

Efficiency Evaluation of the Earth Remote Sensing System Based on Small Satellites

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Abstract. The paper considers the issues of the comparative analysis of the efficiency of the two Earth remote sensing systems (ERS) based on the Resurs-P spacecraft and small spacecraft. The system of spacecraft as a complex technical system should be evaluated in three areas: operational efficiency, cost of resources for its creation, and operation. Cost estimate resources for development and operation of satellites of the Resurs-P type can be obtained based on the analysis of a long-term experience of their application. Similar data do not exist for small spacecraft. Therefore, the article compares only the functional efficiency. The evaluation of the two systems was performed assuming that each subsystem produces images of objects on the Earth's surface with similar characteristics and the same periodicity of the observation of the Earth regions. It is shown that to obtain images with the quality relevant to the Resurs-P images in orbit with the altitude of 535 km, the orbital altitude of small spacecraft should be 265 km. The active service life of the Resurs-P spacecraft is 5 years [1], small spacecraft at this orbit is 6 months.

It is proved that to ensure the possibility of the observation of Earth regions with the interval not exceeding the interval of the system consisting of three Resurs-P spacecraft, the small spacecraft system should include 8 spacecraft. Thus, the ERS system of small spacecraft comparable to the functional characteristics of the ERS system with three spacecraft of Resurs-P type should include about 80 small spacecraft during a five-year operation.

Keywords: Earth remote sensing, small spacecraft