



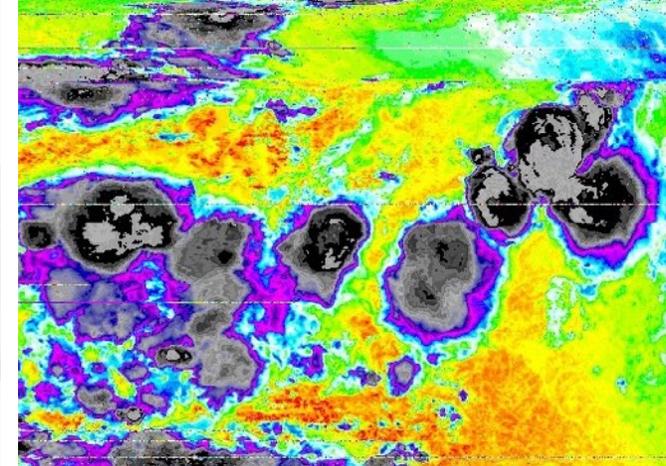
Фонд содействия
ИННОВАЦИЯМ

ФРИИ

ИНЖЕНЕРНАЯ
КОМПАНИЯ
LORETT

LORETT ENGINEERING COMPANY: BRIEF OVERVIEW OF PRODUCTS & PROJECTS

JANUARY 2020



LoReTT Engineering Company

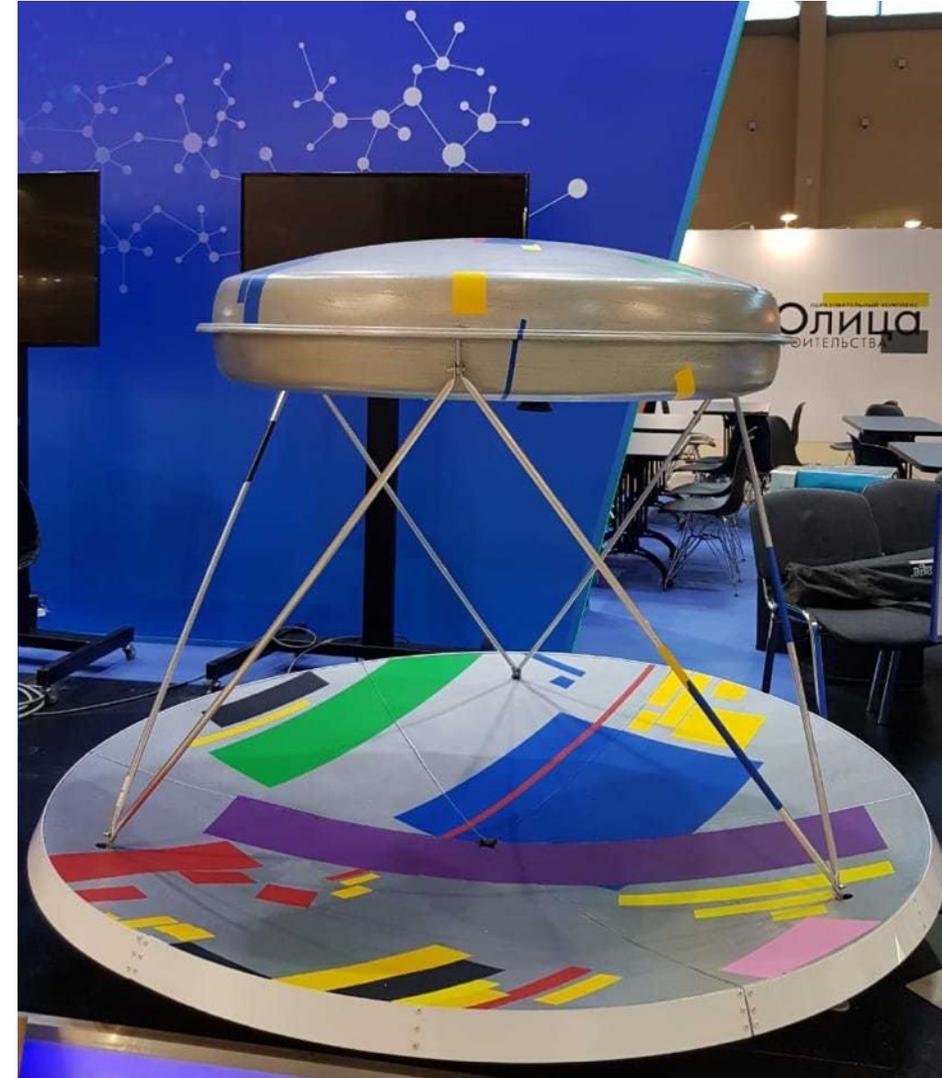
"**LoReTT**" **LLC** is an innovative start-up, engineering company, founded in April 2017 with participation of Internet Initiatives Development Foundation (**IIDF**). Since 23 March, 2018 "LoReTT" LLC is the resident of "**Skolkovo**" **Innovation Center**.

The founders and employees of the company have almost 30 years of experience in the field of creating technologies for receiving, processing and using images of the Earth from Space.

"LoReTT" LLC is the developer of the "LoReTT" Laboratory complex for satellite monitoring, which is the basis of an Interdisciplinary Laboratory "Earth from Space" for additional schooling.

We transform school geography into a modern "living" science with research and innovation components. We offer the subject of the future and technology for the conscious choice of a promising and in-demand profession!

The Interdisciplinary Laboratory "Earth from Space" at the joint of geography, informatics, physics, biology and other subjects will allow to involve schoolchildren in project activities and participation in domestic and international hackathons, contests, exhibitions etc.



About us

The Founders of the «LoReTT» project are Vladimir Gershenzon and Olga Gershenzon, experts in the field of reception and use of remote sensing data from space.

In the early 1990s, Vladimir and Olga created the company «SCANEX», which made a breakthrough in the approach to the use of new technologies for receiving and analyzing data from space – satellite images.

Also they founded the company «SPUTNIX» (creation and launch of Russia's first commercial EO satellite), and NP «Transparent world» (nature conservation and education projects based on Earth observation data).

«LoReTT» (Local Real Time Tool) technology is a natural continuation of the work of Vladimir and Olga on the democratization of access to images of the Earth from space.



Our experience:



Lectures

OUR EXPERTS' LECTURES FOR CHILDREN AND ADULTS ON THEORY AND PRACTICE OF THE EARTH OBSERVATION FROM SPACE

Topics:

- «To see the invisible, to embrace the immense, to know the unknown ...»
- «Images of the Earth from space: myths and reality»
- «From a balloon to video from space. A brief history of satellite imagery»
- "World of modern satellites»
- «How satellites survive?»
- «Receiving and processing a signal from a weather satellite»
- «How to «catch» a satellite?»
- «Space imagery and geospatial data in project activities of schoolchildren» (seminar for teachers and mentors)



Master classes

DEVELOPMENT OF PRACTICAL SKILLS IN WORKING WITH IMAGES OF THE EARTH FROM SPACE AND GEOSPATIAL DATA

- Art master class «Images of the Earth from space»
- «Space Fire Unit»
- «Find white on white»
- «Black spots of our planet – from dump to dump...»
- «Sinking Cities: Past, Present, Future»
- «Sea at risk»
- «In unknown countries, clouds live ...»
- «Space imagery for environmental monitoring and management decisions»
- «Rainforest from space»
- «Satellite orbit calculation»
- «Forest cuts»
- «Land use: view from space»



Art master class «Images of the Earth from space»



Participants of the art master class «Images of the Earth from space» – 10 years old students of Educational Center #7 of Tula, Russia

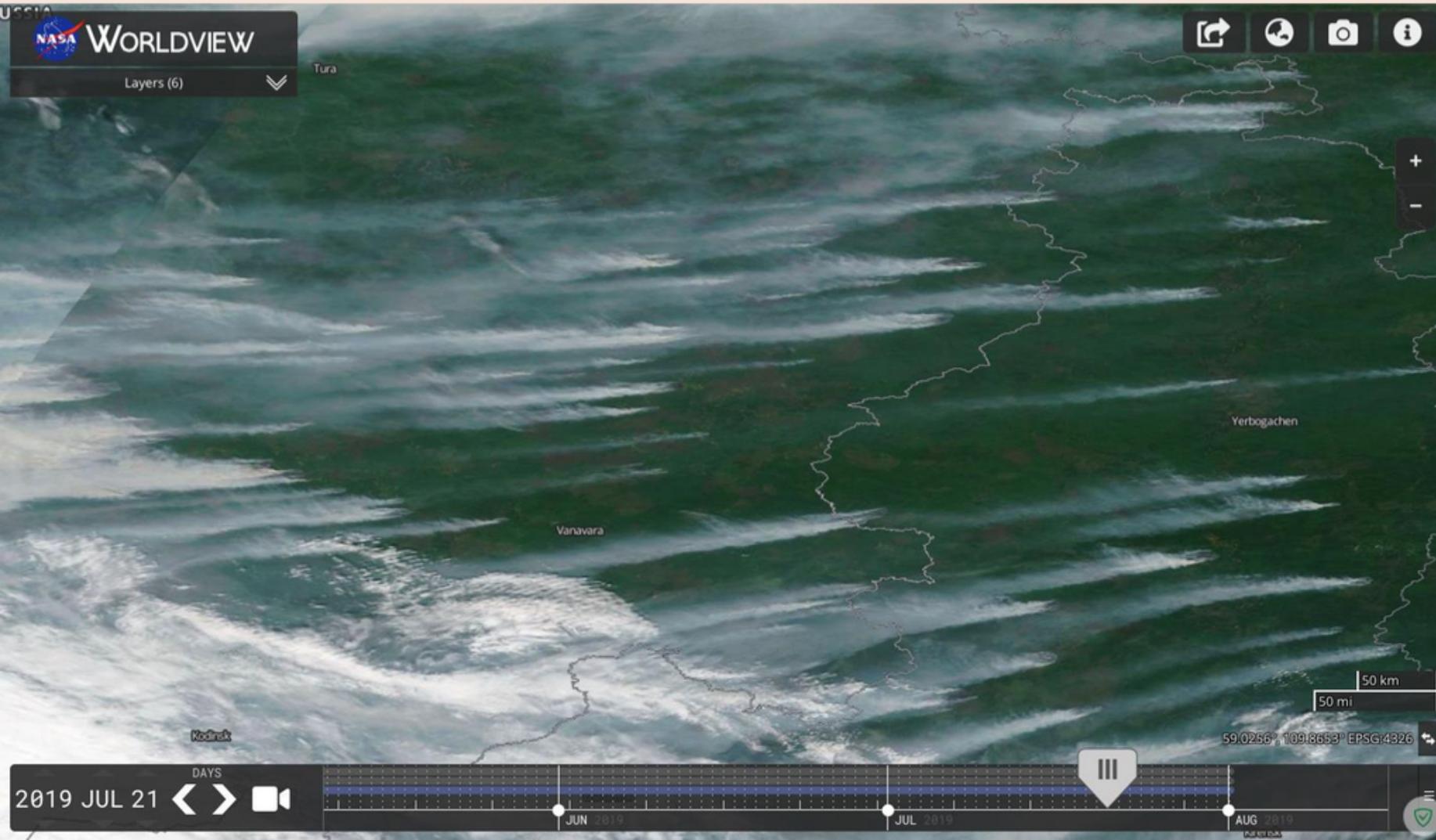


Gallery of the results of the master class.
Educational Center #7 of Tula, Russia

Art master class «Space Fire Unit»



Master class results: participants will create a map of fires and/or burned out forest areas for the area of interest, and compare it with neighboring territory, as well as with the situation a year ago in both areas.



Fire situation in the Krasnoyarsk Territory (Tura, Vanavara, Kodinsk), MODIS data.

Acquisition date: July 21, 2019.

Source:
worldview.nasa.gov



Master class «Find white on white»

Description: a master class on a crowdsourcing project to search for harp seal whelping grounds and seal pups, massively dying during ice pilotage in the White Sea.



The relevance of the work is due to the need for a set of reference areas of highly detailed satellite imagery to develop automated recognition of indirect signs of harp seals' whelping grounds.

Thanks for the original name to the participants of the All-Russian contest "Belki-2019" from Voronezh

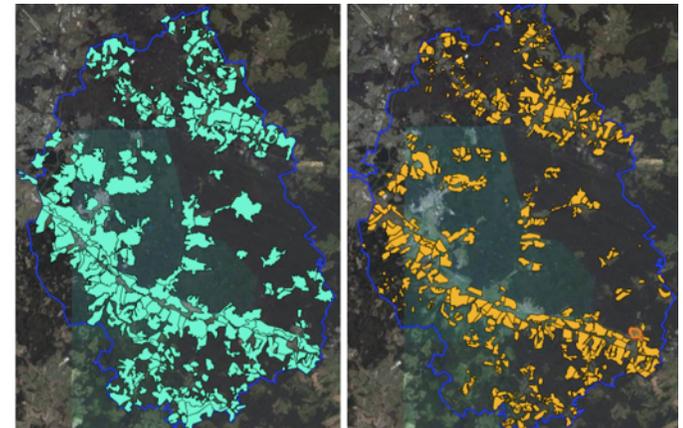
Express projects

PROMPT DEVELOPMENT OF THEORETICAL MATERIAL AND THE IMPLEMENTATION OF A GROUP ENGINEERING OR RESEARCH PROJECT

Engineering and research express projects based on technologies for receiving, processing and analyzing Earth images from space and geospatial data are carried out by groups of 12-18 years old students accompanied by tutors during short-term educational events, intensives, project shifts based on schools, universities and other institutions.

On average, the implementation of an express project requires from several days to 2-3 weeks, depending on the chosen topic and a number of other conditions.

Example: [Land Use in Kaluga Region: View from Space](#) (IRS-2019).



Engineering Training

MAKE SATELLITE DATA RECEIVING STATION UNDER THE GUIDANCE OF OUR ENGINEERS

As part of the training, the teams of participants assemble stations for receiving satellite information on the basis of «Lenticularis» complex, configure them and receive data from passing weather satellites in real time at the station.

In the case of successful assembly and tuning of stations, teams should receive several images of the Earth from space with the possibility of their subsequent thematic processing. If the event lasts longer than one day, one part of the data reception can take place during working hours, another part – in the stand-alone operation of the stations at night.

The training is aimed at high school students and adults who are fond of technical creativity, in particular, programming, electronics and design, as well as astronomy and physics.

If several stations are planned to be assembled, then competitions between teams are possible on the quality of the received signal, which directly depends on the assembly and tuning. The quality of the received data and the success of the reception are evaluated by an expert jury. The competition regulations and the protocol for evaluating the received images have been developed.



Creative weekend

NEW IDEAS FOR THE WHOLE FAMILY, FRIENDS OR WORK TEAM

Edutainment ("learning as entertainment") is a modern educational and entertaining format for participants of any age and occupation, which allows you to spend free time in a pleasant company with benefit and pleasure, gain knowledge and develop skills in new areas.

Educational events on Edutainment technology are held in a relaxed atmosphere in a park, museum, office, cafe, etc. You can take part in them with the whole family, a company of friends or a team.

Looking for fresh ideas for corporate parties? Competitions in assembly of stations for satellite data reception, real-time acquisition of the Earth images from space and a satellite imagery quiz will be a fascinating addition or alternative to a classic evening in a restaurant or country club.



Events and Festivals

FESTIVALS, REGIONAL SEMINARS, BUSINESS PROGRAMS BASED ON YOUR ORGANIZATION

We offer a modular event format for working with images of the Earth from space, the distinguishing feature of which is that you think up the course of events and the schedule. You can choose ready-made, liked blocks from the list of existing ones or offer your own theme, which we, if possible, will translate into a new module, which will be available to other participants in the future.

Communication within the framework of our festival or, in the case of a more traditional approach, a regional seminar is an excellent tool for training and inspiration and an occasion to create something impressive based on the knowledge gained.

The basic block of the event is the engineering and design training “Create a digital satellite meteorology laboratory yourself”. An introductory lecture on “How to «catch» a satellite?” Is required. The remaining events are modular and can be selected from the proposed list, which is divided into two parts: lectures and master classes. Some restrictions on the age of participants are prescribed in the modules and are associated with the school curriculum.

Special training for participants is not needed!



Thematic shifts in children's camps

LEARNING NEW SKILLS AND KNOWLEDGE WHILE RELAXING

Thematic shifts in children's camps under the guidance of our experts are an opportunity to get acquainted with the world of space technology, broaden your horizons, pump hard & soft skills and implement impressive projects based on images of the Earth from space.

Examples of completed projects:

- [Participants of the Preactum school cup at the "Orlyonok" Center \(Tuapse\) have developed a model of effective business based on satellite imagery analysis technologies and public mapping services](#)
- [Students developed a space data receiving station at "Sirius" Educational Center \(Sochi\)](#)
- [Participants of the International Research School \(IRS-2019\) studied the features of land use in the Kaluga Region using satellite imagery](#)



LoReTT – Local Real Time Tool

X-BAND RECEIVING STATION FOR SATELLITE MONITORING

Educational laboratory complex for satellite monitoring "LoReTT" is designed to receive, demodulate, decode, record and process digital information, transmitted from spacecrafts in low Earth orbits via X-band radio channels with the range of demodulation speeds 0.2 - 100 Msps (with option up to 350 Msps).

The Complex provides a stable signal reception from the Terra, Aqua, Suomi NPP, JPSS satellites (in Direct Broadcast (DB) mode), and also from FengYun-3A/3B/3C, EROS-B, Kanopus-V, and many others.

The Complex provides automatic data recording on computer disk and receiving images from satellites in radius about 200 km from a point of Complex location.

"LoReTT" Complex can be introduced into educational and innovative projects in three directions:

- complex-constructor for engineering education;
- complex as a basis for an interdisciplinary project laboratory, basic tool for providing access to very high spatial resolution data in real time;
- complex as a tool for developing services and / or mobile applications. It can function for centers of collective use or through domestic and international hackathons.



«Lenticularis» Laboratory Complex for Receiving Data from Meteorological Satellites

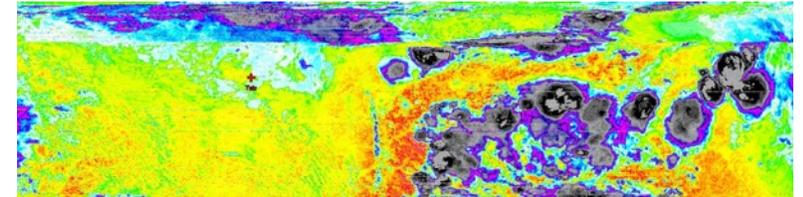
L-BAND SATELLITE DATA RECEIVING STATION

Laboratory complex for receiving data from meteorological satellites «Lenticularis» is designed to receive, demodulate, decode, record and process digital information, transmitted from meteorological spacecrafts in low Earth orbits via L-band radio channels. It enables to receive images from the following satellite series: Meteor-M #2, NOAA, MetOp, FengYun-3.

The Complex provides receiving images from satellites in radius about 400 km from a point of its location and automatic data recording on computer disk.

«Lenticularis» can be implemented in educational and innovative projects in the following areas:

- construction complex for engineering education;
- the complex as the basis of the design laboratory for the development of a number of competencies in the space industry and hydrometeorological support.



Consulting

CONSULTATIONS OF OUR EXPERTS ON THE APPLICATION OF TECHNOLOGIES FOR THE RECEPTION, PROCESSING AND ANALYSIS OF IMAGES OF THE EARTH FROM SPACE

The founders and employees of «LoReTT» engineering company have 30 years of experience in the industry of creating technologies for receiving, processing and using Earth images from space, they are experts in the field of Earth observation systems and their applications and are ready to provide information and consulting support to your projects on a wide range of issues:

- features of the market of technologies and remote sensing data;
- spheres of application of technologies and remote sensing data;
- industry development prospects;
- etc.



«On Duty for Planet» Program

PROGRAM OF TECHNOLOGY CONTESTS AND PROJECTS FOR STUDENTS BASED ON THE EARTH OBSERVATION FROM SPACE

«On Duty for Planet" is a program of technological competitions and projects for school students of 7-11 grades based on satellite imagery of Earth. Projects and competitions of the program help to involve students in scientific and technical activities in the field of astronautics, to train through the creation of their own developments, working with experts and implementing their ideas. The program is carried out as part of the Kruzhok Movement roadmap of the National Technology Initiative.

Participation in the “On Duty for Planet” program enables to order satellite imagery of the area of interest from the Russian high-resolution satellite “Aist-2D” – thanks to the support of the Innovation Promotion Fund.

To do this, you can apply for participation in one of the existing projects or offer your own project based on the analysis of images of the Earth from space.



onduty4planet.com

NTI Contest: «Analysis of satellite images and geospatial data» Profile

National Technological Initiative Contest is the all-Russian annual school student team tech competition for school students (8-11 grades), which has been held in partnership with the largest Russian universities and leading technology companies since 2015.

One of the 28 profiles of the NTI contest from the academic year 2018/19 was the profile “Analysis of satellite images and geospatial data”. Profile developers are «LoReTT» Engineering Company, ANO «Transparent World», and Ecoburo «GREENS».

Simultaneously with the contest, online courses on the Stepik platform are opened for participants, which help to go beyond the school curriculum and gain additional knowledge for solving the contest problems.

Winners and prize-winners of the NTI contest receive bonuses upon admission to the organizing universities (more details on the ONTI website: nti-contest.ru/english/).



MODIS Real Time

PROVIDING METEOROLOGICAL DATA ON CLOUDINESS THROUGH THE MODIS / TERRA AND AQUA DATA SERVICE IN REAL TIME

"LoReTT" LLC provides users with initial data of space imagery and information products, obtained from MODIS radiometer data (Terra and Aqua spacecrafts), using standard algorithms for coordinated areas of interest:

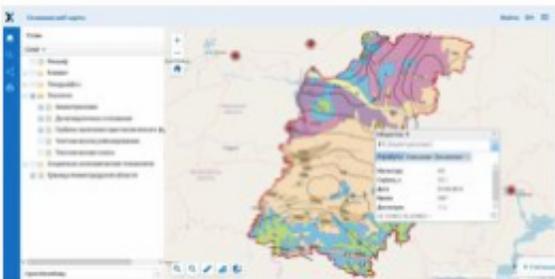
- cloud mask (MOD35);
- data on the temperature of the upper edge of the cloud cover (MOD06CT).

"LoReT" LLC provides access to online data in 24/7 mode by an agreed login and password using the FTP protocol. Information is provided to users in HDF4 file format. The contents of the fields, their encoding and formatting within the HDF are described in the NASA documentation for respective products. "LoReTT" LLC provides users with a description of the format of the products. Approbation of the method and verification of the results were carried out jointly with the Institute of Radar Meteorology (**IRAM**), St. Petersburg, Russia.



Software

NEXTGIS WEB, NEXTGIS MOBILE, NEXTGIS QGIS SOFTWARE PROVIDED BY PARTNER COMPANY «NEXTGIS»



NextGIS Web

Server GIS
for storage, regulation
of access to geodata
and services



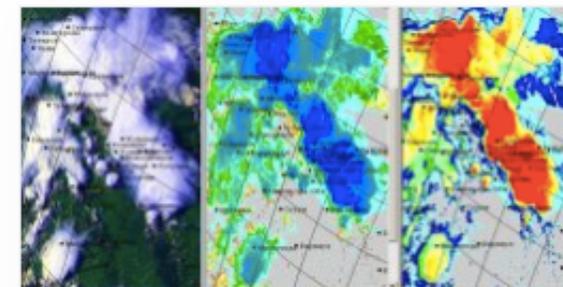
NextGIS Mobile

Mobile application
(Android) with unlimited
data layers, editing and
customizable input
forms



NextGIS QGIS

Full-featured desktop
GIS for data creation,
analytics, map creation



MeteoLenta®

A software package
for processing satellite
digital meteorological
information on topics of
hydrometeorological and
environmental monitoring

Educational materials

TO HELP STUDENTS AND MENTORS IN THE PREPARATION OF PROJECTS IN THE FIELD OF WORK WITH IMAGES OF THE EARTH FROM SPACE AND GEOSPATIAL DATA

To prepare projects in the field of working with satellite imagery and geospatial data, «LoReTT» engineering company and «Transparent World» Autonomous Non-Commercial Organization, the creators and developers of the “Analysis of satellite imagery and geospatial data” NTI contest profile, recommend a list of information sources that you can download for free on [eng.lorett.org](http://lorett.org) website in the «Products and projects» section: <http://lorett.org/services#ul-id-177-34>

Examples (in Russian):

- our [course "Modern technologies in the teaching of geography"](#) on the Foxford.ru online school platform
- [Lectures by Vladimir Gershenzon](#) on the platform of NTI University
- [10 training webinars](#) on our YouTube channel





Thank you for your attention! We invite you to cooperation!

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