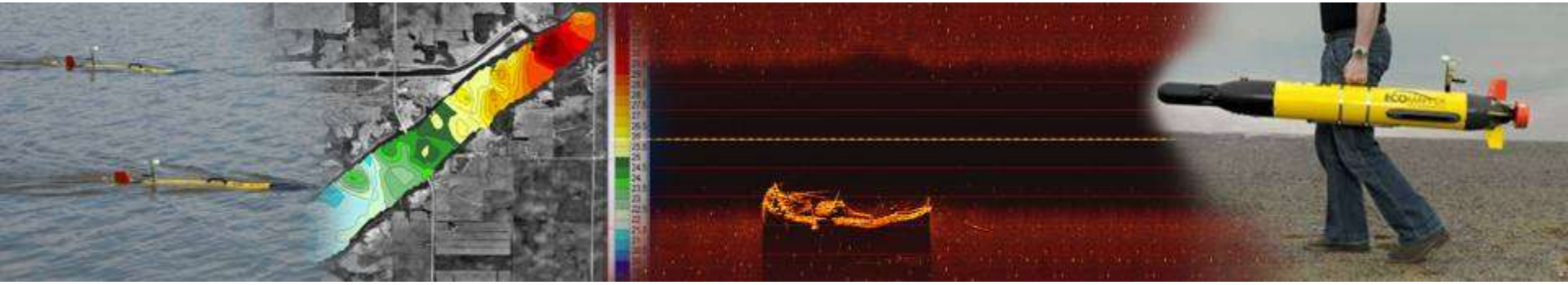
YSI EcoMapper

Autonomous Underwater Vehicle

~ A Cost-Effective Water Quality & Bottom Mapping Tool ~



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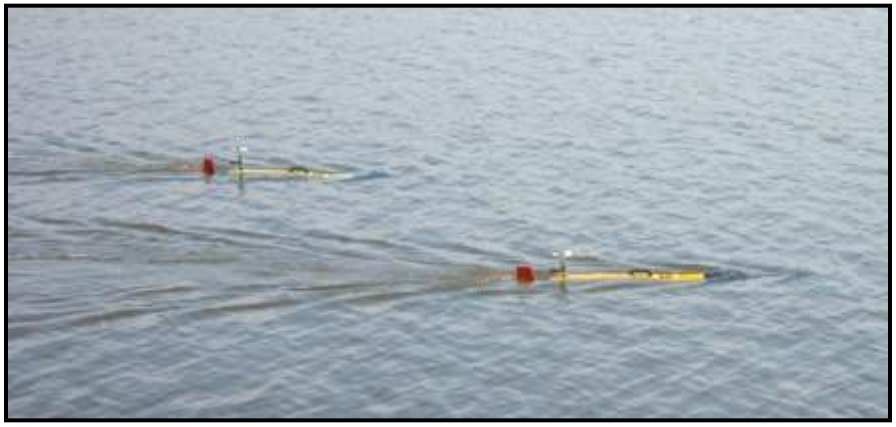
Overview

The EcoMapper is a cost-effective tool for water quality, bathymetry, and bottom mapping / surveying

- Small, 1 Person-deployable
- Autonomous
- Ease of Use
- Sensor payload
- Open architecture



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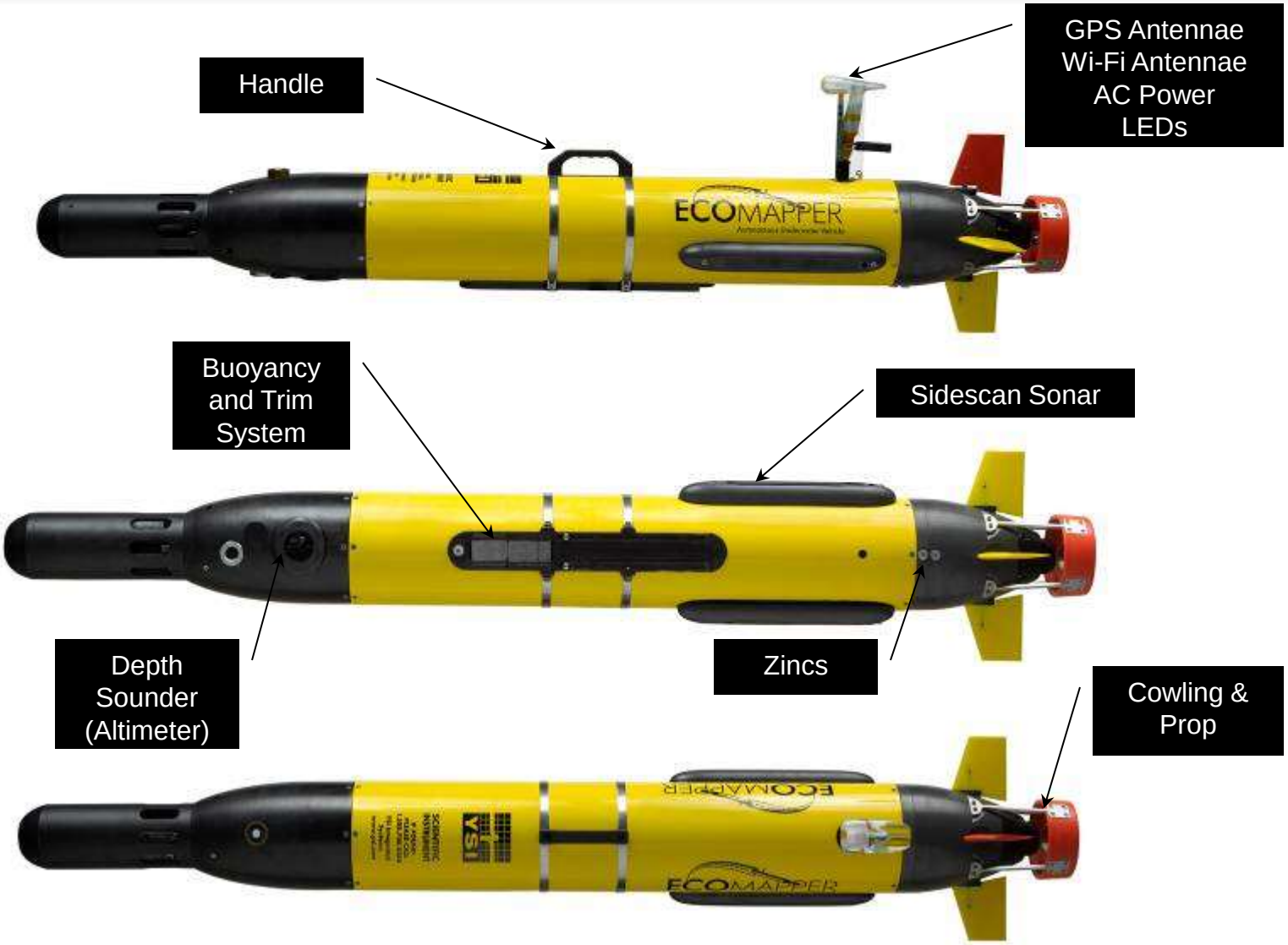
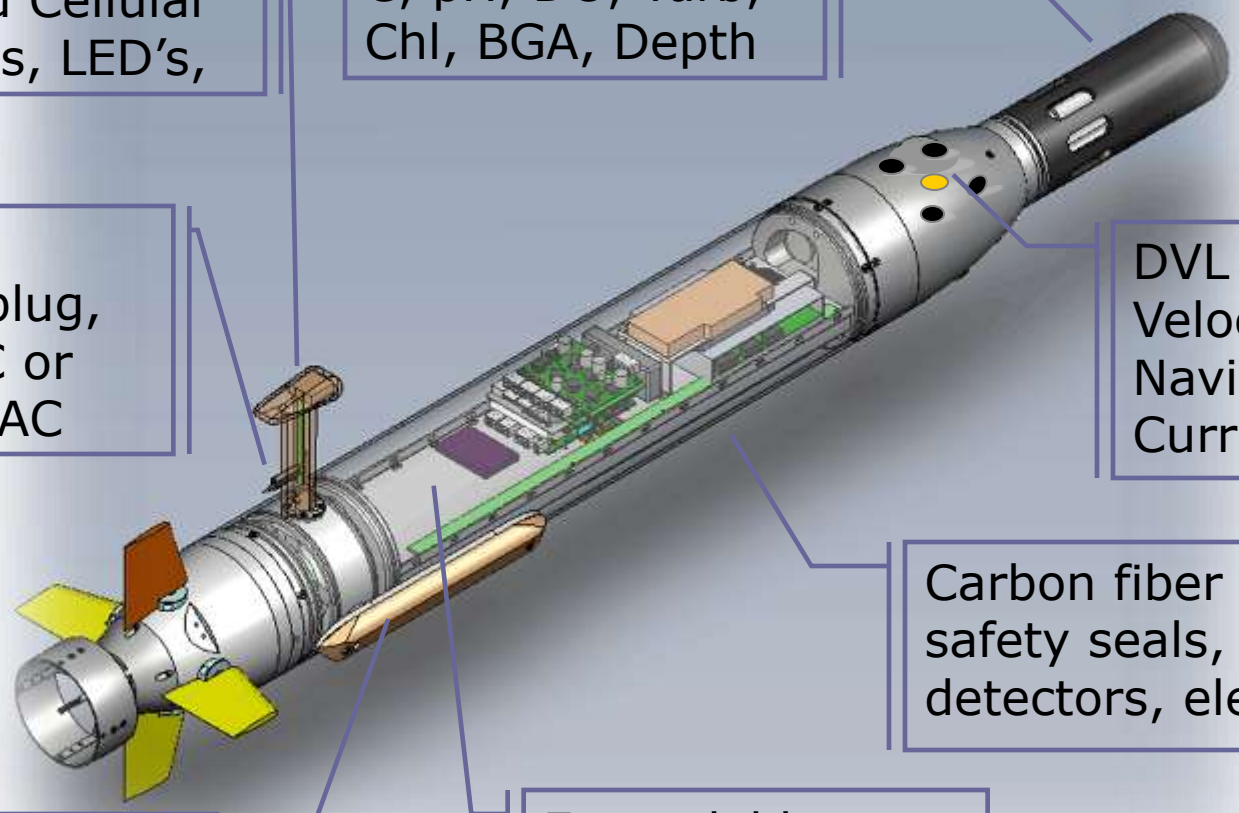
EcoMapper Components



EcoMapper Components



GPS Receiver, WiFi and Cellular antennas, LED's,

Sensor Suite, T, C, pH, DO, Turb, Chl, BGA, Depth

External Charger plug, 9-28V DC or 90-260V AC

DVL – Doppler Velocity Log, Navigation & Current Profiles

Carbon fiber hull, safety seals, leak detectors, electronics

Side Scan Sonar Transducersec

Expandable Payload - EP

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Sensor Suite

- Blue-Green Algae
- Chlorophyll
- Conductivity
- Depth
- Dissolved Oxygen
- Nitrate
- ORP (Redox)
- PAR (Photo Active Rad)
- pH
- Resistivity
- Rhodamine
- Salinity
- Specific Conductance
- Temperature
- Total Dissolved Solids
- Turbidity
- More…..

- Measure up to 18 Water Parameters simultaneously
- Employs a YSI 6600V2-4 System
- User installable/configurable sensors
- Interchangeable and Field Replaceable

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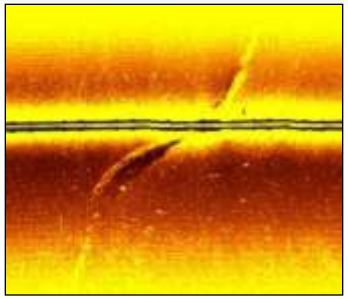
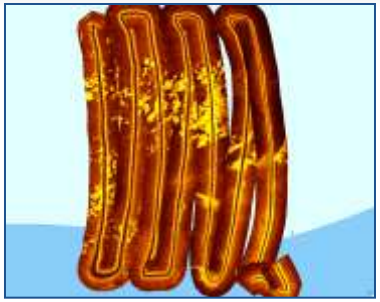
Sidescan Sonar





- Imagenex Sidescan (330KHz/800KHz)
- High Frequency <30m altitude,
- Low Frequency 120-30m altitude
- Range (beam swath) from 30-120m
- Best results by flying EcoMapper under the surface at a fixed depth at 1.5-2.5 knots.
- VectorMap Mosaicing software standard

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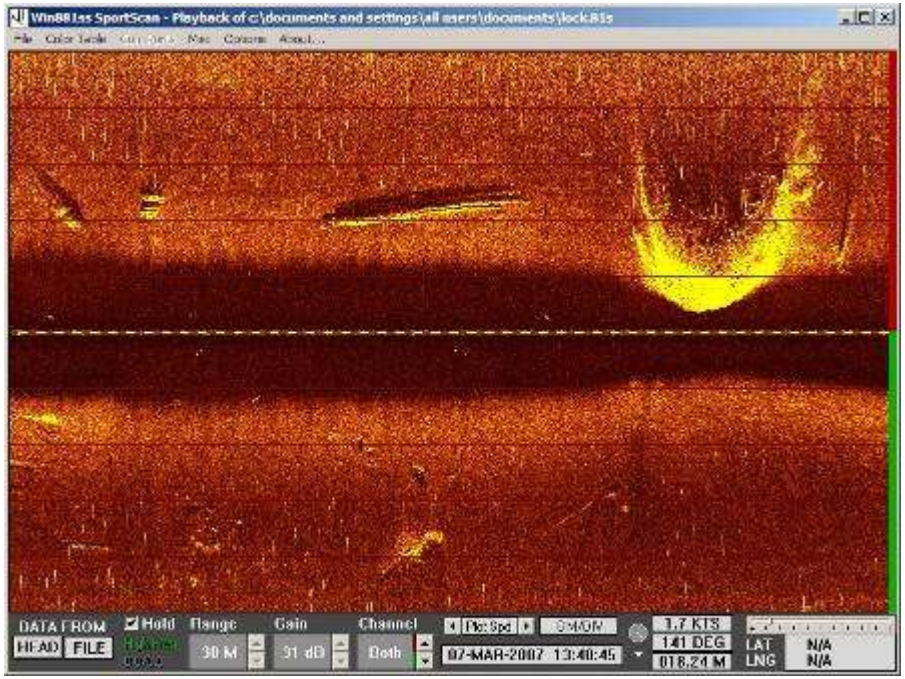
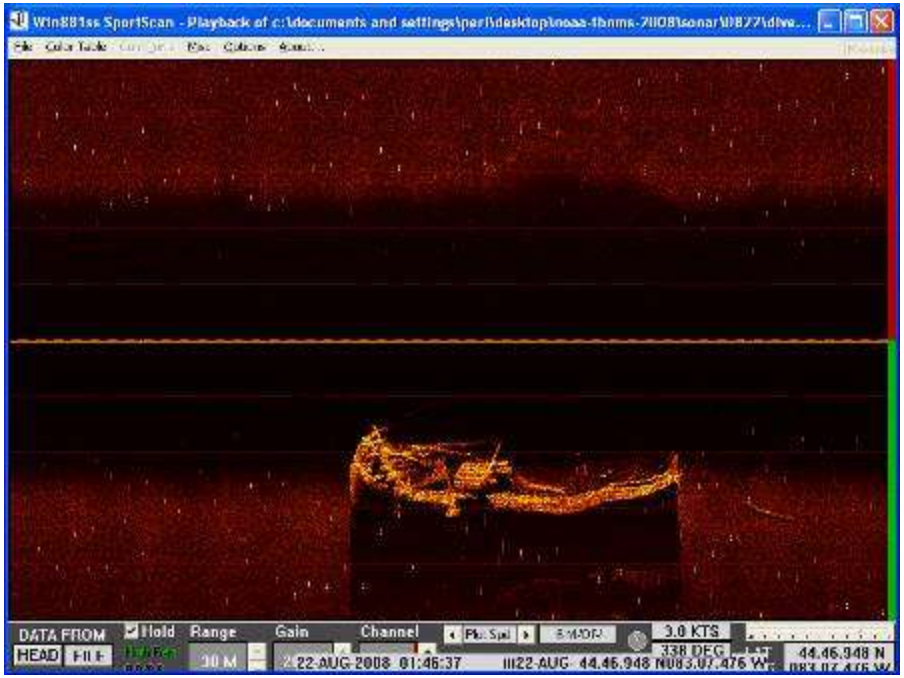
Sidescan Images



EcoMapper SSS Image of debris on the river bed in Pearl River, MS



EcoMapper SSS Image of shipwreck in Great Lakes

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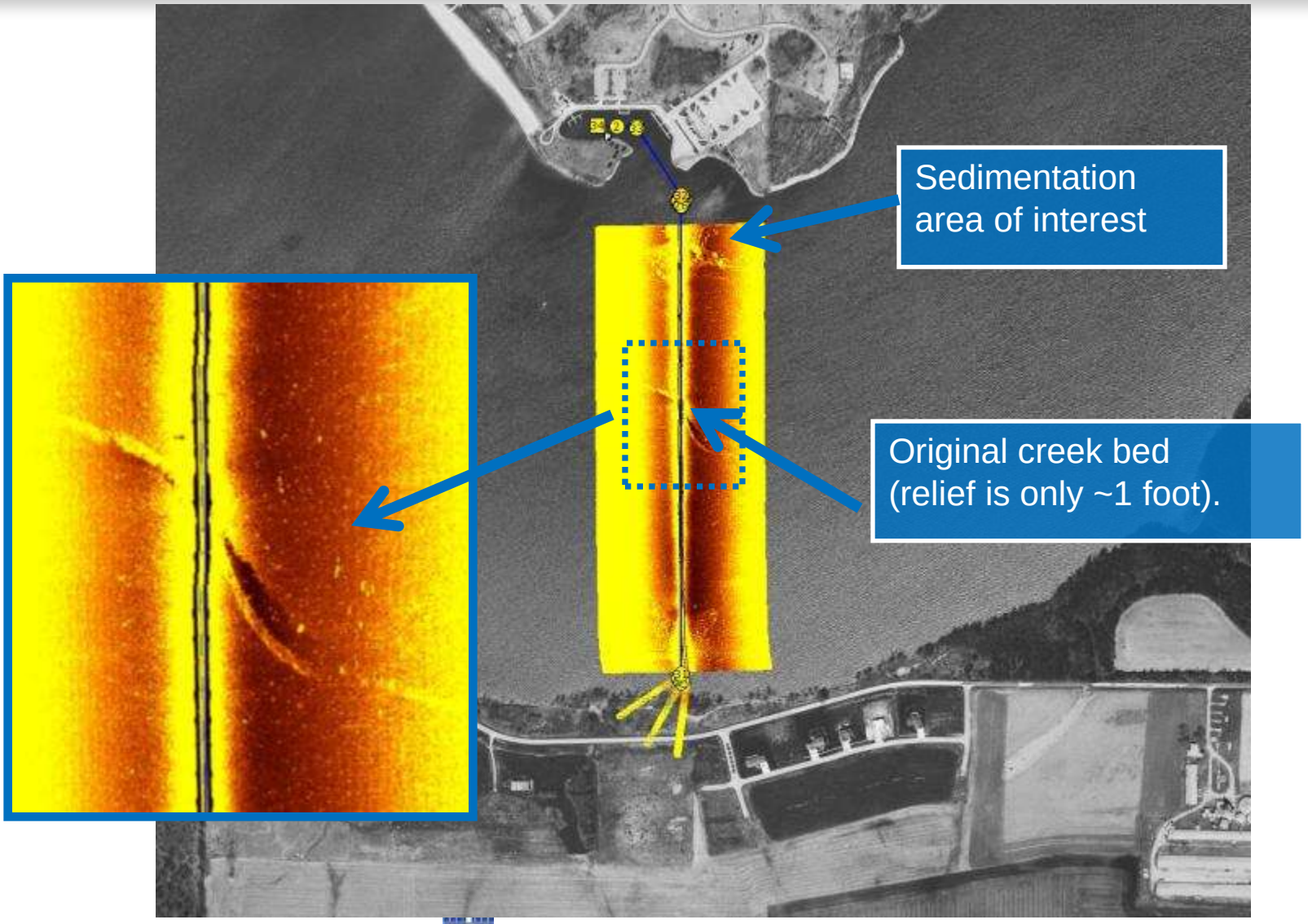
Sidescan Images



5 Steps to an EcoMapper Mission

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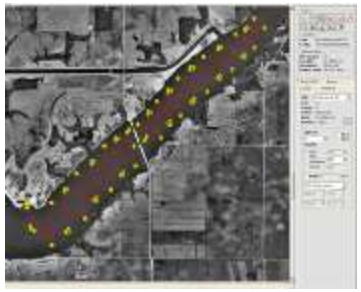
1.



1. *Vector Map* –

Point and click mission planning onto a geo-referenced map

2.

2. *UVC Software-*

Start EcoMapper with key fob

Load mission in EcoMapper

UVC Software

3.

3. *Start Mission*

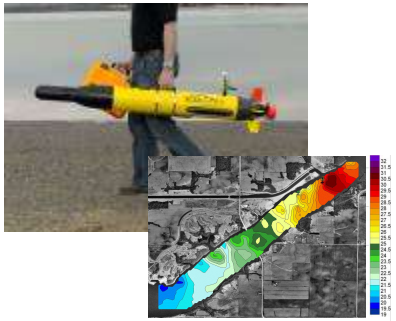
Place vehicle in water and start mission

4.

4. *Remote Control* –

When EcoMapper is on the surface and within range, view data and monitor progress or take manual control

5.



5. *Retrieve EcoMapper* –

at planned PARK location and download data via Wi-Fi link

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Vehicle Safety Features

1. ***3 internal leak detectors***. **If triggered the vehicle will abort the mission, come to the surface, and employ park mode and remain within safety circle**
2. ***Location pinger***. **If the vehicle becomes stuck or disabled at depth, a hydrophone can be used to locate submerged vehicle.**
3. **UVC Safety Rules (see next slide)**
4. ***Vacuum fixture*** **allows to test seals before all missions**
5. ***Pressure relief valves*** **in case of moisture getting into battery compartment**
6. ***Safety Tow Body***: **towable pod that contains pinger, electronics, location LEDs, pressure sensor and large flotation device that will be triggered under specified conditions.**

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Safety Tow Float

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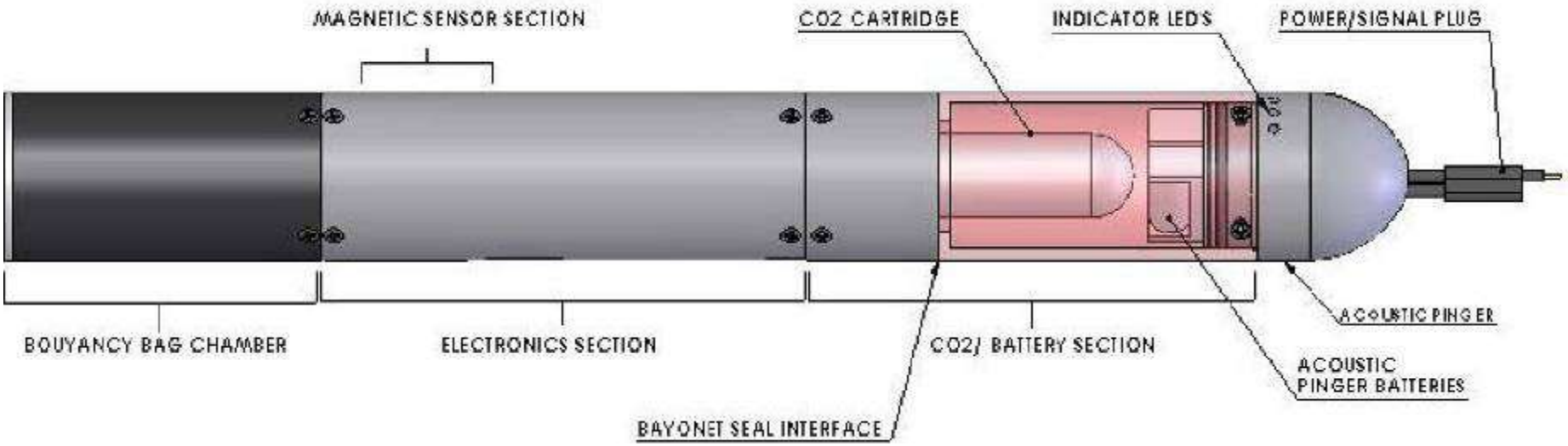
Safety Tow Float



1. Enables Vehicle recovery from typical deployment hazards
2. Includes acoustic pinger for tracking
3. Simple autonomous operation
4. Reusable buoyancy bag
5. Simple CO2 cartridge system
6. 12 minute charge time

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CASE STUDIES

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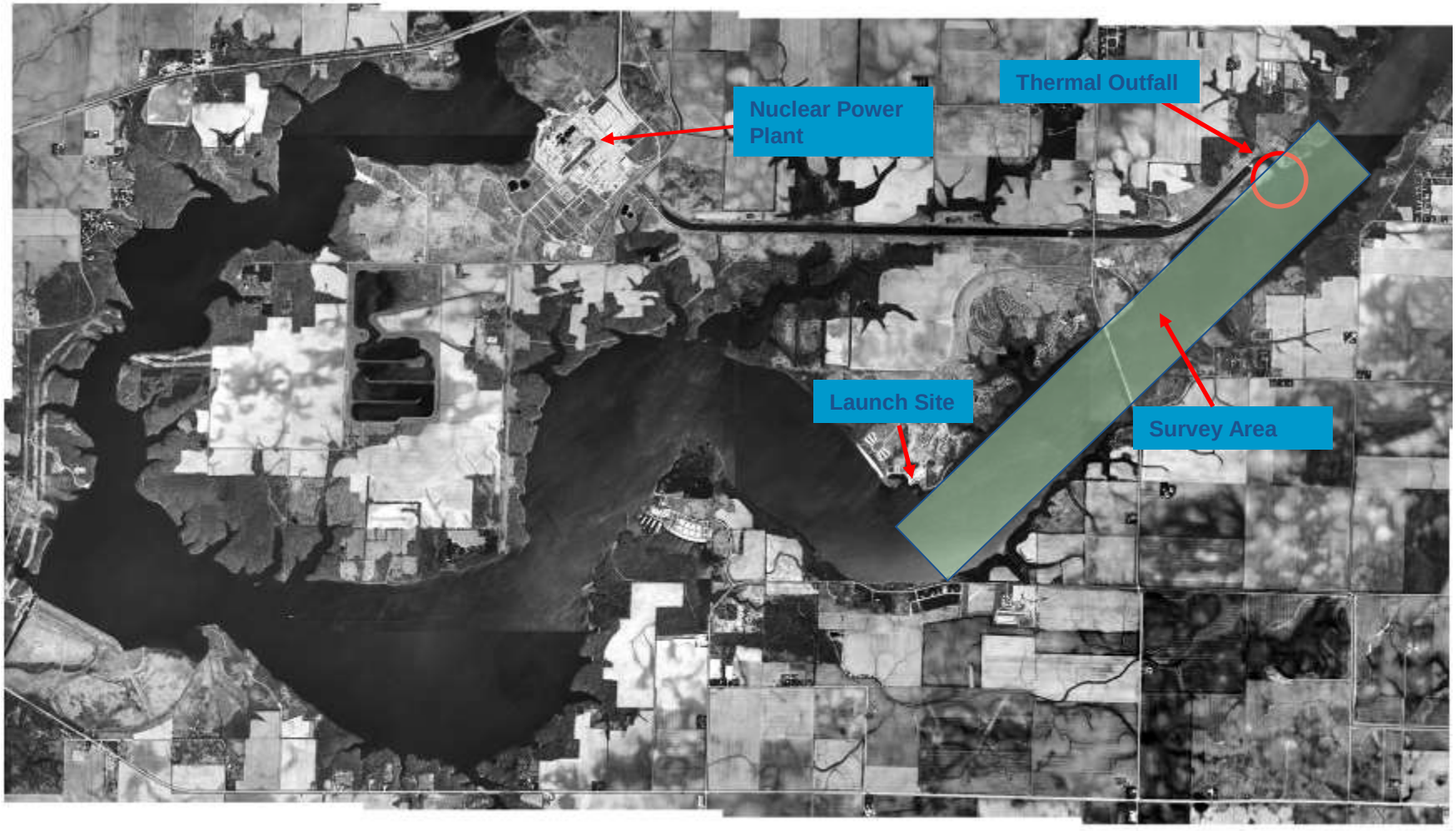
Clinton Lake, Il



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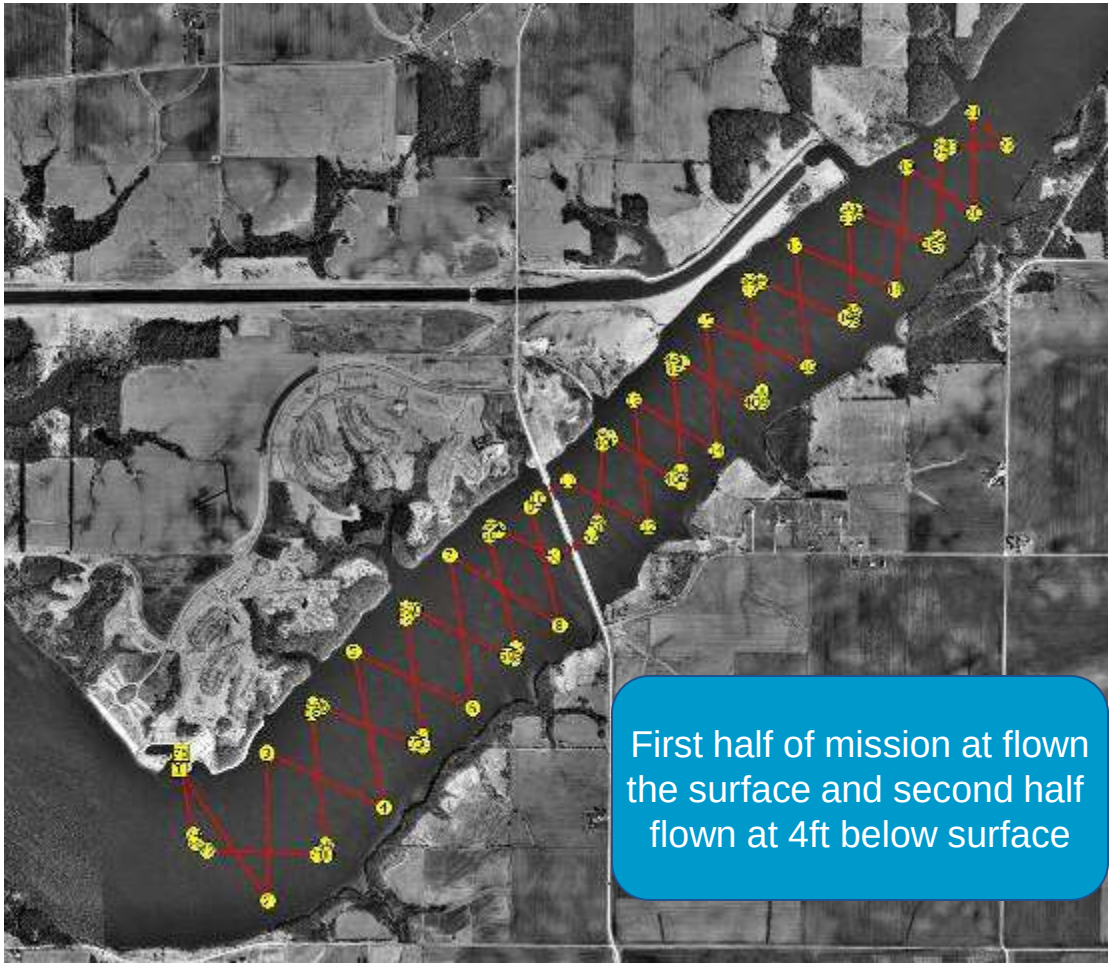
Clinton Lake, Il



Mission was 4:43 minutes plus 1 hour Park

Location
Lat: 40.1761411496583
Long: -88.7658708940397

Mission Info
WP Count: 76
Length: 11.0966 mi
Duration: 05:43:55
Power Left: 387.32 WHr

Waypoints | Buoys
Layers | Tracking

WP: Reference WP
Lat: 0
Long: 0
Time: 05:43:55
Dist: 11.0966 mi
Power: 0 WHr

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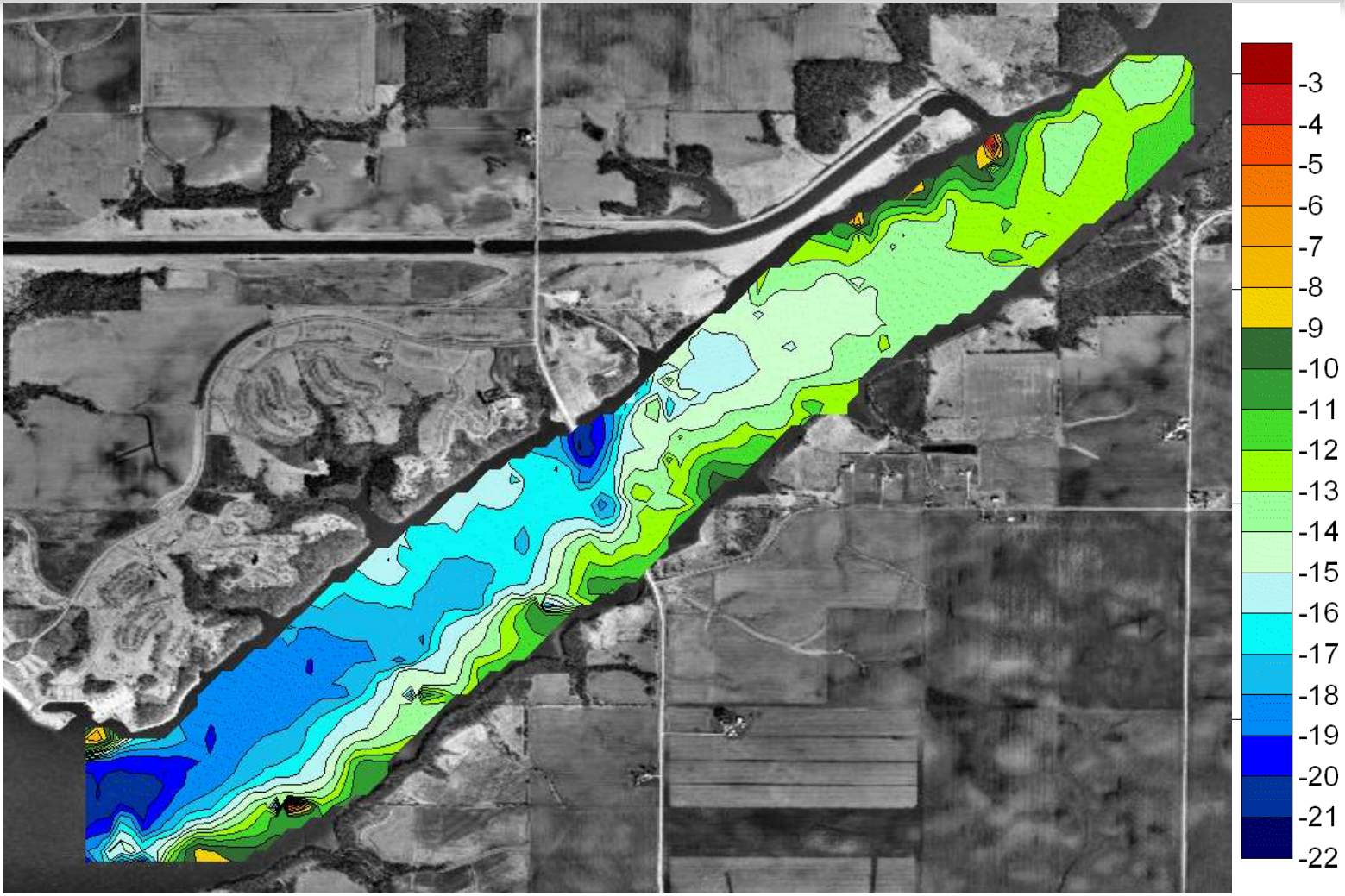
DEPTH



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SURFACE TEMPERTURE

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SUB-SURFACE TEMPERTURE (4')

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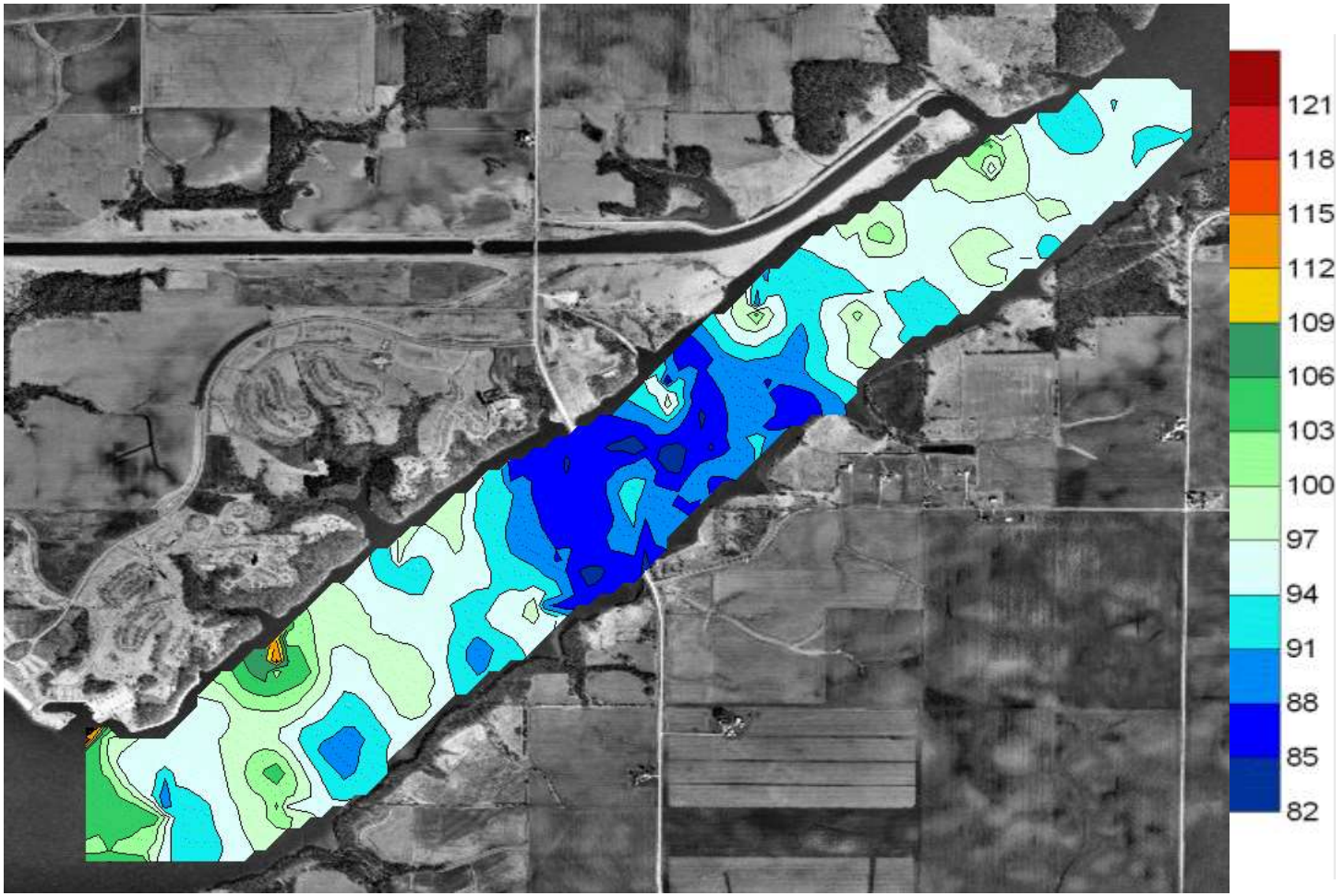
DISSOLVED OXYGEN



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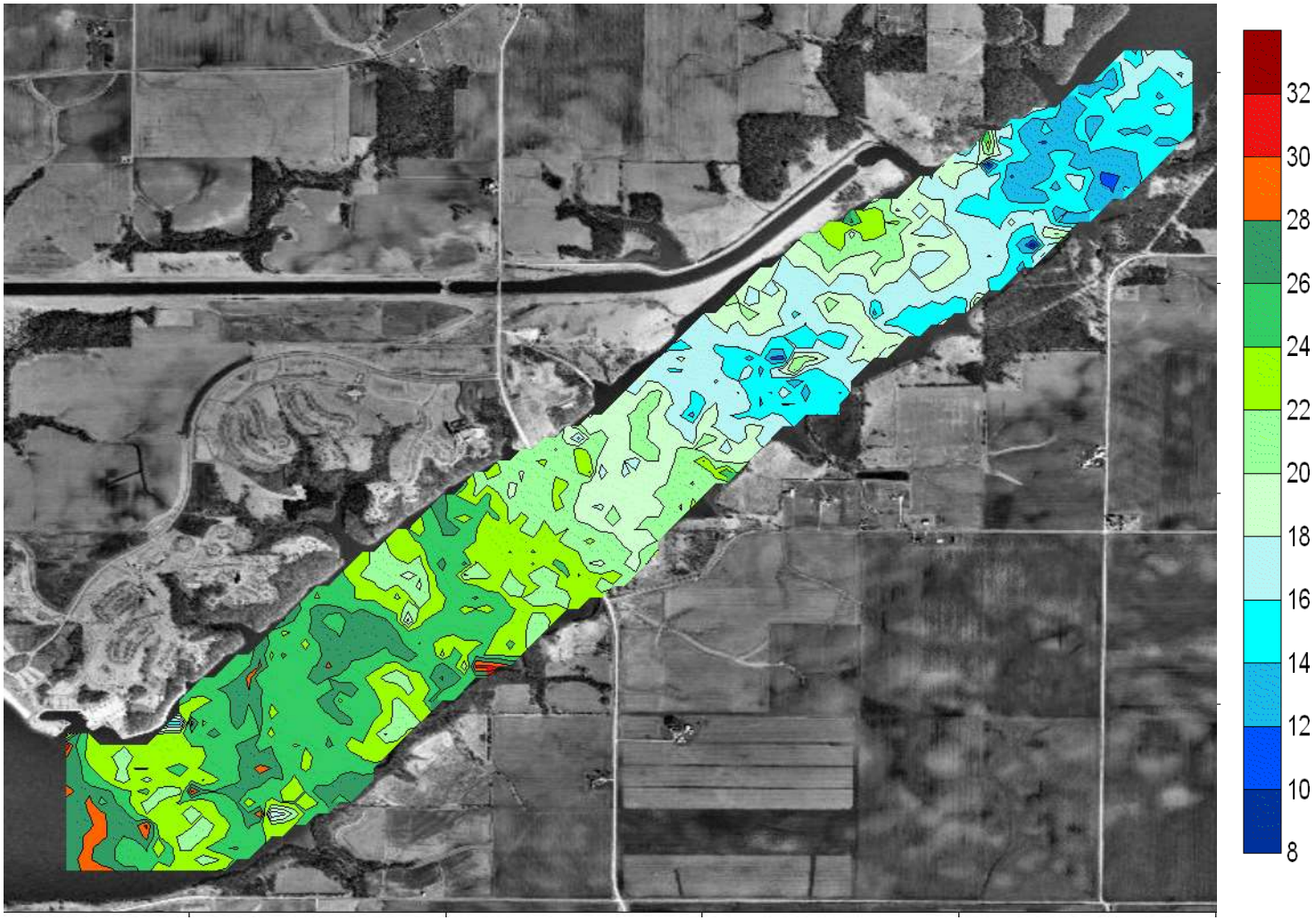
CHLOROPHYLL FLUORESCENCE



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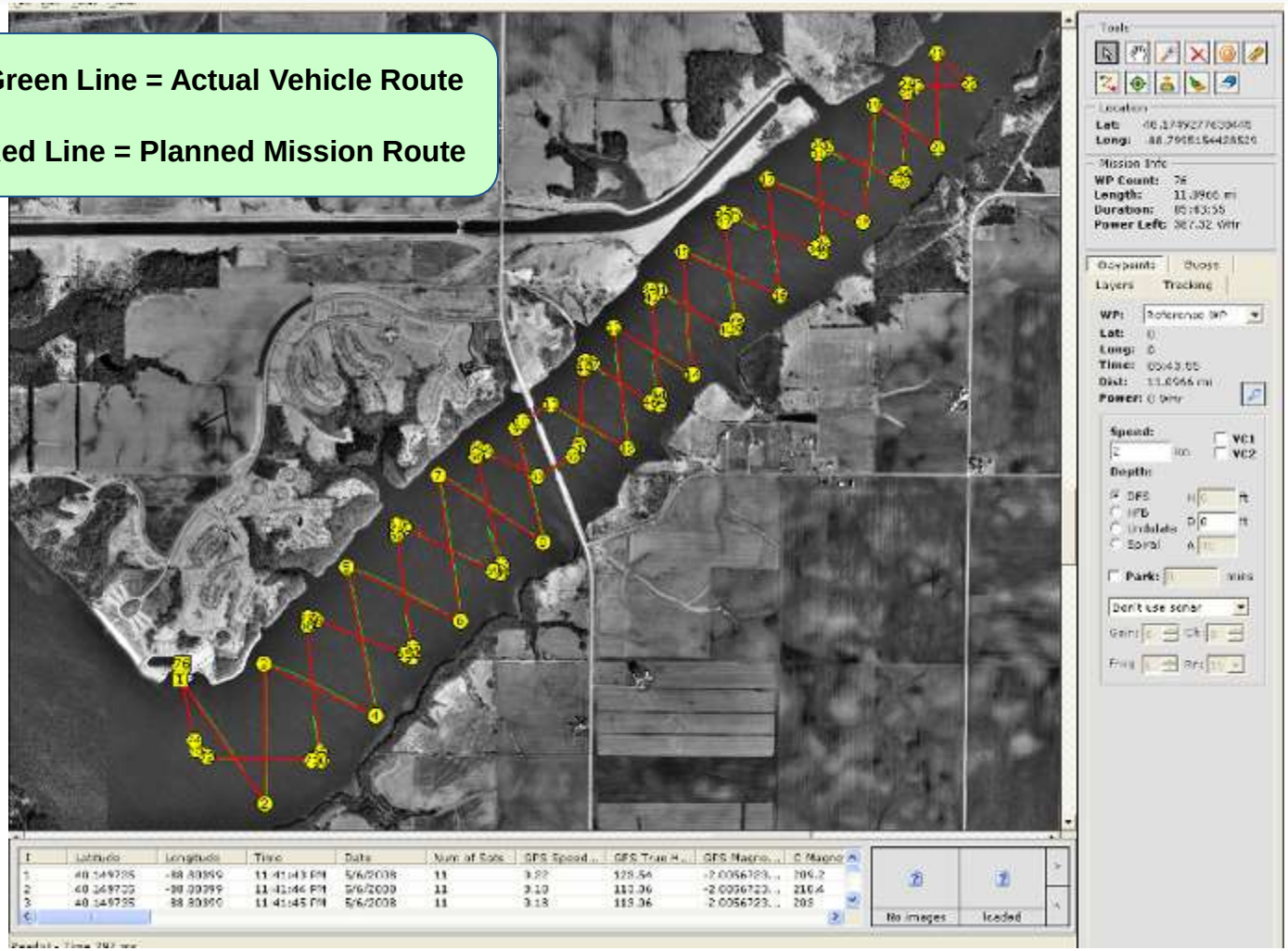
Mission Log

Green Line = Actual Vehicle Route

Red Line = Planned Mission Route



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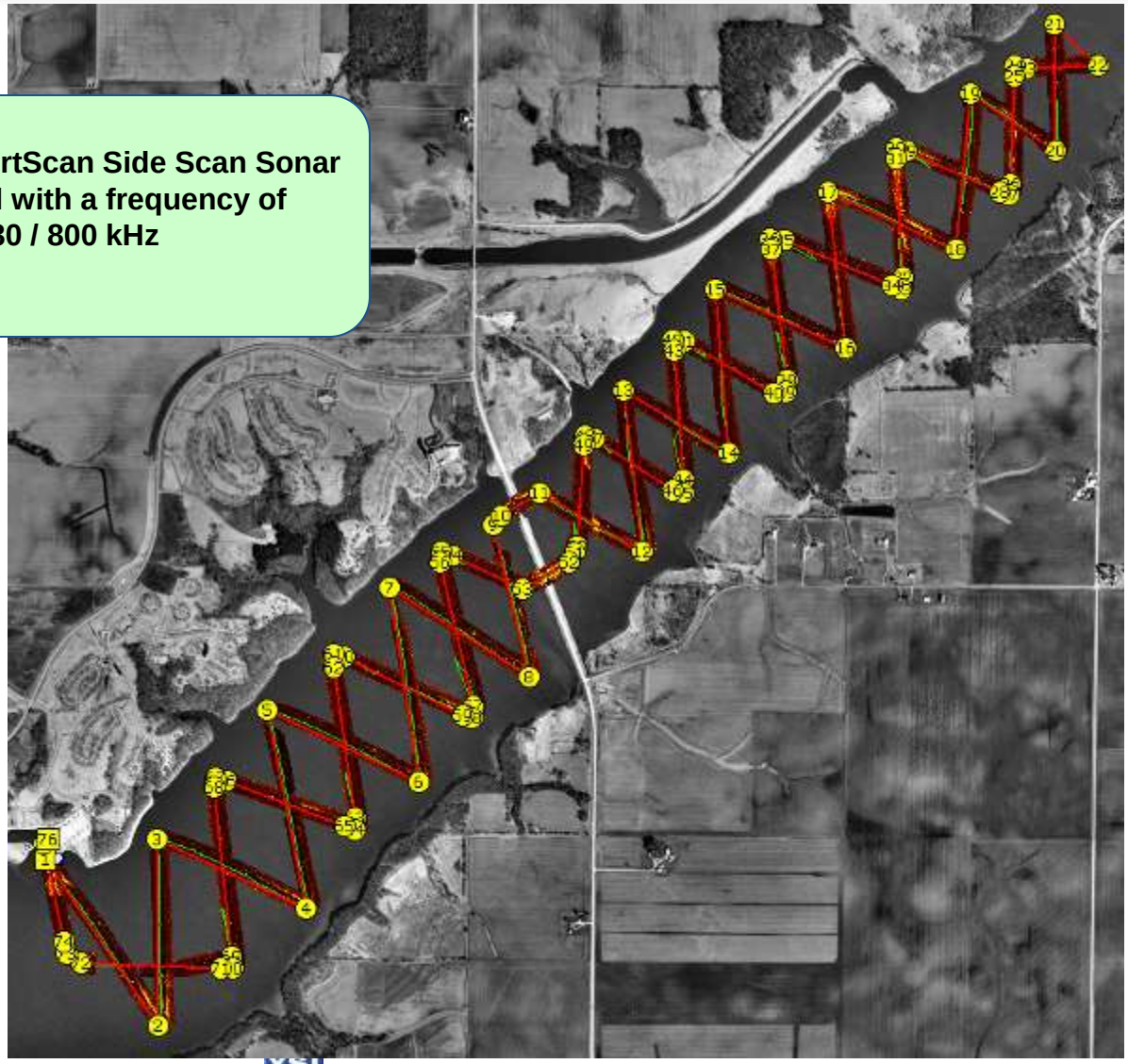
SIDESCAN SONAR DATA

Imagenex SportScan Side Scan Sonar
- **Dual channel with a frequency of 330 kHz or 330 / 800 kHz**
- **60m swath**



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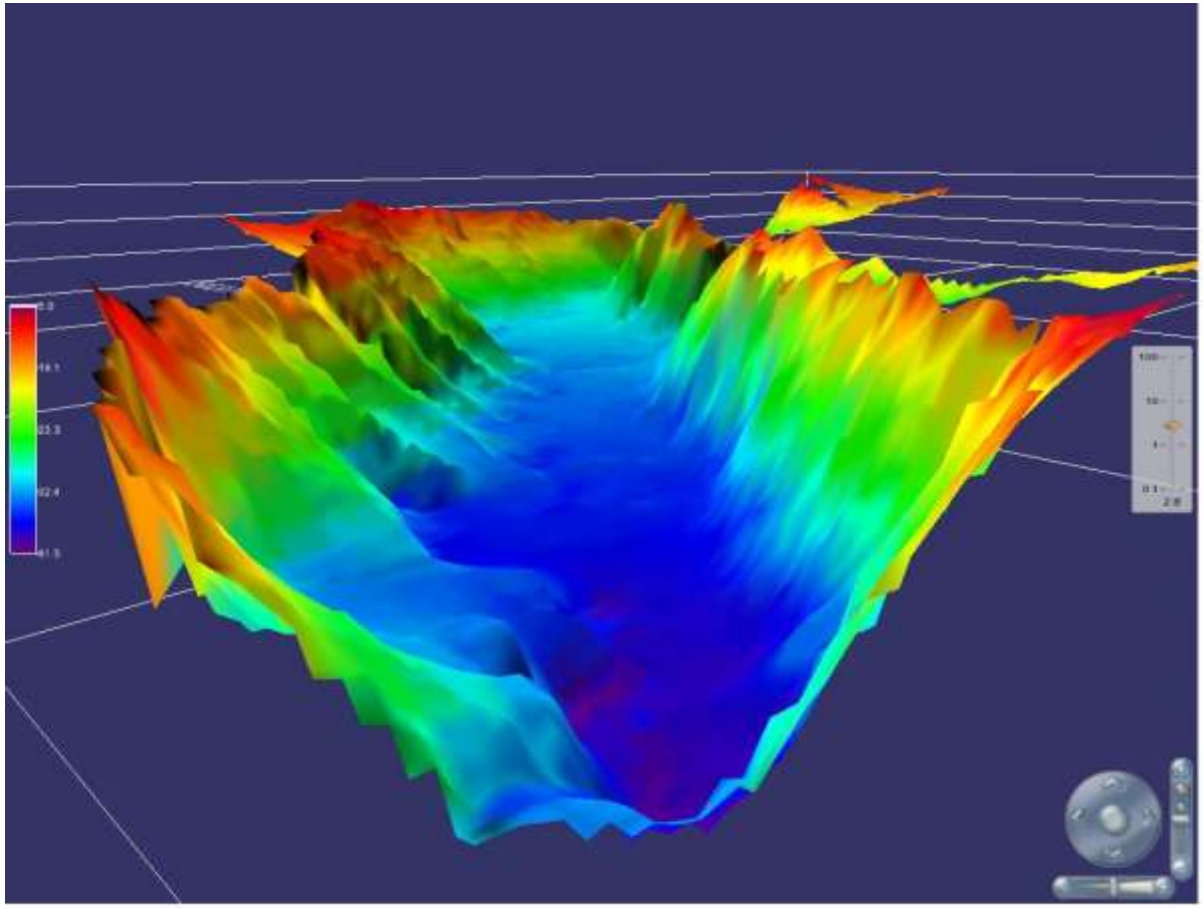
Example Bathymetric Data



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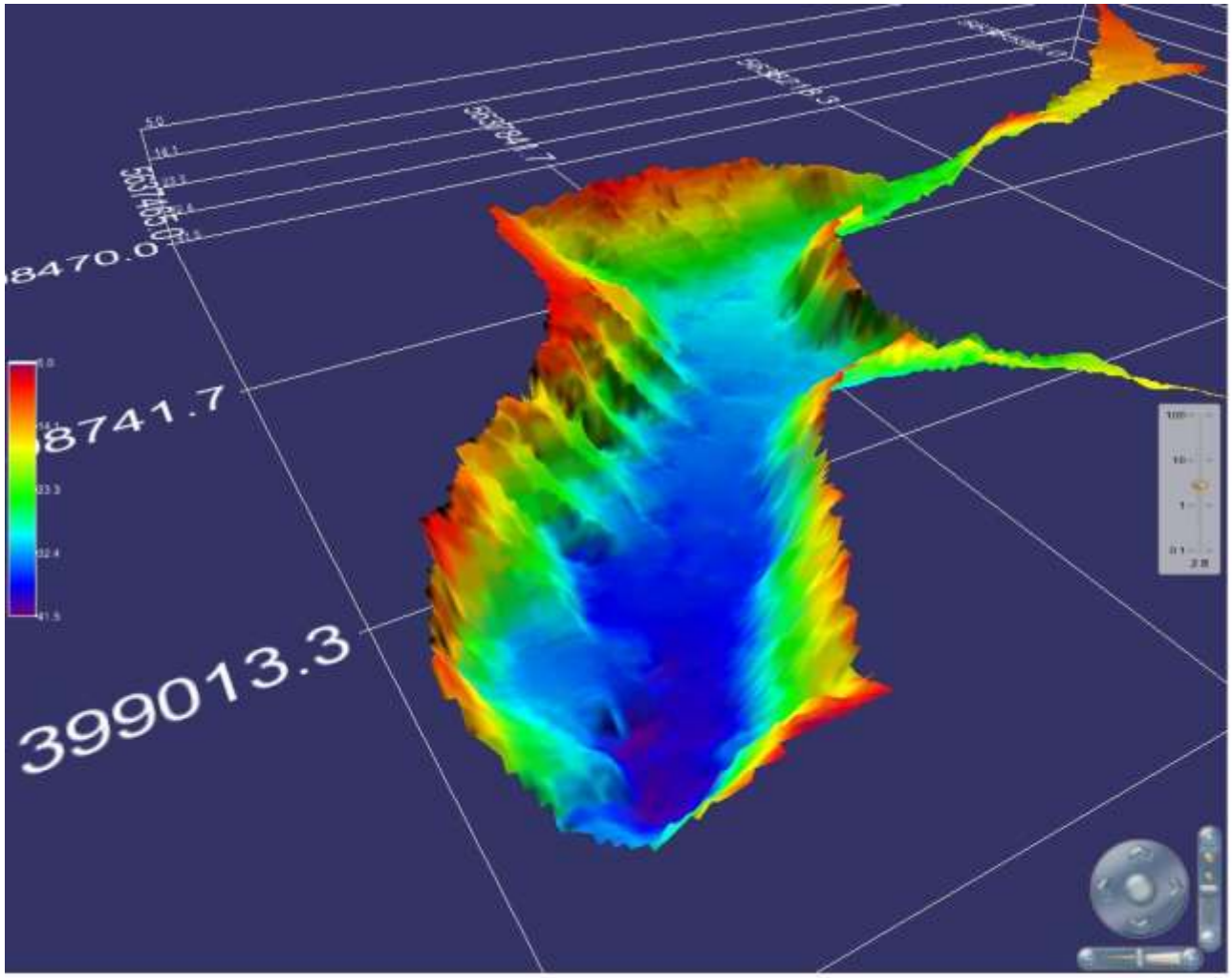
Example Bathymetric Data



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Example Bathymetric Data