Spaceborne Monitoring System for Multipoint Measurements of Ionosphere Parameters Necessary for Solving the Tasks of Earthquakes Prediction and Space Weather

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Yuzhnoye State Design Office (Yuzhnoye SDO) according to the order of the National Space Agency of Ukraine (NSAU) for a long time has been developing various satellite systems (such as Poperedzennya (Warning), Interball-Forecast, Analysis-Forecast) intended for research of lithospheric, ionospheric and magnetospheric phenomena with the purpose of creation of space systems for detection of earthquake precursors and study of solar wind impact on the biological and technological processes on Earth. Yuzhnoye SDO possesses huge experience in the development of spacecraft and onboard systems for solving the above-mentioned tasks: «Intercosmos-19», «Oreol-3», «Intercosmos-Bulgaria-1300», «Intercosmos-24» as well as development of «Intercosmos» family spacecraft based on automatic universal orbital stations AUOS-3 and AUOS-SM. At present time Yuzhnoye SDO is conducting researches on advanced space systems based on new generation small class spacecraft (up to 250 kg and up to 1000 kg) for monitoring of disasters, catastrophes, earthquakes, atmospheric phenomena and other emergency situations.

Taking into consideration the recent tragic events in Indian Ocean near the coastline of Southern Asia, a serious need for creation of global system for prediction of litospheric processes resulting in Earth surface deformation has arisen.

In this connection Yuzhnoye SDO jointly with Astro Research Corporation are considering an opportunity of international cooperation for implementation of Analysis-Forecast satellite system (advanced Poperedzennya Mission) intended for study of processes, occurring in lithosphere, atmosphere and the Sun and their influence on the Earth biosphere, especially on human; as well as for implementation of satellite system for emergency situations radar-visible monitoring – Sich-3-SAR satellite.

Astro Research is collaborating with University of Electro-Communications and other universities to develop the geomagnetic monitoring systems, ionosphere monitoring systems related to earthquake precursor phenomenon, and the technology and computer programs to integrate the ground based monitoring data and space based monitoring data for higher accuracy in earthquake prediction.

The proposed method of multipoint measurements using the constellation of closely situated satellites (Analysis-Forecast system) is an exceptionally important one for solving the above stipulated task, since single-point measurements do not allow to define wave mode structure. In case of implementation of such project in the nearest time, global monitoring satellite configuration (constellation) consisting of 3 satellites placed in one plane will be set up in ionosphere (it is supposed to place satellites in six planes). Installation of scientific instruments onboard of several satellites, situated on a certain distance from each other, provides an opportunity for conducting of a number of new experiments devoted to study of radio-waves dissemination in auroral ionosphere, study of small scale heterogeneities and nonlinear dynamic structures, opportunity to combine continuous measurements of solar optical radiation performing simultaneous measurements of ionospheric characteristics, study of features of short radio-waves dissemination, study of solar optical radiation variations.

Distribution of active and passive measurement systems on different satellites allows to reach the maximum possible level of electromagnetic pureness on the passive satellite, meaning better accuracy of measurements.

YUZHNOYE SDO MISSION: ANALYSYS-FORECAST

The Analysis-Forecast multi-mission will provide end-users with rapid and direct high efficiency emergency, aerosol investigation, earthquake, troposphere processes investigation, ionosphere and magnetosphere analysis and research, space weather and atmosphere control and different disasters monitoring at low cost. Based on Yuzhnoye's KS-2 platform, Analysis-Forecast satellite constellation will supply near real time communication from three united by network small spacecrafts in one plane of LEO to ground stations, with data processing software and archiving capabilities.

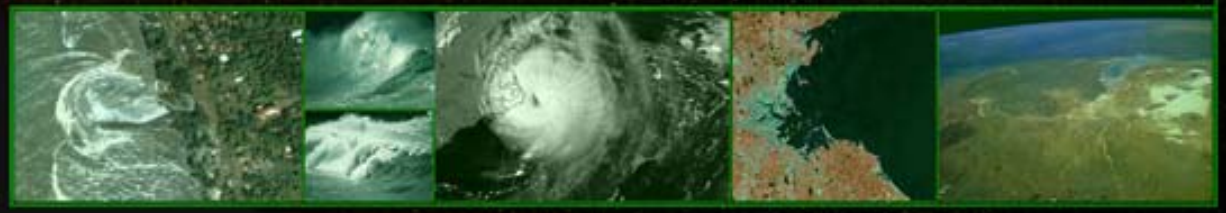
CHRACTERISTICS

- 670 KM SSO (NOMINAL)
- 180, 200 AND 210 KG SPACECRAFT MASSES IN NETWORK
- 18 SATELLITE HAS OWN PROPULSION SYSTEM
- AVERAGE POWER 72W
- 3-AXIS ATTITUDE CONTROL
- GLONASS/GPS ORBIT DETERMINATION
- X-BAND 32 MBPS PAYLOAD DATA DOWNLINK
- S-BAND TTC
- NEAR REAL-TIME OPERATION
- LIFETIME 5 YEARS
- DIRECT-TO-USER INFO
- DESIGN LIFE OF 18 MONTHS AS A DEMONSTRATION MISSION

YUZHNOYE design office

Partnership with

ASTRO RESEARCH



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