19th International Scientific and Technical Conference
FROM IMAGERY TO DIGITAL REALITY: ERS & Photogrammetry

Photogrammetric technologies PHOTOMOD — effective solutions for spatial data acquisition

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Russia

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RACURS

Racurs

Racurs company's business mission *is to provide the world-wide geospatial community with advanced and cost-effective digital photogrammetry solutions and services for creation of wide range of output products from the available remote sensing data.*

Racurs business activities:

- PHOTOMOD development and further integration into Russian and international markets;
- Photogrammetric production services using both airborne and satellite imagery;
- R&D in the field of RSD processing software, methods, and algorithms;
- Remote sensing data distribution in Russia and the CIS countries.

Sustaining member

Certified Company

Member of International Industrial Advisory Committee (I2AC)

Racurs today

- Employees over **50** people
- 60 partners across **45** countries
- More than **900** user's companies over the world (**80+** countries)
- Almost **10.000** PHOTOMOD workplaces
- More than **100.000** delivered satellite images for processing
- More than **17.000.000** km^2 digital maps, DEM and orthophotoplans

PHOTOMOD Software

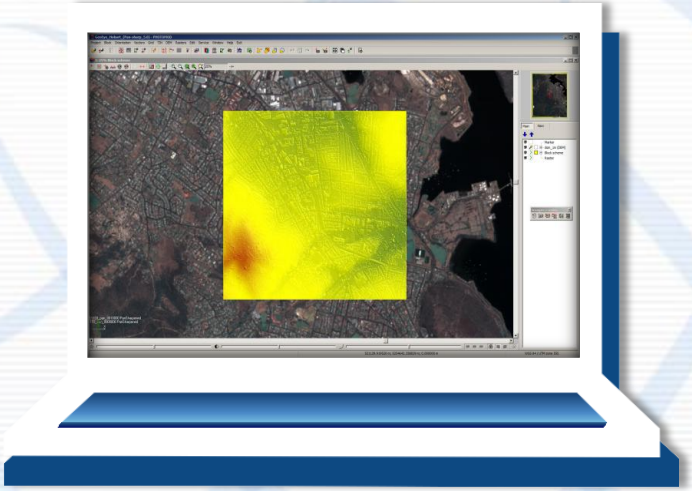
DPW PHOTOMOD – digital photogrammetric system

PHOTOMOD Conveyor – automatic photogrammetric processing

PHOTOMOD GeoMosaic – combining georeferenced images

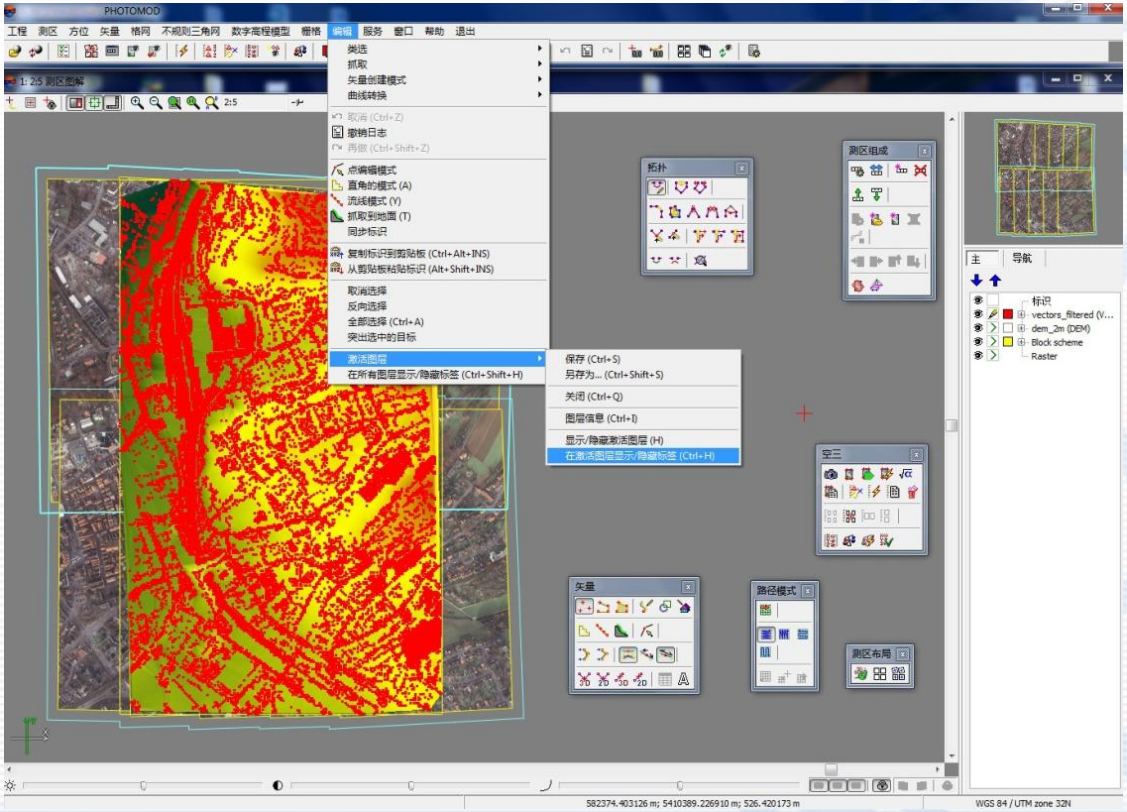
PHOTOMOD UAS – UAS data processing

PHOTOMOD Radar – SAR data processing



PHOTOMOD Lite, PHOTOMOD Radar Viewer, PHOTOMOD Datum Parameters, PHOTOMOD DirectGeoreferencing, PHOTOMOD GeoCalculator – utilities and free apps

PHOTOMOD Localization



Chinese

Greek

English

Russian

Spanish

RACURS

PHOTOMOD Distribution Map

10.000+ PHOTOMOD workplaces. 80+ countries.

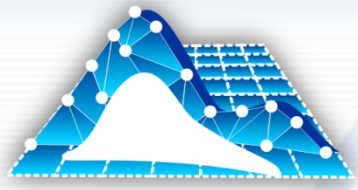
PHOTOMOD. Input and output

Satellite images

Aerial photos

Radar data

PHOTOMOD



DTM, DDSM, contour lines

Orthophotos and mosaics

3D terrain models

2D and 3D vectors

Digital maps

Bentley Map

AutoCAD

ArcGIS

QGIS

MapInfo

GIS "Panorama"

DPW PHOTOMOD. High-end photogrammetric system

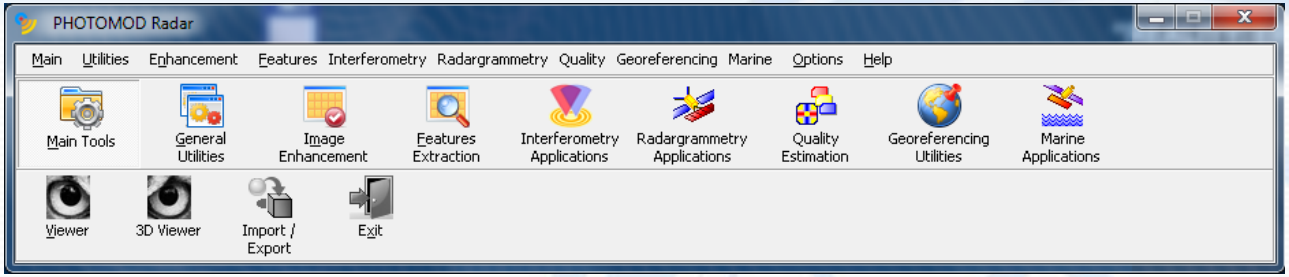
- Processing of aerial and satellite images
- Aerial triangulation and block adjustment
- Flexible strategy for DTM generation and editing
- Contour lines building, editing and smoothing
- 3D feature extraction
- Orthomosaicking
- Digital maps creation and output
- 3D models creation

PHOTOMOD Geomosaic

Combining georeferenced images in a single, seamless, color-balanced mosaic of high geometric accuracy

- Creating high-precision mosaics from any number of orthorectified images (tens of thousands source images can be processed)
- Building precise mosaics from georeferenced images of various formats
- Image processing: Radiometric image enhancements (filters, color/brightness/contrast balancing, histogram adjustment, etc.); Pan-Sharpening; DustCorrect
- Fully automatic seam line creation
- Automatic tiling

PHOTOMOD Radar



- module for data visualization (viewer);
- module for data export/import, including CEOS ERS, CEOS Radarsat, CEOS SIR-C/X, CEOS Condor, CEOS PALSAR, ENVISAT ASAR, TerraSAR-X, ALOS and COSMO-SkyMed; Kompsat; Sentinel; Radarsat-2; Risat; etc.
- geocoding processor;
- interferometric processor;
- stereo processor;
- image processing tools;
- quality estimation software tools;
- oil slicks detection processor;
- ship detection processor;
- sea waves analysis software tool;
- polarimetric processor;
- software tool of coherent change detection;
- software tool of coherent co-registration of SAR images.

More information in the report of A. Chekurin "PHOTOMOD Radar — a powerful tool for processing of SAR images"

PHOTOMOD UAS

Photogrammetric UAS-oriented software

- Process UAS data and acquire all types of photogrammetric products: DEM, dDSM, 2D and 3D-vectors, orthomosaics.
- Complete image data processing workflow without third party products.
- Automation of photogrammetric operations.

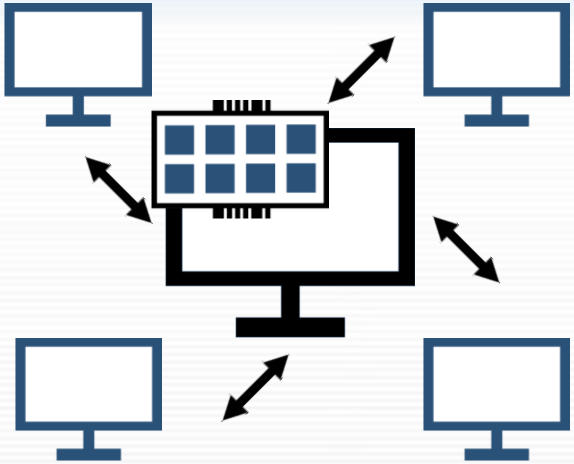
China, UAS, 3D-TIN
Images number – **386**, **GSD** – **25** мм
2x CPU Intel® Xeon® (12 cores), RAM 48&96 GB
DSM (25 mm)/**LAS** – **14** hours **42** minutes (at 5 cores, TrueOrtho included)
3D-TIN by LAS – **51** hours **34** minutes

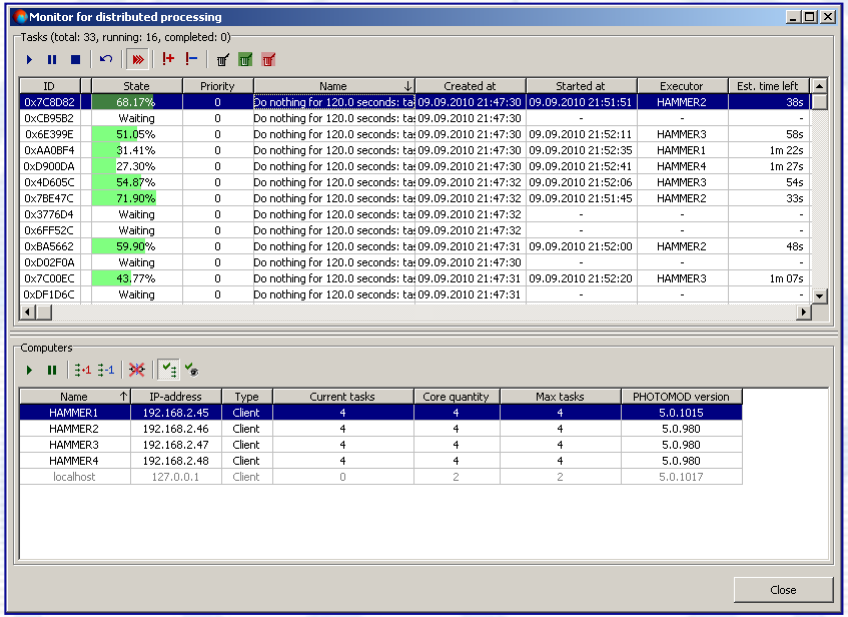
PHOTOMOD Automation

Photogrammetric operations	Automation level
Aerial triangulation	●
DTM, DSM, denseDSM	●
Point cloud	●
Contour lines	●
Mosaicking	●
Orthorectification	●
3D modeling	●
2D-3D vectorization	●

● Fully automatic
● Semi-automatic

PHOTOMOD. Distributed Processing





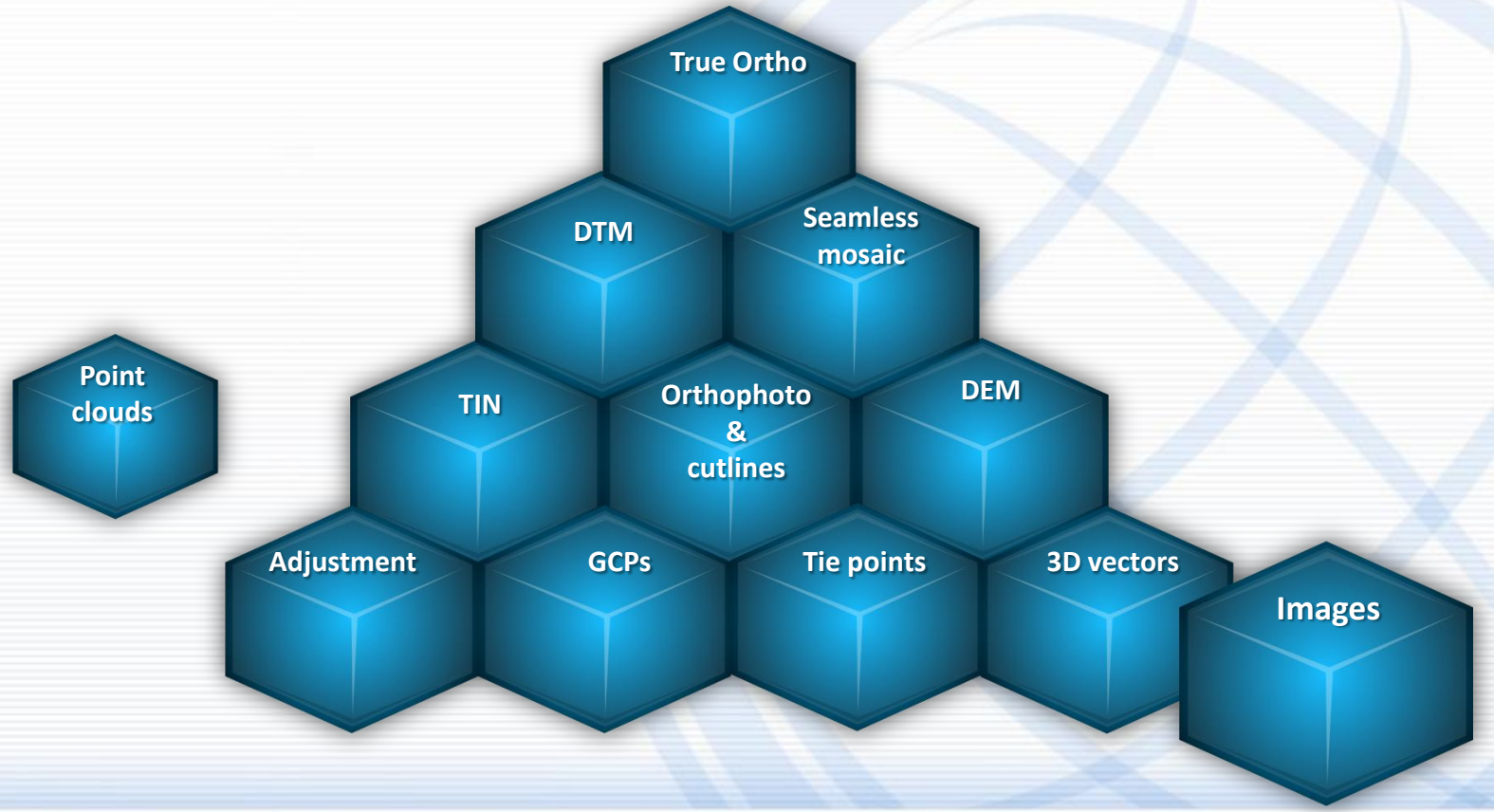
Parallel tasks execution with multiple processor cores or multiple computers

Supported for:

- Converting images to PHOTOMOD format
- Aerial triangulation
- DEM creation
- Orthorectification and mosaicking

Photogrammetric blocks

Blocks can be combined into automatic chains of algorithms and data

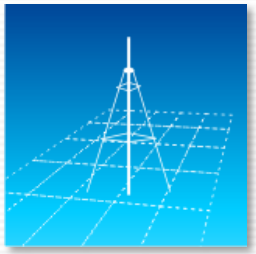


PHOTOMOD Conveyor

Automatic photogrammetric processing

Productivity

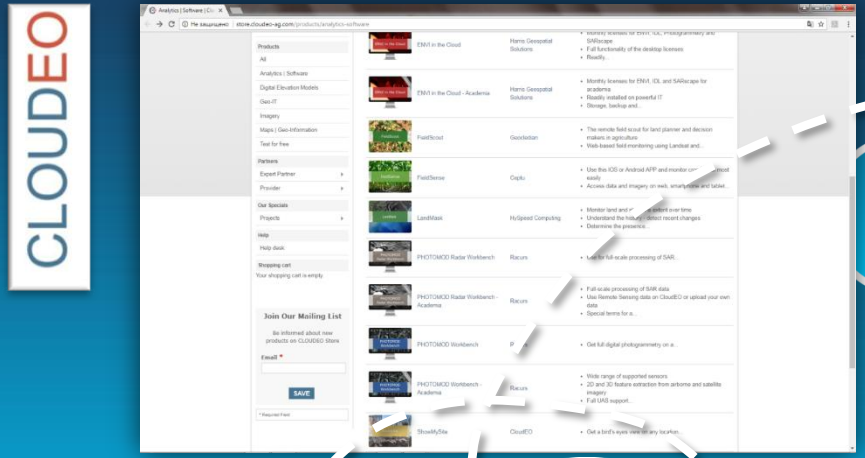
	GSD	Area	Output products	Processing time*
Aerial survey	3-5 cm	100 km^2	Mosaic, DTM, orthophoto	60 min
Satellite survey	1 m	20 000 km^2	Mosaic, DTM, orthophoto	60 min

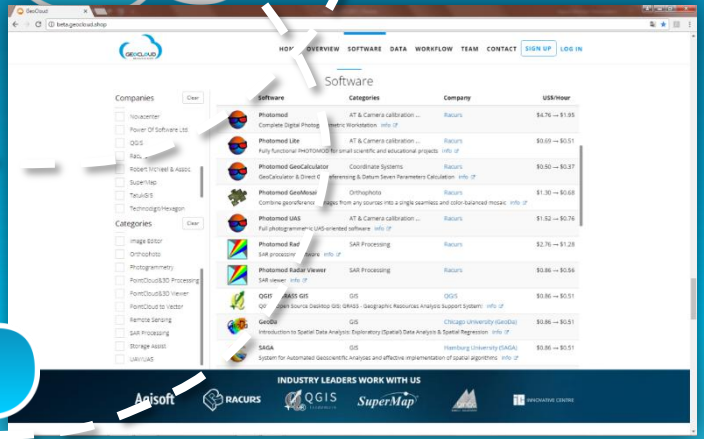


*Xeon E5-2680 2.40GHz – 10 CPU (140 cores, 280 hyper-threading), RAM 1280GB, 10Gb/s Ethernet

More information in the report of D. Kochergin "PHOTOMOD 6.5. Productivity and new functions"

PHOTOMOD Cloud





More information in the report of A. Sechin "Affordable photogrammetry — stereo measurement with smartphone"

Stereo vectorization efficiency

Stereo vectorization on a remote computer

Affordable photogrammetry

VR headset

More information in the report of A. Sechin "Affordable photogrammetry — stereo measurement with smartphone"

Utilities and free apps

Free apps

PHOTOMOD Lite

free software package which has all features of PHOTOMOD

PHOTOMOD GeoCalculator

stand-alone free application or Android app. for points coordinates transformation, included in the PHOTOMOD system

Free tools

- **PHOTOMOD Radar Viewer -** *free version of PHOTOMOD Radar for SAR images viewing*
- **PHOTOMOD DirectGeoreferencing -** *calculations of estimating accuracy assessment of terrain measurements*
- **PHOTOMOD Datum Parameters -** *calculations of datum parameters*

PHOTOMOD. Factors of development

Demand of geodata

Photogrammetric technologies

Sensors & platforms

Computer tools

Algorithms

- Processing data volume growth
- Processing speed increase
- Adaptation to new hardware and technologies
- Standardization
- Integration with other software

PHOTOMOD Trends

- Photogrammetric technology progress depends on evolution of RS sensors and platforms, increase of hardware productivity and new efficient algorithms developments
- One of directions of photogrammetric technology advancement is the development of special high-productive solutions for fully automatic creation of such products as orthomosaics, terrain models and 3D-models
- Cloud technology development leads to appearance of new models of photogrammetric production workflow and services
- Modern photogrammetric algorithms allow creation of accurate and detailed 3D-models of cities and objects both as point clouds and vector models. Such models can be used as a spatial backbone of comprehensive 3D GIS
- Photogrammetric technologies become affordable and mobile

Thank you