Tropopause fold observation by MARA VHF wind-profiler radar and their occurrence rates over the Antarctic station Troll (72° S, 2.5° E)

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One of the important mechanisms of stratosphere–troposphere exchange, which brings ozone-rich stratospheric air to low altitudes in extratropical regions, is transport related to tropopause folds. They are widely studied in the northern hemisphere but so far only a few studies of tropopause folds from mid- or high southern latitudes are available. The 54.5 MHz wind-profiler radar MARA (The Moveable Atmospheric Radar for Antarctica) has operated at the Swedish summer station Wasa, Antarctica (73° S, 13.5° W) during austral summer seasons from 2007 to 2011. Since December 2011 it has been operated continuously at the Norwegian year-round station Troll, Antarctica (72° S, 2.5° E). During this time tropopause fold signatures have been observed. These observations were confirmed by a complimentary ozonesonde measurement and a modelling study. After that based on MARA observation at Troll station, an occurrence rate statistics of tropopause folds from December 2011 until November 2012 has been made. Radar data have been compared with the analysis from the European Center for Medium-Range Weather Forecasting (ECMWF). The fold occurrence rates exhibit an annual cycle with winter maximum and summer minimum and suggest significantly higher occurrence rates for the given location than those obtained previously by global model studies.

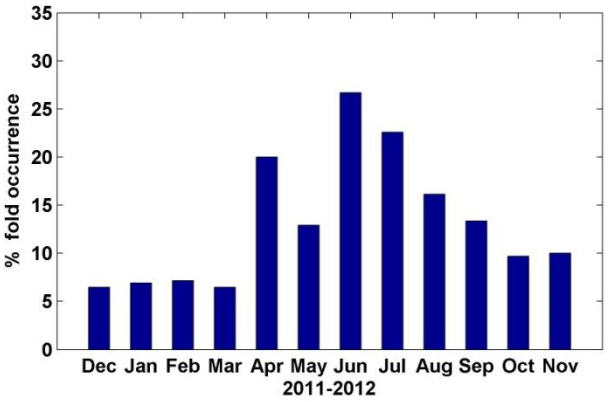

Figure 1. Percentage fold occurrence at Troll station between December 2011 and November 2012

References

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