Visualizing the Underwater Behavior of Humpback Whales

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Outline

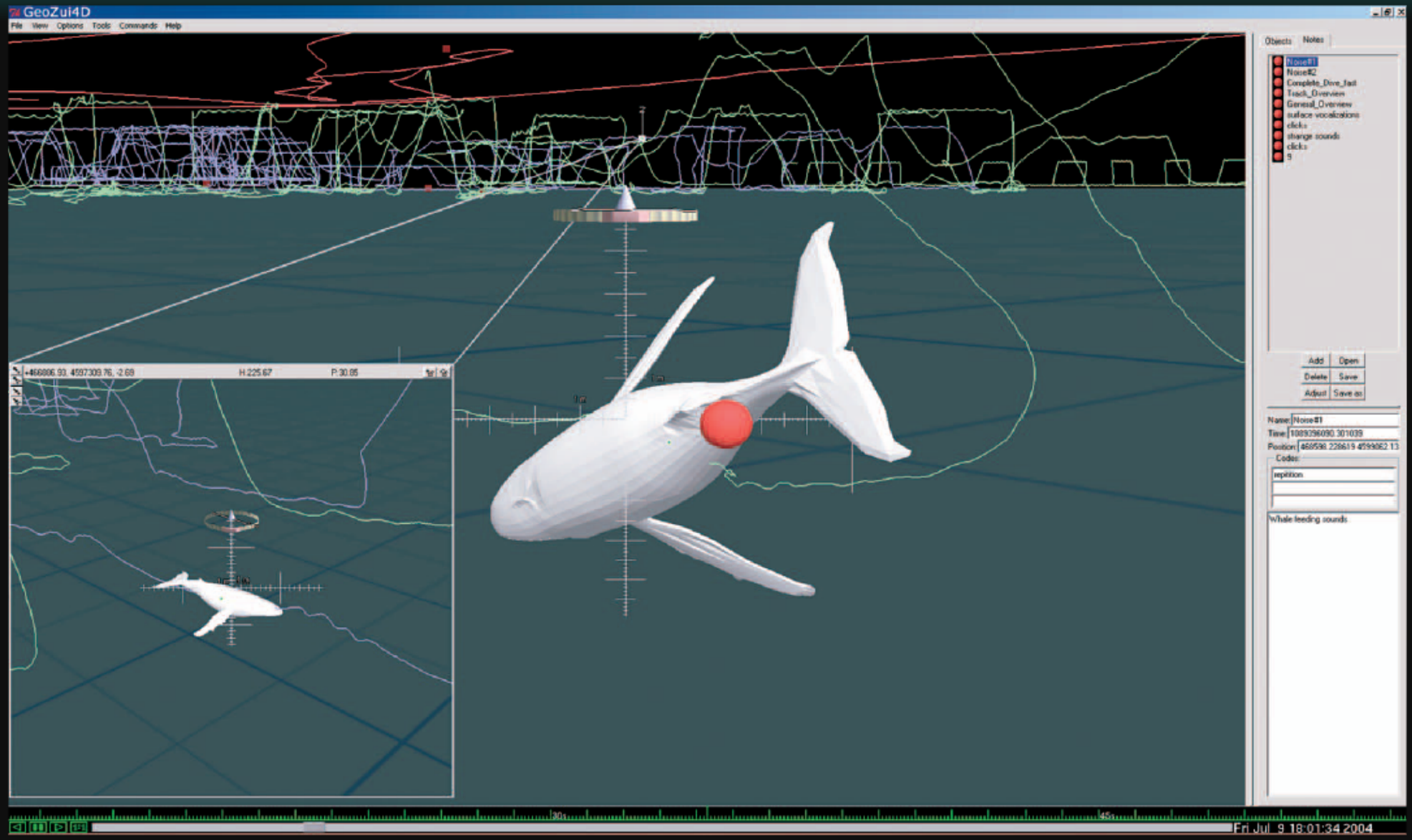
- Understanding whale foraging behavior
  - Important for both scientific and ethical reasons.
- Tracking whales underwater is difficult
  - Divers cannot efficiently follow whales
  - Sonars provide only partial information

Recording whale behavior

- Digital recording acoustic tag (DTAG)

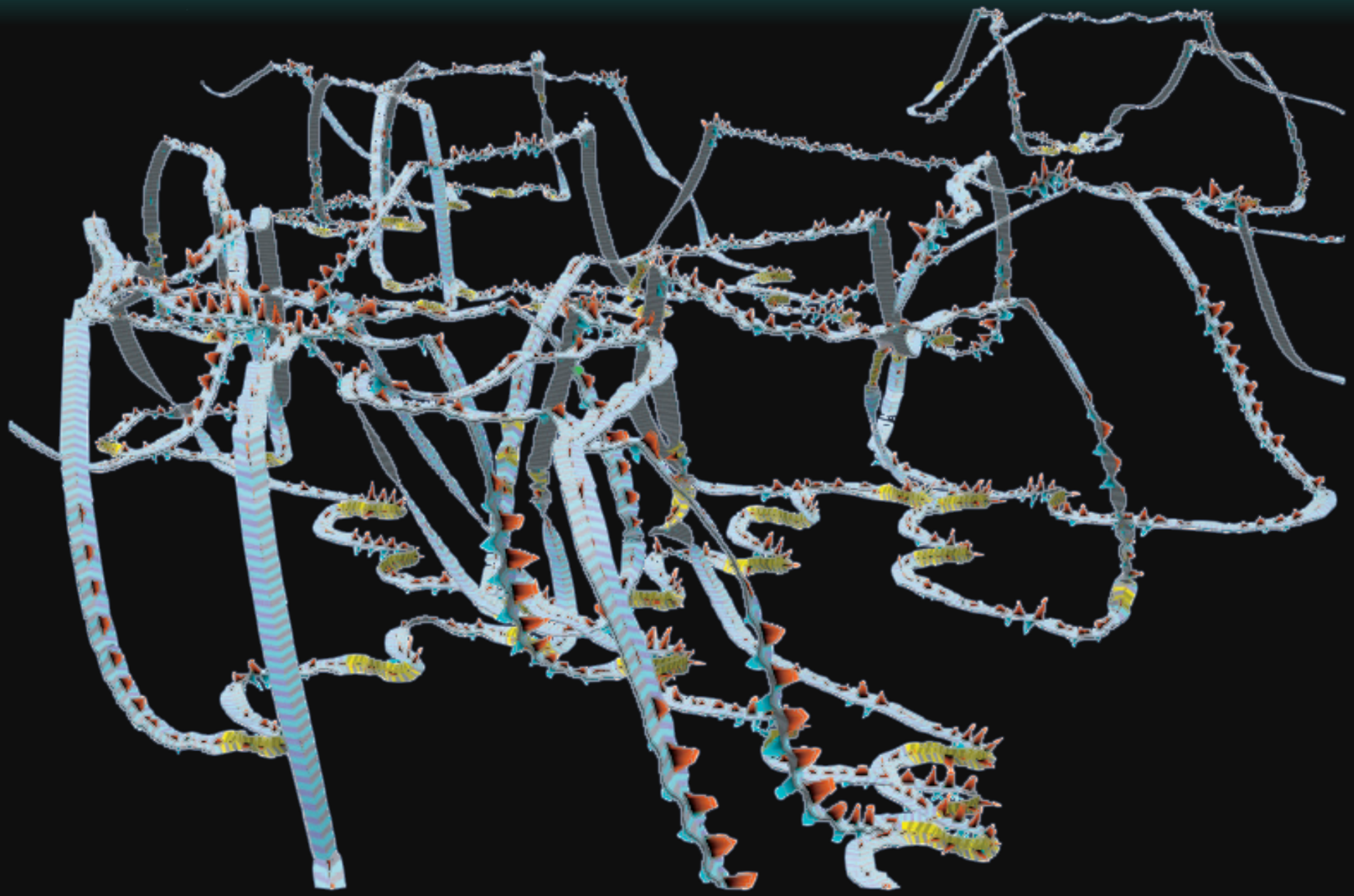
- Accelerometers & magnetometers
- Pressure sensor
- Hydrophone
- 10 – 22 hours of data logged before device release and pick up

GeoZui4D

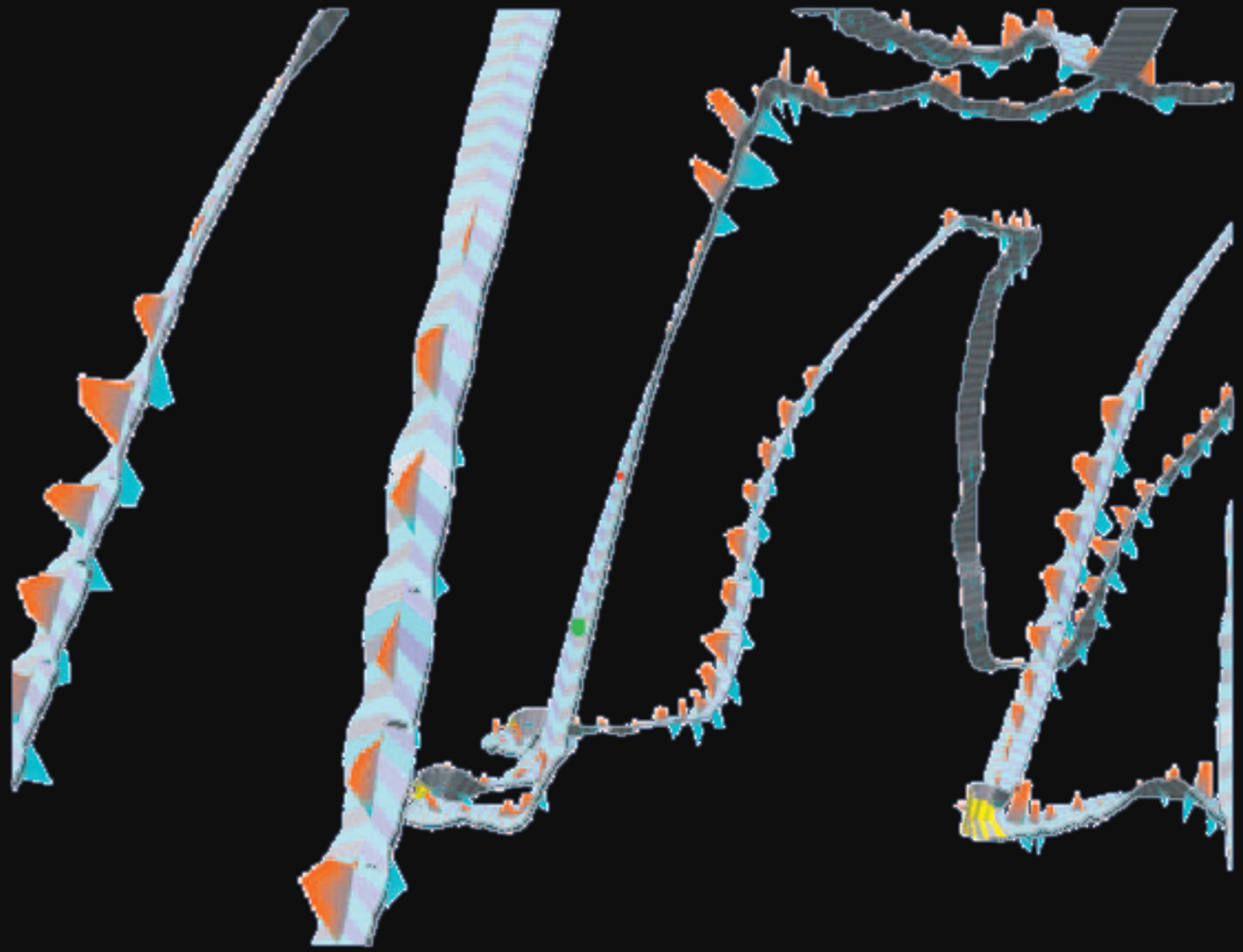

GeoZui4D
File View Options Tools Commands Help
Objects Notes
Noise#1
Noise#2
Complete_Dive_fast
Track_Overview
General_Overview
surface vocalizations
clicks
strange sounds
clicks
9
Add Open
Delete Save
Adjust Save as
Name: Noise#1
Time: 1089096090.301039
Position: 468598.228619 4599062.13
Codes:
repition
Whale feeding sounds
Fri Jul 9 18:01:34 2004

Temporal vs Spatial Data

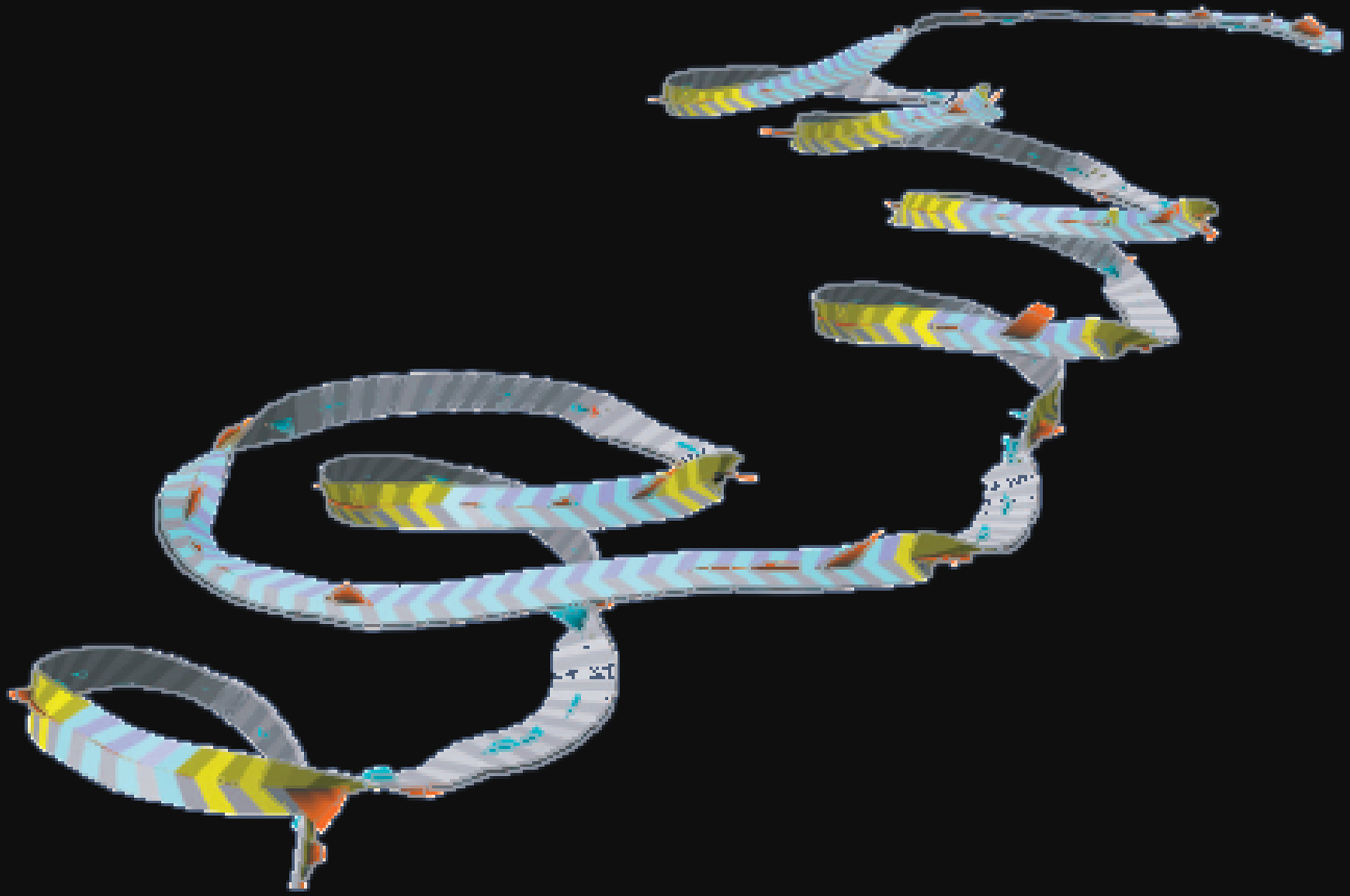
- Istantaneous behavior: not good to reveal patterns
- Trackplot
  - Custom ribbons to represent temporal data spatially.
  - Ribbon twists show roll behavior.
  - Sawtooth glyphs show fluke strokes.



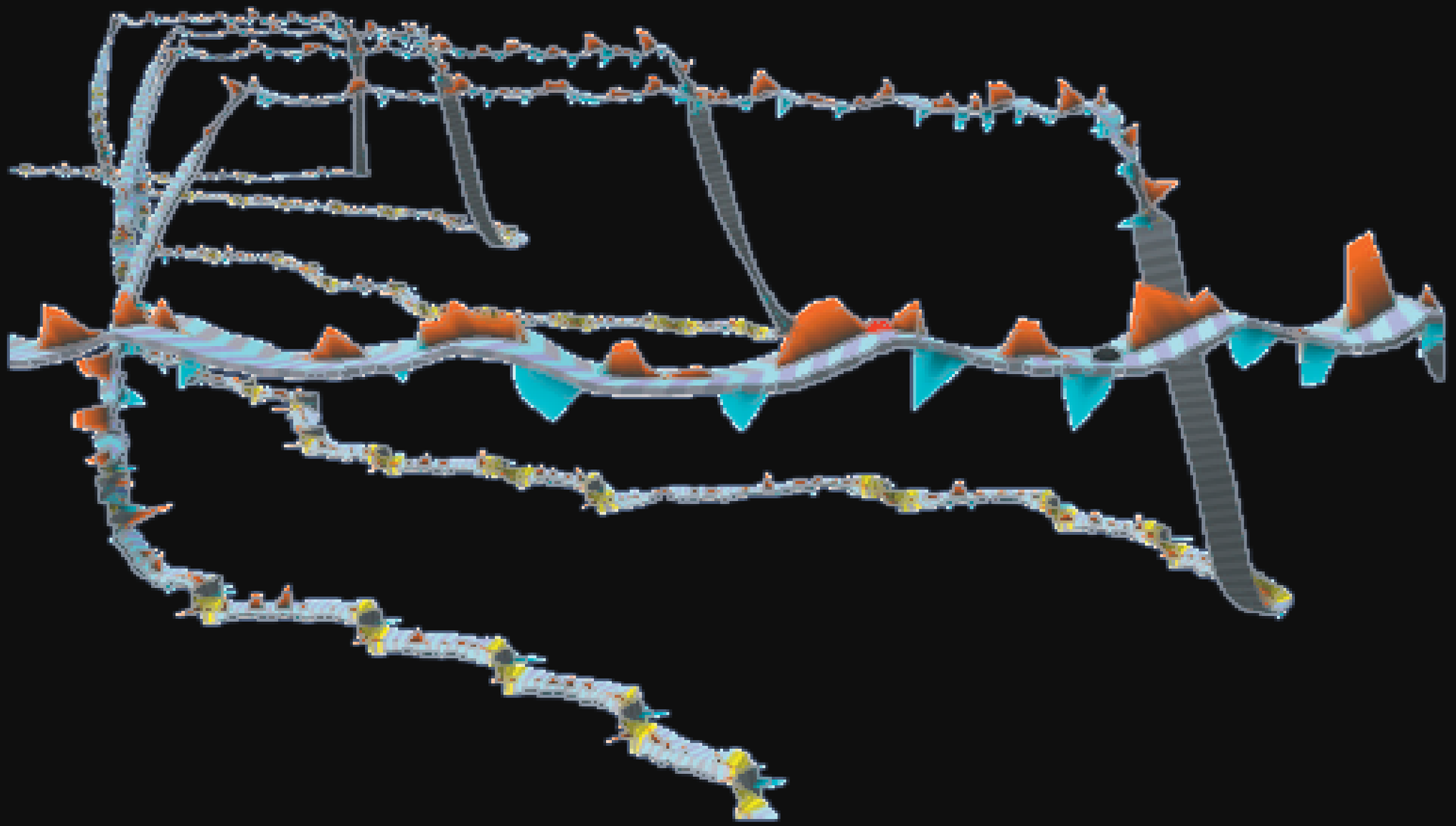
Ascent / Discent behavior



Sand Lance Hunting



Foraging Pattern



Conclusion

- Transforming time varying data into an enriched spatial visualization:
  - Simplified the identification of foraging patterns.
    - Different sets of patterns from year to year
    - *Dangerous* patterns
  - Allowed to confirm the existence of difficult-to-see behaviors

That's All, Folks

Questions?

Bubble Net Production