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Concept of small-sized instruments for monitoring and diagnostics of solar wind

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The problem of reliable forecasting of the space weather and their effects is still far from the solution. This is due both to its fundamental scientific complexity, and to the insufficient amount of observational data available to researchers. It might be a large step forward to create systems for operational control of space weather, in particular, simultaneous measurements of corpuscular solar radiation in different heliosphere locations. For improved forecasts of space weather near the Earth, simultaneous measurements both inside and outside its magnetosphere at different distances from the surface are required.

This goal can be achieved with help of complex scientific diagnostic instruments installed on spacecraft with various orbits. At the same time, it is important that the experimental data obtained will be properly calibrated. This can be more easily achieved with similar complexes of diagnostic equipment installed on different spacecraft after passing a unified system of quality control, calibration and testing. If, in addition, these complexes have small mass and size (i.e. miniaturized), then they can be placed as an additional payload on a wide range of spacecraft (including microsatellites) with different orbit. This extensive network of diagnostic stations of space weather control will be similar to the network of weather stations and multiple and atmospheric probes.

As the space infrastructure develops and the number of spacecraft launches increases the cost of individual elements of space weather network will decrease. We believe that it is now necessary to begin to work out the issue of creating a basic scientific and measurement complex, part of which will be a compact system for the diagnostics of corpuscular radiation, which can be installed onboard different spacecraft, leading to further expansion of the network of monitoring of space weather (space-meteorological network).

We are presenting results of modeling of the instruments being developed in order to solve this problem. The instruments are designed to perform measurements of solar wind ions and electrons within energy range of 0,5-10 keV and 30-10000 eV respectively and $\Delta E/E$ aimed at 10-15%.