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OPTICAL METHODS OF EARTH REMOTE SENSING AND PROSPECTS FOR THEIR USE IN COMMERCIAL SPACECRAFT

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Commercial remote sensing spacecraft currently use optical multispectral and hyperspectral, thermal infrared and radar imaging methods. At the same time, the capabilities of existing and promising remote sensing methods are not fully utilized in commercial satellites. Trends in the development of optical remote sensing methods are analyzed with the aim to determine prospects for the application of these methods in commercial remote sensing satellites. Optical multispectral, hyperspectral, and lidar imaging and methods based on chlorophyll fluorescence measurement are considered. It is shown that multispectral optical imaging is developing by way of increasing the number of spectral channels, using narrower channels, and increasing the spatial resolution in tasks of detailed and survey imaging and by way of increasing the repeatability of imaging without reducing the spatial resolution due to the use of constellations of inexpensive small satellites. Hyperspectral and lidar imaging face the problems of processing and transmission of a large amount of data. A promising way to solve these problems is to process data immediately onboard the spacecraft. In lidar imaging, there are prerequisites for the formation of a constellation of satellites to provide a regular annual global coverage of the Earth's dry land. Remote sensing methods based on chlorophyll fluorescence are at the stage of accumulation and generalization of experimental data. At the same time, these methods open new opportunities in solving many ecological and agricultural problems. The integration of spectral and structural information provided by optical imaging methods and lidars may be used in the future to solve a wide range of problems. It is possible to form orbital constellations in which individual satellites will use different remote sensing methods and constellations of universal satellites equipped with several types of imaging devices.

Keywords: *remote sensing, multispectral imaging, hyperspectral imaging, lidar, solar-induced chlorophyll fluorescence*.

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