I-T-13

INVERSION TECHNIQUE FOR THE RETRIEVAL OF ATMOSPHERIC MINOR CONSTITUENTS

S. L. Jain

Radio and Atmospheric Sciences Division, NPL, New Delhi
Fax: 091 11 25726938
E-mail: sljain@mail.nplindia.ernet.in

The measurement of trace species in the atmosphere plays an important role in the understanding of the radiation budget, chemistry and dynamics of the atmosphere. The composition profile or temperature profile can be obtained by analysis of individual spectral line measured at ultra high spectral resolution through inverse solution of radiative transfer equation. An inversion technique has been developed and tested to obtain the height profiles for water vapour, ozone, nitrogen dioxide and ammonia. It is found that the retrieved profiles match well with the model profiles and are independent of initial guess profile. Different height zones have been considered for Lorentz and Voigt line profiles depending on the constituent of interest. The various line parameters such as line half width, line strength, absorption coefficients as a function of height were computed for the present work using AFGL line parameters i.e. AFGL HITRAN data base. The careful selection of absorption line is made to get sharp contribution functions and hence the good height resolutions. The contribution function which depends on absorption coefficient has a property of reaching maximum peak at different values of height for different values of frequencies. The computations are made for line center and in the wings of the line. The data obtained from actual measurements with laser heterodyne system have been inverted to retrieve the height profiles of ozone, ammonia and water vapour using the inversion technique. The inversion technique was also used for the retrieval of ozone profiles over Antarctica during ozone hole period as well as for the normal period. In the present communication details of the inversion technique will be discussed.