

# **Innovative laboratory at a university for real-time acquisition of high resolution optical and radar satellite imagery**

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## **Introduction**

The task of increasing the economic competitiveness of any country is not possible without reinforcing the role of the higher professional education, attracting youths to deliberate choice of future profession. Today, the traditional education, as an access to learning, can not keep up with the current requirements of science and industry.

One of the solutions to resolve these problems can be the introduction of Remote Sensing Laboratories or Centers for Earth observation from Space for territories changes monitoring as research and development links in the chain of universities. This will allow the students to master practical skills having an ultra-modern laboratory base.

Traditionally remote sensing centers at universities are equipped with ground stations enabling to receive free data, such as worldwide known AVHRR from NOAA satellites series with resolution of 1,100 m and MODIS from Terra and Aqua satellites with 250, 500 and 1,000 m resolution. Important positive peculiarity of these data is that there are many open and free software tools and many of them can be found in Internet. This opens a wide field for students and researchers to change of knowledge, ideas and new developments investigating AVHRR and MODIS data for global changes on vast territories. But low resolution of these data makes considerable restrictions for their practical applications for more precision changes of local areas of the Earth.

At the same time one who wishes to receive data with middle and high resolution faces with such problems as high price for ground station and expensive telemetry fee. Usually only national large remote sensing centers have a possibility to receive data with middle and high resolution. However, it was a dream for universities...

Since 2009 ScanEx has been exercising the possibility of equipping universities with technologies for receiving Earth remote sensing data of high resolution (up to 1.8 m) in real time. As a result the world universities will be able to effectively utilize the state-of-the-art space technologies in their educational process and scientific research by working with up-to-date satellite data received at their own stations with the footprint of up to 2.5 thousand kilometers in radius.

## **Results and Conclusions**

To date, there are over 20 Remote Sensing Centers/Laboratories operating on UniScan ground stations deployed at the leading universities in Russia, Kazakhstan and Spain.

Contemporary Remote Sensing Laboratory/Center at a university allows to:

- turn the university into one of the world leading education institutions equipped with cutting-edge technology and firmware for Earth observation from space (footprint of ground station is about 12 million square kilometers);
- carry out training and advance training of specialists having skills in remote sensing and GIS, used for decision-making support;

- monitor territories and submit data in support of decision-making of regions and sub-regions.

- monitor sustainability of biomass production

Additionally remotely sensed data received by Remote Sensing Laboratory/Center of a university will allow resolving following practical tasks concerning change detection using different types of remotely sensed data both optical and radar:

- topographic maps updating;

- forest fires early detection and monitoring;

- on/off shore oil spills detection within the oil production and transportation areas;

- forestry monitoring (logging dynamics, logging status);

- agricultural monitoring for crop rotation rules observation and proper arable lands use;

- independent and operational natural disaster damage assessment;

- creation of up-to-date thematic maps of natural objects condition (vegetation, soil cover, areas hazard rate, etc.);

Remote Sensing Centers allowing real-time imagery acquisition from Earth observing satellites within the structure of Universities provides proper environment for innovative education. It delivers the efficient training for scientific and academic and teaching personnel, secure the role of the young professionals in science, education and hi-tech, and maintain the continuity of generations in science and education. Centers stations serve as the basis for Earth monitoring from space providing the training and advanced training to produce the specialists having the state-of-the-art knowledge in Earth Remote Sensing and GIS, as well as the land-use monitoring and geo-data service for the economic operators in such diverse areas as the nature resource management, agriculture (e.g. biomass production sustainability), land property management etc. Currently our proposal of UniScan for universities all over the world allows to receive satellite high resolution optical and radar images, within the footprint of up to 2,500 kilometers in radius. Creation remote sensing centers at universities will lead to a new quality level for education and scientific studies and will enable to make education system in such innovation institutions open to modern research work and economy.

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