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Microwave complex for ground based ozone and thermal sounding of middle atmosphere

Alexander Shvetsov, Alexander Krasil'nikov, Mihail Kulikov, Vitaly Ryskin, Oleg Bolshakov, Mihail Belikovich, Dmitry Mukhin, Dmitry Karashtin, Lev Fedoseev, and Alexander Feigin

Russian Federation (shvetsov@appl.sci-nnov.ru)

Description of the novel ground-based microwave complex for ozone and thermal sounding of middle atmosphere is presented. The instrument include two spectroradiometers operating in the frequency range 110.3–111.3 GHz (ozone line), and in the in the frequency range 52.5 – 54.5 GHz (edge of 5-mm molecular oxygen band), accordingly. The latter includes band slope and four resolved from the earth's surface relatively weak oxygen lines. Both spectroradiometers employ feed cone as antenna with half-power beam width approximately equal 4 degree. Two digital fast Fourier transform spectrometers developed by "Acqiris" are used for signal analysis in the intermediate frequency range 0.05 – 1 GHz with the effective resolution 61 KHz. Both spectroradiometers operate in total power mod with fast internal calibration that realize by electrically controlled noise generator on basis of Shottky barrier diodes.
Noise temperature is approximately 3000 K for ozone spectroradiometer and 1400 K for thermometer.
Novel method for retrieval vertical profiles of ozone and temperature from radiometric data is applied. The procedure is based on Bayesian approach to inverse problems which assumes a construction of probability distribution of the characteristics of retrieved profiles with taking into account measurement noise and available a priori information about possible distributions of ozone and temperature in the middle atmosphere.
At the present time we carry out the experimental campaign aimed to simultaneous measurements temperature and ozone profile above Nizhny Novgorod, Russia.

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