RadExPro
seismic software

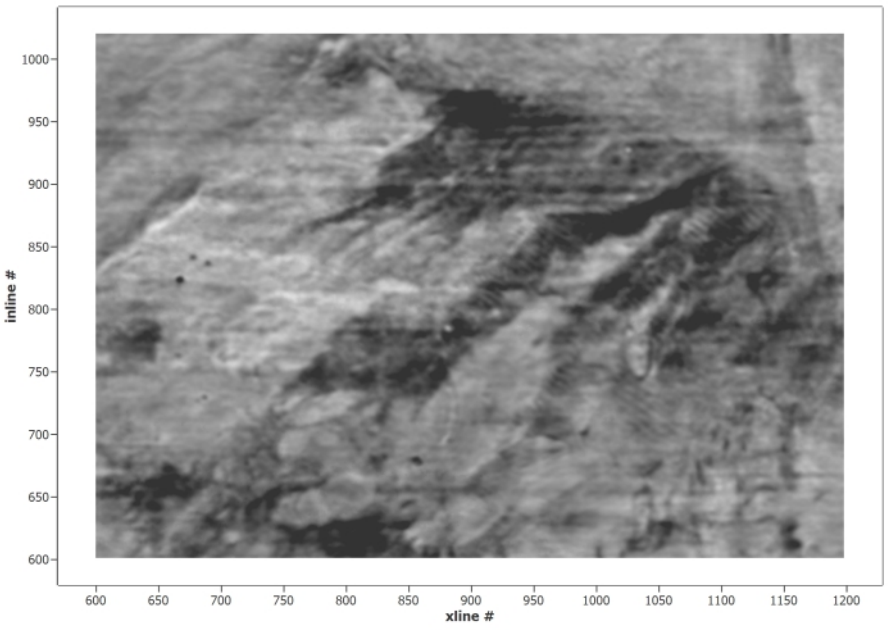
Automated Boulder Detection

Precise detection of sub-seafloor boulders is crucial for derisking offshore windfarm installation and other subsea construction work.

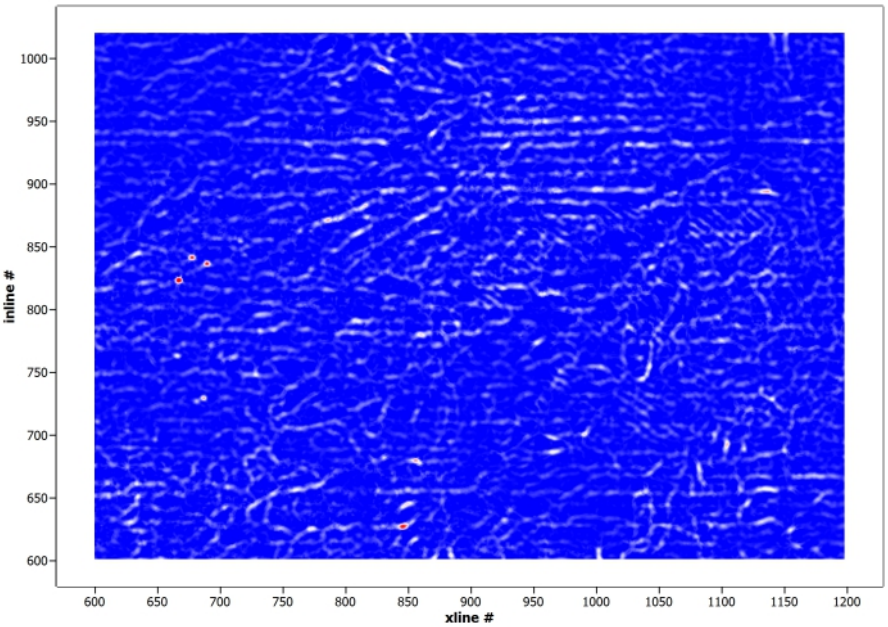
With the new **Boulder Detection** tool of the **RadExPro** software, you can efficiently detect and localize individual boulders on 3D HR/UHR marine seismic data at just a fraction of time required for the human interpretation! The size of the recognizable objects can be as small as spatial resolution of the seismic data allows.

On pre-migration stacked data, boulders appear as hyperbolic events. After migration, they are focused into local amplitude anomalies, which are particularly easy to notice on time slices.

The detection algorithm involves computation of a qualitative boulder probability attribute based on an image processing technique highlighting local amplitude anomalies of defined size. It is applied to migrated 3D volumes, which makes the process of boulder detection impressively fast even with a regular PC.



Initial time-slice

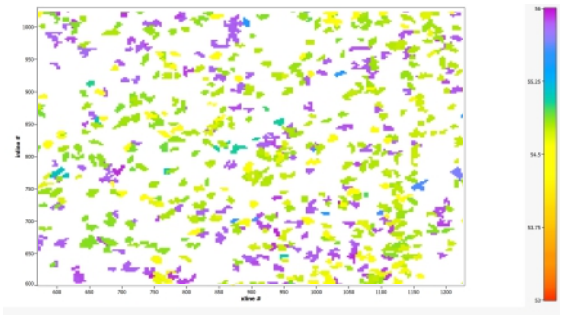


Qualitative boulder probability attribute, the boulders are highlighted with highest amplitudes.

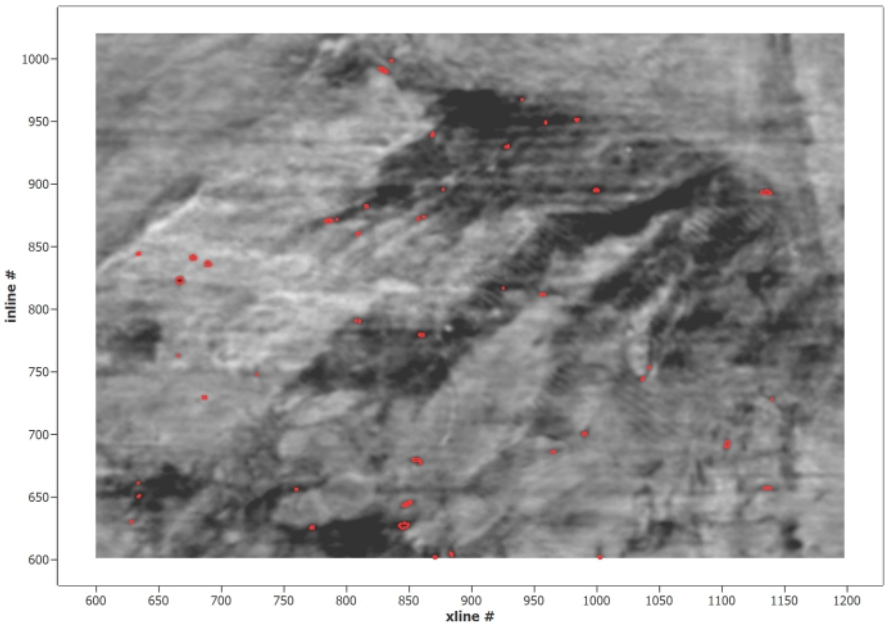
The attribute is used for initial boulder classification with a 3D labeling algorithm. Then, the properties of the detected potential boulders are used to filter out the false positives that do not fit the *a priori* constraines. The interpreter can fully control the characteristic horizontal and vertical sizes as well as the aspect ratio of the objects to be detected. Manual interactive editing of the result can also be performed at the final stage.

The deliverables include a table with all detected boulders, their coordinates, depths, dimensions, and aspect ratios.

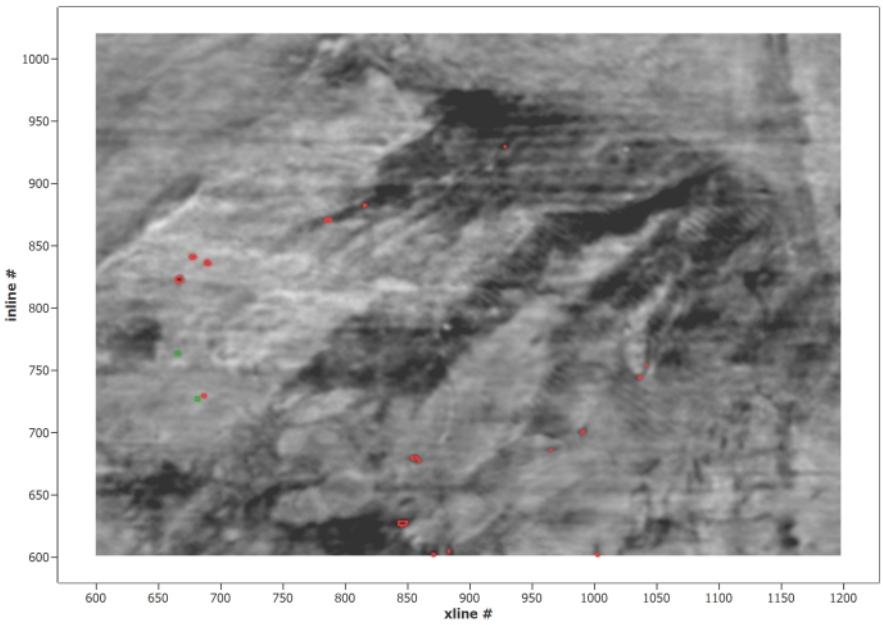
Additionally, you can generate a map of the survey area with all the boulders color-coded according to their depth.



Resulting boulder map, each sample on the surface is colored according to the two-way traveltime to the top of the shallowest boulder at that location.



Identified potential boulders (marked red) after 3D labeling



Final result (most false positives filtered out basing on a priori constrains)

centroid-x-(m)	centroid-y-(m)	centroid-TWT-(ms)	top-TWT-(ms)	bot-TWT-(ms)	TWT-span-(ms)	major-axis-(m)	minor-axis-(m)	aspect-ratio
376.66667	373.72222	54.95	54.9	55.0	0.1	1.65831	0.8165	2.03101
503.23333	518.23333	53.3	53.2	53.4	0.2	2.0702	1.5353	1.3484
390.22881	513.49153	53.65	53.4	53.9	0.5	2.40001	1.72914	1.38798
336.3	431.2	55.15	55.1	55.2	0.1	0.86603	0.86603	1.0
444.1	337.9	55.05	55.0	55.1	0.1	1.5	0.61237	2.44949
327.88462	549.30769	53.55	53.5	53.6	0.1	1.80463	1.57241	1.14769
414.77778	553.16667	53.55	53.5	53.6	0.1	1.73205	0.70711	2.44949
341.46	428.38	55.2	55.1	55.3	0.2	3.33691	1.36906	2.43738
309.75	572.38636	53.7	53.6	53.8	0.2	1.82248	1.78429	1.02141

Main deliverable – resulting table of identified boulders with their parameters.

RADEXPRO EUROPE OÜ
Tallinn, Estonia

RADEXPRO SEISMIC SOFTWARE LLC
Tbilisi, Georgia

www.radexpro.com