



"SECTOR" SCIENTIFIC MULTI-BEAM ECHO SOUNDER



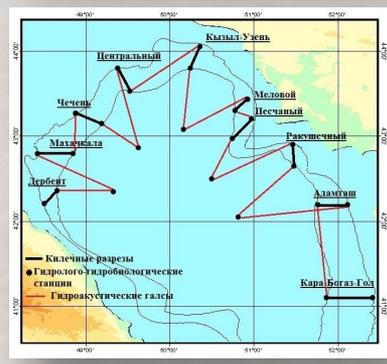
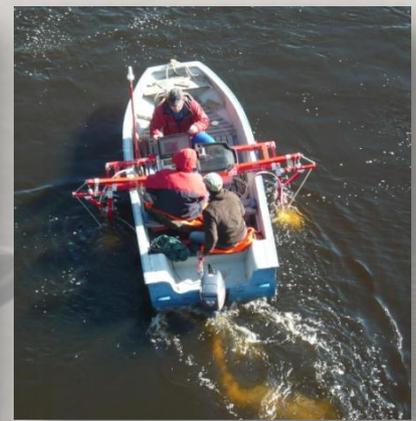
"Vector" Design Bureau of Marine Electronics, LLC ©
Taganrog



PURPOSE OF SCIENTIFIC MULTI-BEAM ECHO SOUNDER

Industrial aquaculture

Quantitative assessment of fish stock in in-land shallow waters and near-shore zone



WIDE SWATH – MORE INFORMATION

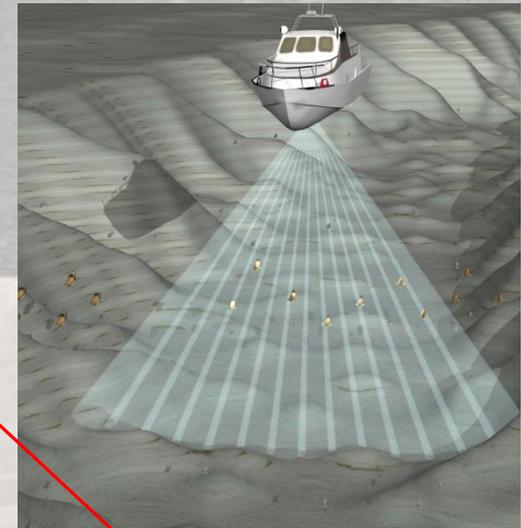


Narrow swath of single beam echo sounder

Vertical detection and ranging
Surface layer up to 2.5m



Use of two single beam echo sounders in vertical and horizontal planes in shallow waters



Broad swath of multi-beam echo sounder

Horizontal detection and ranging
Surface layer up to 2.5 m

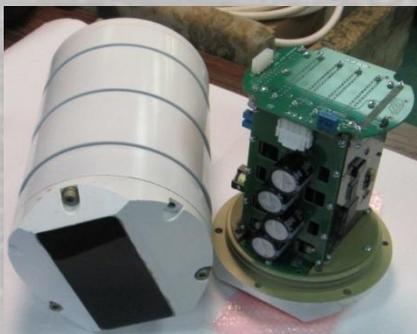


EQUIPMENT STUFF OF SCIENTIFIC MULTI-BEAM ECHO SOUNDER



COMPONENTS OF SCIENTIFIC MULTI-BEAM ECHO SOUNDER

Underwater unit



Interface unit



Control and display unit – fully protected laptop



Vessel motion transducer



Satellite receiver
GLONASS/GPS



Reference sphere for calibration



Battery
24 V 20 Ah



Board mounting device



"SECTOR" SCIENTIFIC MULTI-BEAM ECHO SOUNDER SPECIFICATIONS

1. Operating frequency, kHz:	200
2. Frequency bandwidth, kHz:	30
2. Range of operation according to target strength minus 45 dB, m:	150
3. Range of operation, m:	up to 255
4. Range resolution, sm:	up to 2.5
5. Directive pattern width of single beam, degrees:	7x7, 8x12
6. Coverage area, degrees:	up to 90
7. Number of beams in the coverage area, pcs.:	33
8. Type of radiated signals:	tone, FM
9. Duration of emitted impulses, microsecond:	from 32 to 1024 (tone), from 1000 to 8000 (FM).
10. The way of target direction detection inside of directive pattern beam split:	"split beam".

SPECIAL FEATURES OF "SECTOR" SCIENTIFIC MULTI-BEAM ECHO SOUNDER

- generation of fan-shaped receiving split beams within band of 90 degrees
- adjustable parameters of radiating and receiving directive patterns
- functions of echo-counting (count of detected single targets with equal strength effect and target strength histogram plotting) and echo-integration (quantitative assessment of biomass)
- procedure for transducing path calibration under conditions of shallow waters
- hydroacoustic data post-processing system.

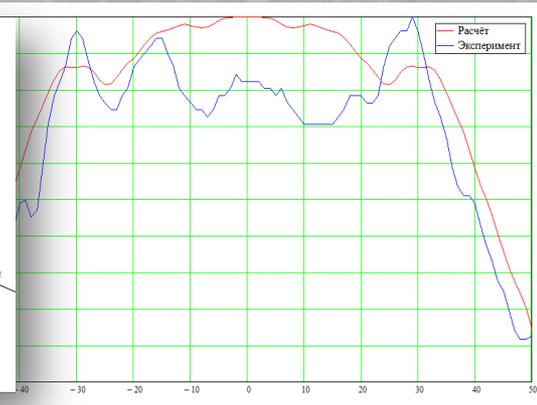
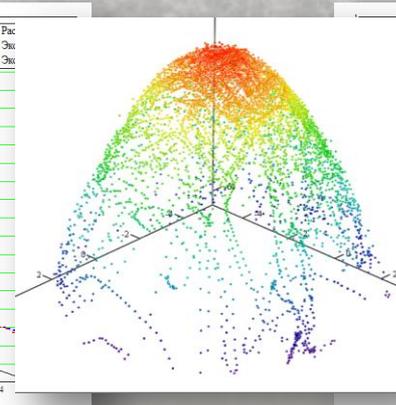
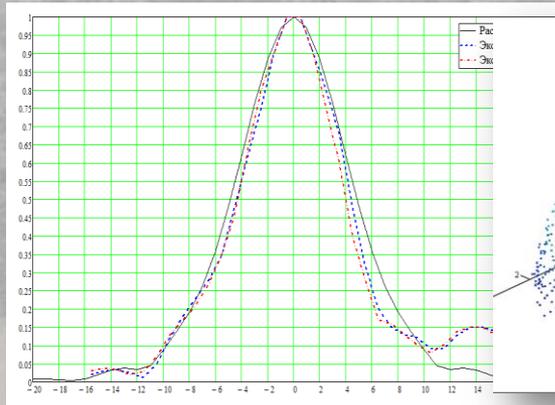
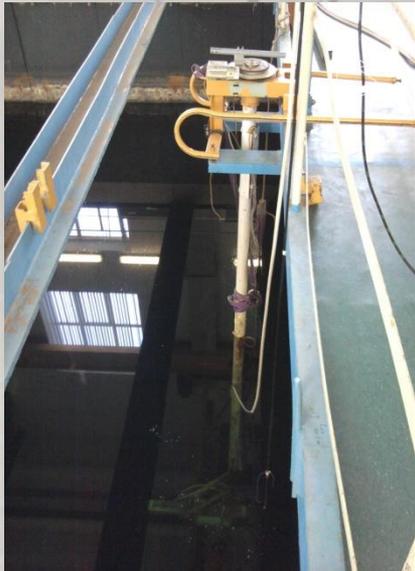
SOFTWARE OF “SECTOR” SCIENTIFIC MULTI-BEAM ECHO SOUNDER

1. **Transducer software** consists of underwater unit software and interface unit software. The transducer software is used to establish communication between transducer and control & display unit as well as to provide primary digital processing of hydroacoustic data.
2. **Control & display unit software** is used to control the echo sounder, to provide secondary processing of hydroacoustic data, to display graphic information and to record digital data of echo signals on hard disk.
3. **Calibration software** is used to calibrate echo-ranging sonar with the use of reference sphere – solid sphere made of tungsten carbide.
4. **“Target strength software” calculator** is used to calculate the value of reference sphere back-scattering strength with respect to current temperature, salt content of the environment (water) and the depth of the sphere immersion.
5. **Post-processing software** is used in the mode of suspended time for processing digital data recorded in the course of “Sector” scientific multi-beam echo sounder operation.

The software is provided with required patents and certificates.

MEASUREMENT RESULTS OF ANTENNA DIRECTIVE PATTERNS

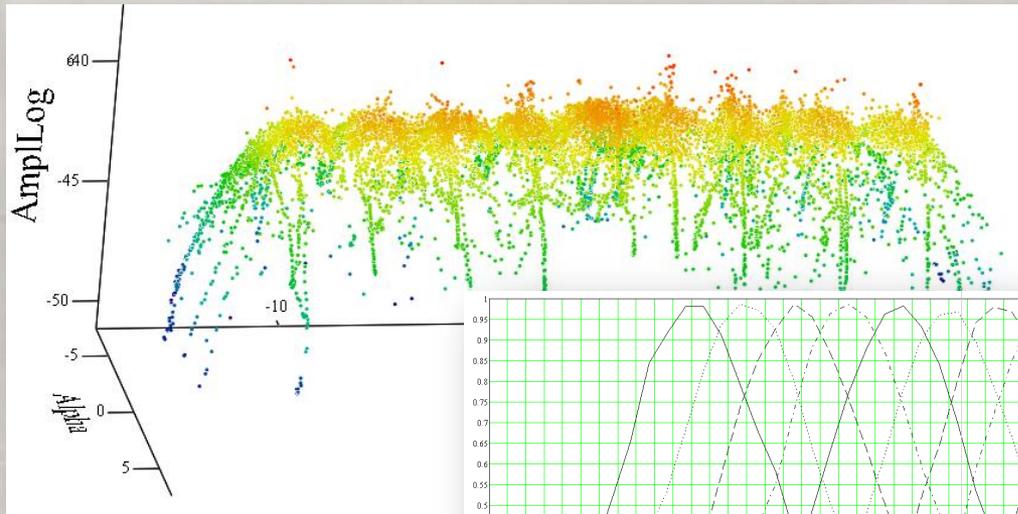
Measurements in hydroacoustic basin



Main lobe of directive pattern

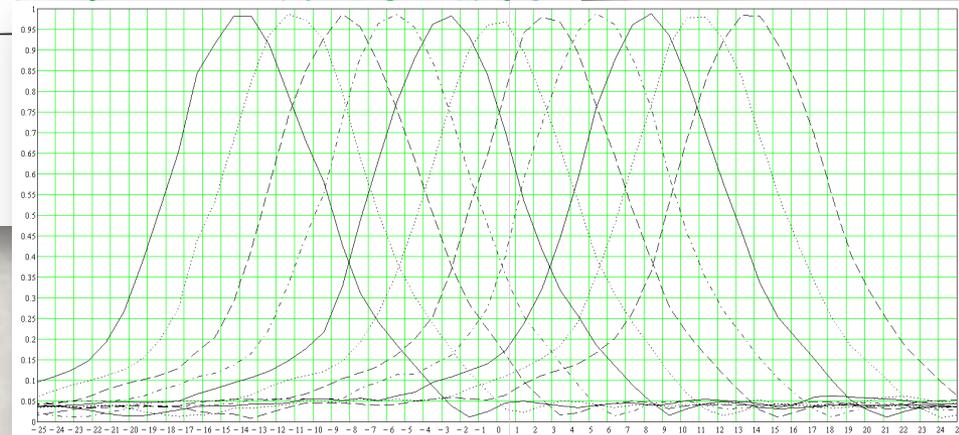
Narrow radiating directive pattern

Broad radiating directive pattern



Measured directive patterns of fan-shaped through-beams in 3D

Measured directive patterns of fan-shaped receiving beams





USER INTERFACE. "ECHOGRAM" DISPLAY MODE

ПО ПУИ ПГЛС "Сектор" (сборка 9186 от 01-09-2017 12:20:19)

VECTOR SECTOR echo 3D Координаты 00°0.0000'N 00°0.0000'E Скорость 0.0 м/с Status bar

Дата 00.00.000 00:00:00 Записи... Пинг: 0/0 Player

Глубина, м **7.49** ← Distance to bottom

Single targets

Прицел 3D-луч

Histogram

Fish shoals

Single fishes

Objects at the bottom

Тип сигнала Sv (TVG 20lgR) +

Sv ↑ -24 дБ +

Sv ↓ -60 дБ +

Цветовая гамма Стандартная, 12 +

Номер луча 1 +

Прозрачность, % 10 +

Отображать БП 1 +

Ориентация (БП 1) Эхолот +

Режим Эхограмма +

Настройка режима

Menu

Sr, -70 дБ Sv, -60 дБ -24 дБ



USER INTERFACE. "ECHOGRAM" DISPLAY MODE

ПО ПУИ ПГЛС 'Сектор' (сборка 9186 от 01-09-2017 12:20:19)

Координаты 056°004.338'N 034°027.786'E Скорость 4.37 м/с

VECTOR ECHOLOGO 3D

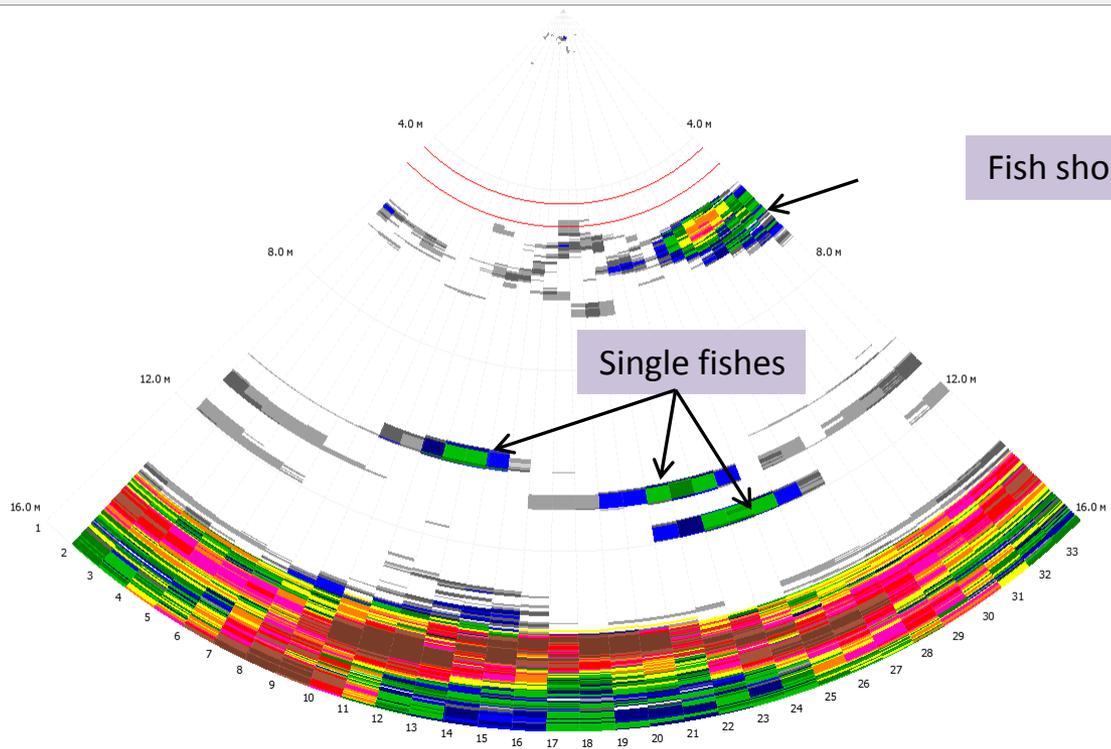
Warning icons: Alert, 100%, Settings, Magnifying glass, Menu

Дата 18.06.2017 15:15:30

Settings icon | Play/Pause icon | ID: R0766-D170618-T151504

Пинг: 738/1916

[-]	Тип сигнала Sv (TVG 20lgR)	[+]
[-]	Sv ↑ -20 дБ	[+]
[-]	Sv ↓ -56 дБ	[+]
[-]	Цветовая гамма Стандартная, 12	[+]
[-]	Номер луча 17	[+]
[-]	Прозрачность, % 10	[+]
[-]	Отображать БП 1	[+]
[-]	Ориентация (БП 1) Эхолот	[+]
[-]	Режим Сектор	[+]
<< Настройка режима		





USER INTERFACE. "3D" DISPLAY MODE

ПО ПУИ ПГЛС 'Сектор' (сборка 9186 от 01-09-2017 12:20:19)

Координаты 044°040.154'N 048°020.556'E Скорость 2.40 м/с

Дата 28.09.2017 06:35:46 R0973-D170928-T063521 Пинг: 7493/13857

Surface reverberation

Fish shoals

Fish shoals

Sturgeons echo-routes

Bottom surface

-	Тип сигнала Sv (TVG 20lgR)	+
-	Sv ↑ -58 дБ	+
-	Sv ↓ -94 дБ	+
-	Цветовая гамма Стандартная, 12	+
-	Номер луча 17	+
-	Прозрачность, % 10	+
-	Отображать БП 1	+
-	Ориентация (БП 1) Эхолот	+
-	Режим 3D	+
Настройка режима		

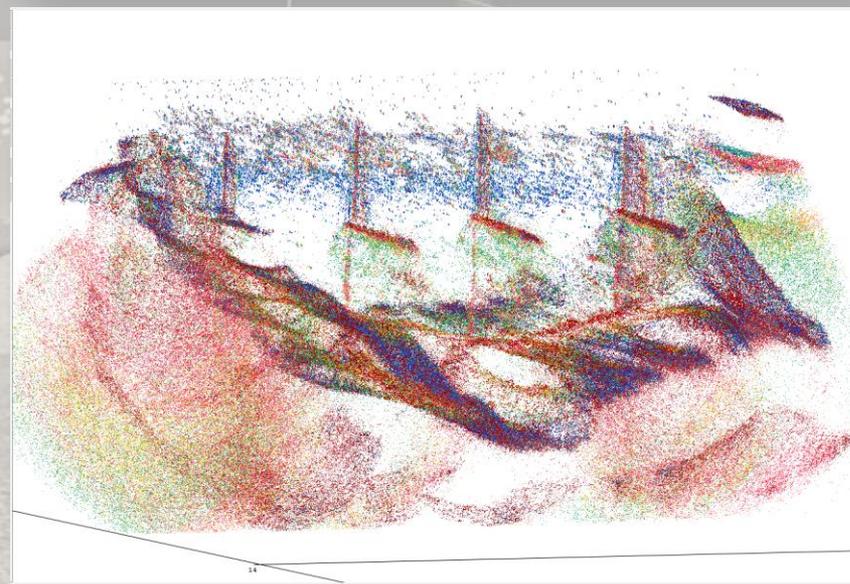
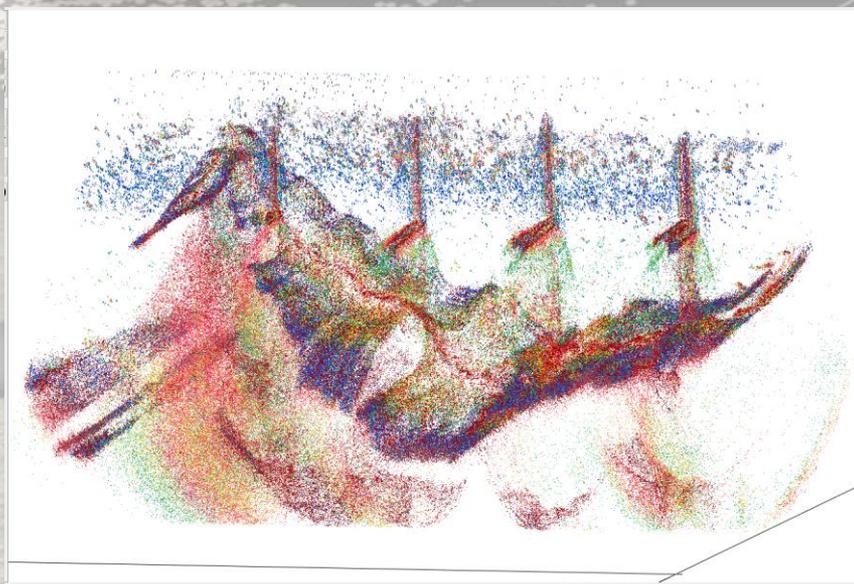
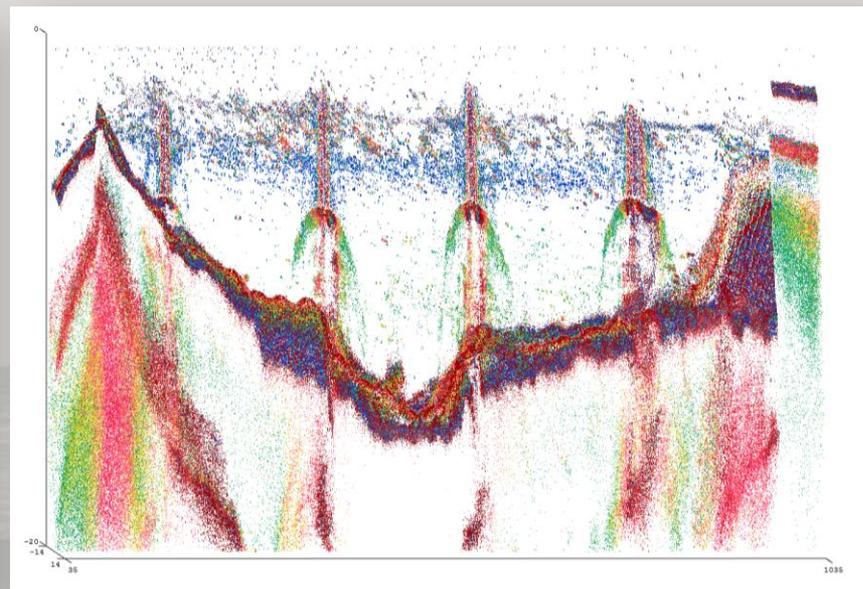


"3D" DISPLAY MODE (VIDEO CLIP)

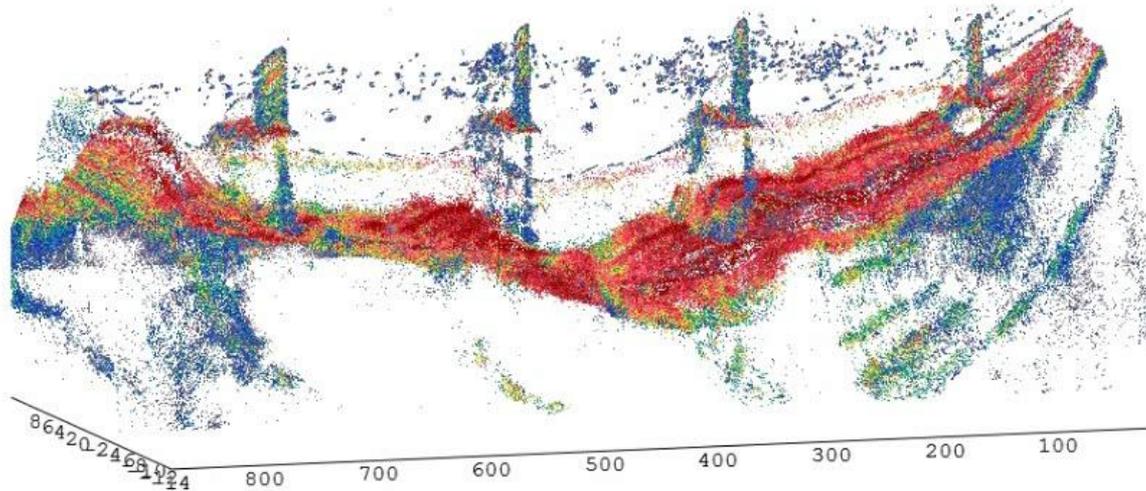
A number of 3-D X-shaped structures at the bottom used to attract fish



SURVEY OF BRIDGE FOOTING



SURVEY OF BRIDGE FOOTING "3D" ECHOGRAM (VIDEO CLIP)





SURVEY OF FISH IN EXPERIMENTAL KEEPNETS



SURVEY OF FISH IN KEEPNETS (VIDE CLIP)



HYDROACOUSTIC SURVEY AT THE RIVER

Comparative hydroacoustic survey in collaboration with “VNIRO” Federal State Funded Research Institution with the use of “Sector” scientific multi-beam echo sounder and scientific single beam echo sounder EY500 (Simrad, Norway) for verification of the developed fish stock estimation methods



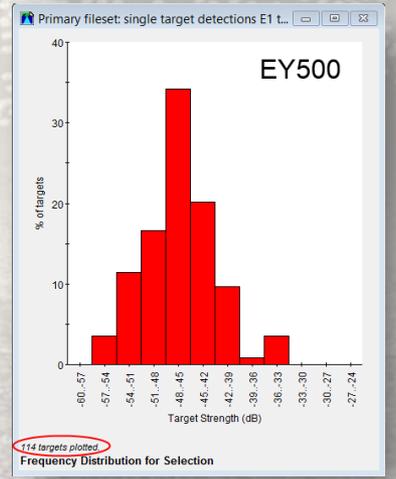
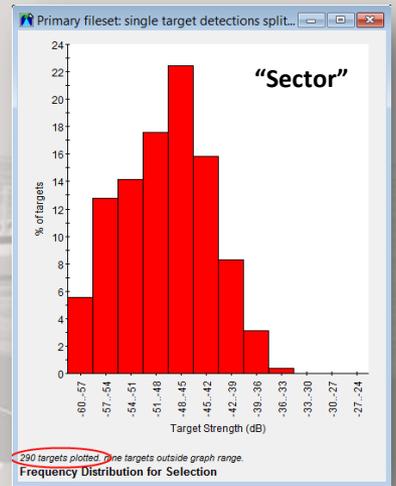
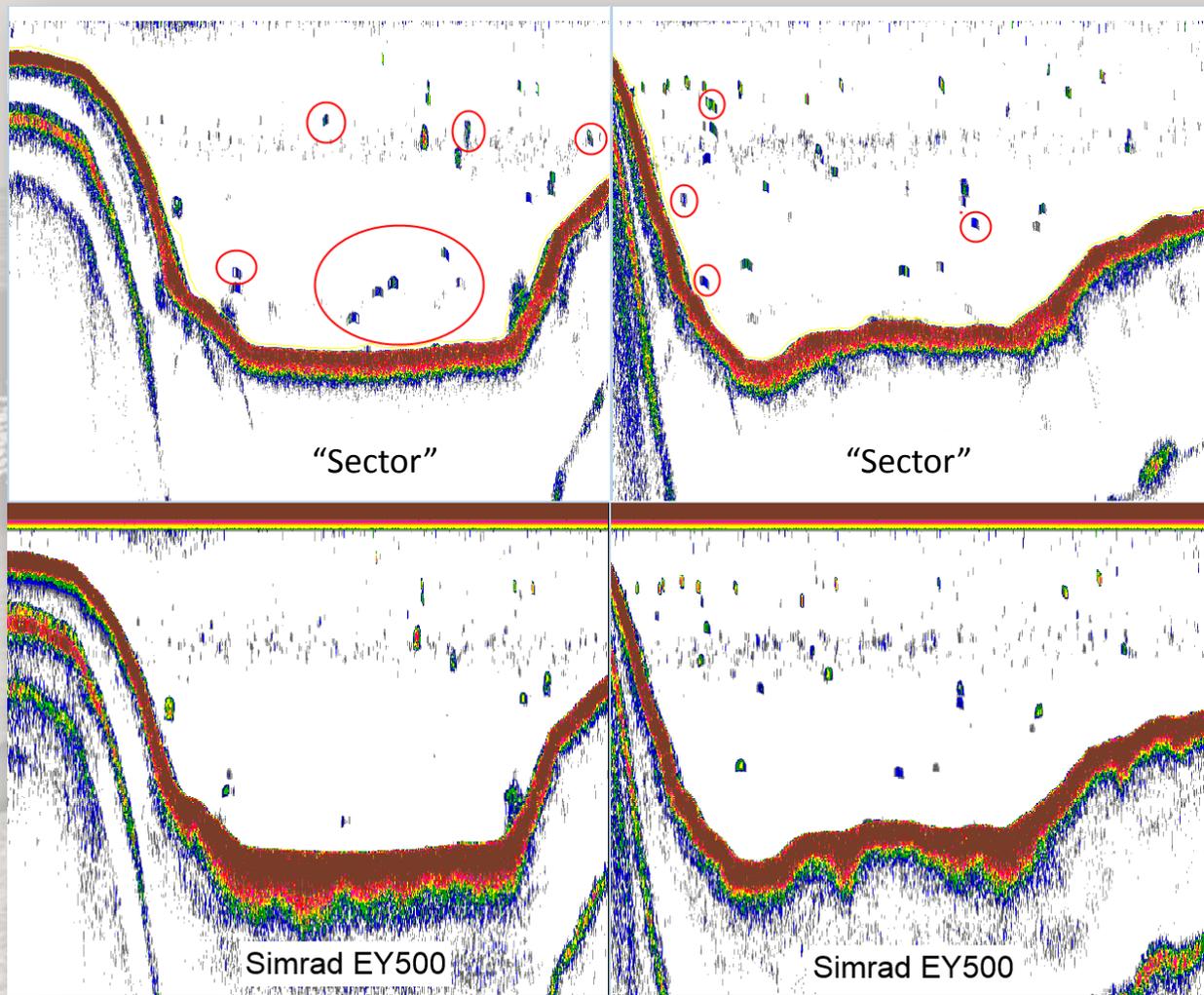
Vessel motion path



Vessel with researchers and equipment installed

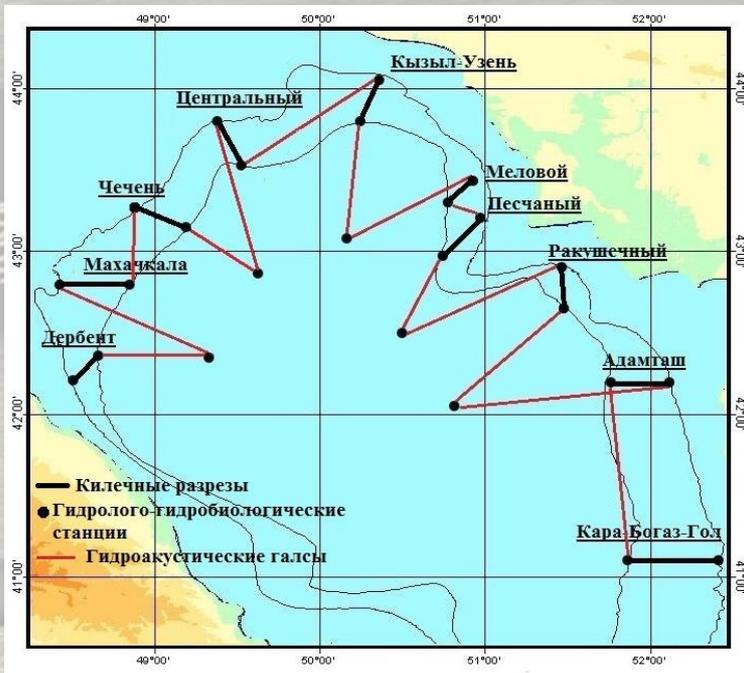


RESULTS OF HYDROACOUSTIC SURVEY AT THE RIVER



HYDROACOUSTIC SURVEY IN THE SEA

Comparative collaborative hydroacoustic survey with the use of “Sector” scientific multi-beam echo sounder and scientific single beam echo sounder EK60 (Simrad, Norway) was provided in Caspian Sea for verification of the developed fish stock estimation methods.



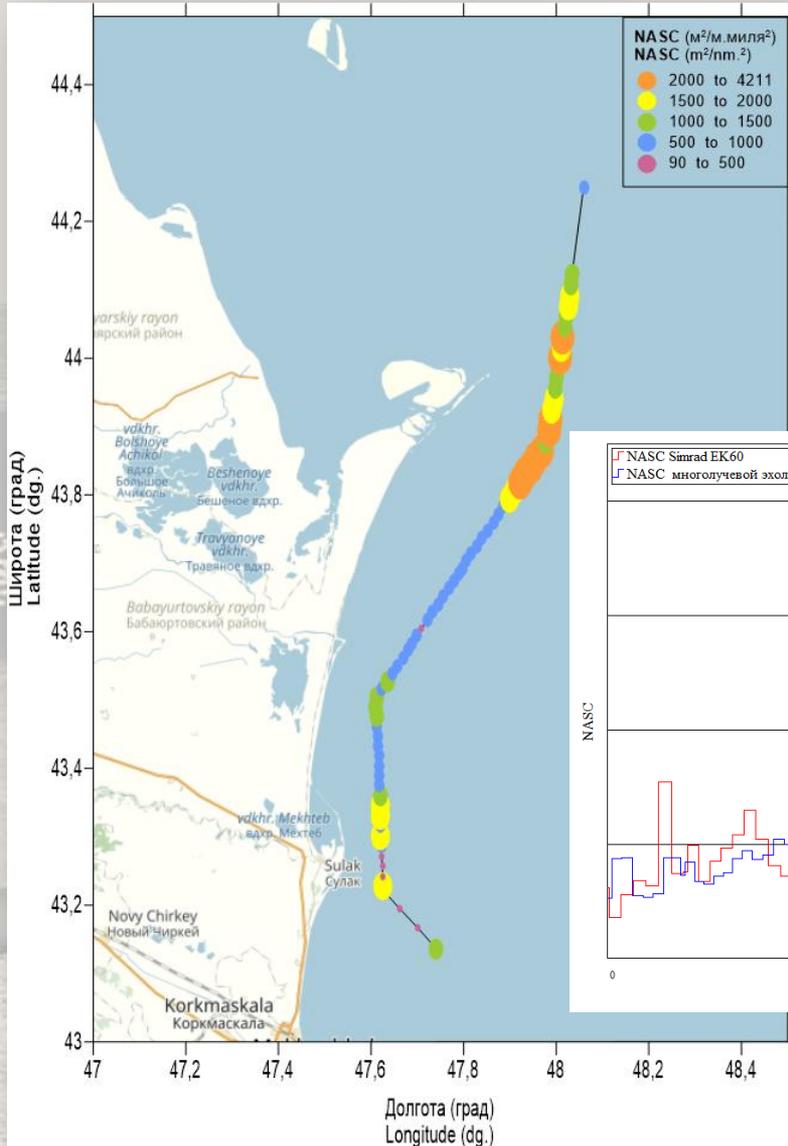
Vessel motion path



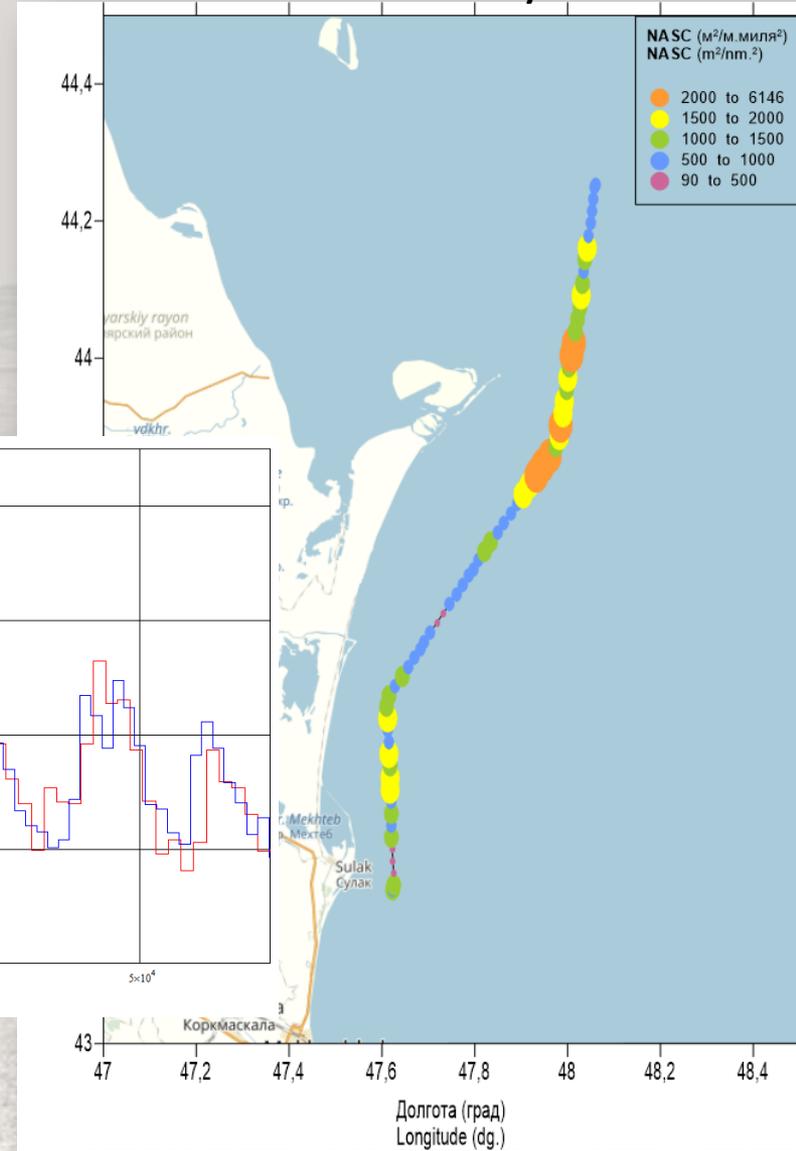
“Caspian researcher” survey vessel

RESULTS OF HYDROACOUSTIC SURVEY IN OFFSHORE ZONE

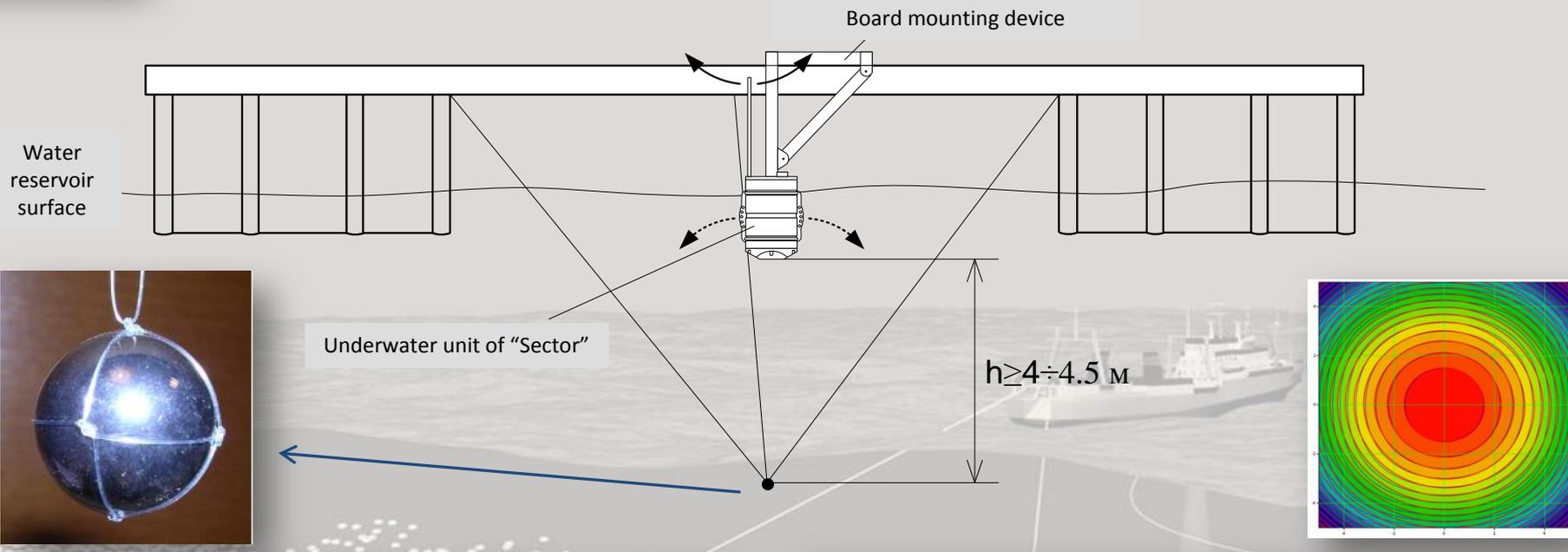
Vessel motion path and "Sector" survey results



Vessel motion path and EK60 Simrad survey results



Calibration of "Sector" scientific multi-beam echo sounder



SppSeriesMainView

0.0 м, 8.2 м, 16.5 м, 24.8 м, 33.0 м

36°30.454'E

55°45.482'N

55°45.111'N

55°44.740'N

Глубоко

200м

© Участники OpenStreetMap

Параметр	Значение
Область выделения	Вертикальная

Расчеты: Эхоинтегрирование, Эхосчет, 3D косяки

Параметр	Значение
interval	0
latitude	0
longitude	0
date	0
time	0
layer_top	0
layer_bottom	0
depth	0
nasc	0
sv_threshold	0
sv_avg	0
sv_max	0
sv_dev	0

Экспорт

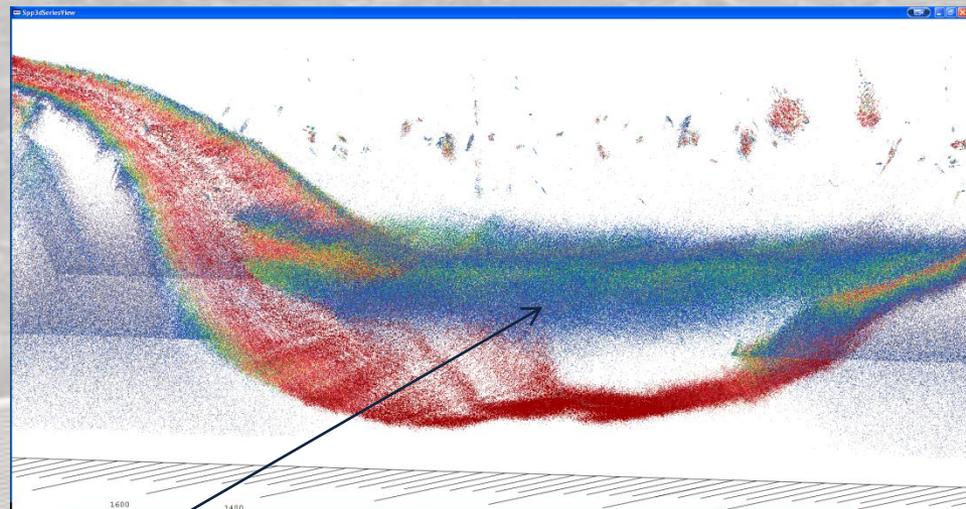
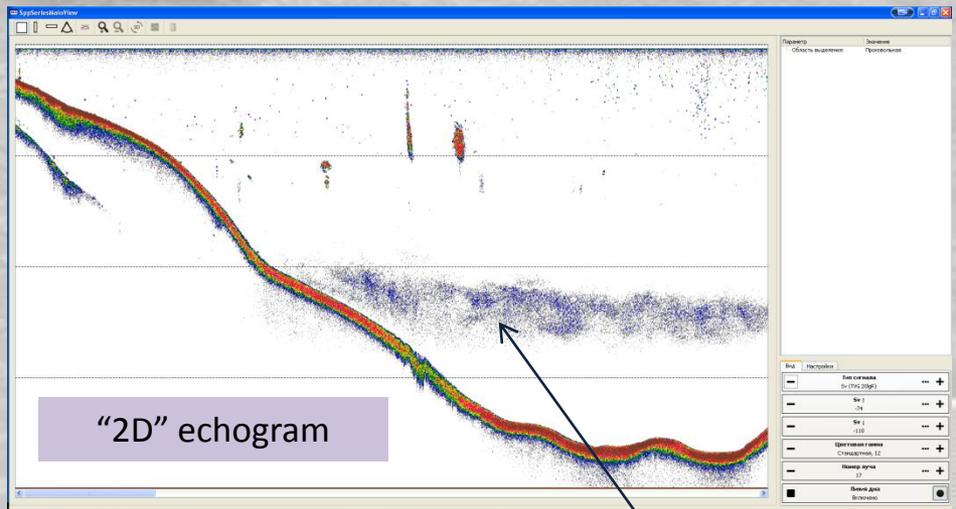
Вид: Настройки

Настройки		
Дно и поверхность	...	+
Тип редактирования	...	+
Линия поверхности, м	0.5	...
Линия дна	Расчетная	...
Отступ от дна, см	0	...

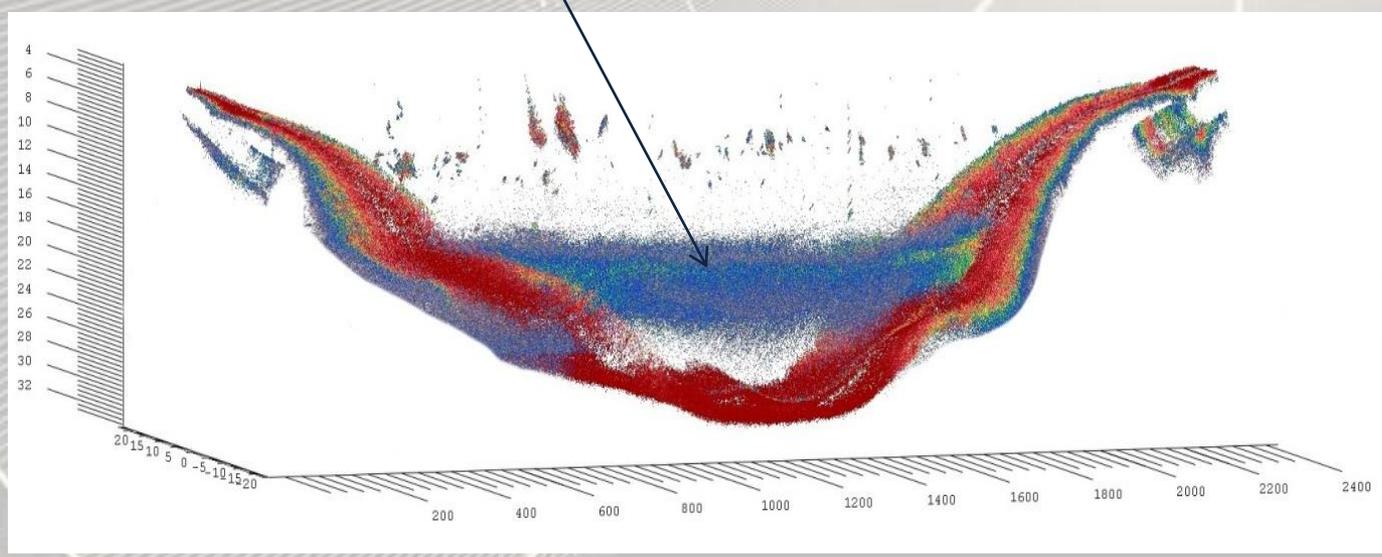
<< Назад Вперед >>

Подтвердить

"3D" MODE POST-PROCESSING DATA SOFTWARE



WRIGGLER



OPERATIONAL TEST OF "SECTOR" SCIENTIFIC MULTI-BEAM ECHO SOUNDER





THANK YOU FOR YOUR ATTENTION!