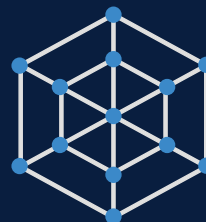
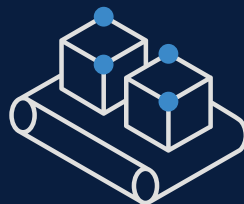


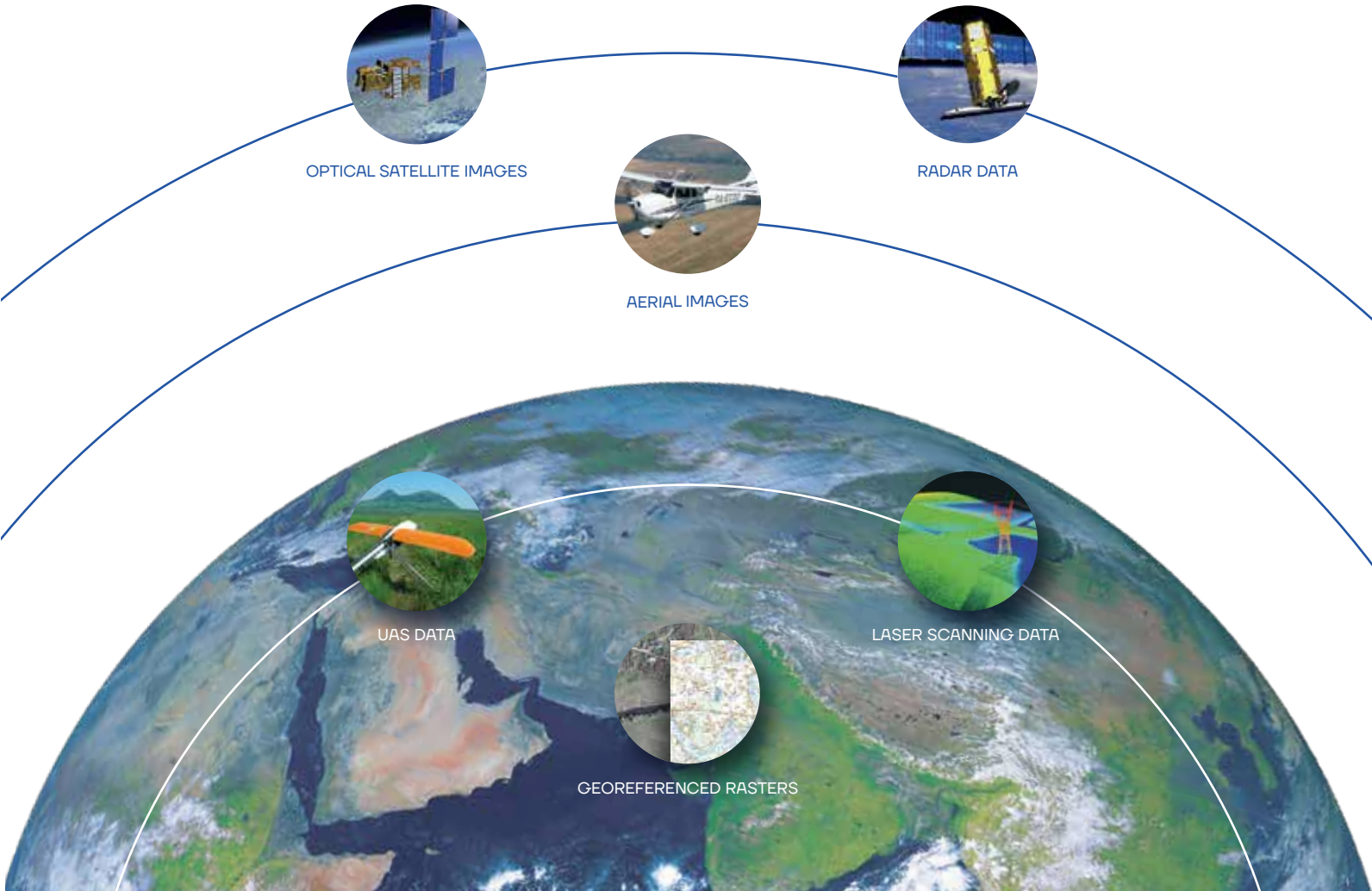
PHOTOMOD



Comparative characteristics of PHOTOMOD software products

Functionality	DPW PHOTOMOD	PHOTOMOD Lite	PHOTOMOD Conveyor	PHOTOMOD UAS	PHOTOMOD AutoUAS	PHOTOMOD GeoMosaic
Description	Full-featured digital photogrammetric workstation	Free program to get acquainted with DPW PHOTOMOD	Automated program for processing remote sensing data on clusters	Full-featured DPW for UAS data processing	Automated program for UAS data processing	Program for creating mosaics and stitching rasters
Supported data types	Spaceborne scanner imagery, UAS data, professional aerial cameras, laser scanning	Spaceborne scanner imagery, UAS data, professional aerial cameras, laser scanning	Spaceborne scanner imagery, UAS data, professional aerial cameras, laser scanning	UAS data, laser scanning	UAS data	Georeferenced rasters
Network configuration	+	–	+	–	–	–
Modular configuration	+	–	–	–	–	–
Stereovectorization	+	+	–	+	–	–
Manual correction of processing results	+	+	–	+	–	+
Error report	+	+	+	+	+	–
Output products:						
True orthophoto	+	+	+	+	+	–
Orthophotomosaic	+	+	+	+	–	+
DSM	+	+	+	+	+	–
DTM	+	+	+	+	–	–
3D model as a point cloud	+	+	+	+	+	–
3D model as TIN	+	+	+	+	+	–
Vector 3D model	+	+	–	+	–	–
2D vectors / contours	+	+	–/+	+	–	+/–
Limitations on data volumes	No	Limitations on the size and number of vector and raster data	No	Size of UAS images not more than 100 Mp	Size of UAS images not more than 100 Mp	No

Functionality	PHOTOMOD Radar*
Description	Program for radar data processing
Supported data types	SAR data
Network configuration	–
Modular configuration	+
Stereovectorization	–
Manual correction of processing results	+
Image enhancement	+
Image analysis	+
Radargrammetry	+
Interferometry	+
Maritime applications	+
Georeferencing	+
Quality assessment	+
Neural network processing of radar data	+



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RACURS

Racurs company has been successfully working in the world geoinformatics market since 1993. Our company was one of the first firms in the Russian and world markets to offer the commercial digital photogrammetric workstation (DPW) PHOTOMOD for personal computers. Today, PHOTOMOD is the most popular digital photogrammetric software in Russia, and it is successfully operated in 80+ countries worldwide.



80+

countries

3,500+

licenses



1,200+

corporate users

12,000+

work places



PHOTOMOD™ Photogrammetric Platform

REMOTE SENSING DATA-BASED CARTOGRAPHIC PRODUCTION SYSTEM

PHOTOMOD photogrammetric platform is a complex solution that allows to build a unified production workflow for photogrammetric processing of RSD. PHOTOMOD platform is based on algorithms and methods developed by JSC RACURS since 1993.

PHOTOMOD Key Characteristics:

Scaling

PHOTOMOD photogrammetric platform does not limit a number of users. The system can be successfully used both by a single specialist in a small company and by dozens of employees at large cartographic enterprises.

Configuration

PHOTOMOD software components can be deployed in various computing environments: from laptops to clusters, from local networks to global cloud services.

Customization

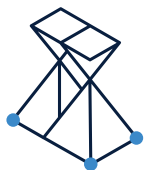
PHOTOMOD architecture, a high degree of automation and completely inhouse development allow to create interactive services and application solutions to meet the needs of clients from different industries.

Integration

The unity of PHOTOMOD software components allows to build technological chains for remote sensing data processing in the most optimal way, saving time and labor costs.

The project "Development, implementation, and technical support of the **PHOTOMOD** software solution for photogrammetric and radiometric processing of Earth remote sensing data" has become the winner of the **BRICS Solutions Awards** International Contest in the Sky, Space and Communication Technologies nomination.



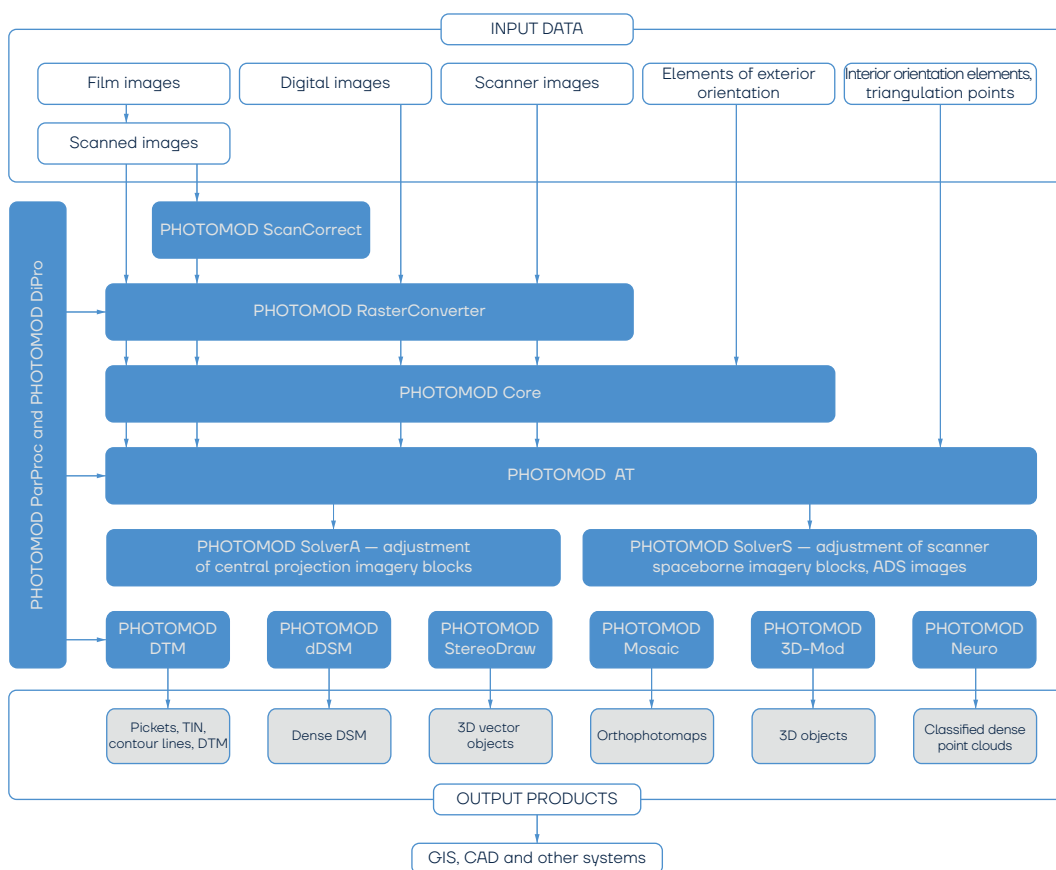


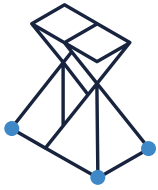
PHOTOMOD DPW

DIGITAL PHOTOGRAMMETRIC WORKSTATION FOR PROCESSING ANY TYPE OF REMOTE SENSING DATA

Digital photogrammetric workstation PHOTOMOD allows to solve a whole range of tasks from data collection for building phototriangulation networks to creation of 3D terrain models.

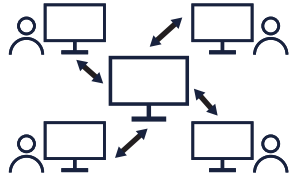
A flexibility of the system lies in its modularity. Each module of the system is designed to perform only necessary operations at the appropriate stage of project processing, thus achieving optimal customization of the system configuration for the specific production.





PHOTOMOD DPW

System Configuration



Network

Unlimited number of workplaces to solving industry-wide tasks



Local

Full-featured DPW for 1 workplace



Cloud

Available in cloud services

Licensing Options



Temporary or Perpetual

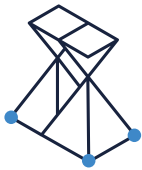
Optimal use of working time



Hardware security key, software security key or internet access

Operating Systems





PHOTOMOD DPW

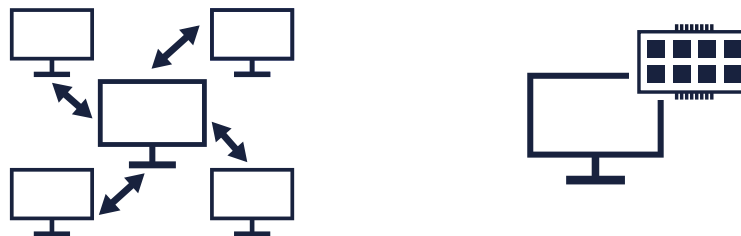
Automation

Photogrammetric operations	Automation level
Phototriangulation	●
Construction of DTM, DSM	●
Construction of point clouds	●
Construction of contour lines	●
Orthorectification	●
Mosaic creation	●
3D modeling	●
2D/3D vectorization	●
Classification of point clouds	●

- Full automation
- Partial automation

PHOTOMOD DPW

Distributed Processing



Distributed processing in PHOTOMOD provides a possibility to parallel executing computational tasks using several processor cores and/or several local network computers. This improves performance when processing large volumes of aerospace data.



PHOTOMOD GeoMosaic

SIMPLE AND POWERFUL SOFTWARE SOLUTION FOR STITCHING GEOREFERENCED IMAGES

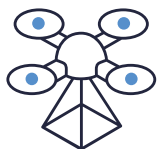
The purpose of the program is to create a single, seamless, color-balanced mosaic of high geometric accuracy from georeferenced raster images. PHOTOMOD GeoMosaic supports work with georeferenced digital raster images: aerial images, pushbroom satellite imagery and maps. PHOTOMOD GeoMosaic does not require any additional software to operate.

Main Functions



Georeferencing of images; mosaic construction from large volumes of georeferenced, orthorectified images; image enhancement; cutlines construction; adding control points to refine geodetic reference.

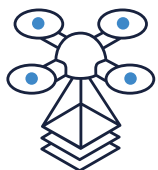




PHOTOMOD UAS

FULL-FEATURED PHOTOGRAMMETRIC SYSTEM FOR PROCESSING UAS DATA

PHOTOMOD UAS allows to process UAS data to produce following types of photogrammetric products: DTM, DSM, 3D-vectors, orthophotomaps. Advanced processing settings, detailed reports on the accuracy of block adjustment and aerotriangulation, professional stereo mode and the ability of manual adjustment at all stages allow to obtain high-quality output products even in difficult shooting conditions.



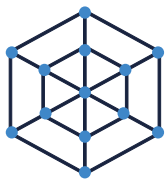
PHOTOMOD AutoUAS

FULLY AUTOMATIC PROCESSING OF UAS DATA

PHOTOMOD AutoUAS program is designed for fast, fully automatic processing data obtained by UAS.

The program's output products are following: digital terrain models (DTM), true orthophotomaps (TrueOrtho), point clouds and two types of 3D models (DTM + TrueOrtho or Textured 3D-TIN).





PHOTOMOD

Neuro

POINT CLOUD PROCESSING USING NEURAL NETWORKS

PHOTOMOD Neuro allows to automatically classify point clouds and identify objects of the following types: land, vegetation, buildings, cars, asphalt, street furniture. The software is delivered with a neural network trained to recognize these objects.

The user is granted with a possibility to train the neural network on her own objects for their automatic classification, as well as with a possibility to create her own training samples for semi-automatic classification.

PHOTOMOD Neuro consists of three following blocks.

Automatic Classification Block

Classification of point clouds using the trained neural network.

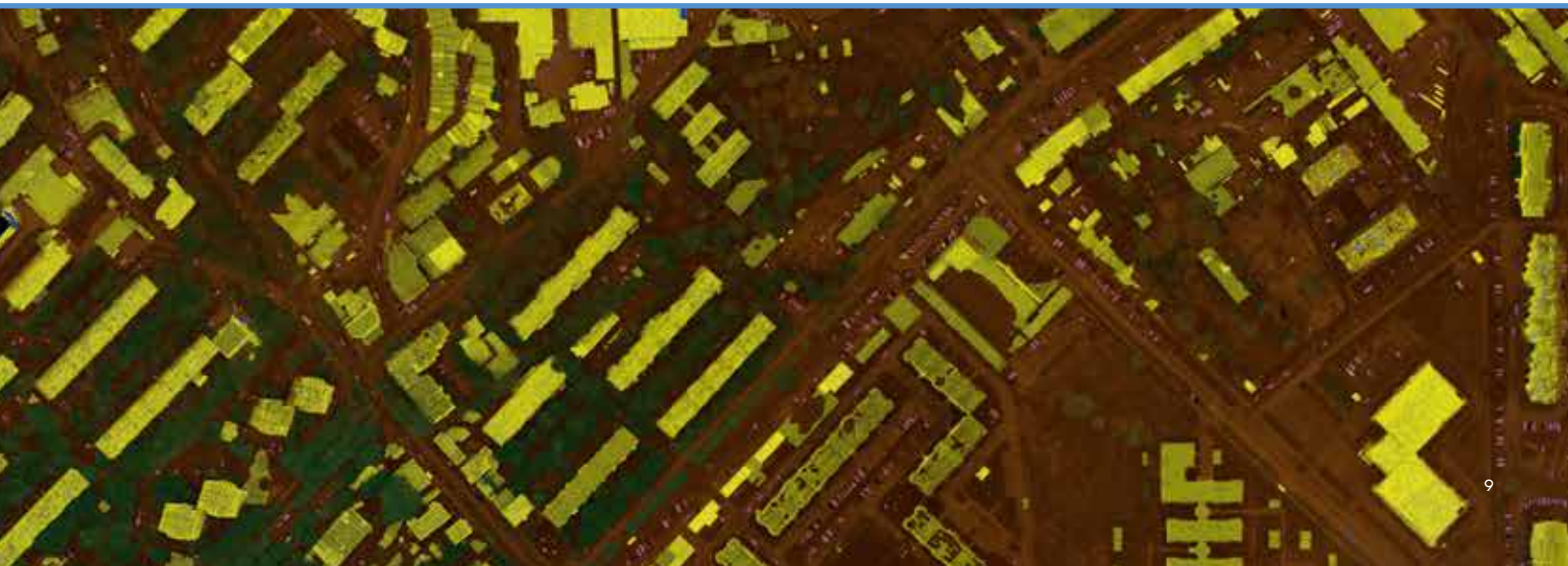
Training Block

Creating a new neural network model for classifying new types of objects.



Semi-Automatic Classification

Creating training samples for the training block. Editing results of automatic classification.





PHOTOMOD Radar

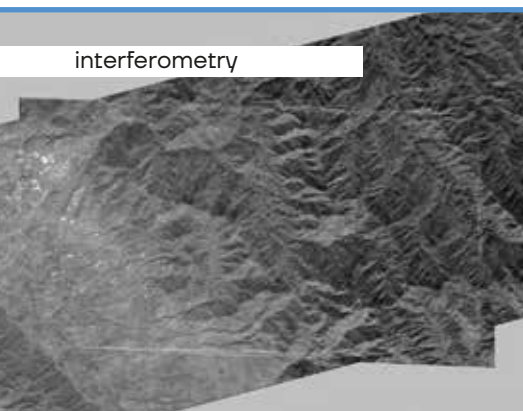
PROCESSING DATA OBTAINED BY SYNTHETIC APERTURE RADARS (SAR)

PHOTOMOD Radar is designed to process Earth remote sensing data received from the most known satellites equipped with SAR, such as: TerraSAR-X, KOMPSAT-5, ICEYE, Sentinel, Capella, ALOS, RADARSAT, COSMO-SkyMed, Kondor, Gaofen-3, Chaohu-1, HiSea-1, and others, - and to create high-level processing products based on them.

The user is granted with an access to radargrammetry, interferometry, initial data quality assessment, image enhancement and analysis tools, marine applications, and georeferencing utilities.



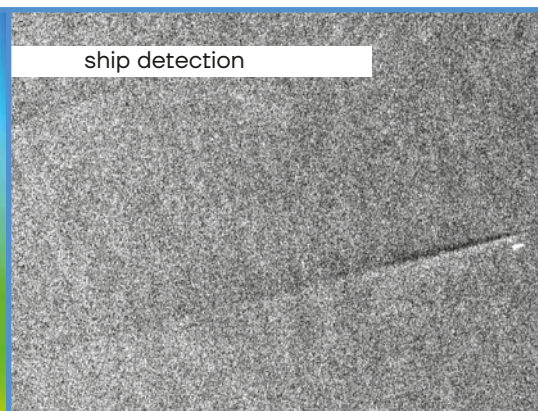
The use of radar images makes it possible to obtain the required measurements at any time of day and under any weather conditions.



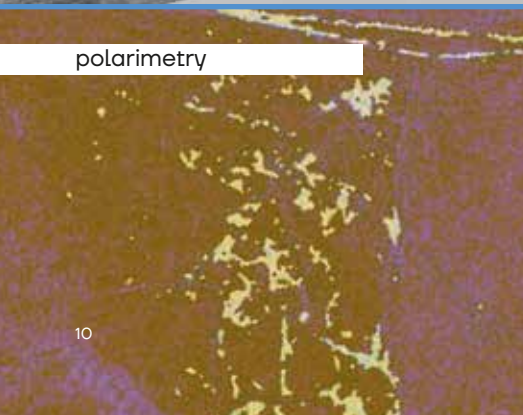
interferometry



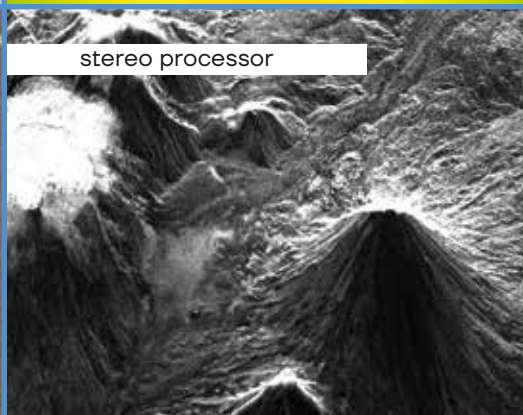
sea waves analysis



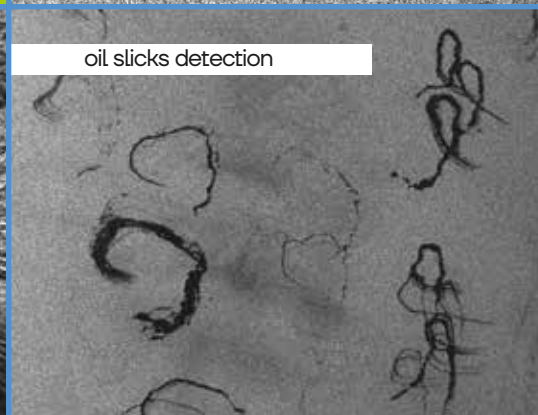
ship detection



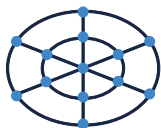
polarimetry



stereo processor



oil slicks detection



PHOTOMOD Radar Neuro

NEURAL NETWORK PROCESSING OF RADAR DATA

PHOTOMOD Radar Neuro allows to automate a process of searching for and classifying objects in radar images by using neural networks and correlation algorithms.

PHOTOMOD Radar Neuro consists of five blocks.

Annotating Block

Annotating radar images to generate training samples for a neural network based on real data.

Training Block

Neural network training, during which the network identifies complex dependencies between input and output data and performs generalization.

Detection Block

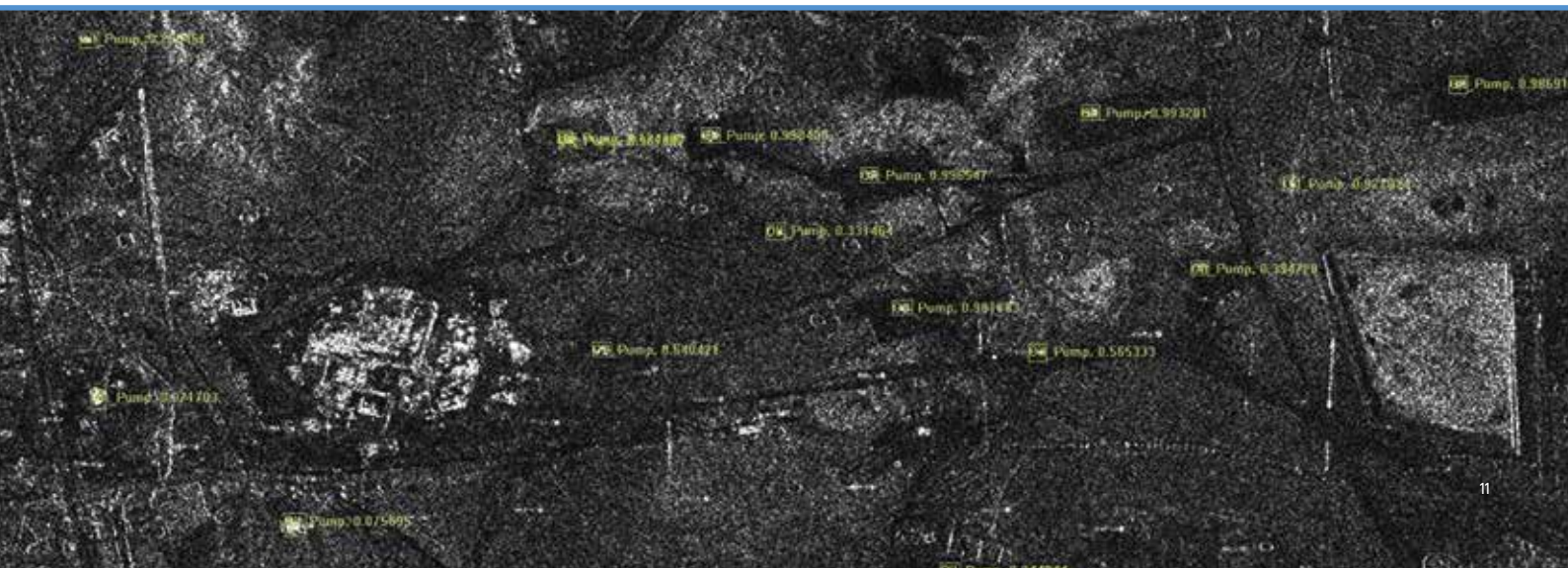
Detection of objects present on an amplitude or complex radar image (or series of images) using a neural network method and determination of their geographic coordinates.

Patterns Maker

Formation of synthetic reference pattern images of objects.

Patterns Recognition

Analysis of radar images and search for objects of interest based in their reference images using the correlation method.





PHOTOMOD Conveyor

AUTOMATIC PROCESSING OF REMOTE SENSING DATA ON HIGH-PERFORMANCE CLUSTERS

PHOTOMOD Conveyor — an automated high-performance solution for processing large volumes of remote sensing data.

Input data: pushbroom satellite imagery, professional aerial survey data, UAS data.

Output data: DTM, DSM, (un)classified point clouds, orthophotomosaic, 3D models, TrueOrtho.

High performance is achieved by using distributed processing system optimized for powerful clusters. The program provides interactive access to the full functionality of PHOTOMOD.

Types of Licenses

License	Max number of cores	Number of interactive places
PHOTOMOD Conveyor Standard	72	1
PHOTOMOD Conveyor Optimum	144	1
PHOTOMOD Conveyor Pro	Unlimited	1



PHOTOMOD GeoCloud

CLOUD PLATFORM PROVIDING REMOTE ACCESS TO PHOTOMOD SOFTWARE FUNCTIONS VIA RDP PROTOCOL

PHOTOMOD GeoCloud — a full-featured cloud photogrammetric station with a convenient system for selecting computing power and usage time. Suitable for realization of research and commercial projects on photogrammetric data processing. It can be used for educational purposes, when the limitations of demo version are critical.

The following products are available to work in the cloud: PHOTOMOD, PHOTOMOD UAS, PHOTOMOD GeoMosaic, PHOTOMOD Radar, PHOTOMOD Radar Viewer, PHOTOMOD GeoCalculator.





PHOTOMOD

Lite

FREE SOFTWARE SOLUTION FOR TRAINING STUDENTS AND PERFORMING SMALL TESTING PROJECTS

PHOTOMOD Lite is a free software product for photogrammetric processing remote sensing data. The program is intended for familiarization with the capabilities of PHOTOMOD, carrying out test projects with user data and is not intended for commercial use.

The main difference between the Lite version and the full-featured software package is the limitation on the maximum possible number of used images, vectors, pickets, structural lines, nodes, etc. The Lite version allows you to process small photogrammetric projects related to the creation of orthophotomaps, DTM and vector maps.

PHOTOMOD Lite is an excellent solution for training photogrammetric engineers, teaching students or carrying out scientific and educational projects.

Lite version includes following demo projects:

Aerial Survey RC-30	2 strips with 3 images (2 stereo pairs) in each strip, 153.503 mm focal length, image scale 1:9400
Aerial Survey DMC	2 strips with 3 images (2 stereo pairs) in each strip, 120 mm focal length
Aerial Survey UltraCamX	2 strips with 3 images (2 stereo pairs) in each strip, 100.5 mm focal length
UAS data	40 images with SONY RX1, 24 Mpix, 35 mm focal length, 7.5 cm pixel size (GSD)
GeoEye-1 spaceborne survey	GeoStereo product, RGB, 8 bits, GeoTIFF, 0.5 m pixel size



Available for downloading in your personal profile after registration at <https://en.racurs.ru>

Useful Applications



PHOTOMOD Radar Viewer

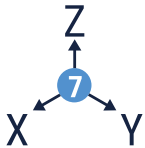
Free version of PHOTOMOD Radar for viewing, importing, exporting radar images obtained from following satellites: Sentinel-1, KOMPSAT-5, ICEYE, Capella, TerraSAR-X, ERS-1/2, Radarsat, Almaz-1, SIR-C/X and others, - in USGS, GTOPO30, GeoTIFF, Tiff, BMP formats.



PHOTOMOD GeoCalculator

Free software for points coordinates transformation.

PHOTOMOD GeoCalculator includes databases of reference systems used in the world and in Russia (approximately 1500 reference systems). User can also add reference systems on his own by specifying: units (coefficient for transformation to meters or radians); ellipsoids (semi-axes or flattening); datums (parameters for transformation to WGS 84); map projections (parameters for the selected projection).



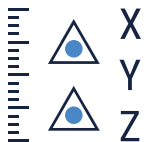
Calculation of 7 parameters

The program allows to determine transformation parameters from coordinate system of the 1st dataset to coordinate system of the 2nd dataset based on at least 3 identical points in each one. The transformation parameters include scale, 3 angular elements of rotation and 3 shifts.



Calculation of projection parameters

The program allows to calculate unknown parameters of Gauss-Kruger projection. The input data for the program include values of the Latitude-Longitude coordinates of the point and X,Y coordinates with unknown values of the longitude of the axial meridian and parallel transfers.



Direct Georeferencing

The program calculates approximate estimates of the accuracy for measurements on the ground from images based on the known shooting geometry (flight altitude, overlap, camera parameters) and the specified accuracy of exterior orientation (EO) parameters.



Technical Support

Racurs' technical support specialists provide professional consultations by phone, email or remotely, connecting to your computer.

Education

Training type	Duration
Webinars, incl. on demand	1-2 hours
DPW PHOTOMOD	5 days
PHOTOMOD UAS	4 days
PHOTOMOD Radar	5 days

Training course can be held at customer's place provided that the group consists of at least 3 people. The conditions for carrying out such courses have to be agreed additionally.

Training based on the customer's production data is possible.



Remote Sensing Data Processing Services

Racurs' production department is provided with qualified personnel having a vast experience in performing various projects in remote sensing data processing.

We perform the whole range of photogrammetric works: pre-project consulting; supply of remote sensing data; construction and adjustment of phototriangulation networks; construction and processing of DTM and DSM; construction of orthophotomosaic; 3D stereovectorization; 3D modeling; creation and updating of digital maps based on space and aerial survey.

Our Advantages:

- high qualification and vast experience of our operators;
- multiple control at all technological stages;
- speed and quality of work, due to high productivity and technical equipment;
- individual approach to each project;
- the ability to adapt processing technology to specific customer requirements.



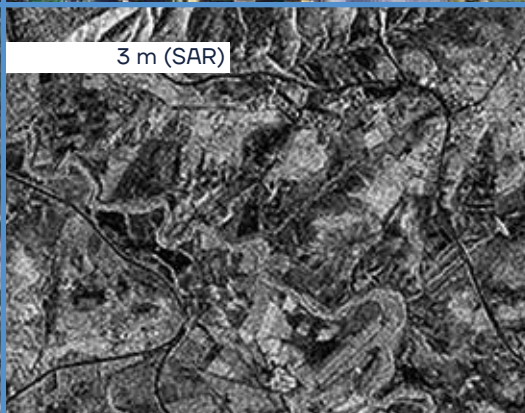
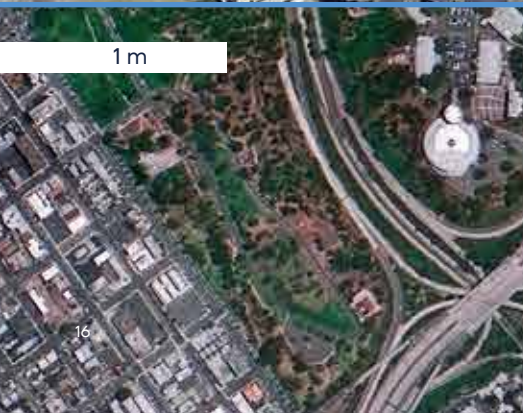
Remote Sensing Data

The use of remote sensing data is the most effective method of obtaining spatial information about objects. Remote sensing data are objective, clear, and the cost of obtaining information about the area under study is significantly lower than the cost of a ground survey.

Racurs is an official dealer of JSC Russian Space Systems , Space-Rocket Centre PROGRESS (RKTs-Progress) and other leading remote sensing operators in Russia and China.

Racurs supplies a wide range of optical and radar data, and offer a full range of services related to it:

- ordering a new tasking for the area of interest or selecting images from the archive;
- supplying software for RSD processing;
- implementing production projects on RSD processing.





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