

6-2010

4D Multimodal Visualization and Analysis of Seafloor Vents and Plumes

Maurice Doucet

Interactive Visualization Systems

Mark Paton

Interactive Visualization Systems

James V. Gardner

University of New Hampshire, Durham, jim.gardner@unh.edu

Jens Greinert

Royal Netherlands Institute for Sea Research

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Recommended Citation

M. Doucet, Paton, M., James V. Gardner, and Greinert, J., "4D Multimodal Visualization and Analysis of Seafloor Vents and Plumes", Canadian Hydrographic Conference (CHC). Quebec City, Quebec, Canada, pp. 1-2, 2010. <http://hydrography.ca/2010-conference.html>

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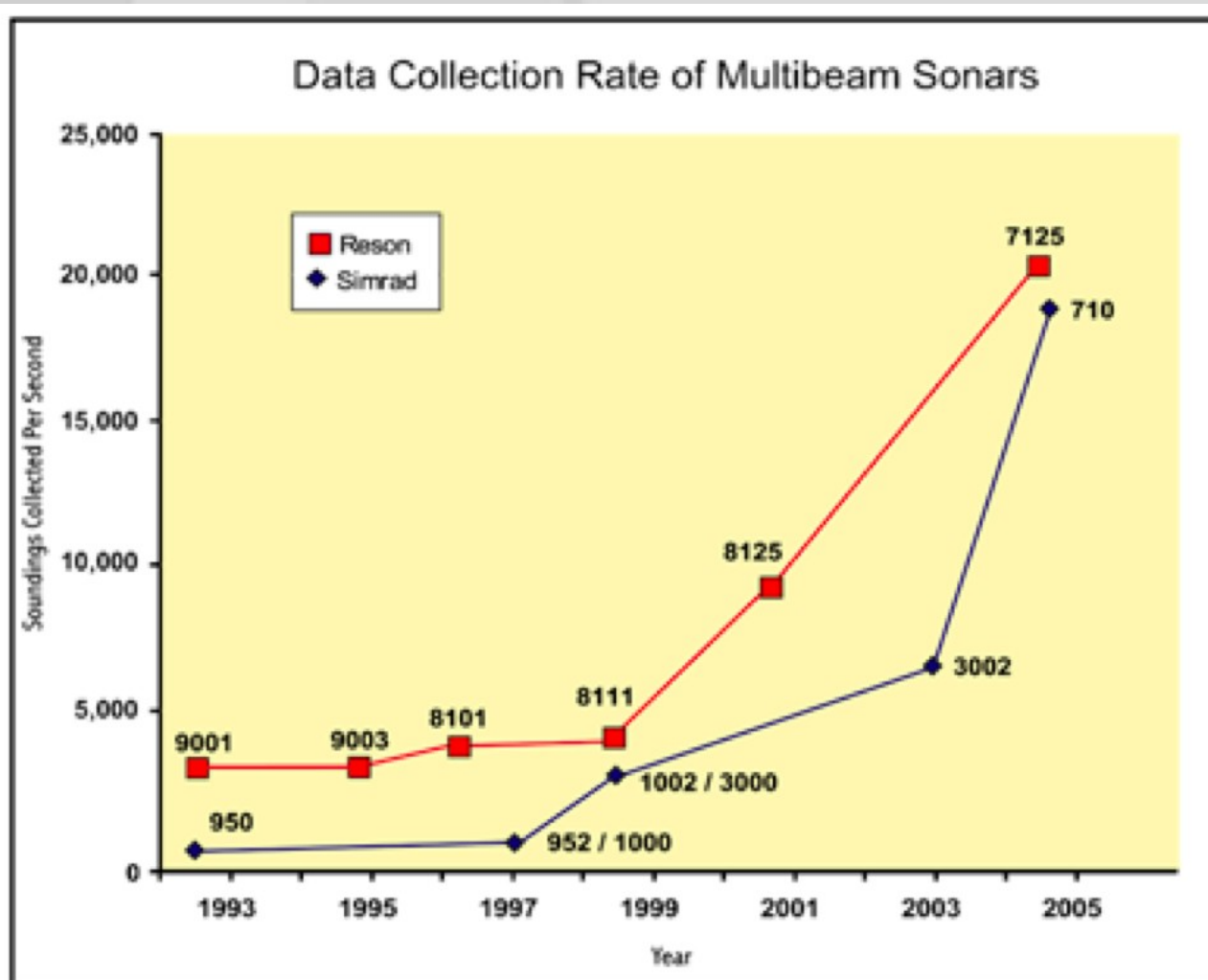
4D Multimodal Visualization and Analysis of Seafloor Vents and Plumes

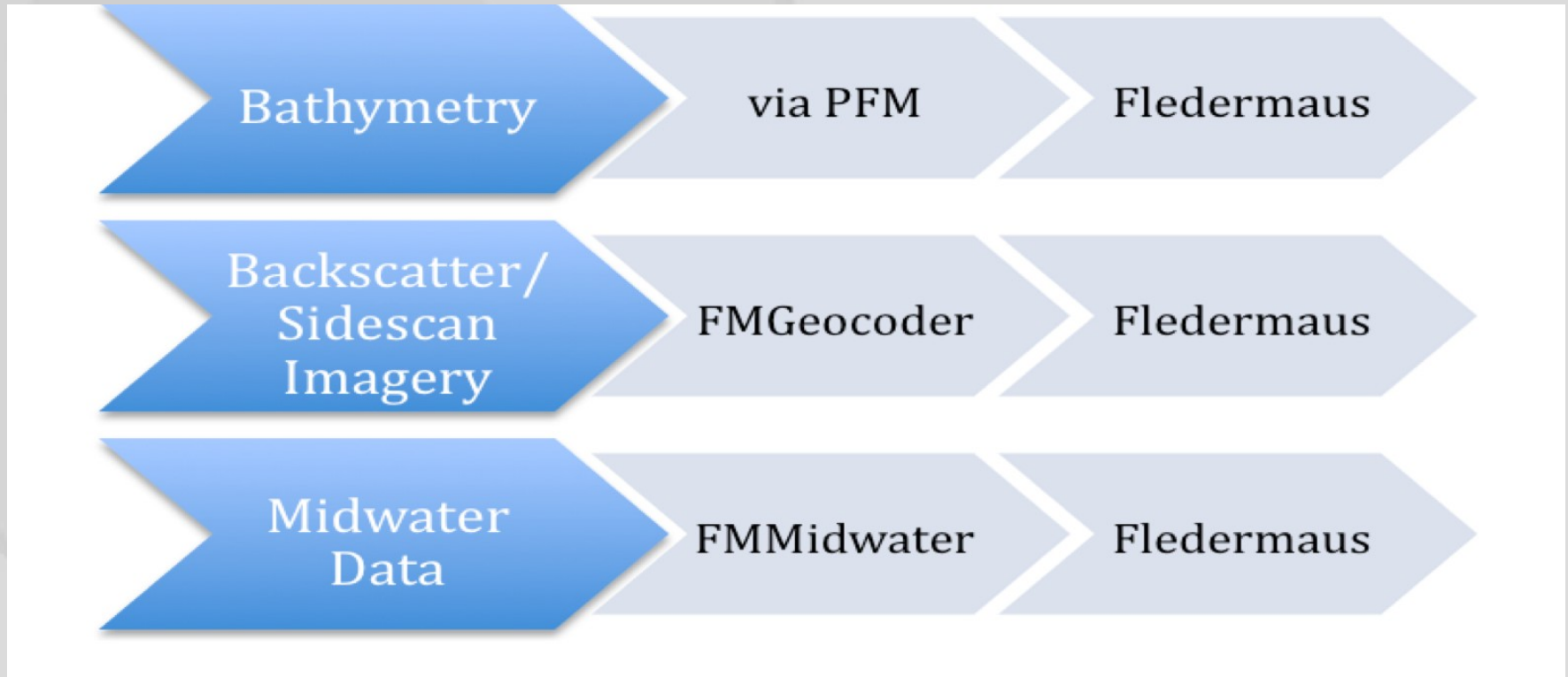


Maurice Doucet & Mark Paton, IVS3D

Jim Gardner, Center for Coastal & Ocean Mapping, UNH

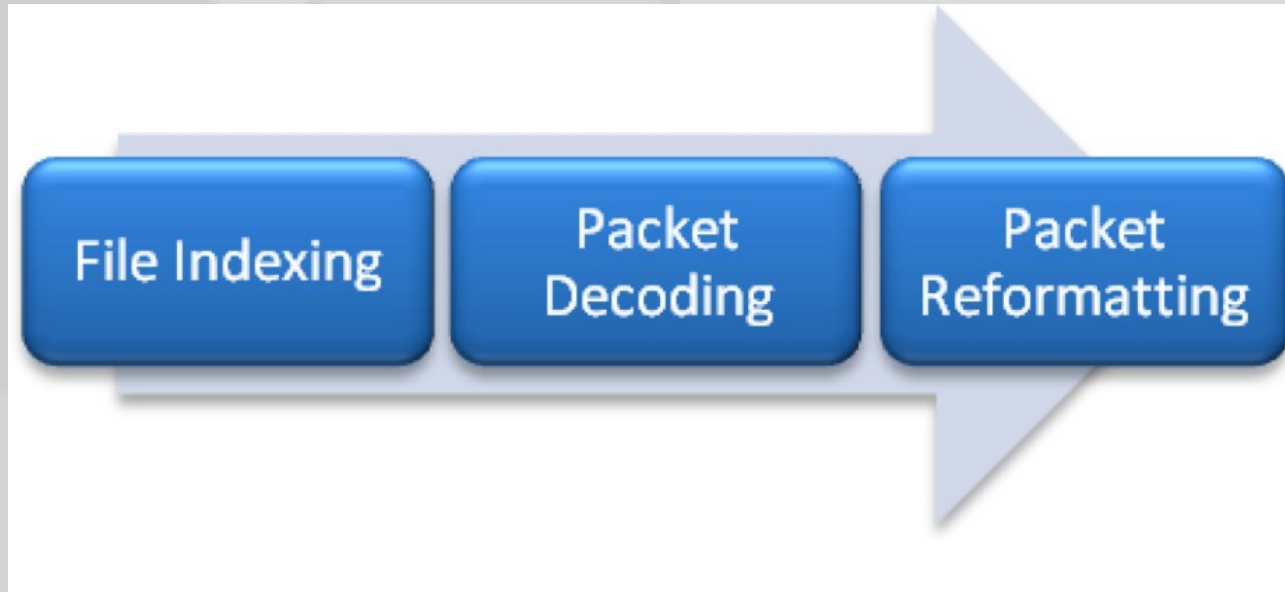
Jens Greinert, Royal Netherlands Institute for Sea Research





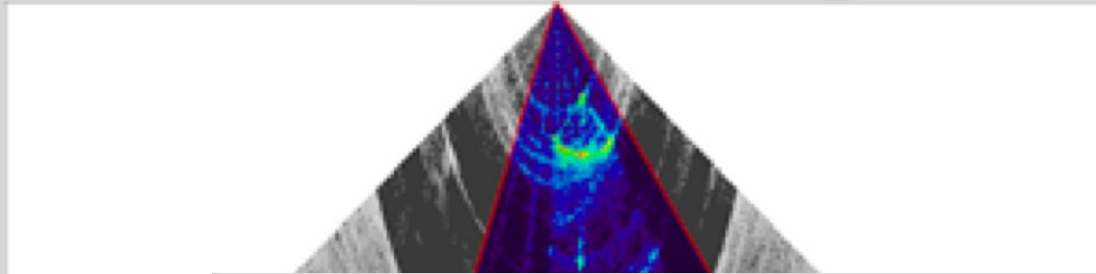
- Data Density
- Most of the time there isn't much to see
- Different manufacturer have different storage schemes.
- Desire for a suitable and Open Format

The GWC Format

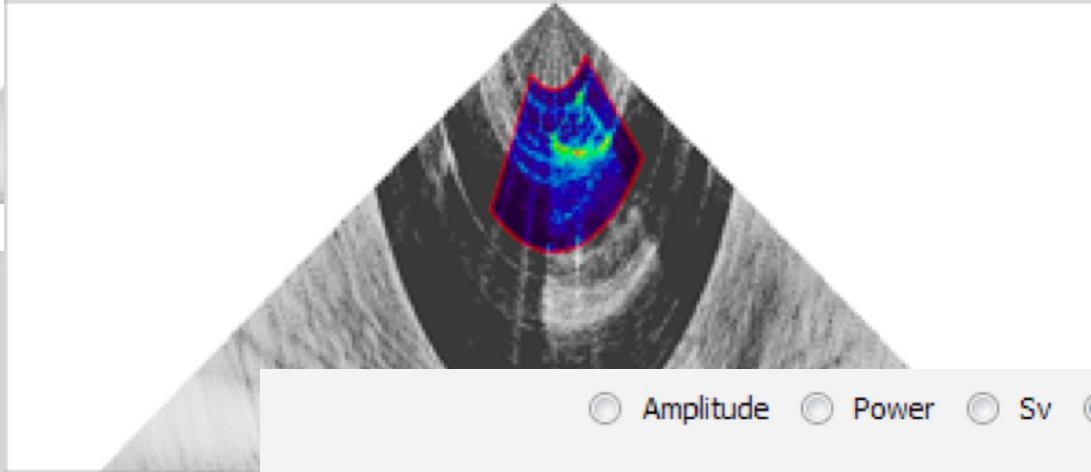


- Integrated ping based packets with TS & sync'd nav and attitude.
- Parsers for Kongsberg, Reson, Imagenex, XTF, etc.
- External navigation can come from POSPac and GSF.

- Method of feature extraction
 - No automatic feature detection
 - Provide tools for feature examination and visualization.
 - Fan View/Stack View
 - Ability to control the time range and beam range of interest
 - Ability to zoom in on the histogram of resulting intensities.
 - Data sent to Fledermaus for 4D visualization and analysis.

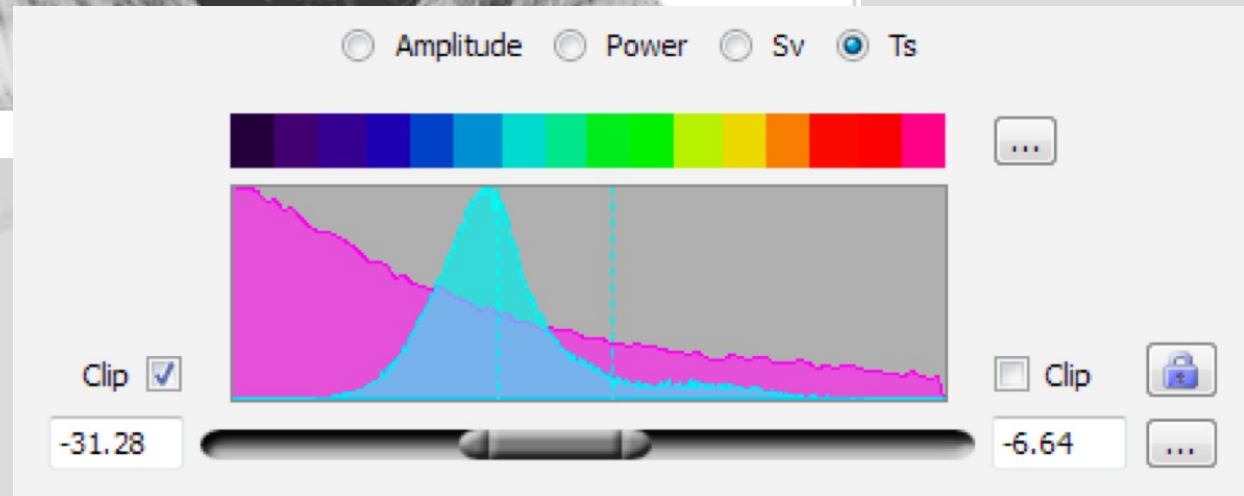


Beam Limiting



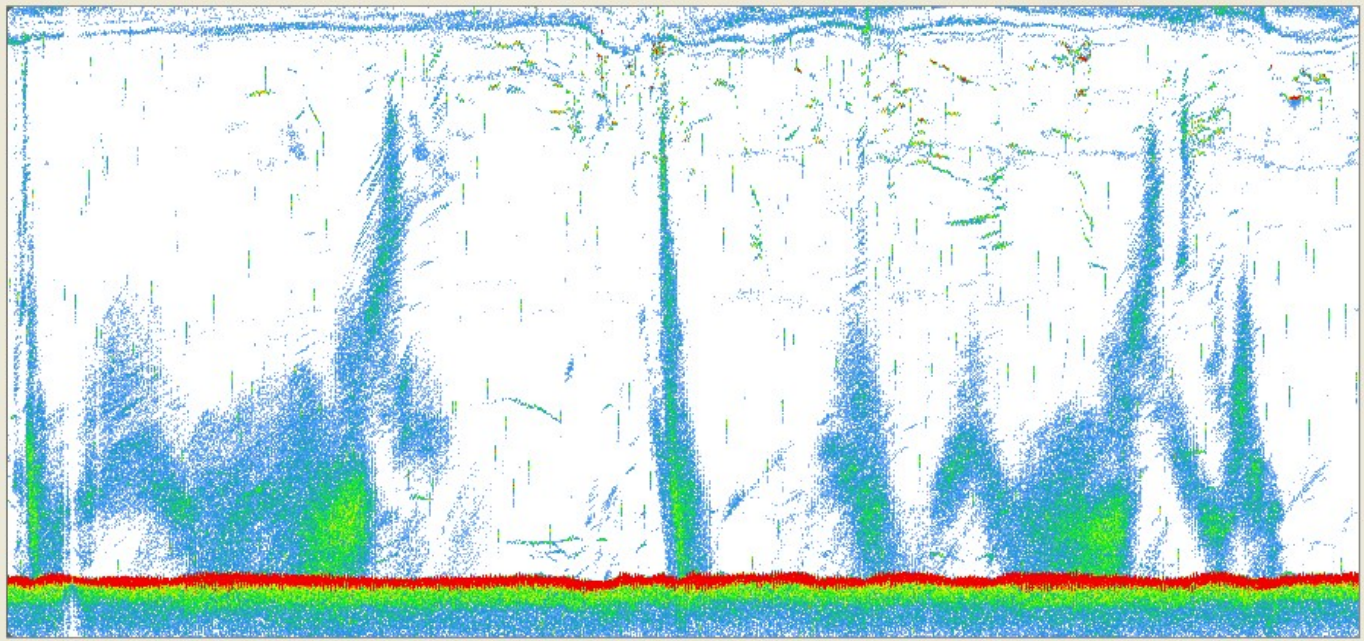
Range Limiting

Histogram Limiting



Source Files

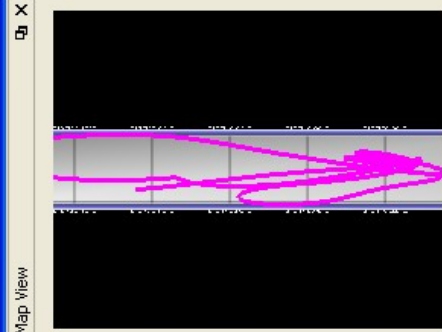
- Sensor
- Navigation
- Midwater
 - 2009701-D20090725-T191917_R1_...
 - Sonar Info
 - Beam Configuration
 - Watercolumn: 2427 packets
 - Installation: 1 packets
 - SourceFileInfo: 1 packets
 - SD Files



Map

Midwater

1:1



Time: 07/25/2009 19:19:17.4 Rate: 1s

Beam View Options

Fan Polar Stacked Beam 1 Use ...

Beam: 1

Range: 26.0 254.0

Depth: 0.0 1000.1

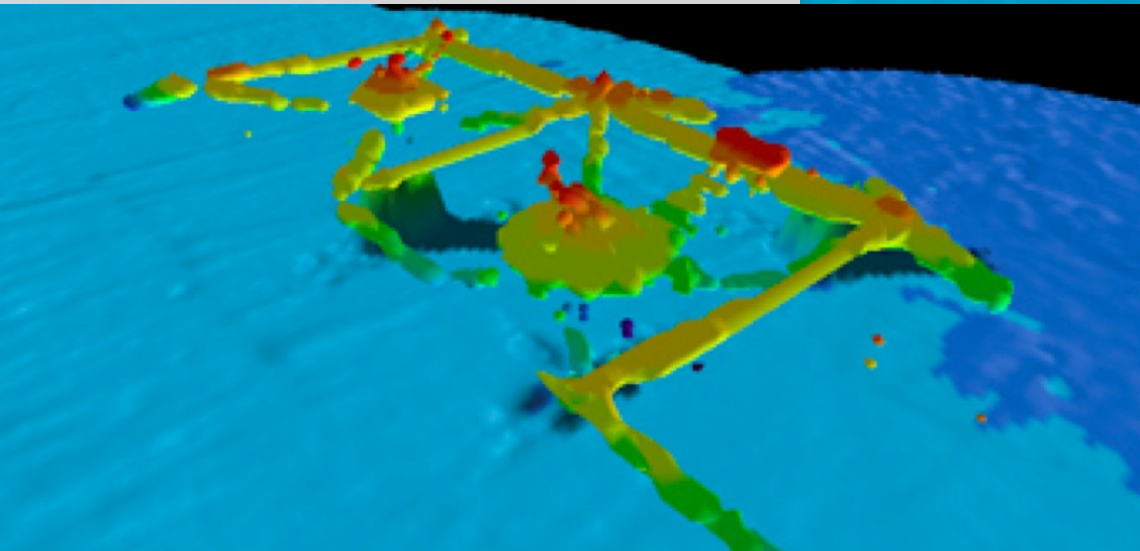
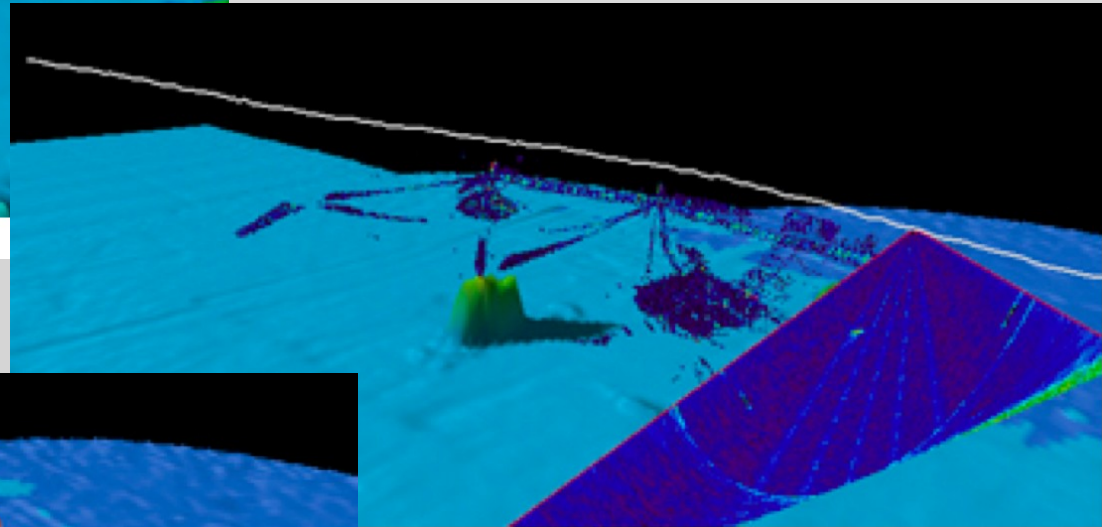
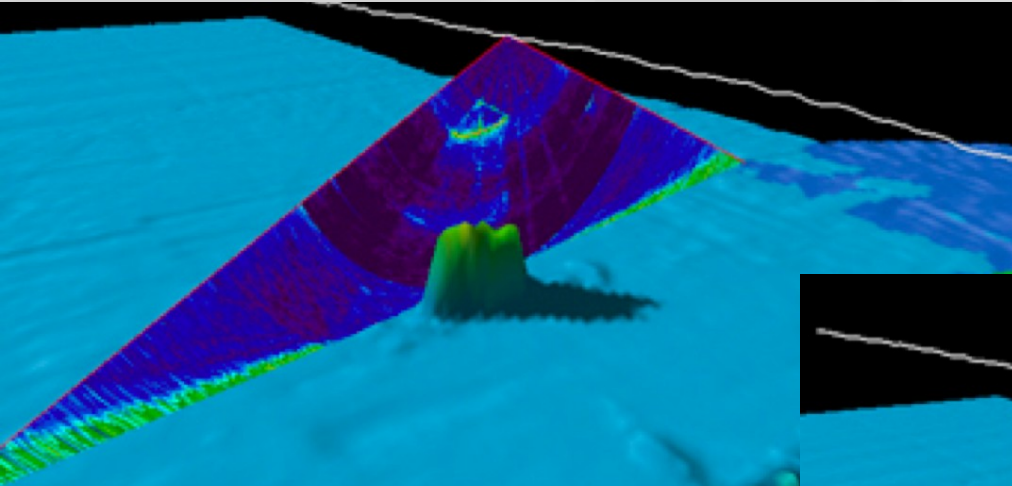
Signal Options

Amplitude Power Sv Ts

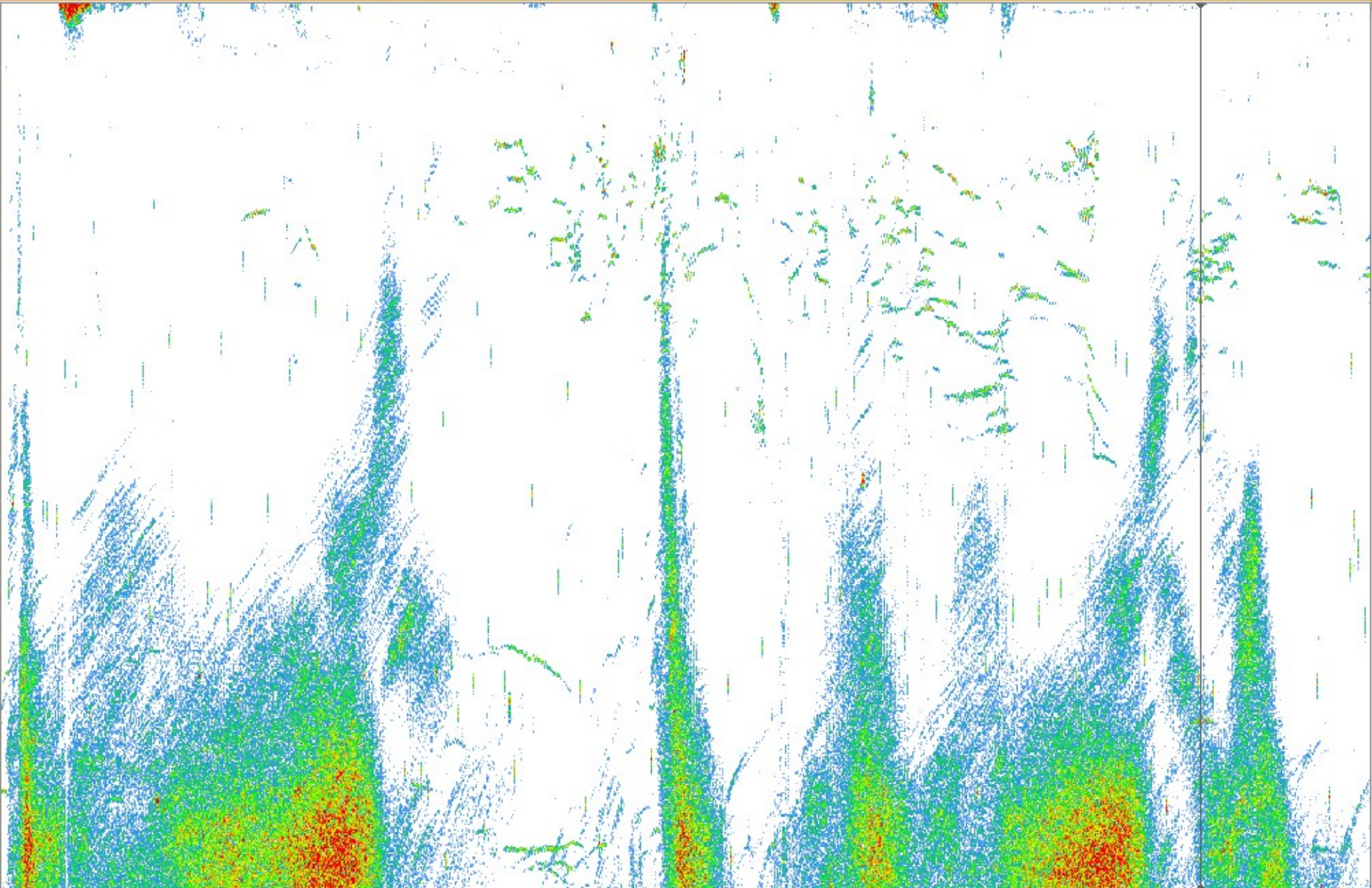
Color Map

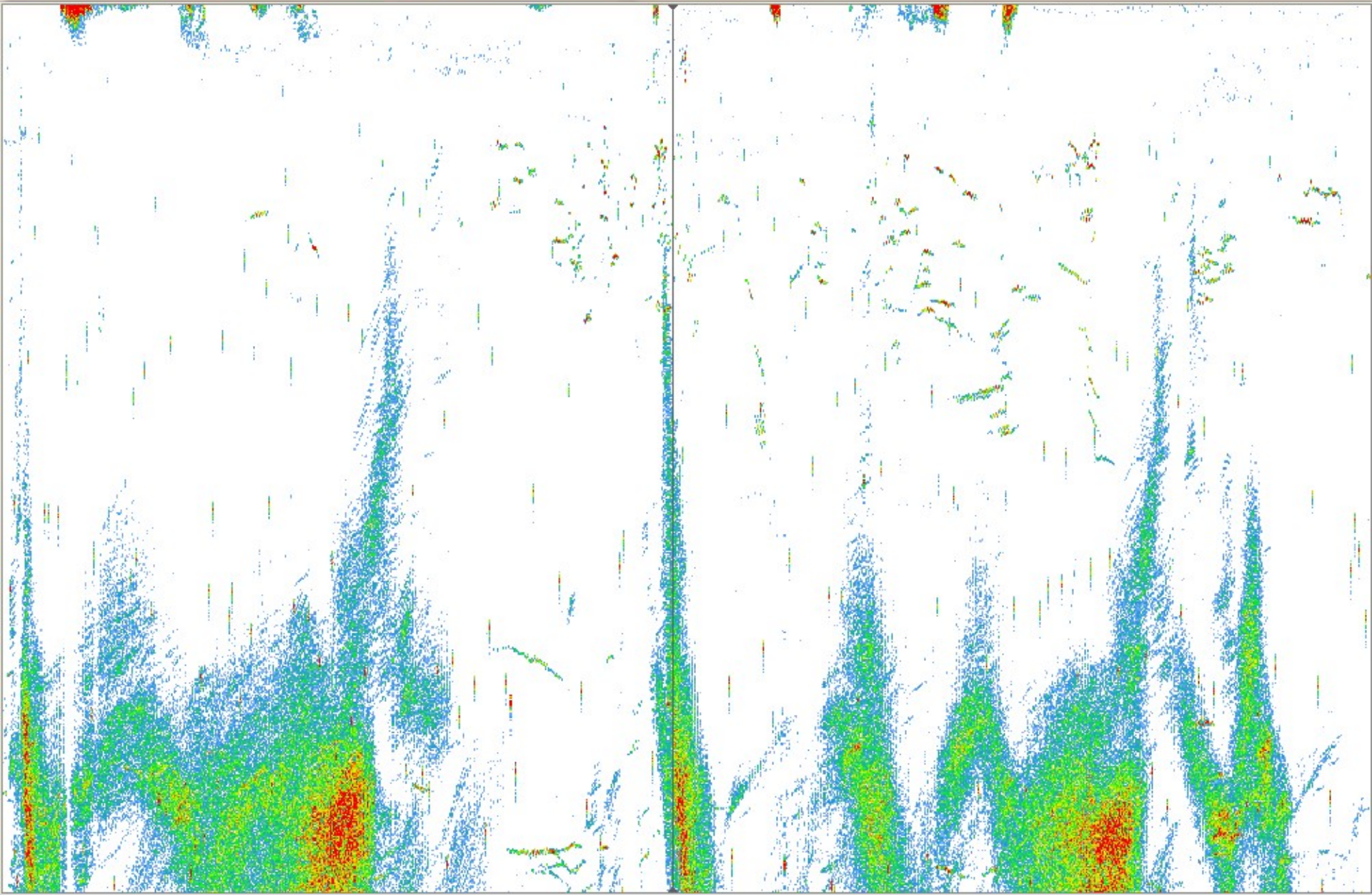
Clip -9486.79 -5978.56

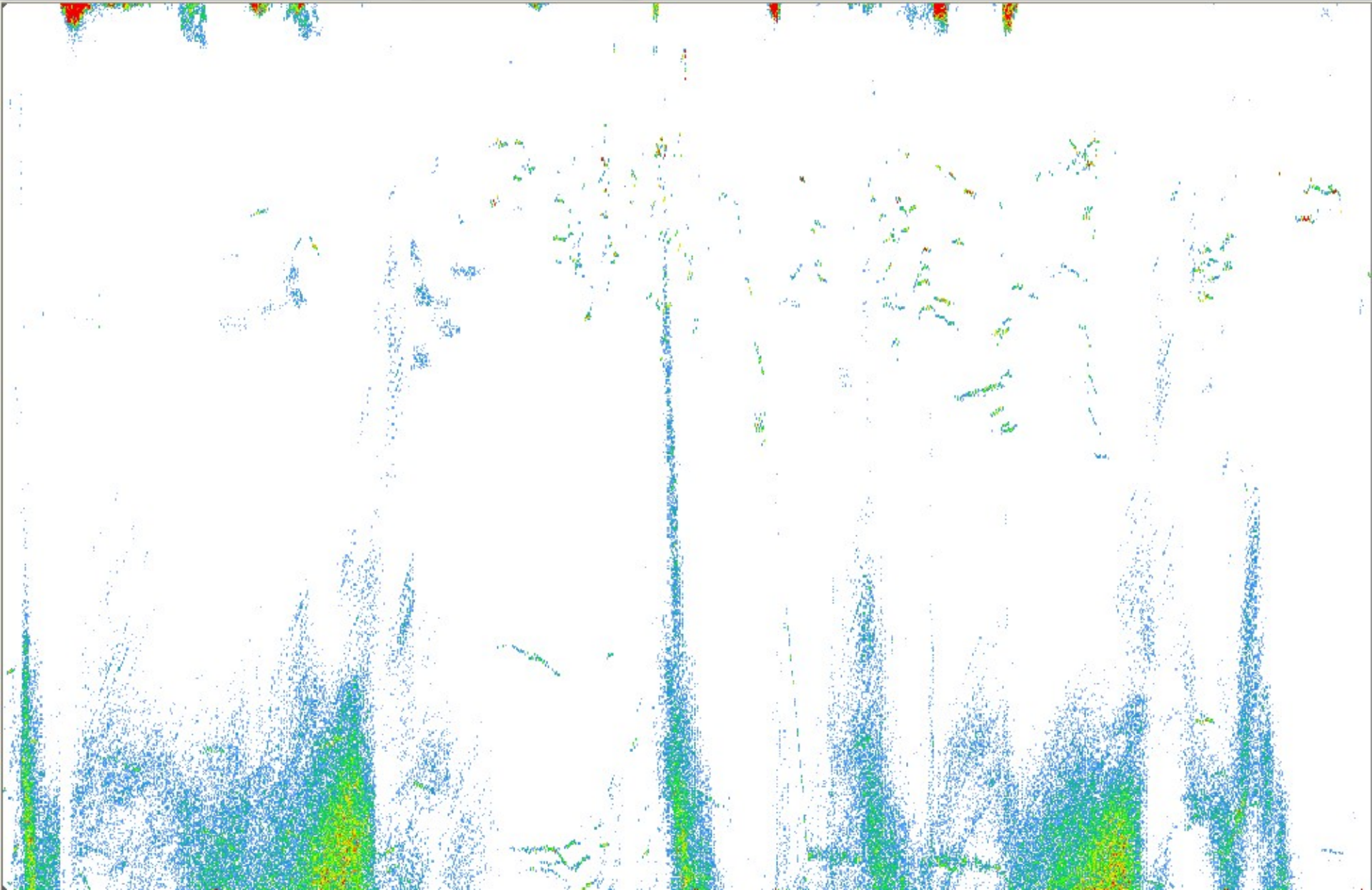
- Beam Time Series Curtain
- Ping Fan over time
- 3D Points from resulting features (time tagged)
- 3D Volume with ISO surface visualization



- Kongsberg ES60 Survey
 - Jens Greinert
 - Data collected offshore of Svalbard on the RV Jan Mayen (University of Tromsøe)
 - Data collected in 3 frequencies
 - 18 KHz, 38 KHz, 120 KHz







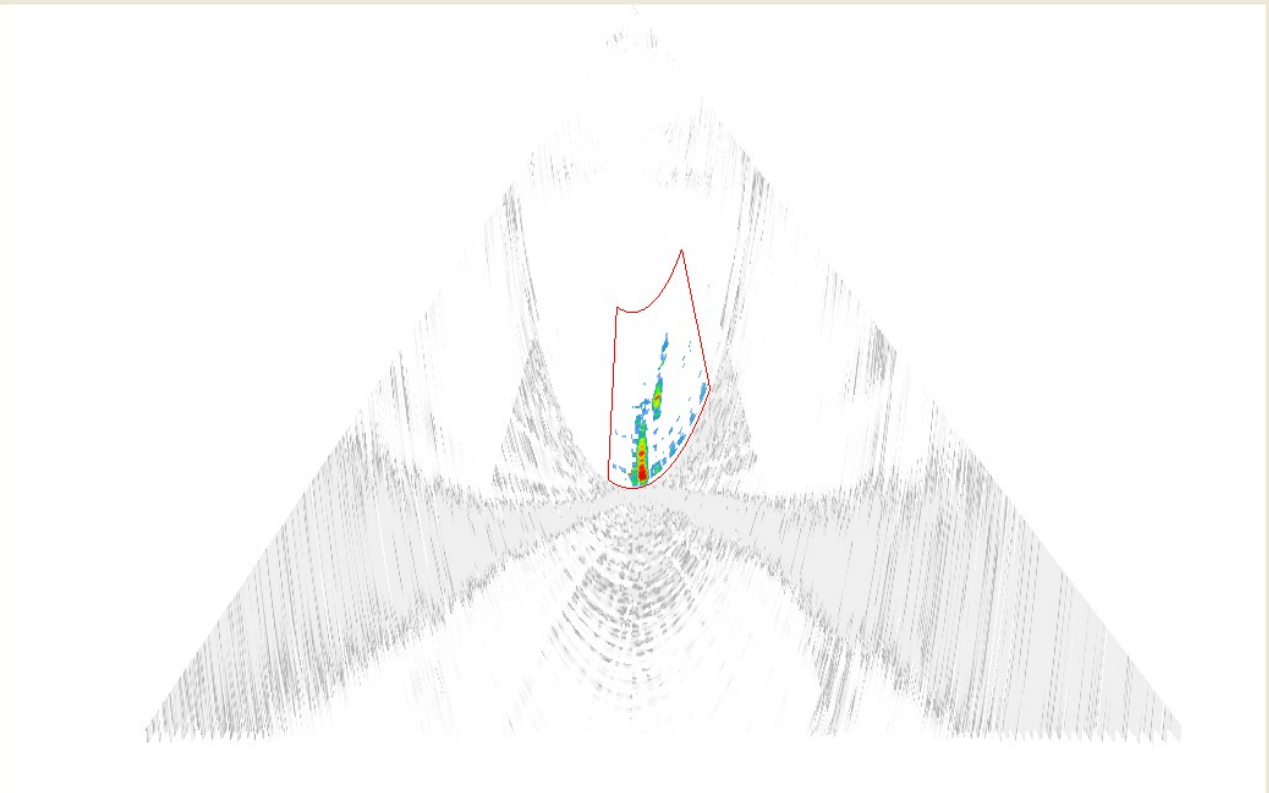
- EM122 Sea Acceptance Trials
- Known area of hydrate plumes
- Interested to see whether the sonar would pick up the plume at 12Khz

FMMidwater

File View Tools Filter Help

Source Files

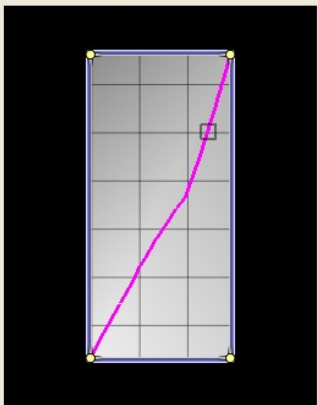
- Sensor
- Navigation
- Midwater
 - KMtrials_line_21_R1_CH1.gwc
 - Watercolumn: 634 packets
 - Installation: 1 packets
 - SourceFileInfo: 1 packets
 - SoundSpeedProfile: 1 packets
- SD Files



15m 20m 25m 30m 35m 40m

Time: 01/30/2010 14:20:15.3
Rate: 1s

Map View



Display Control

Beam View Options

Fan
 Polar
 Stacked
 Beam
 1
 Use
 ...

Beam

...

Range

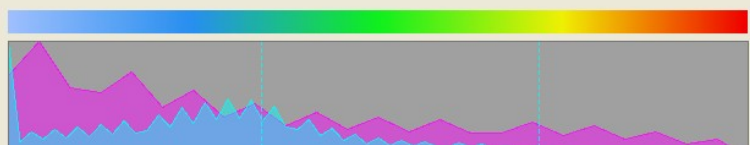
...

Depth

...

Signal Options

Amplitude
 Power
 Sv
 Ts
 Color Map

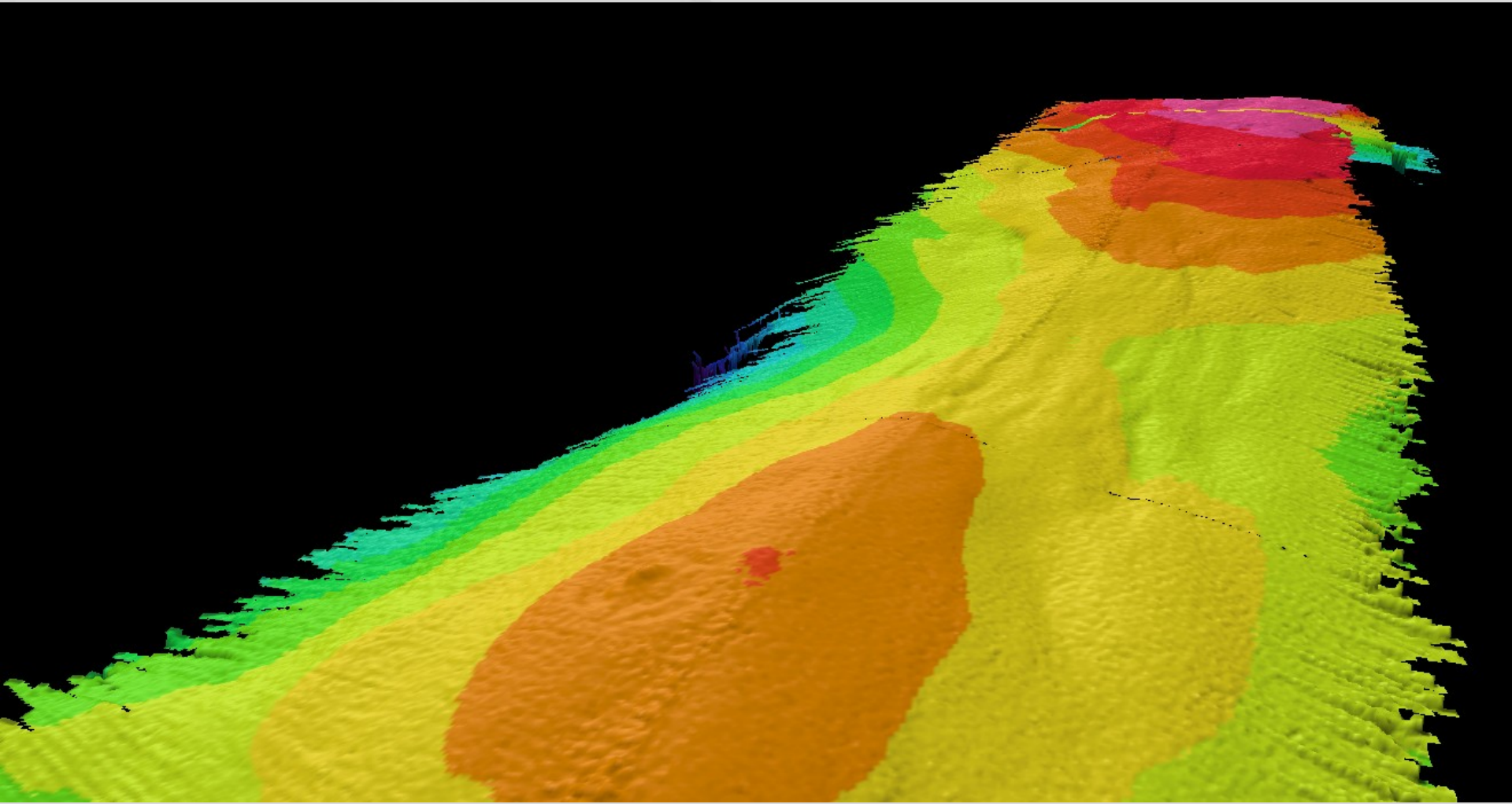


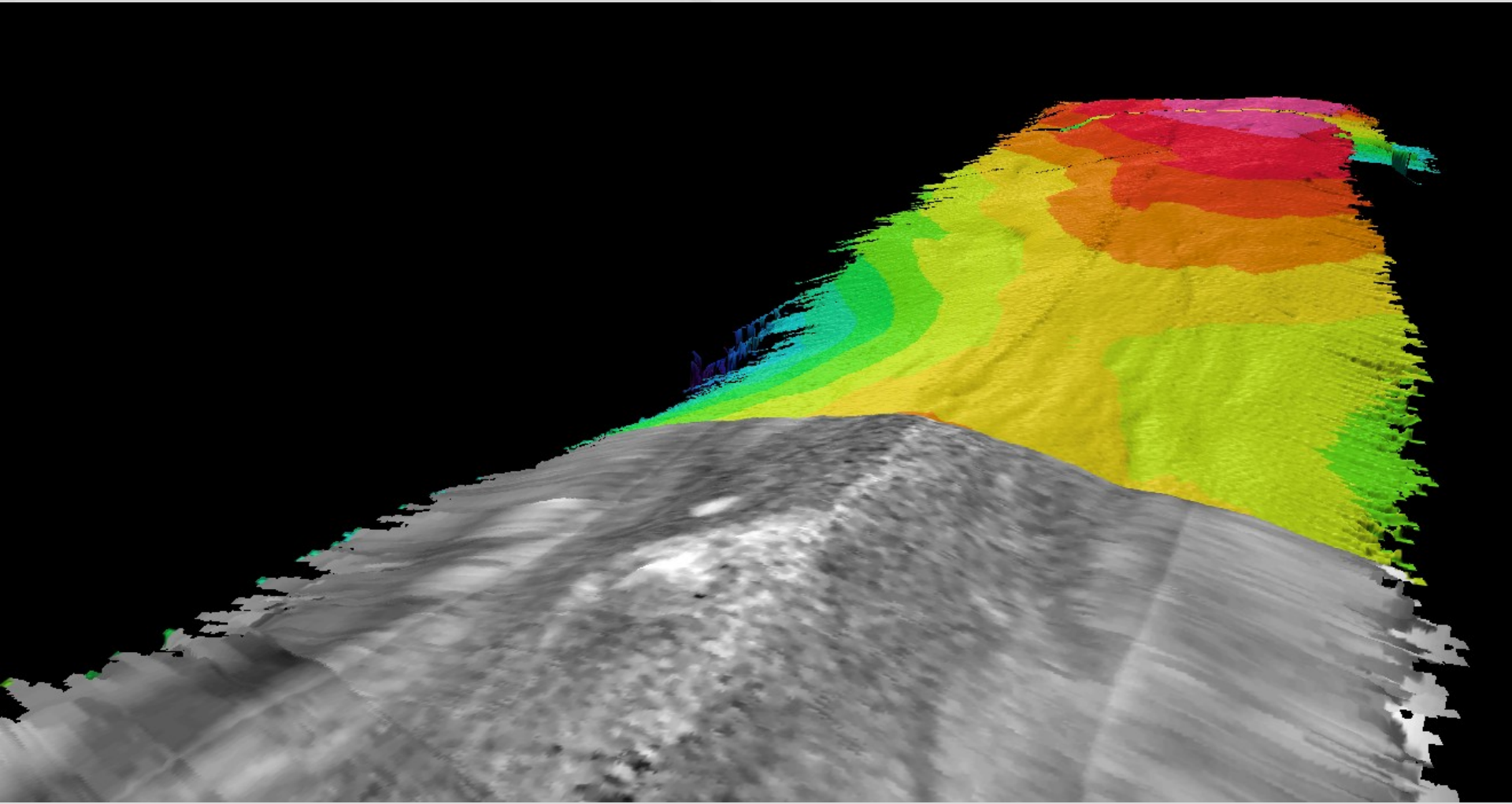
Clip

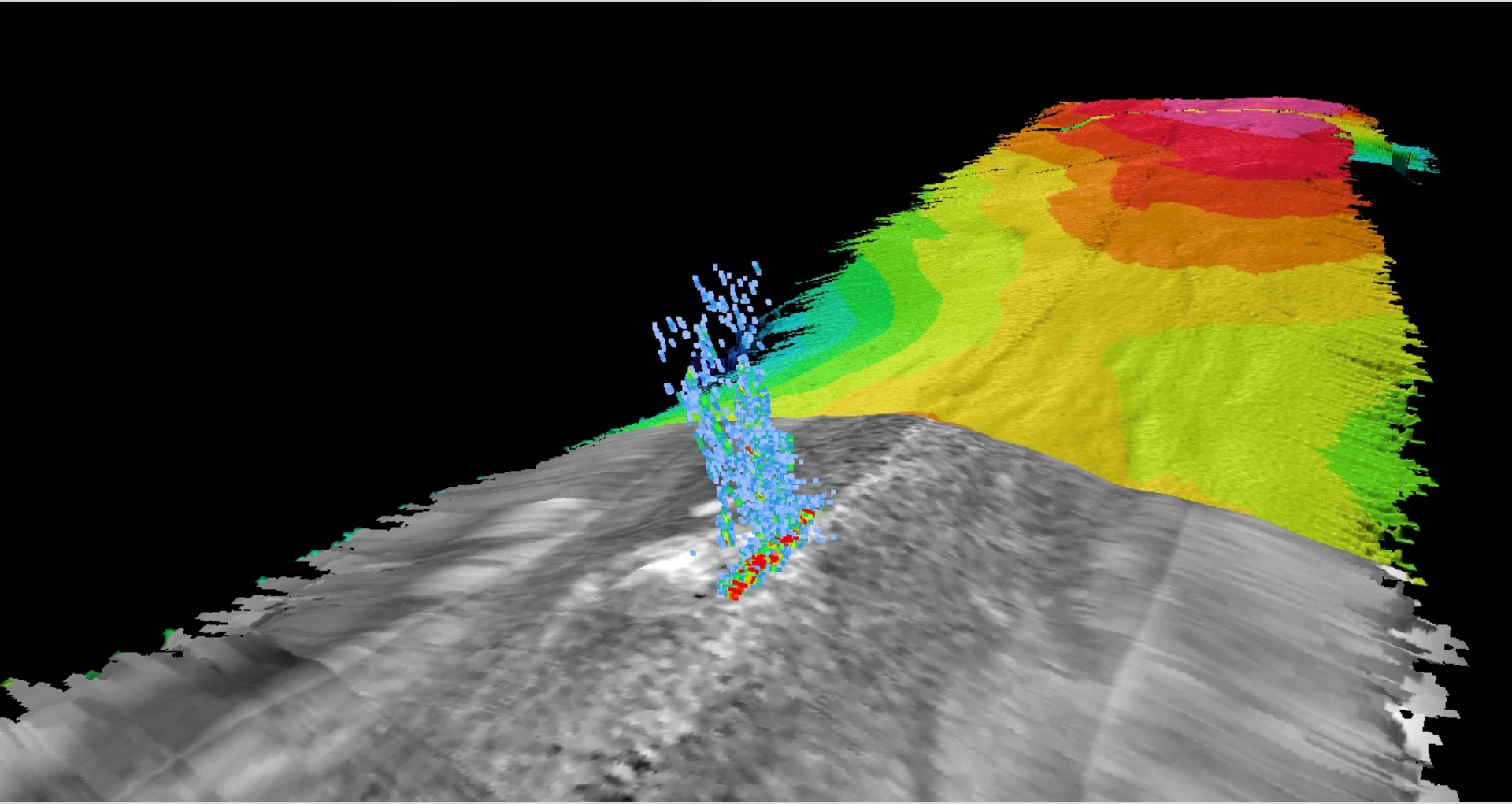
 Clip

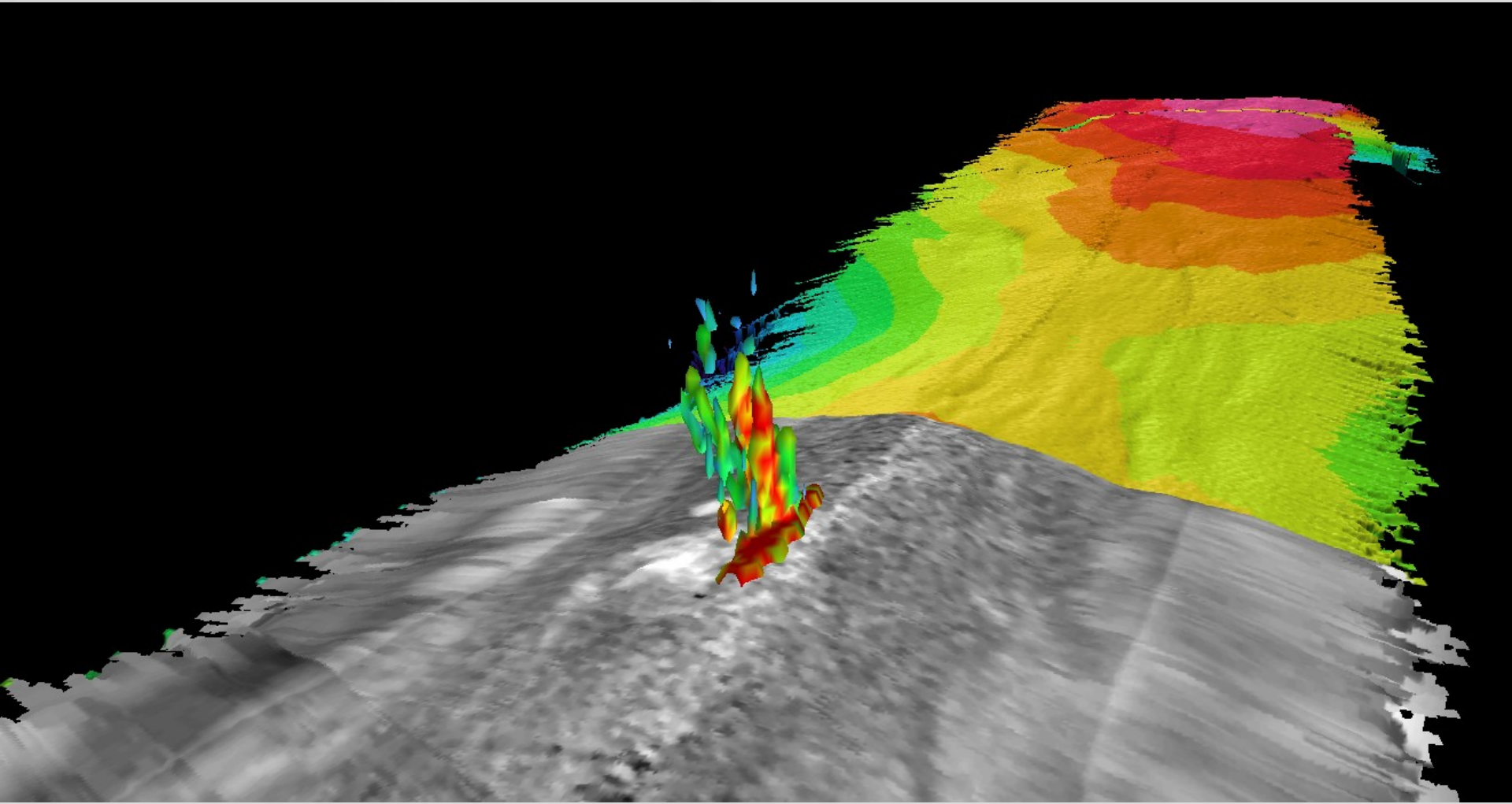
-73.05

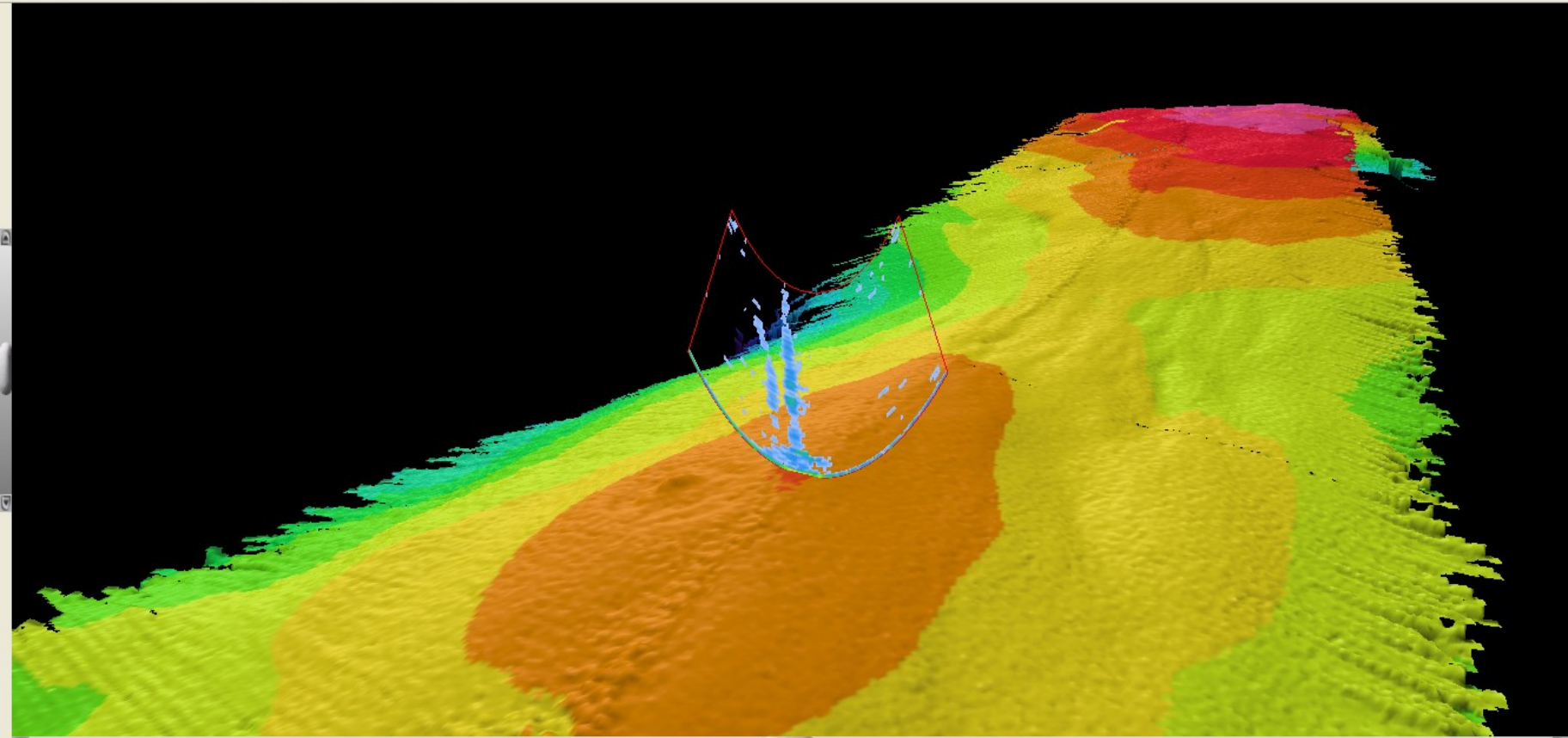
-13.54











Camera
Mode
Edit
Display

40.081y 40.081y 40.081y 40.081y 40.081y 40.081y Time: 01/29/40 14:20:46.0 Rate: 1s

Exag: 2.50

Scene

- avgsurfac_15m-backscatter.sd
- plume--volume15m.sd
- plume_points-largerrange.sd
- EM122-Backscatter-BA
- EM122-ventpoints.sd
- avgsurfac_15m.sd
- beam-fan2.sd*

Midwater Fan

Bounds Geo-Referencing Time Info

Fan Display Options

Pixel Gap: 1 Auto Render beam pattern

Show Edges Render Points Radius: 1.0

Beam: 58 227

Range: 475.0 778.0

Connect: KMtrials_line_21_R1_CH1

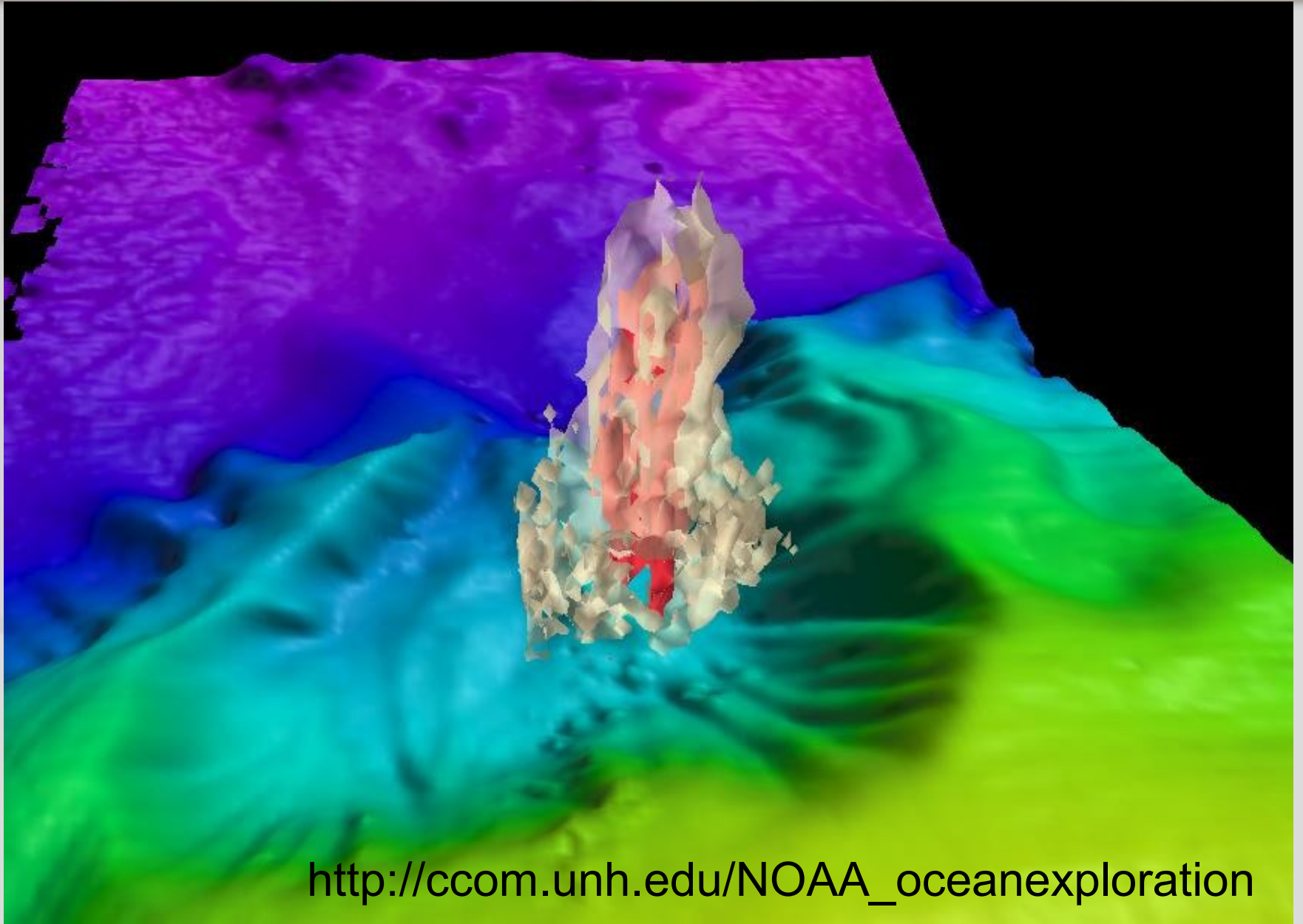
Signal Options

Amplitude Power Sv Ts

Color Map

Clip Clip

-87.1 40.3



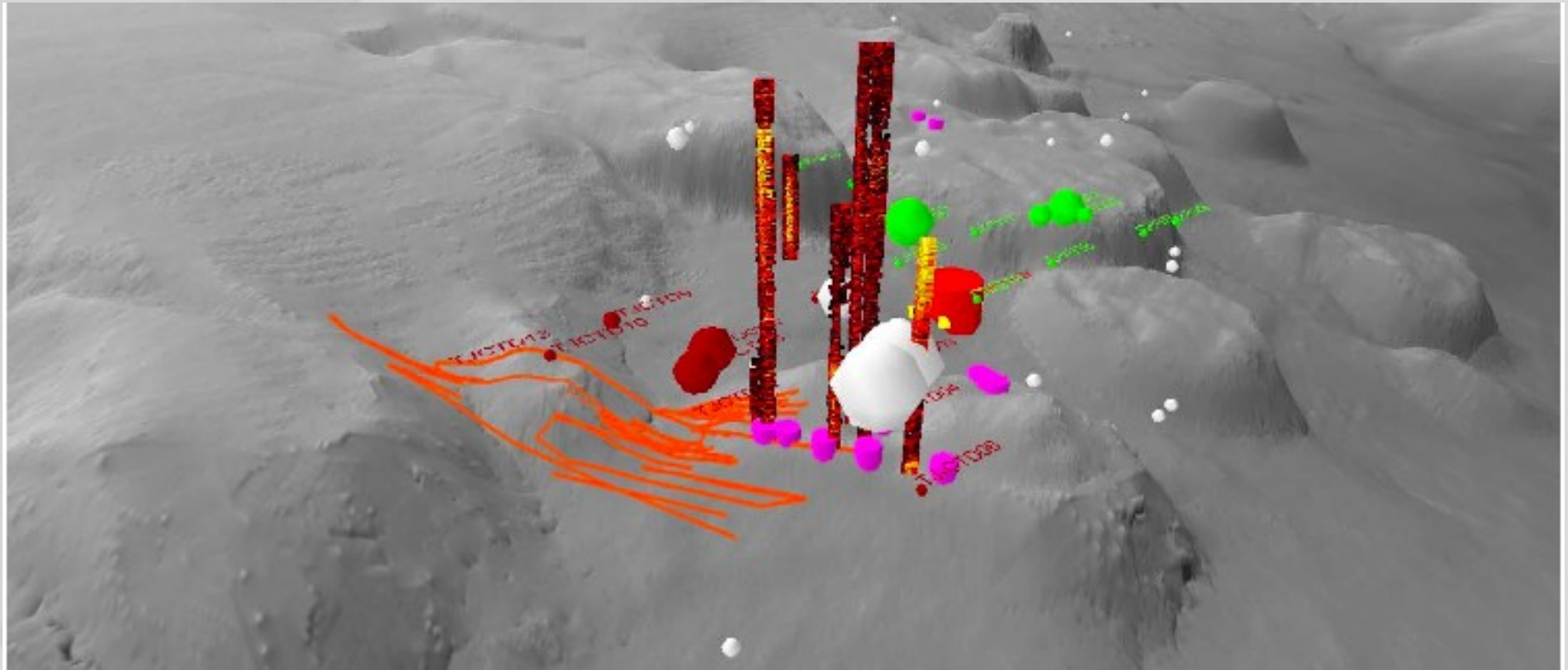


Figure 20. Natural seeps (red and yellow columns) mapped by *Thomas Jefferson*, and by *Gordon Gunter* (purple cylinders) along with CTD stations showing high fluorescence (brown, green and white spheres). Deepwater Horizon well site is in background (red cylinder) and distribution of Bottom Following Reflectors is represented by orange lines.

As the latest sonar system hardware leads the way providing new capabilities it is our goal as a software vendor to provide the tools to maximize the investment you've made in that hardware.

Request the GWC format via email:
support@ivs3d.com

We will post the format on the web:
<http://www.ivs3d.com/support/gwc>