



Spectrometer for monitoring of atmospheric ozone (ozonometer)

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The spectrometer for the monitoring of Earth atmospheric ozone from the board of spacecraft is being designed. The aim of the spectrometer called "Ozonometer" is global and permanent monitoring of total ozone by means of measuring spectra of scattered solar radiation in near-UV and visible range of spectrum (300 – 500 nm). This range includes Huggins absorption band of ozone in near-UV (300 – 360 nm) and nitrogen dioxide NO₂ absorption bands in visible light (400 – 500 nm). The optical design of the spectrometer is based on the Rowland circle scheme with holographic concave diffractive grating. An off-axis parabolic mirror is used as an entrance objective. The CCD detector is linear with 2048 pixels. The spectral resolution is up to 0.3 nm. The spectrometer is supposed to provide nadir observations but there is also an additional optical entrance orientated to Sun hemisphere in order to measure pure solar spectra.

The spectrometer is being designed within Russian special federal program "Geophysics". Among the program, a group of 4 spacecrafts "Ionosphere" is to be launched in 2014–2015. They are planned to operate at a pair of circle solar-synchronous near-polar orbits (2 spacecrafts at each orbit).

Up to the present moment, the qualification model of the spectrometer has been manufactured and tested. The first performance tests were completed at optical laboratories in St. Petersburg and Moscow with the help of Hg lamps and other light sources. After that, the field atmospheric measurements have been carried out in Moscow, Orel and at Kislovodsk high-altitude atmospheric station at Caucasus. The observations have been provided at zenith direction (scattered radiation) as well as solar direct measurements. The obtained results are presented.