

# **Innovative techniques of air-space monitoring of natural & anthropogenic sphere**

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Space systems enable to obtain land cover characteristics using multispectral imagery processing procedures, but a necessity is seen to gain new information products in the form of specified parameters particular users deal with. The biomass amount of forest, agricultural and other ecosystems is one of such parameters to be retrieved for each pixel of satellite images. These parameters are invariant (not depending on) to view angles of remote sensing instruments, solar illumination condition, transparency of the atmosphere at a moment of air-space monitoring of natural & anthropogenic sphere. An assemblage of forest and other ecosystems within a region linked with industry, agriculture, transportation infrastructure is implied under the indicated sphere. Available applications based on initial data of satellite observations are not sufficient for quantitative assessment of the relevant parameters from multispectral images. This is due to uncertainties of data operative reception for a particular region (cloudiness, insufficient spatial resolution of the related instruments, specific trajectories of orbital carriers, etc.) and restrictions of currently available techniques dealing with initial data or any their combinations like vegetation indices changeable from one scene to another.

A new generation of local monitoring system operating on an ultra-light basis (glider) has been constructed equipped by topographic camera, Global Positioning System (GPS) receiver and other instruments. An imaging spectrometer in visual and infrared spectral bands for quantitative assessment of the indicated vegetation cover parameters, a thermo-vision instrument for observed targets characterization by thermal images and a microwave radiometer for soil moisture sounding are among these instruments. The onboard information & measurement complex consists in satellite navigation system, digital television camera of high spatial resolution, monitor & controller, shock-proof suspension system for air-space instruments installation on a specified platform with a turning ability, onboard system of energy supply and information protection, onboard computer system and other programming software support. This complex exploiting by professional pilots provides permanent synchronization of any imaging frame of local monitoring data and GPS data, compression of raster information and address placement of current measurement data into a generalized data base along with flying vehicle trajectories tracing on a route digital map in real time. This is a unique complex for validation techniques concerning new information products

from space.

Besides the biomass amount for natural ecosystems, the newly defined information products are given by types of land cover (grass lands, swamps, forests: deciduous, coniferous, mixed species, etc.), types of underlying surface (soil moisture conditions), optical depth of the atmosphere and path radiance values connected with the current atmospheric transparency conditions. Thus, a new opportunity is opened up of constructing a unified air-space monitoring multi-functional information system that combines a wide coverage of remotely sensed areas by the proposed information products from space and details of regional peculiarities of these areas by local monitoring techniques.

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