

## Remote Sensing Data Acquisition for Disaster Management

**Dr. Vladimir E. Gershenzon,**

Director General

R&D Center ScanEx, 5/22, Rossolimo Str., Moscow, 119021, Russia - [info@scanex.ru](mailto:info@scanex.ru)

R&D Center ScanEx has developed an integral solution for reliable and fast access to Earth observation satellite data for disaster management in Russia. It consists of the universal UniScan™ ground station ([www.scanex.com](http://www.scanex.com)) with a small-size antenna system for receiving various Earth observing data, archiving of local imagery data and processing in near real-time mode. The UniScan™ ground station is capable of receiving data in X-band with a rate of up to 170 Mbps (in one channel) from 14 different international remote sensing satellites, such as Terra/Aqua, IRS, EROS, RADARSAT-1, Monitor-E, SPOT-2/4, LANDSAT-5, Envisat-1 and others.

Relevant satellite remote sensing programs allow acquisition of real-time low-resolution data and detailed identification of objects and processes with the aid of medium- and high-resolution data. We use several types of data in order to design an integrated system of satellite monitoring, such as:

- ✓ Low-resolution (0.25-1 km) TERRA/AQUA data (MODIS satellite) acquired in real-time with the aid of our EOStation program assist with rapid identification of fires, as well as seasonal floods, springtime river ice break and ice movement. These data are analyzed and the final product is made available through our web server (<http://eostation.irk.ru>)
- ✓ Medium-resolution data from satellites SPOT-2/4 (10 and 20 m resolution), LANDSAT-5 (30 m resolution), and IRS (6-56 m resolution), which are available through a web-based catalogue, are used for a detailed assessment of problems and the development of appropriate solutions.
- ✓ Radar data from RADARSAT-1 (8-100 m resolution) allow the detection, regardless of weather conditions, of oil spills, seasonal floods, springtime ice break and ice movement.

The images from SPOT 2/4 and LANDSAT-5 satellites are received in broadcast mode and are actively used for the rapid assessment of disaster impacts. The web-based catalogue service makes it possible to find images or order new ones.

We have also developed a transportable receiving station based on our Uniscan-24 technology for use in regions with poorly-developed infrastructure. The station can be deployed and made ready for use in 1-2 hours.

The integral solution based on fast access to multi-mission Earth observation data for disaster management in Russia has been implemented in the remote sensing centers in Moscow and Irkutsk. It was tested during

the Lena River flood in Siberia in June 2006. The image of the flood-affected areas was received by the UniScan™ ground station in the Irkutsk center from the IRS-1D Indian satellite and was then processed with an archived Landsat-7 image (Fig.1). The resulting flood map was delivered to the regional emergency situation authority in Yakutsk.



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Fig.1. Vitim town in Siberia affected by the Lena River flood in June, 2006. IRS-1D, 6.6.2006 processed with Landsat-7, 28.8.2000 by BaikalInformCenter, Irkutsk. The areas affected by water (including the local airstrip) are coloured in blue.

One of the largely unresolved problems is the issue of acquisition of real-time high-resolution data for disaster regions. The fast response in the above-mentioned case was largely achieved through the advanced programming of the IRS-1D satellite programming for taking images of Siberian sections falling under an existing large-scale forest logging monitoring program.

Agreements between the leading satellite operators and the data receiving centers, aimed at the rapid programming of satellites for data delivery to the direct receiving stations in disaster regions, could lead to a significant improvement in response times.

The MDA's Geospatial Services, RADARSAT-1 operator, is ready for an emergency programming and allows the ground station operator to place a request 29 hours prior to the actual time of acquisition. In some emergency cases with severe casualties and damages, we have received proposals from the satellite operator for express programming and imaging on a cost-free basis. The real value of the fast response imaging was demonstrated during the international satellite imaging campaigns after the devastating tsunami in Asia in 2004 and typhoons in 2005. We hope that a comprehensive

agreement would be incorporated within the Space and Major Disaster Charter.

**Brief bio of presenter (100 words)**

A graduate of the Moscow Institute of Physics and Technology, Vladimir has worked at the Russian Academy of Sciences and defended his PhD in Physics. He is the General Director and co-founder of R&D Center ScanEx ([www.scanex.ru](http://www.scanex.ru)) – the leading Russian company in the remote sensing market. Keenly interested in the application of remote sensing technology to the solution of practical problems, he is an advocate of affordable, decentralized solutions for receiving, processing, and analyzing space information. Vladimir is a co-founder of the nonprofit NGO "Transparent World" ([www.transparentworld.ru](http://www.transparentworld.ru)) established to conduct scientific and applied research projects using satellite imagery in the field of education, environment and tourism.