

Research and Development Satellite Systems

“RESURS-DK”

A NEW RUSSIAN EARTH OBSERVING SPACECRAFT

Summary and purpose of the WP

The “Resurs-DK1” mission objective is the Earth’s surface multi-spectral remote sensing to acquire high-quality visible images in near real-time as well as on-line data delivery via radio channel and providing a wide range of consumers with value-added processed data.

Due to a wide swath width (28.3km) and high resolution (no worse than 1m in panchromatic band and 2-3m in narrow spectral bands) the “Resurs-DK1” is of a high performance capability.

The “Resurs-DK1” is equipped with the PAMELA (Russia/Italy) and ARINA (Russia) science instruments.

Action proposed: no action required.

“RESURS-DK”

A New Russian Earth Observing Spacecraft

Description

Consumer – Federal Space Agency of Russia;

“Resurs-DK1” Prime Developer - TsSKB Progress (State Research & Production Space Rocket Center) of Samara;

Operator – Research Center for Earth Operative Monitoring (Moscow);

“Resurs-DK1” spacecraft was placed in orbit by “Soyuz-U” booster from the Baikonur Cosmodrome, Kazakhstan on 15 June 2006.

The spacecraft design life is no less than 3 years.

Mission Objective

The mission objective is the Earth’s surface multi-spectral remote sensing to acquire high-quality visible images in near real-time as well as on-line data delivery via radio channel and providing a wide range of consumers with value-added processed data.

Main Characteristics:

- Spacecraft mass – 6570kg;
- Elliptical orbit,

Min altitude – 360km,

Max altitude – 604km,

Inclination – 70.4°;

- Swath width (at nadir), km –

With H=350km – 28.3;

- FOR (Field of Regard), km – with H=350km (with regard for turning by roll $\pm 30^\circ$) - 448;

- Resolution on ground –

- No worse than 1m (panchromatic band, 0.58-0.8 μ m),

- 2.0-3.0m (in narrow spectral bands, 0.5-0.6, 0.6-0.7, 0.7-0.8 μ m);

Observational periodicity is 6 days.

Exploitation

Due to a wide swath width (28.3km) and high resolution (no worse than 1m in panchromatic band and 2-3m in narrow spectral bands) the “Resurs-DK1” is of a high performance capability. During the in-flight tests more than 2.5 million sq km was imaged. The size of data acquired during this time period is approximately 8.5TB.

Sensor Complement

The “Resurs-DK1” is equipped with the PAMELA (Russia/Italy) and ARINA (Russia) science instruments.

PAMELA (Payload for AntiMatter Exploration and Light-nuclei Astrophysics) is designed in the context of RIM Russian/Italian Program (Russian/Italian Mission) with the German, Swedish, and American scientists involved and its objective is precise measurements of primary cosmic radiation spectra (antiprotons, positrons, electrons, and light cosmic nuclei) over the $\sim(0.1-200)$ GeV energy range.

ARINA designed at the Institute of Cosmophysics (INKOS), MEPhI is a small-sized automatic scintillation spectrometer for recording charged particle bursts. The objective of the ARINA Experiment is to refine a new technique of earthquake prediction using space facilities. The technique is based on recording bursts of high-energy charged particles in near-Earth space that occur several hours prior to forthcoming earthquake and thus act as short-term earthquake forerunners.

ARINA designed at INKOS has no world-wide analogs. Because of the “Resurs-DK1” operational orbit parameters the instrument may be stationed underneath the Earth’s radiation belt for much of time thereby recording most effectively the bursts of high-energy charged particles of seismic nature pouring out from the radiation belt. In each burst it is expected to measure energy spectrum evolution and burst time profiles required for positioning the focus of forthcoming earthquake.

The ARINA Experiment may determine the latitude and longitude of an earthquake focus to an accuracy of the order of $1^{\circ}-2^{\circ}$ (approximately 100-200km).

Dissemination

Remote sensing data acquisition over foreign state territories may be performed both through an operator and directly by foreign user data acquisition stations.

The assigned stations must be certificated and recorded for servicing by an operator of remote sensing spacecraft.

Remote sensing data dissemination is on a contractual basis. For joint projects data transfer may be free of charge.