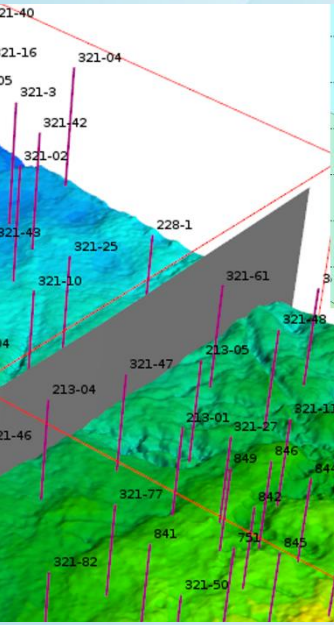
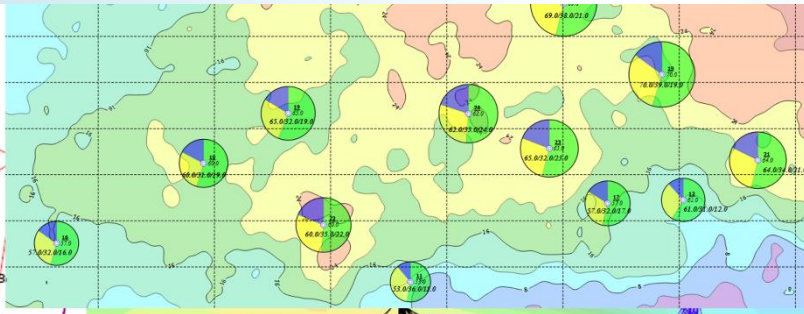
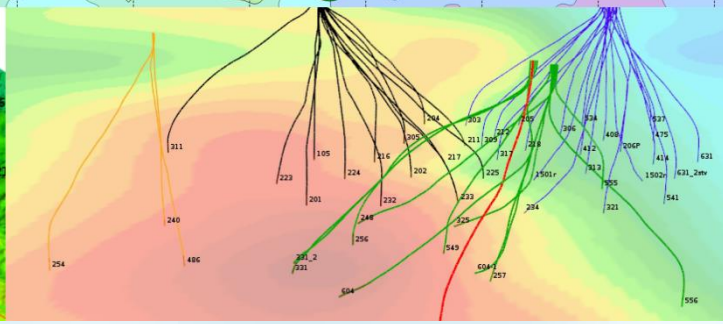
INGEOSERVICE-Sk

SOFTWARE DEVELOPMENT







IngeosMAP (iMAP)®

State-of-the-art comprehensive technology for 2D model building and representation

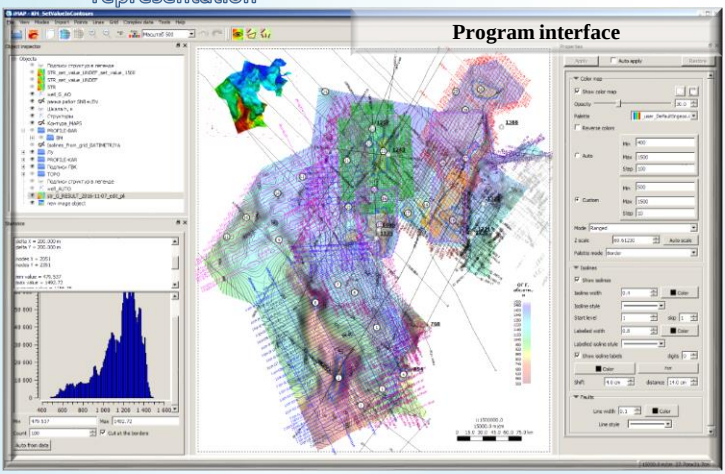
Moscow - Tyumen

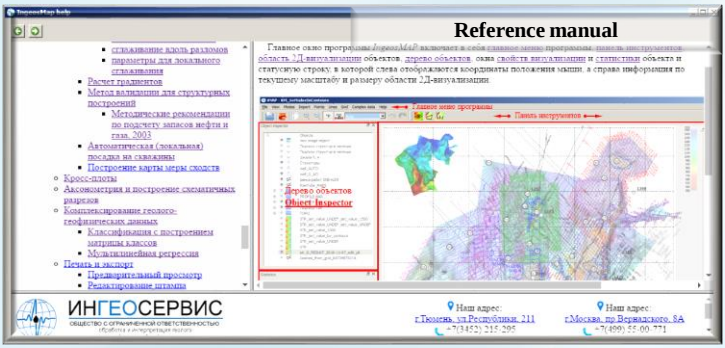
2022

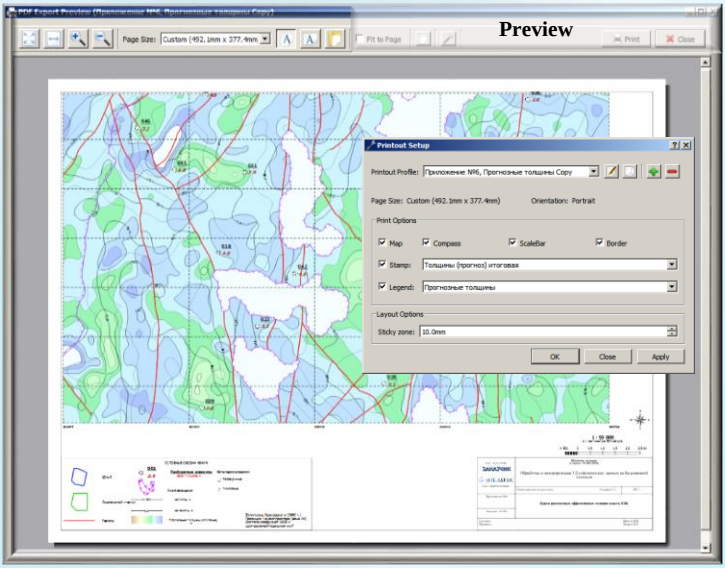
Complete cycle technology to work with 2D geological models

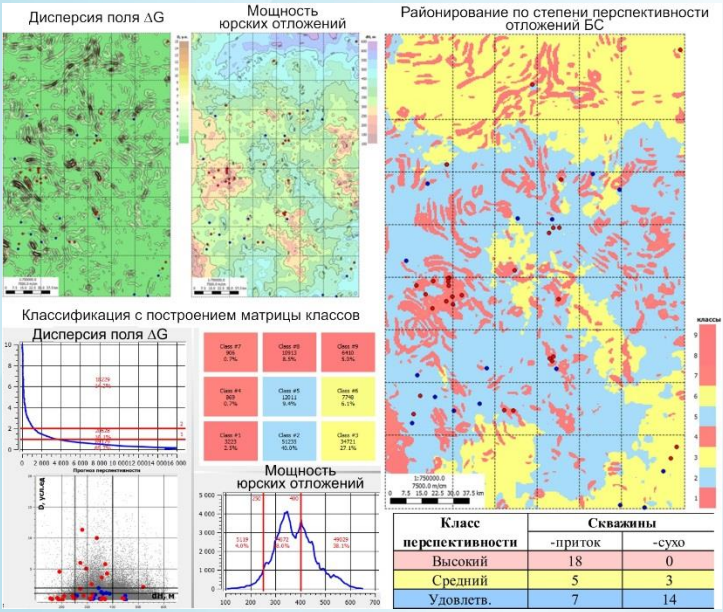
Data import/export, interpolation, visualisation, analysis, editing; export and printing of graphics; project-based storage of prepared graphical annexes and figures, etc.

Our software allows to solve a wide rage of problems falling within the competence of geologists, geophysical data analysts, geomodellers, and specialists in reserves assessment

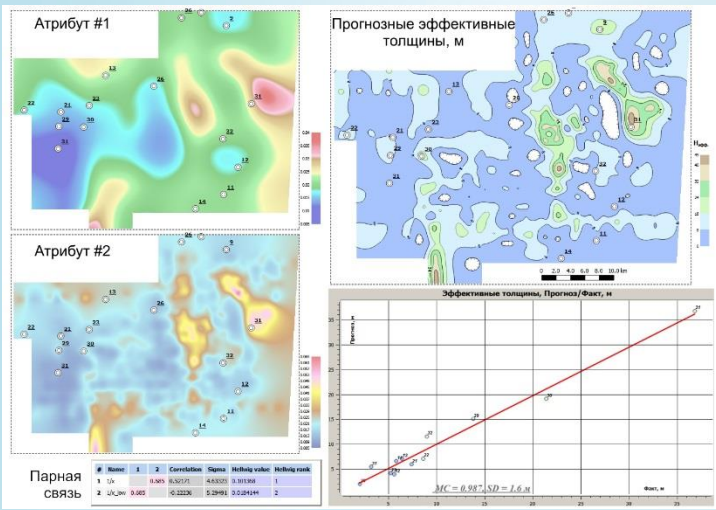


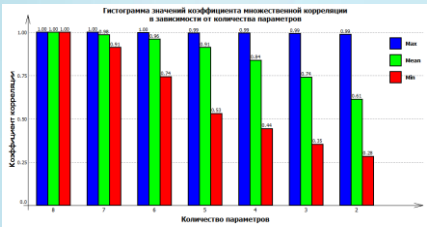






Класс перспективности	Скважины	
	-приток	-сухо
Высокий	18	0
Средний	5	3
Удовлетв.	7	14





Parameter Count	Point count	1	2	3	4	5	6	7	8	MC	SD
8	12	1	1	1	1	1	1	1	1	0.999	0.37
7	12	1	0	1	1	1	1	1	1	0.999	0.44
6	12	1	0	0	1	1	1	1	1	0.997	0.75
5	12	0	0	0	1	1	1	1	1	0.994	1.04
4	12	0	1	0	0	0	1	1	1	0.993	1.14
3	12	0	0	0	0	0	1	1	1	0.991	1.30
2	12	0	0	0	0	0	0	1	1	0.987	1.59

Integration of geological and geophysical information

Classification with building a matrix of classes: analysis of geological and geophysical interpretation objects (structural surfaces, thickness maps, petrophysical properties, potential field continuations, etc.), and identification of anomalies of one character against the background of the other

Multiple linear regression with automated validation of references and regressors

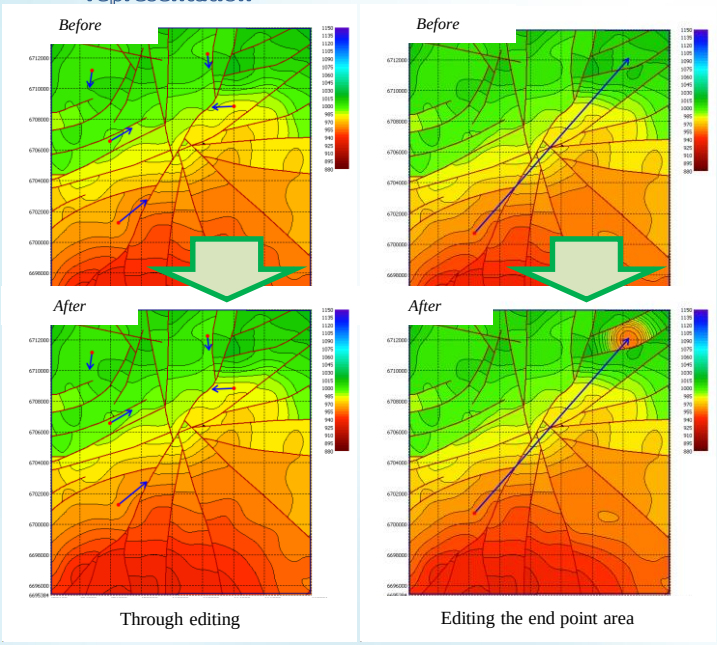
Determination of the best combination from any number of regressors and references

Calculation of pair correlation coefficients

Statistical values output (both graphical and tabular)

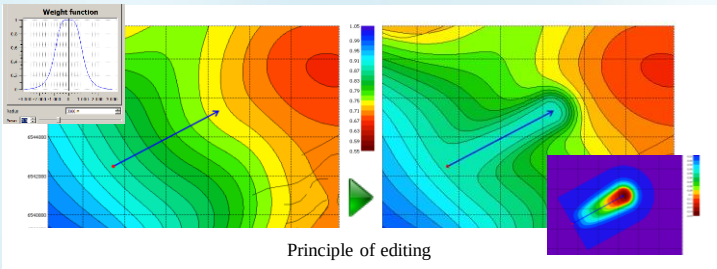
Fast, flexible, interactive editing of grid models

Fault tectonics maintenance in the course of calculations with and editing of grids

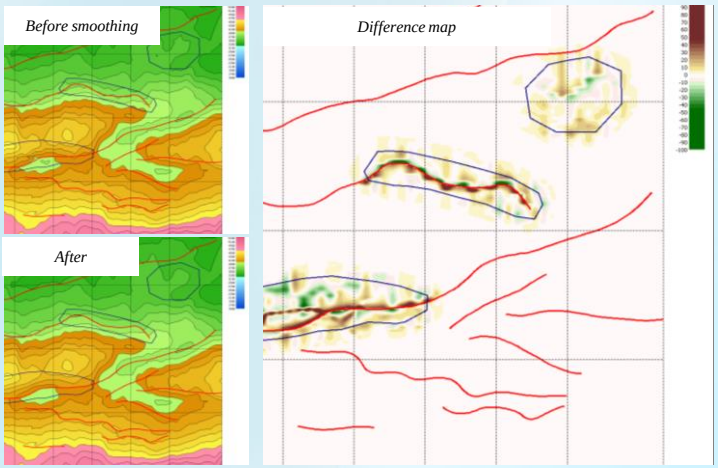


Through editing

Editing the end point area

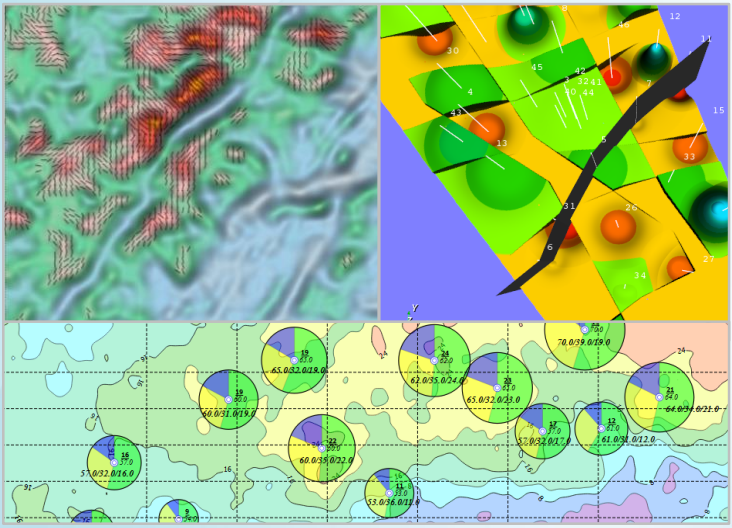


Principle of editing



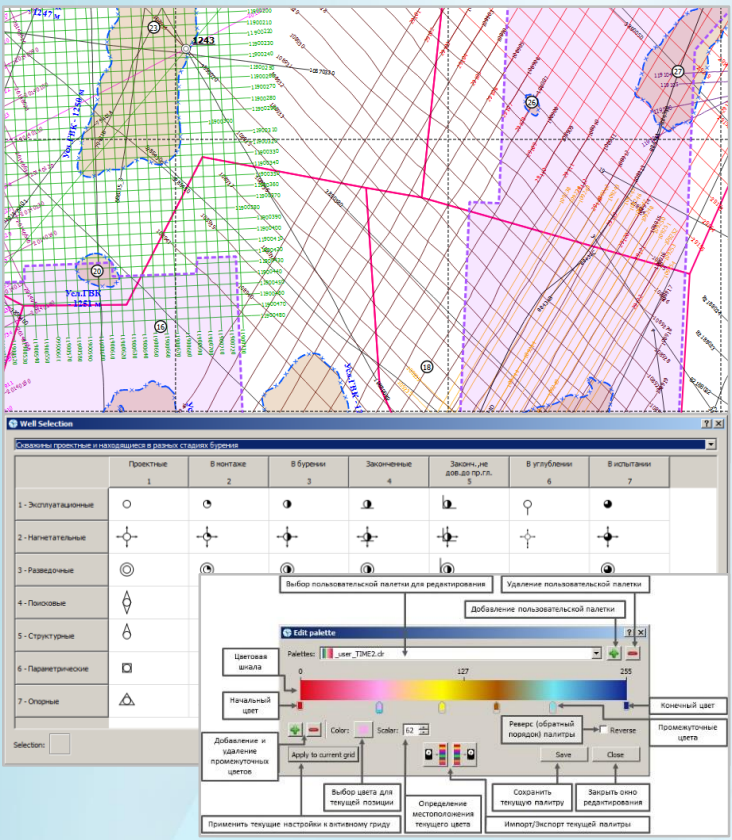
Processing modes:

- With temporary polygons: local smoothing, grid blanking taking into account fault lines geometry; copy-paste of grid fragment from one grid to another
- Interactive editing of grid with the use of vectors: changes in grid occur along any number of vector directions



Full-featured graphical visualization of objects

Building axonometric projections, visualization in the form of composite vector objects; building pie/clock charts, etc.

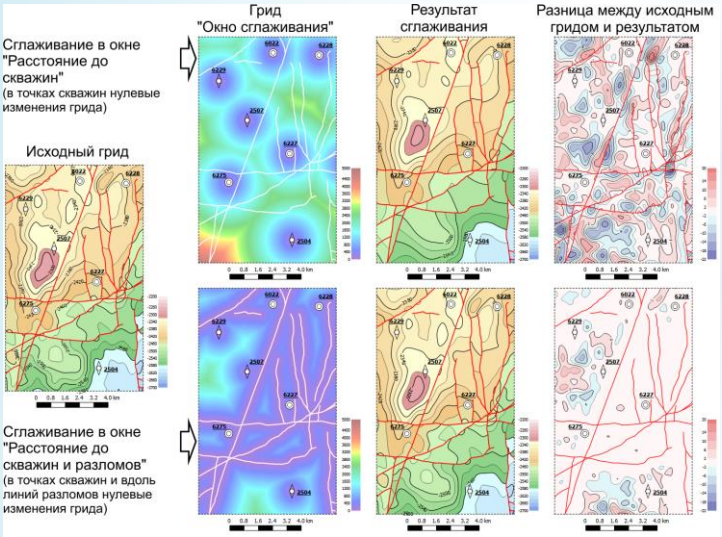


Colour scale editor for grid-type objects; large variety of icons for well data displaying and line types for linear objects (pinch-out, alternation, GWC, etc.); transparency control for all object types

Flexible settings for grid smoothing

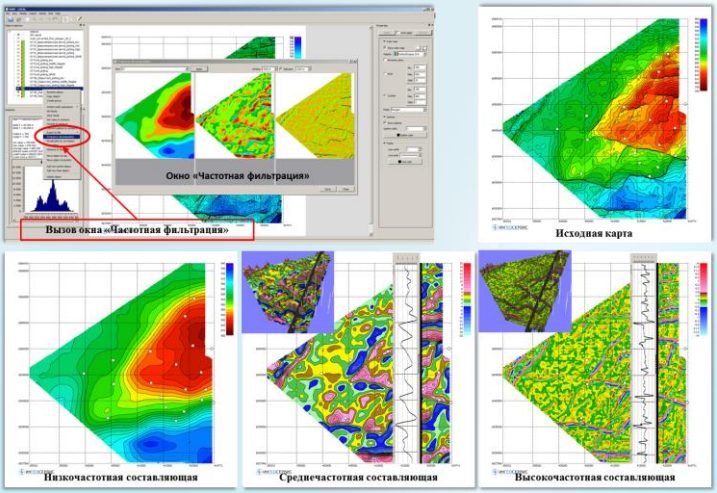
Along faults, lines, contours, inside/ouside of polygons; with arbitrary window size for each cell (window is grid-dependent), etc.

Window-based smoothing taking into account fault line geometry (if any) is used

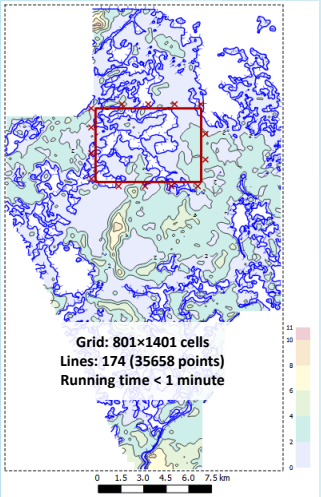


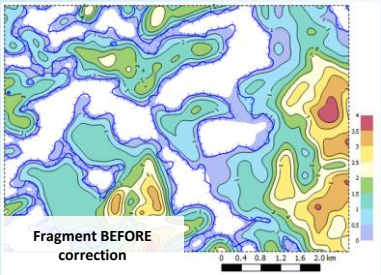
Frequency decomposition

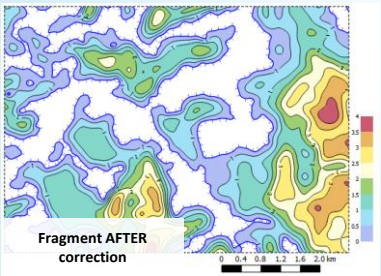
Technology allows solving a wide range of the problems, such as:
Structural and tectonic zoning; delineation and assessment of resources of promising exploration targets; estimation of conditions optimality for oil and gas saturation, and many other



Pinch-out line correction

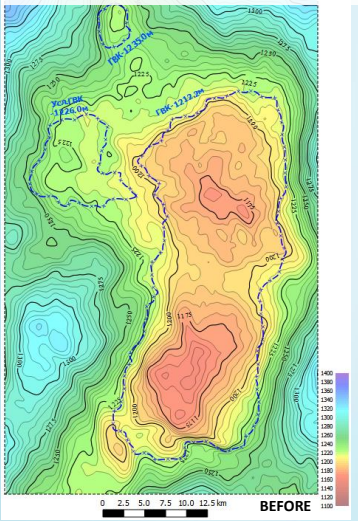


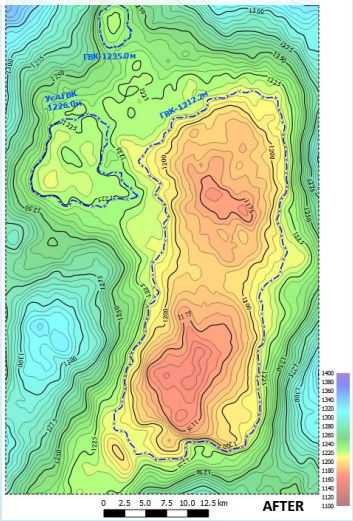


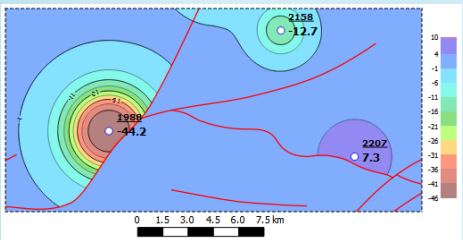


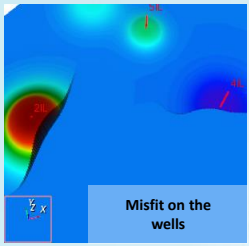
Automated correction (matching) according to well data and linear objects taking into account faults (GWC, OWC contacts; pinch-outs; contours of amplitude anomalies, etc.)

Structural framework reduction to the defined GWC contour









Implemented algorithms are based on:

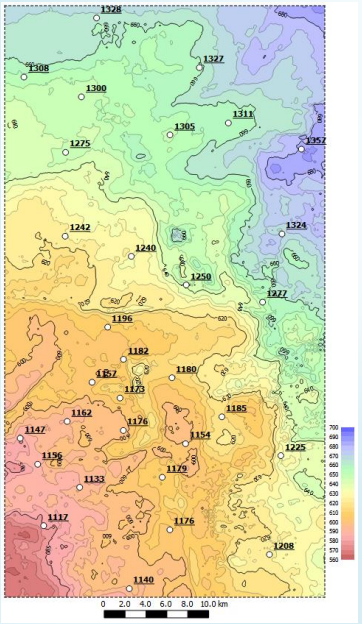
- Interpolation of misfits between grid-based object values and parameter values (point or linear object);
- Well-by-well processing (suitable for wide well spacing, block tectonics)

Method of automated validation

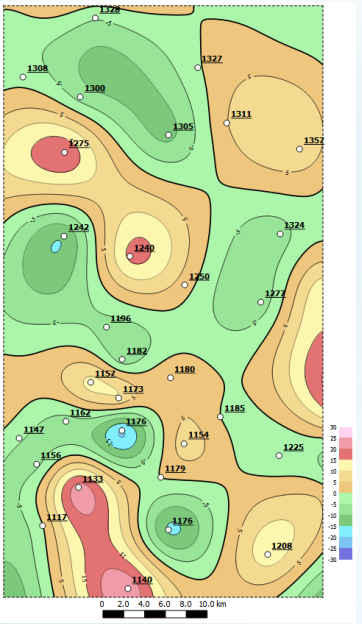
This method is generally used to validate and estimate accuracy of structural imaging, and it can also be applied to estimate accuracy of mapping of any attribute (e.g., thickness, porosity, etc.) carried out with the use of data interpolation techniques

Accuracy of structural map creation is determined by accuracy of average velocity maps based on well data, i.e., by interpolation error that in turn contains errors of time and elevation determination. Method of validation is based on iterative calculation of prediction error where one of the wells is excluded in each run. This method can give a reliable estimate of prediction error when the wells are evenly distributed over the area; modelling tests show that it is efficient when number of wells exceeds 15

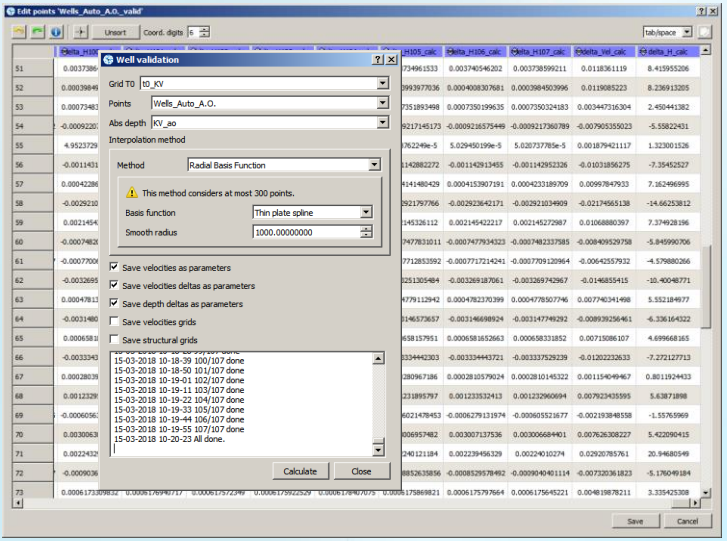
Isochrone map



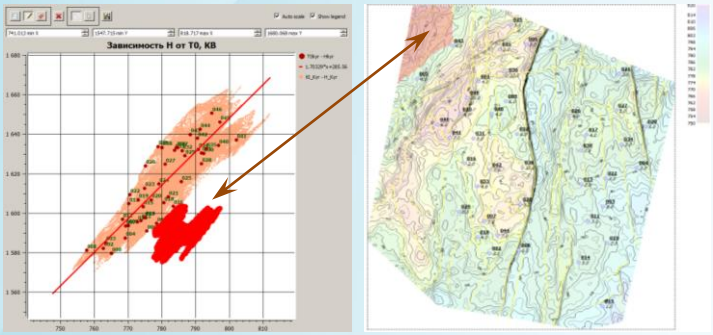
Error map, method of automated validation

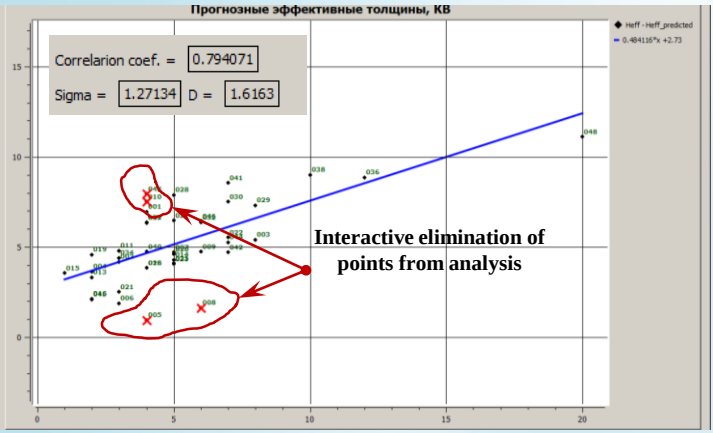


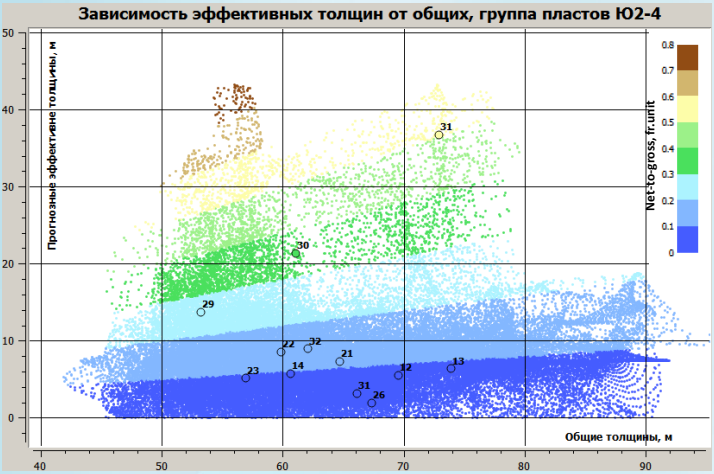
Complete control over the calculations; it is possible to save maps and parameters when one of the wells is excluded



Showing the area of selected points on the map







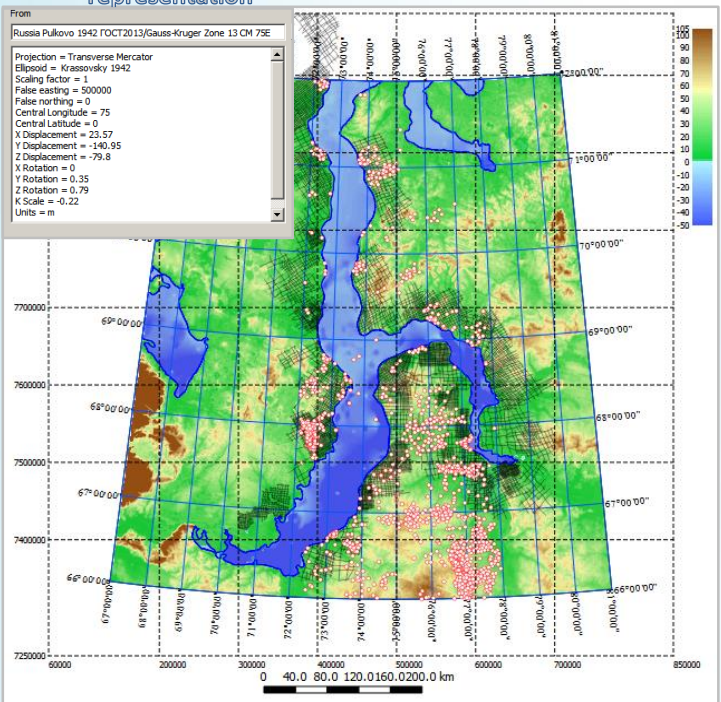
Statistical analysis of links

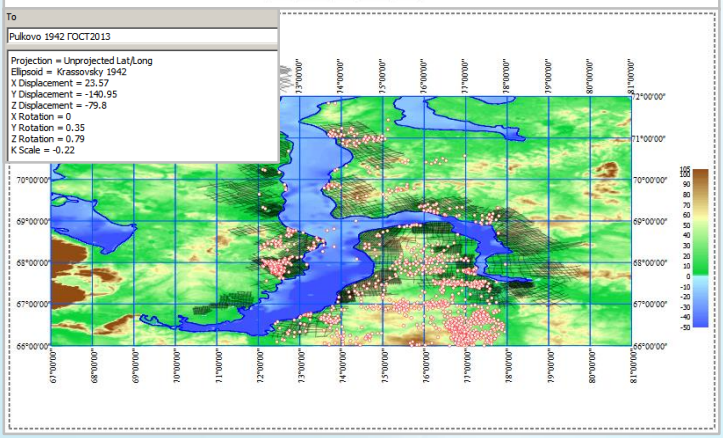
Building crossplots “grid-grid”, “well-well”, “well-grid”;
Building crossplots with possibility of interactive elimination of points from the analysis

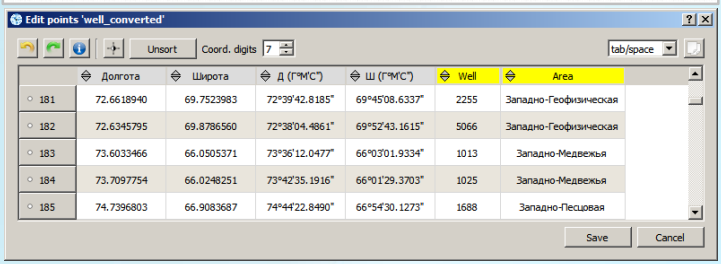
Crossplot is one of the most visual way of representation for both initial data and results. The main purpose of crossplotting is search for and validation of the existing hypotheses and concepts, while visualization, proper substantiation, and interpretation of the patterns obtained is the major task for geologist or geophysicist-analyst.

Calculator for coordinates conversion

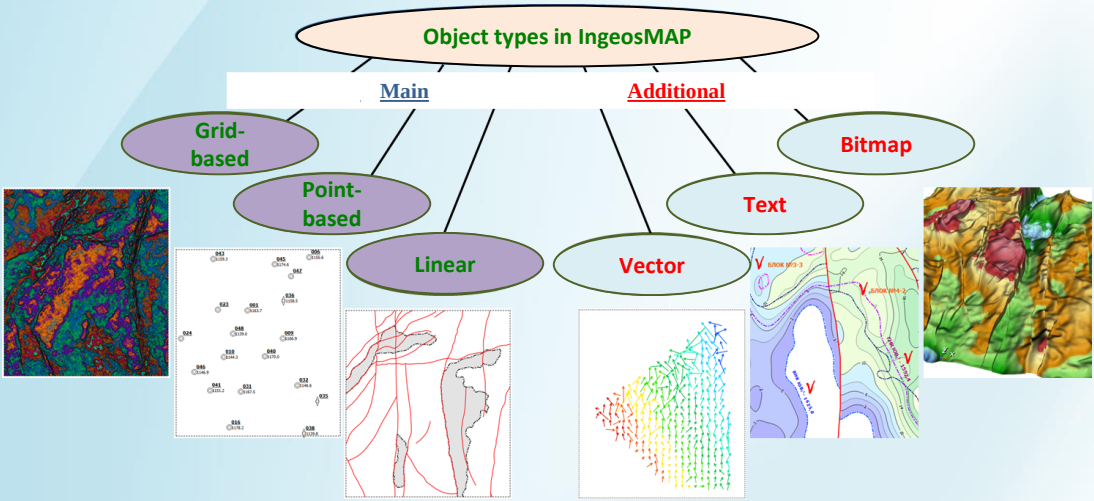
Possibility to operate with geographical coordinates and normal grids; open library *proj4* is applied;
automated conversion of grid-based objects geometry between the projections, taking into account faults (data re-interpolation between grids)







	Долгота	Широта	Д (Г°М'С")	Ш (Г°М'С")	Well	Area
181	72.6618940	69.7523983	72°39'42.8185"	69°45'08.6337"	2255	Западно-Геофизическая
182	72.6345795	69.8786560	72°38'04.4861"	69°52'43.1615"	5066	Западно-Геофизическая
183	73.6033466	66.0505371	73°36'12.0477"	66°03'01.9334"	1013	Западно-Медвежья
184	73.7097754	66.0248251	73°42'35.1916"	66°01'29.3703"	1025	Западно-Медвежья
185	74.7396803	66.9083687	74°44'22.8490"	66°54'30.1273"	1688	Западно-Песцовая



IngeosMAP software technologies

The third-party libraries used: cross-platform; open code and licenses, which allow using them for commercial purposes.

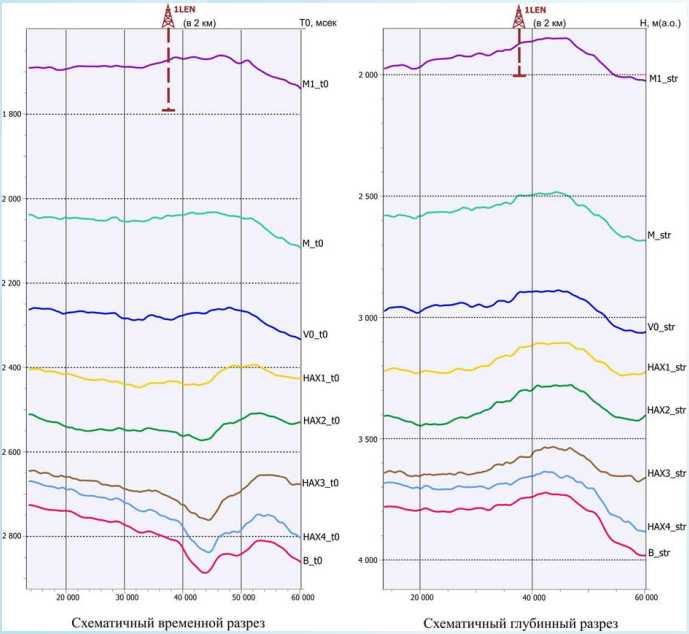
Cross-platform Qt5 (Linux, Windows), LGPL library

Computer vision library OpenCV 3.2 image processing and general purpose algorithms, BSD license

Library Qwt 6.1 for graphic presentation of digital data (charts, histograms, diagrams, crossplots), Qwt License compatible with LGPL

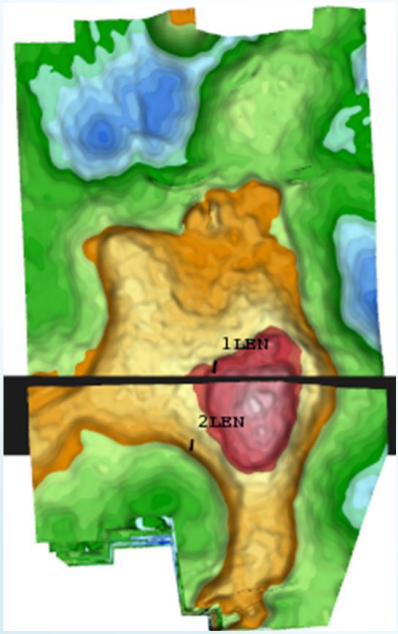
Library VTK 7.1 for 3D modelling, images processing and visualization, BSD license

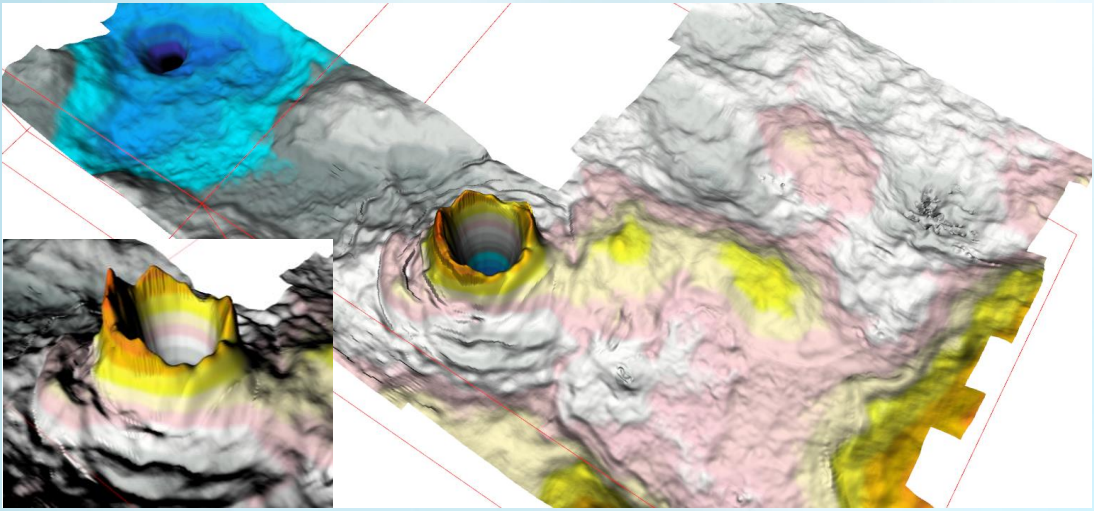
Accounting for velocity anomalies of gas accumulations in structural imaging



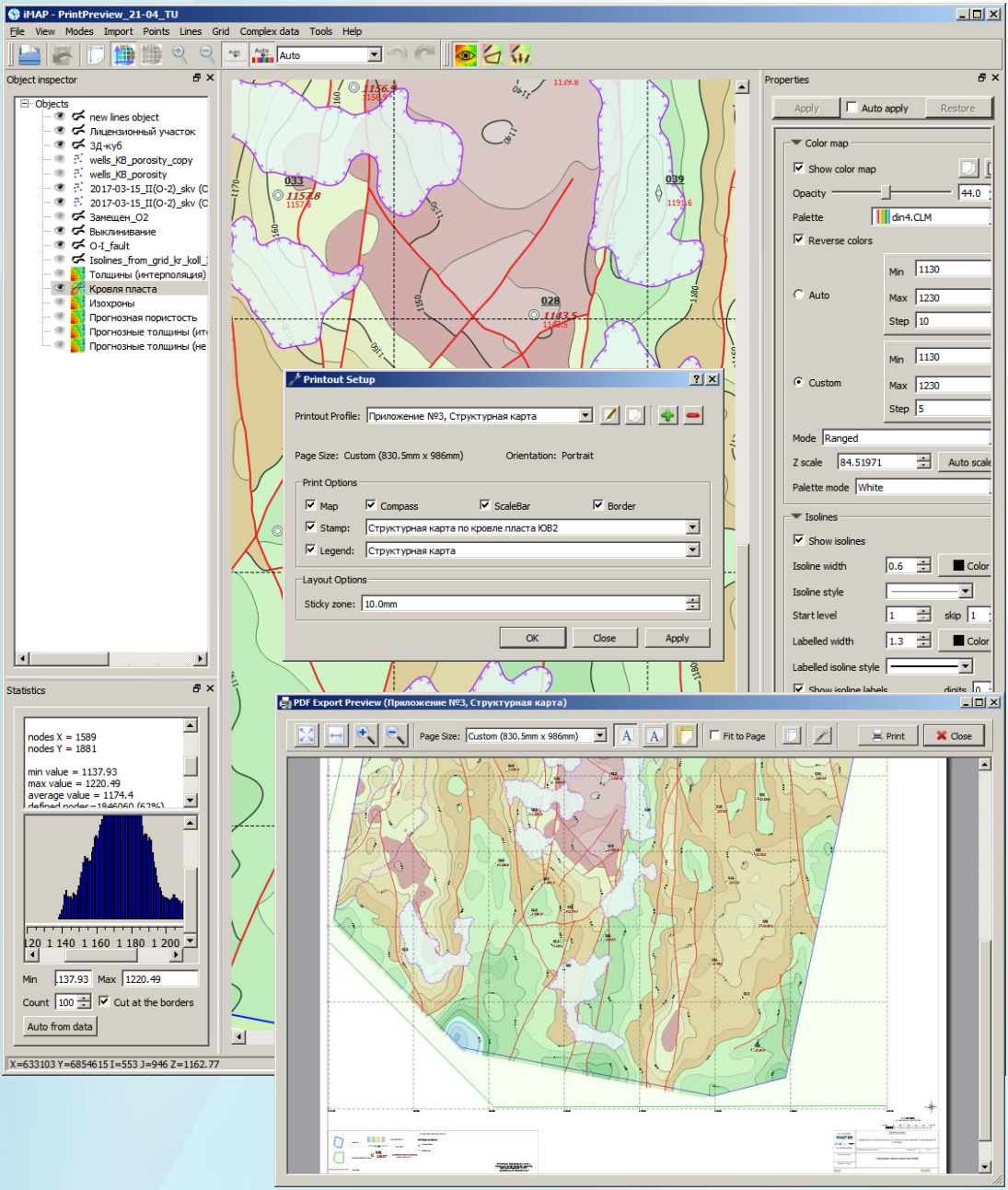
Схематичный временной разрез

Схематичный глубинный разрез





Preparation and storing of graphical annexes, preview



Andrey N. Zaitsev
Deputy Chief Geologist for Geological Modelling

Arrival of iMAP software product was first of all caused by the lacking of the task-specific software allowing to fully solve a wide range of problems related to G&G data mapping, prediction, and integration. So far, this product is already in use. What is more, the program functionality is not limited to the tasks of building 2D geological models. For instance, multiple linear regression algorithm was used to reconstruct the absent well logs necessary for integrated interpretation. Data operation in normal grids and geographical coordinate systems makes it possible to obtain high-quality results in map-making and design.

Oleg A. Smirnov
Chief Geologist

The time has come to reconsider our views on the current world of modelling technologies, and make it more use-friendly and flexible. Years of experience with trials and errors showed that we have created the complete software product. We would like to present you a world of perfect creativity.

Olga M. Susanina
Lead Specialist in G&G data integration

Convenient, multi-purpose, rapidly advancing tool useful both for conventional tasks and user-specific demands. Allows not only to solve the mapping, modelling and data integration problems, but to analyse the obtained results in the fastest and understandable way at the level of both point and grid-based data.

Nikolay A. Krivousov
INGEOSERVICE-Sk LLC, General Director

iMAP is a really necessary and convenient tool for working in a compressed time frame. Software was developed by experts for specialists. Commercialization of the project and reduction of geologic hazards of drilling wells while building the correct geological model - that's what the user of this excellent software gets.

Anastasia V. Poluyakhtova
Lead Geophysicist

We dreamed of analysts' wishes to be fulfilled. And our dreams came true! High mobility, striking efficiency, multifunctionality, clear and sensible user interface are the most attractive features of iMAP. I really like to use "one button" to start massive statistical calculations.

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Moscow - Tyumen
2022