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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
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ASPECTS OF CREATING AND UTILIZING UNIVERSITY-BASED MICROSATELLITE' GROUND CONTROL COMPLEXES

Abstract

Transparency of science and educational projects should be considered as the main principle of international cooperation in aerospace education. Participation in such projects should be widely available for the large number of creative students and young scientists. This can be achieved through the availability of space research activity results obtained from science and educational microsatellites. Educational satellites often use radio-amateur frequencies for telemetry communication and mission control. Internet is widely used to rapidly publish research results. The majority of university' satellites belong to micro-satellite category, which are either cluster-launched or utilize a piggyback payload concept. Educational satellite programs have the following features: - Carry out wide range of various missions; - Satellite mission involve large number of participants from international educational community; - Students and Ph.D. students are actively involved in controlling microsatellites; - Extensive utilization of open information networks and channels. Universities normally create ground control complexes (GCC) for satellite telemetry and scientific data acquisition. Apart from the primary mission, GCC can be used in other tasks related to the utilization of space research activity results. For example, Earth Remote Sensing (ERS) Data Acquisition and Processing Center can be organized on GCC equipment base. Calculations which require significant computational capability can also be carried-out in GCC. Bauman Moscow State Technical University Mission Control Center (MCC-B) should be considered as an example of various GCC applications described above. Due to its' technical characteristics, MCC-B is capable of receiving microsatellite' telemetry data, analyzing this data and evaluating satellite in-flight condition based on such analysis. Besides, MCC-B receives ERS data from TERRA satellite and is ready to receive the data from Bauman University own "Baumanets-2" microsatellite equipped with 30 m resolution camera, which is to be launched this year. During the recent 3 years the following science-research activity was conducted: crop vegetation index forecasting, northern Russia ice conditions monitoring, Aral sea monitoring. Open-access archived ERS data from LANDSAT-5, LANDSAT-7, TERRA, AQUA and OrbView-3 satellites was used in all these research projects. Special software for telemetry processing optimization was developed. The software is universal and can work with data obtained from various microsatellites. MCC-B example can be used as a prototype for defining the structure of Prospective University-based Microsatellite' GCC. MCC-B experience will be useful for the development of optimal structure of microsatellite' ground control system integrated into the international university cooperation.