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Measuring concentration of surface ozone by means of semiconductor gas sensors

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For a number of years, specialists at the National Ozone Monitoring Research and Education Center of the Belarusian State University (NOMREC BSU) have been deep involved in creating easy-to-operate compact indicators and meters of surface ozone concentration that would provide reliable monitoring of this gas component as well as significantly reduce a cost of performing such measurements.

The original gas sensor on the basis of nickel oxide has been engineered by Institute of Electronics, National Academy of Sciences of Belarus. Probing this type of sensors has shown good sensitivity to low concentrations of ozone, i.e. those observed in a surface layer of the atmosphere. Based on the sensor, a compact device has been designed at NOMREC BSU to measure the surface ozone concentration.

Tests of the instrument and parallel measurements of surface ozone concentrations with an optical gas analyzer TEI 49C gave a good result thus allowing to make a conclusion about the prospects of creation of measuring equipment utilizing semiconductor gas sensors. Furthermore, a measurement system based on commercially available tin oxide (SnO_2) sensors has been developed. The system has been successfully tested in polar conditions of the 2015-2016 seasonal Antarctic expedition.

The polar regions are of special interest for studying the surface ozone concentration as here one can easily neglect the anthropogenous influence due to the low population density and lack of industry. Under these conditions, the level of surface ozone is mostly determined by natural processes and vertical transfer of ozone from the stratosphere.

The paper analyzes daily changes of the surface ozone concentration in Antarctica (field base "Gora Vechernyaya" and “Novolazarevskaya” station) for the period of the 2015-2016 seasonal expedition.