

ANALYSIS OF THE TRENDS IN THE DEVELOPMENT OF EARTH REMOTE SENSING MEANS

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The aim of this paper is to analyze the trends in the development of Earth remote sensing (ERS) means over the past twenty years. The analysis involves spacecraft for Earth surface visible-spectrum imaging, space systems for Earth surface video and radar imaging, ground means for ERS data reception and processing, and the ERS development in the future.

In recent years, the development of both space and ground ERS means has been ever accelerating. This is particularly true for spacecraft with optoelectronic equipment (OEE) of high and superhigh resolution. Since the first high-resolution spacecraft, IKONOS-2, was launched in 1999, 213 spacecraft with high and superhigh resolution OEE have been launched, while a total of 940 ERS satellites have been launched since then.

At present, the main trend in the ERS development is the formation of satellite constellations. Satellite constellations consist of spacecraft that are identical or close in their functional characteristics, operate as a system, and have a common data warehouse.

In some experts' opinion, for tasks that do not require any prompt acquisition of ERS data, new satellite imaging will not be ordered at all. The reason is that while still quite recently the ratio of the demand for new imaging to that for archive data was 4/1, today this ratio is 1/3. The customer will be sure that during the imaging season the necessary data will appear in the archive. This is a very important and essential aspect, which opens up entirely new opportunities for the consumer.

For ground ERS means, the current trend is the advent of online services for seeing monthly changes in the Earth surface. For example, the Planet Explorer of Planet Labs Inc., USA, allows users to see satellite imagery over time and detect changes in the Earth surface throughout the world.

The future of ERS will depend on breakthrough technologies, innovative solutions, novel applications, and the integration of technologies, such as virtual reality, augmented reality, artificial intelligence, machine learning, big data, cloud computing, and the Internet of things, which will be of decisive importance to the ERS segment.

The paper gives the reader an idea how strikingly the ERS means have changed over the past twenty years.

The paper uses methods of information technologies and system analysis.

Keywords: video imaging, virtual reality, spacecraft, machine learning, spatial resolution, radar imaging, satellite constellation, cloud computing, artificial intelligence.

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