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A. Title of Research:

Retrieval Methods for Ground-based Millimeter-Wave Measurements
for the Network for the Detection of Stratospheric Change

B. Investigators and Institutions:

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C. Abstract of Research Objectives:

The fundamental objective is to determine the information available in ground-based millimeter-wave measurements of stratospheric constituent profiles, to identify the optimum method of retrieving this profile information, and to characterize the errors in the final result. A secondary objective is to produce retrieval software for operational use with Network for the Detection of Stratospheric Change (NDSC) measurements of O_3, H_2O, ClO, and perhaps N_2O.

D. Summary of Progress and Results:

An overall software plan has been formulated. The software design will be modular, consisting of three major components, a forward model for spectral calculations, a generic inverse model for for retrievals, and an error analysis section for the characterization of retrieval algorithms.

The millimeter-wave forward model, called Millimeter-wave Emission Temperature of the Atmosphere (META) has been written. It was designed for the specific needs of the ground-based millimeter measurements, and will be used both in a stand alone mode for calculations of spectra and as a subroutine package called by retrieval and error analysis drivers.

Design of the inverse model is presently underway. Various retrieval modules, each incorporating a different algorithm, will be callable by the inverse model.

Finally, tests were performed on existing ozone retrieval programs in support of ongoing NDSC field measurements. The results show that if random spectral errors and retrieval bias errors are considered, accuracy of the retrieved profile is about 5% from 20-50 km, and about 10% from 50-60 km.

E. Publications:

None to date.