



Kazakhstan's Project of Creation of Scientific Space System for Research of Earthquake Precursors

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The purpose of the project is creation of scientific space system for research of the physical phenomena in the near-earth space previous to earthquakes, development of technical tools and methods of space- and ground-based monitoring of earthquake precursors for the purpose of assessing the seismic hazard in Kazakhstan.

Proceeding from the experience of foreign countries, pre-eminently France and Russia realizing similar projects (DEMETER and COMPASS II correspondingly), preliminary specifications to all components of the space system and feasibility assessments on its creation were developed in JSC National Company Kazakhstan Garysh Sapary during the 2005-2007 period.

The on-board research instruments configuration, controls and information reception tools were determined. Methods of processing and analysis of ground and satellite data (DEMETER Sat.) for further identification of earthquake precursors were defined. The feasibility study of the project was elaborated. Terms of the project realization are presumedly 3 years. For all components of the space system the assessment of expenses is given.

Realization of the project is divided into two parts that imply creation of:

1. Spacecraft: a platform with scientific equipment block to measure electromagnetic, optical and other characteristics of the near space.
2. Ground infrastructure: a Ground Measuring Station (GMS) to carry out measure-

ments synchronised with the satellite, a Satellite Ground Control Centre (GCC) and a Ground Mission Centre (GMC).

Key features of the Scientific Satellite

- Working title:
 - OMIR (*Orbital Monitoring of Ionosphere Radiation*)
- Mission: study of the physical phenomena in the near Earth space that result from pre-seismic effects and human activities
- Satellite mass: bus + payload, - up to 150 kg
- Payload mass: - up to 35 kg
- Payload average energy consumption: - 30 – 40 W
- Orbit:
 - Type: - circular
 - Altitude: - 500-550 km
 - Inclination: - 51-53°
- Design life: - no less than 5 years

Satellite Payload:

- Electric Field Instrument (ICE)
- Magnetic Field Instrument (IMSC)
- Plasma Analyzer Instrument (IAP)
- VLF-LF Receiver-analyzer
- Optical camera to monitor an undulatory cloudiness in the atmosphere
- Earthquake Precursor Airglow Camera (EPAC)
- Neutral Particle Detector (NDP)
- TEC Instrument

- Radiation monitor

The components of the space system are supposed to be created in cooperation with research and manufacturing companies of Russia (IZMIRAN, GEOSCAN, Institute of the Earth Physics, etc.), France (Thales Alenia Space, CNRS), Canada (CRESS, York University), the Ukraine (YUZHNOE, Institute of Technical Mechanics) and Kazakhstan (Institutes of MES RK, PROGNOZ).