during the major warming and is reestablishing in early March. But for the time being the period with PSC conditions ended with the major warming in late February.

The accumulated volume of PSCs to date this winter was large and currently stands as the fourth highest on record. It may grow a little further if cold conditions return, but this seems unlikely and if they do it will probably only be for a short time. This current winter is generally consistent with the tendency of the cold winters becoming colder in recent years, although overall the average stratospheric temperatures over the Arctic have remained the same or even warmed. In other words it appears that the range (variability) of the observed temperatures has increased. The reasons for this are not yet clear, though SCOUT-O3 scientists are investigating the possibility of a link to climate change.

The volume of PSCs shows a tight, empirical relation to the amount of ozone loss in the Arctic vortex if it survives until the end of March. Assuming that this relation holds for the current winter and that the vortex is stable for the next few weeks, there is clearly the potential for large ozone losses in the Arctic vortex this winter. In these circumstances, the volume of PSCs observed to date indicates the potential for an overall loss of more than 20% in the column amount of ozone by the end of March.

The ozone loss is being measured using ozonesondes by an international group of scientists in the SCOUT-O3 coordinated Match programme. The results are being analysed and will be made available soon. A further report will be made in early April.

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SCOUT-O3 is a 5 year project receiving 15 million euros from the European Commission Research DG's Global Change and Ecosystems Programme and a similar amount of associated funding from national agencies. More information on the SCOUT-O3 project can be found at: www.ozone-sec.ch.cam.ac.uk.

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