

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (2)

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EARTH OBSERVATION SPACE SYSTEM ARCHITECTURE BASED ON SUPER
HIGH-RESOLUTION SPACECRAFT OF 0,5 M.

Abstract

Glavkosmos is a daughter company of State Space Corporation ROSCOSMOS and is authorized for building steady partnerships with international companies, representing Russian side in civil space projects. Nowadays we present our latest integrated solution – Earth observation (EO) space system architecture based on super high-resolution spacecraft platform of 0.5 meter, including its launch, technical maintenance, ground infrastructure and education of specialists. The spacecraft (hereinafter, SC 0.5 m) secures projection of a pixel on the ground in nadir which is 0.5 meter in panchromatic and 1.8 meter in multispectral mode. “Swath width” or field of view by spacecraft, which is available for camera sensors, is not less than 22 km. The area the sensors can observe or “width” of the spacecraft, is more than 600 km. The spacecraft mass is 750 kg and its active lifetime is more than 5 years. Ground infrastructure comprises Ground Control Center (GCC) and combined downlink and uplink ground station. GCC is designed for monitoring of spacecraft status and its control either after separation from upper stage or during the all satellite lifetime. Combined ground station provides reception of target information using X- and S-band antennas and supports several types of modulation: USQPSK, BPSK, 8PSK, 16APSK, 32APSK. The spacecraft operates in the following imaging modes: • Stereo imaging - imaging with not less than 2 imaging sessions of the same Earth area with length of up to 250 km during one orbit; • Strip map imaging – imaging of Earth area with the duration between 2 and 100 seconds within the swath of spacecraft; • Wide swath imaging - imaging with not less than 2 consecutive imaging sessions of overlapping Earth areas during one orbit, at roll angles 20 and pitch angles 20; • Object imaging – imaging of Earth area which is equal to the swath width within the coverage at roll angles 40 and pitch angles 30. EO data of super high-resolution provided by SC 0.5 m and application of advanced data processing technologies allow the acquisition of high-quality Geo-information system (GIS) products essential for rendering demanded satellite monitoring services in various spheres of economic activities for the customers all over the world, addressing the following important tasks: • inventory of natural resources; • creation and updating topographic maps and city plans; • monitoring environmental pollution and soils degradation; • emergencies and ecological monitoring; • monitoring activity of construction facilities.