

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

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ADVANCED SPACE SYSTEMS FOR HYDROMETEOROLOGICAL MONITORING AND EARLY  
DETECTION OF TSUNAMI

**Abstract**

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In order to provide the Federal Service for Hydrometeorology and Environmental Monitoring with timely and high-quality global weather data Lavochkin Association works at development of meteorological space system. The system's orbital spacecraft constellation consists of three geostationary spacecraft and two satellites operating in high-elliptical orbit, which should provide continuous monitoring of areas located above 60 degrees north latitude, not covered by geostationary spacecraft.

Today only one satellite operates in the geostationary orbit in standing point 76 degree east latitude.

The adequacy of information used for weather forecasting which is derived from the space (from meteorological spacecraft) is beyond doubt. The demand for space data is growing continuously. This is due to the rapidly changing climatic phenomena that can damage the economy and security of any state. And if the major participants of the world meteorological programs (USA, Japan, China, EU countries, etc.) have the necessary resources for operational meteorology, many developing countries are dependent consumers of these data.

To the benefit of users it is proposed to establish a system with the orbital spacecraft constellation consisting of satellites operating in the geostationary orbit. Two spacecraft located at various standing points can provide continuous monitoring of the given area. In addition the system can be supplemented with the spacecraft operating in high elliptical orbit with the revolution period of 12 hours. Such kind of satellites provides continuous observation of northern or southern latitudes depending on location of orbit (operative) apogee.

Early detection of tsunami and, as a result, timely notification about it will significantly reduce the human and economic losses that inevitably occur with the arrival of the wave. For the purpose of rapid tsunami detection, the possibility of development of space system consisting of spacecraft equipped with radar and located in the geostationary orbit is being considered. The spacecraft can be built using the flight-qualified components of housekeeping and payload equipment. The object of observation is the water surface of the Pacific and Indian oceans; quasi-real-time tracking of the tsunami speed and direction is performed and data are transmitted to crisis situation centers.