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Strato-mesospheric CO measurements from ACE-FTS and Odin/SMR and a comparison with CMAM, a middle atmosphere model

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Carbon monoxide (CO) is an important trace of atmospheric motions due to its chemical lifetime which varies from weeks in the middle atmosphere to months in the troposphere and mesosphere. This talk presents a comparison of co-located and near simultaneous ACE-FTS, and the Odin/SMR CO measurements during 2004, and from the Arctic to the Antarctic. The Atmospheric Chemistry Experiment (ACE) is a Canadian satellite mission (SCISAT-1) for remote sensing of the Earth's atmosphere. ACE-FTS is a high spectral resolution (0.02 cm-1) Fourier Transform Spectrometer measuring CO by absorption of solar radiation in the first two rotation-vibration bands. Odin is a Swedish-led international satellite project involving Sweden, Canada, France, and Finland, and the primary instrument is a Sub-Millimetre Radiometer (SMR). The SMR uses four tuneable heterodyne receivers in the frequency range 486-580 GHz to perform limb measurements of thermal emission from trace constituents. We find that there is excellent agreement between the two instruments at the locations investigated from the lower stratosphere to the lower thermosphere. There is also good agreement with the CMAM model simulation in the upper mesosphere and lower thermosphere but poorer agreement in the stratosphere and lower mesosphere in the tropics and Arctic. In the tropics, the discrepancy above 45 km can be attributed to the methane source in the model. For the Arctic in March, 2004 differences can be attributed, at

least partly, to the disturbed conditions in the stratosphere in the winter of 2003/2004. Both of the instruments measured a strong shelf or ledge in CO at 45km. This ledge is thought to be related with the strong mesospheric vortex and the major stratospheric warming in January and February 2004. Clearly, CO measurements from these instruments will provide a useful tool for testing model transport from the troposphere to the thermosphere.