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Comparison of high-latitude line-of-sight ozone column density with derived ozone fields and the effects of horizontal inhomogeneity

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Abstract. Extensive ozone measurements were made during the second SAGE III Ozone Loss and Validation Experiment (SOLVE II). We compare high-latitude line-of-sight (LOS) slant column ozone measurements from the NASA DC-8 to ozone simulated by forward integration of measurement-derived ozone fields constructed both with and without the assumption of horizontal homogeneity. The average bias and rms error of the simulations assuming homogeneity are relatively small (−6 and 10%, respectively) in comparison to the LOS measurements. The comparison improves significantly (−2% bias; 8% rms error) using forward integrations of three-dimensional proxy ozone fields reconstructed from potential vorticity- O_3 correlations. The comparisons provide additional verification of the proxy fields and quantify the influence of large-scale ozone inhomogeneity. The spatial inhomogeneity of the atmosphere is a source of error in the retrieval of trace gas vertical profiles and column abundance from LOS measurements, as well as a complicating factor in intercomparisons that include LOS measurements at large solar zenith angles.

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