

New Possibilities of Ground-Based Ozone Radiometry

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Introduction

The problem of the atmosphere ozone can't be solved without using of remote sensing methods including the radiometry at millimeter wavelengths. The measurements of radiobrightness spectra in ozone spectral lines gives the possibility of ozone height profile retrieval. High accuracy spectrometer for measurements of ozone spectra in its strong line at 142.2 GHz has been worked out in Lebedev Physical Institute and now it is in use for continuous ozone monitoring. For retrieval of the ozone height profile new method [1] based on the Tikhonov's theory of incorrect problems has been successfully applied. This method has better height resolution and retrieval accuracy than the well known Shahin-Randegger's method [2]. Using the new method it is possible to retrieve the ozone profile peculiarities in the wider range (from 15 up to 80 km) and the retrieval accuracy in the range 20-60 km does'nt exceed 2-3%.

Retrieval results

The retrieval results for three different atmosphere situations are shown in Fig.1.

The case 1 represents an example of the strong stratosphere disturbance on December 1, 1994; in the case 2 it was ozone exhaustion on January 26, 1989, and the case 3 on March 6, 1995 represents the typical low stratosphere disturbance. One can see that very thin ozone profile peculiarities are well retrieved in all the analysis height range. In the following investigations more attention for mesospheric ozone variations retrieval should be paid.

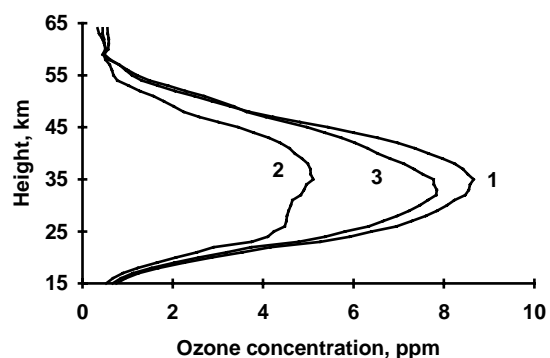


Fig.1. Ozone profiles retrieval

Conclusion

The combination of new spectrometer and new retrieval method gives the possibilities for better ozone profile dynamics monitoring and understanding of its origin.

References

- [1] K.P.Gaikovich. Tikhonov's method of ground-based radiometric retrieval of the ozone profile. Digest of IGARSS'94, v.4, pp.1901-1903, 1994.

[2] A.K.Randegger. On the determination of the atmospheric ozone profile for ground-based microwave measurements. *Pageophys.*, v.118, pp.1052-1065, 1980.