



# A Meteorite Impact in Coastal Waters off Miami Beach? – Novel Data and Insights



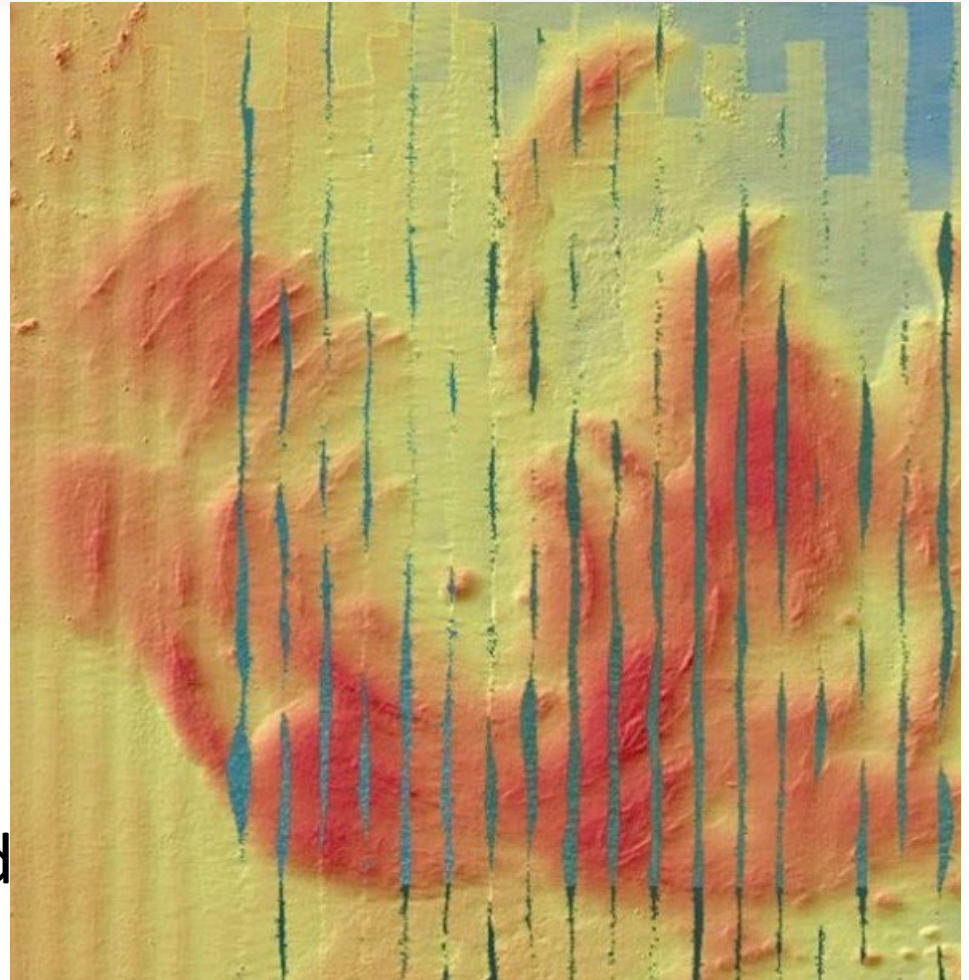
Presented at FSBPA Tech Conference  
William C. Aley IV, P.G. - presenter  
February 5, 2021





# PRESENTATION OUTLINE

1. Background
2. Geophysics
3. Sediments
4. Theories on Structure Origins
5. Discussion of Potential Origins
6. Remaining Thoughts and Questions

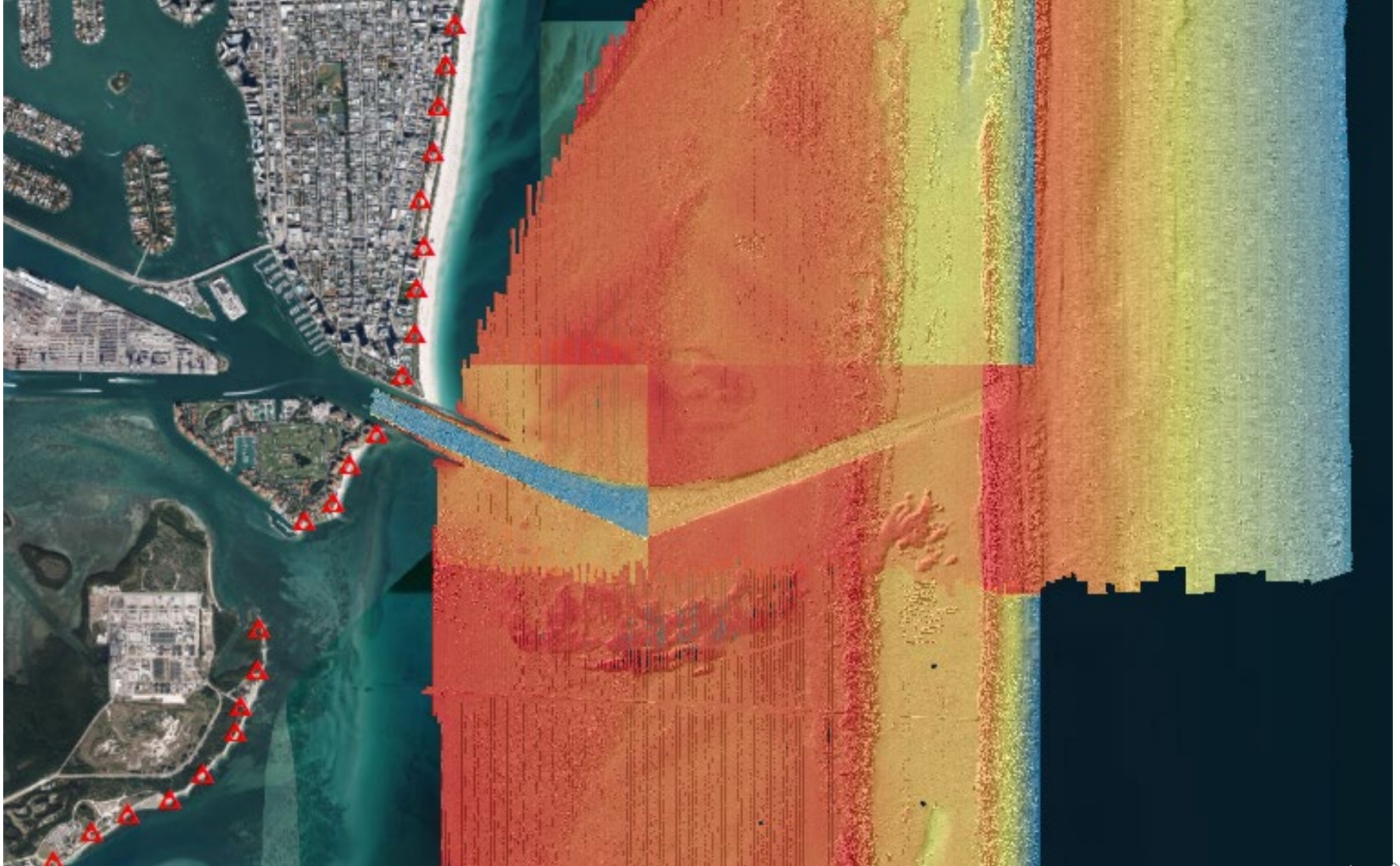


# Background

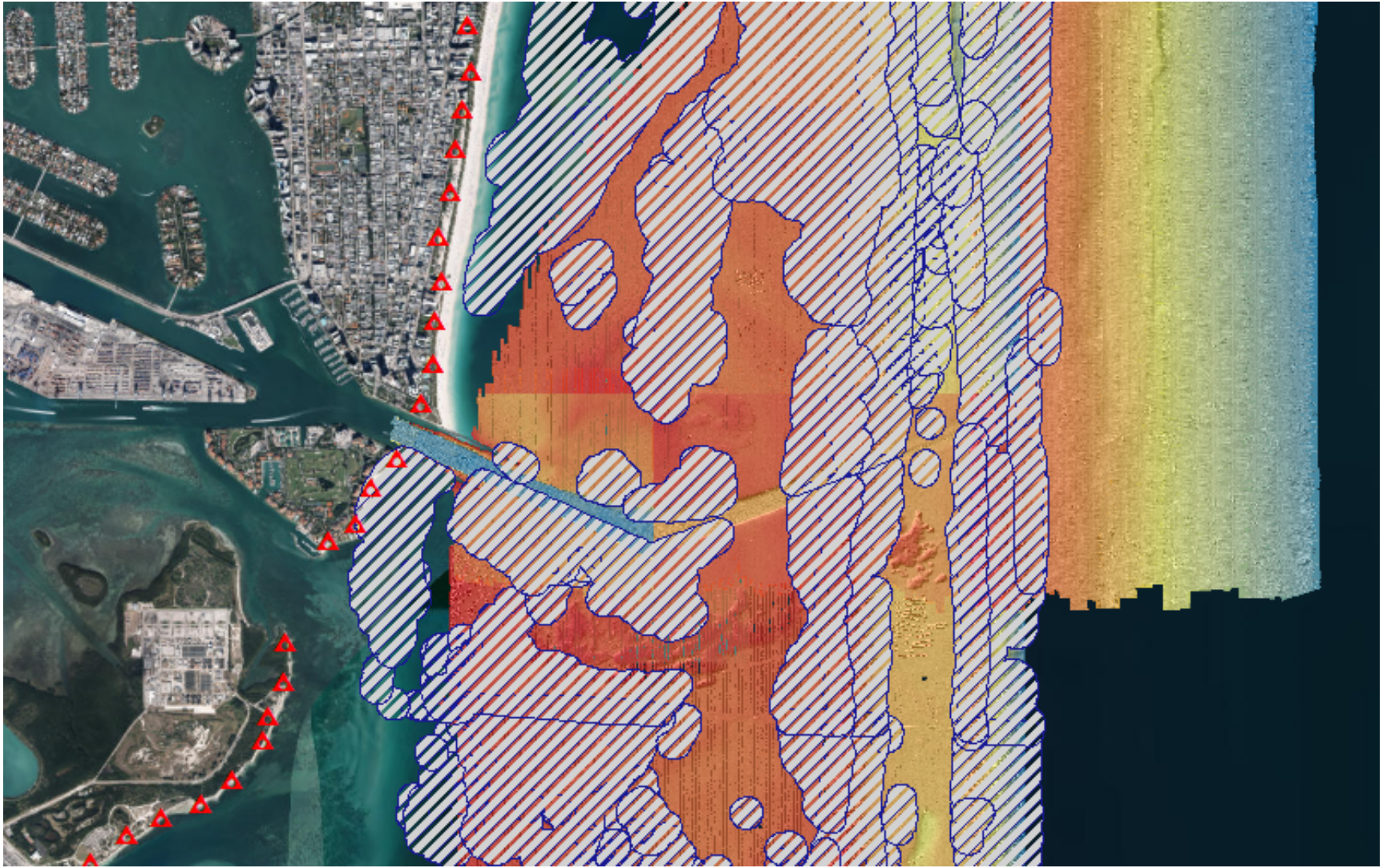
- South Atlantic Division – Sand Assessment and Needs Determination
- Part 2 – Sand Source Investigation
- Identify potential borrow areas



# Background

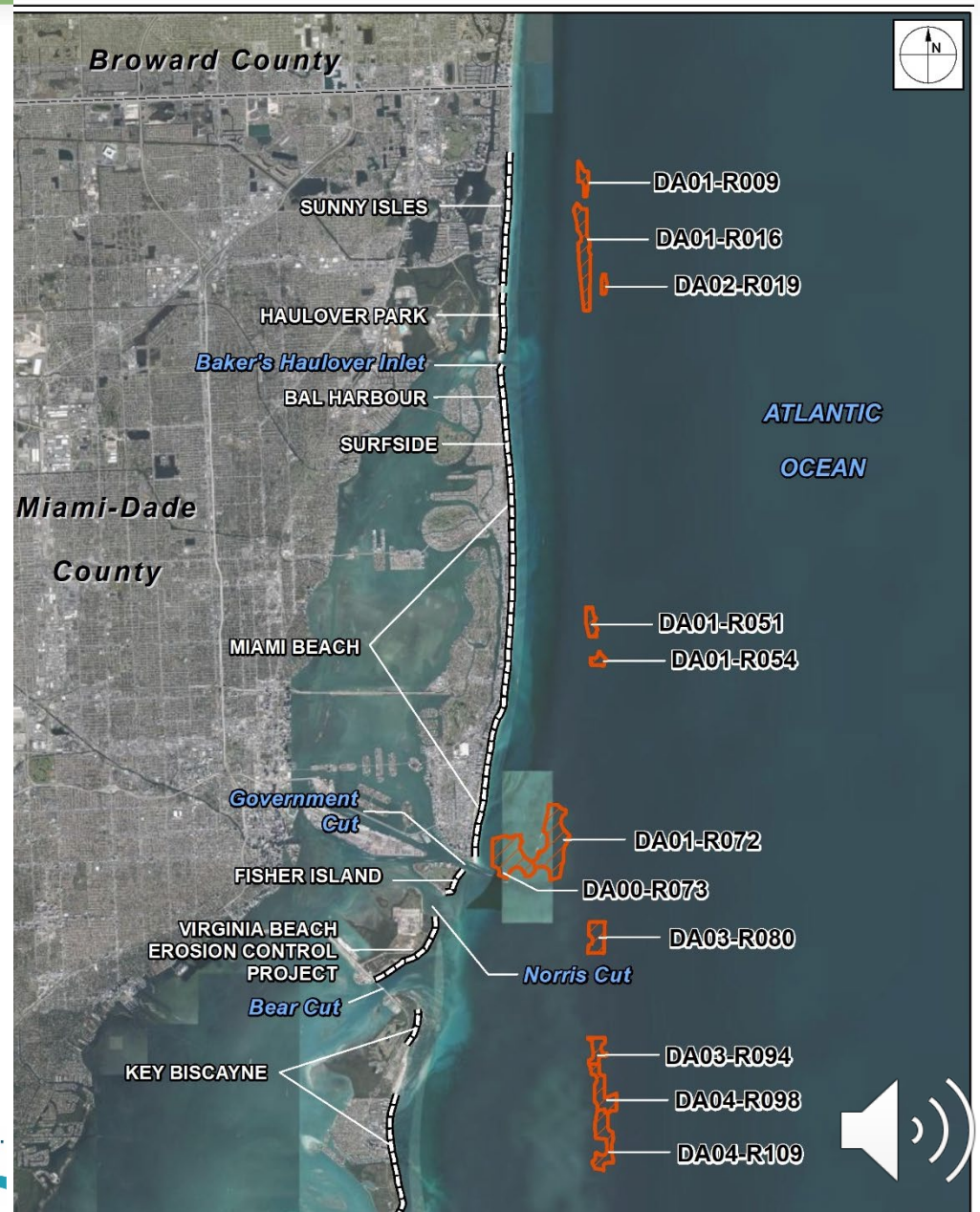


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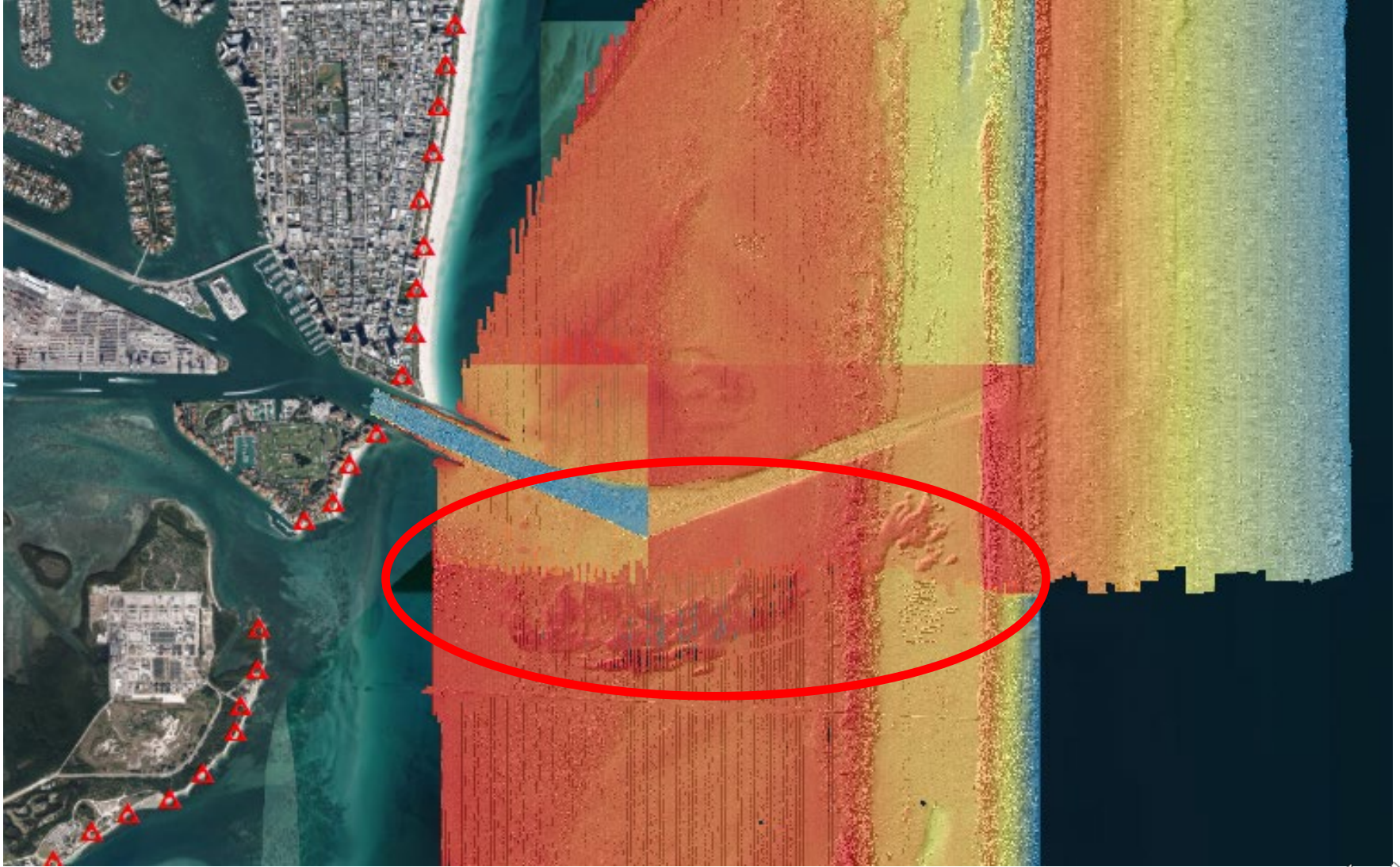


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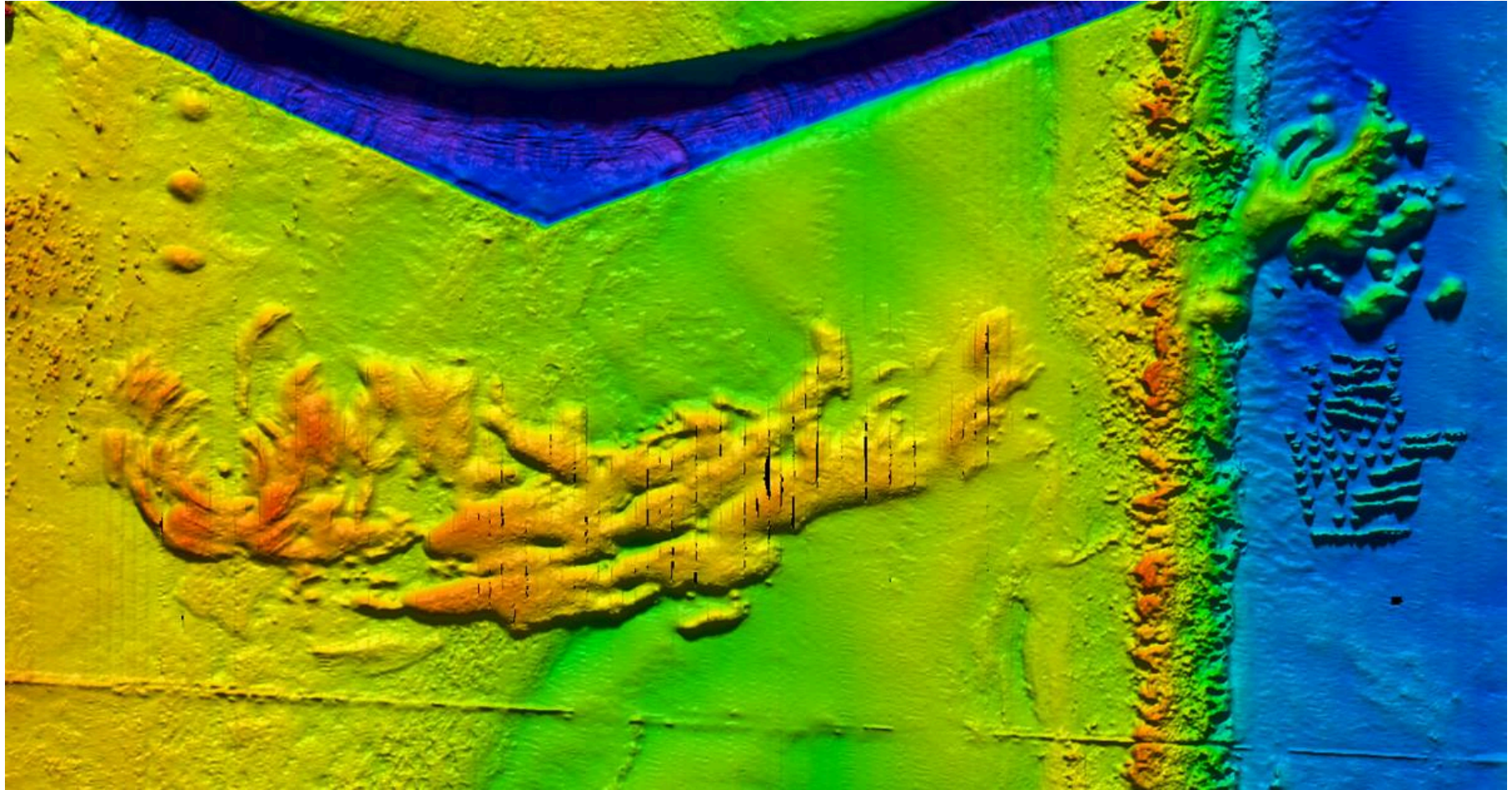
- Sand Search Results:
  - 11 viable borrow areas
  - Approximately 12 MCY beach compatible sediment



# Background



# Background





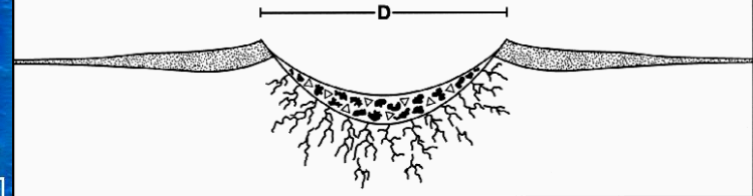


# Background

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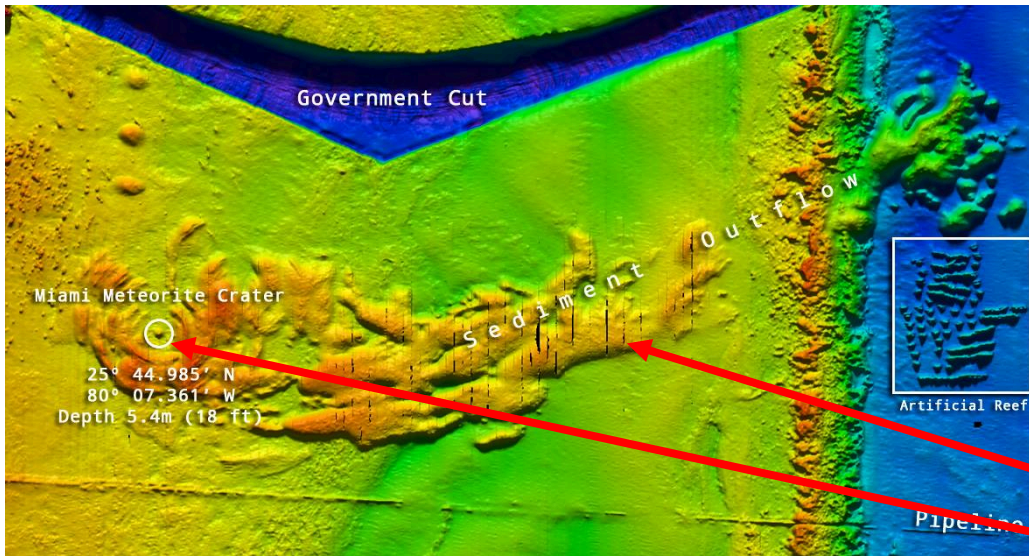
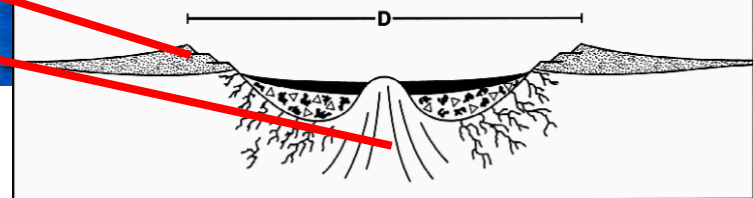
## CRATER DIAGRAM

### Simple Crater

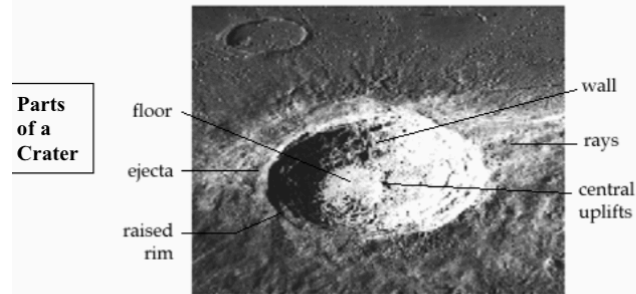


- Breccia
- Impact melt
- Impact ejecta
- Fractured bedrock
- Central peak uplift

### Complex Crater



### Aristarchus



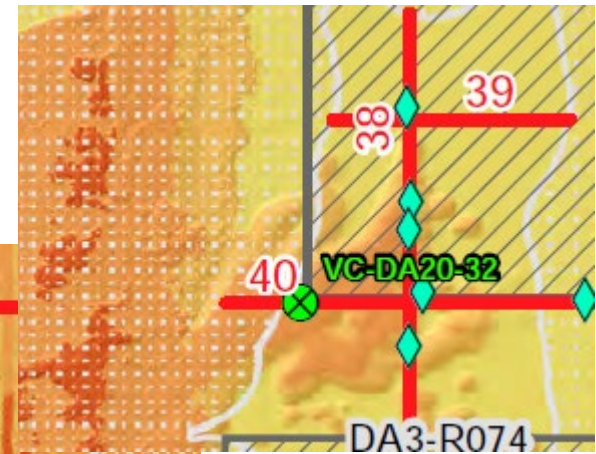
Parts of a Crater

MOON CRATER



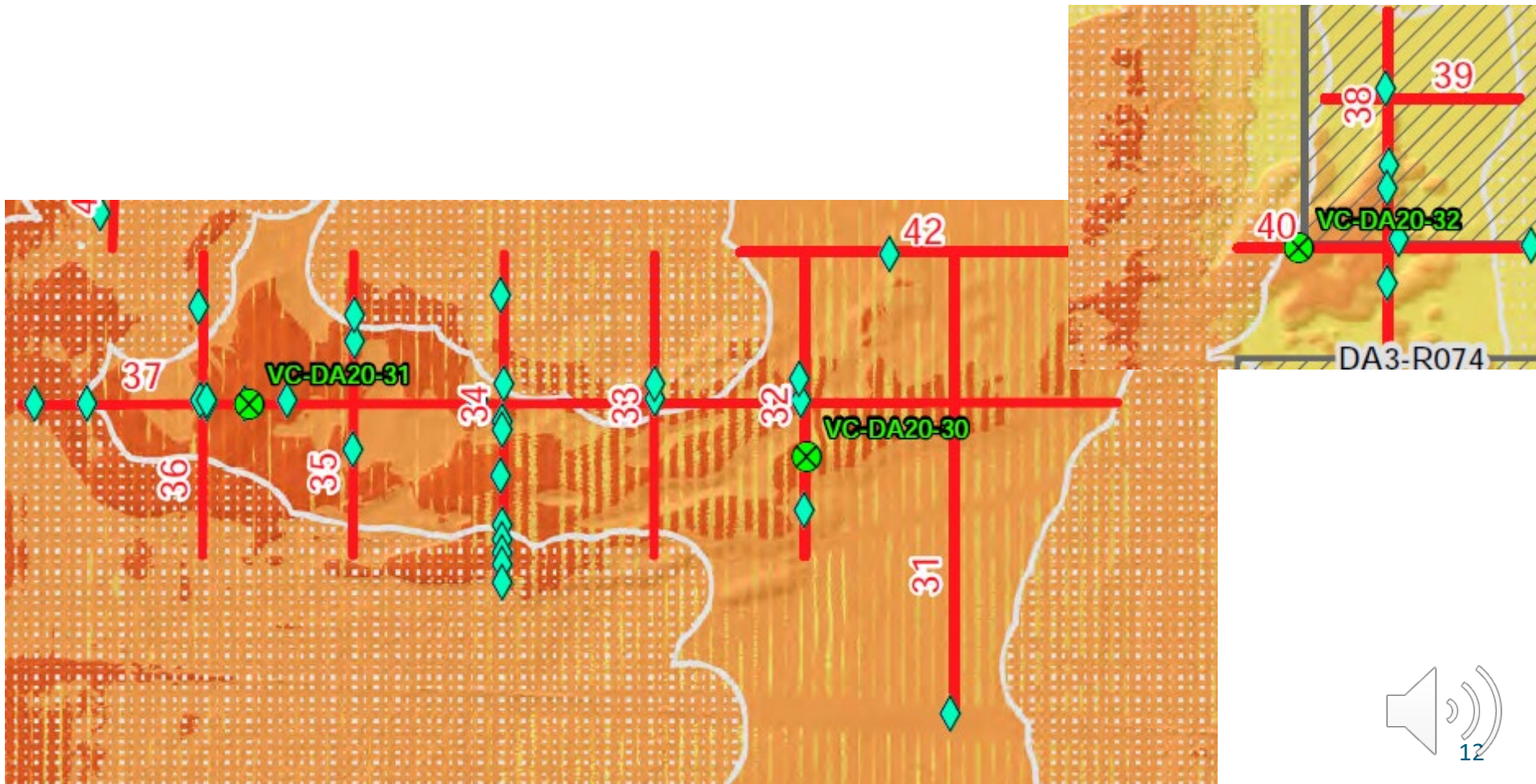
# Geophysics

- 52.5 line-miles of geophysical data collected
  - Multibeam bathymetry, Magnetometer, Side Scan Sonar, Sub-Bottom Seismic
- Novel data collected in vicinity of “Impact Structure”



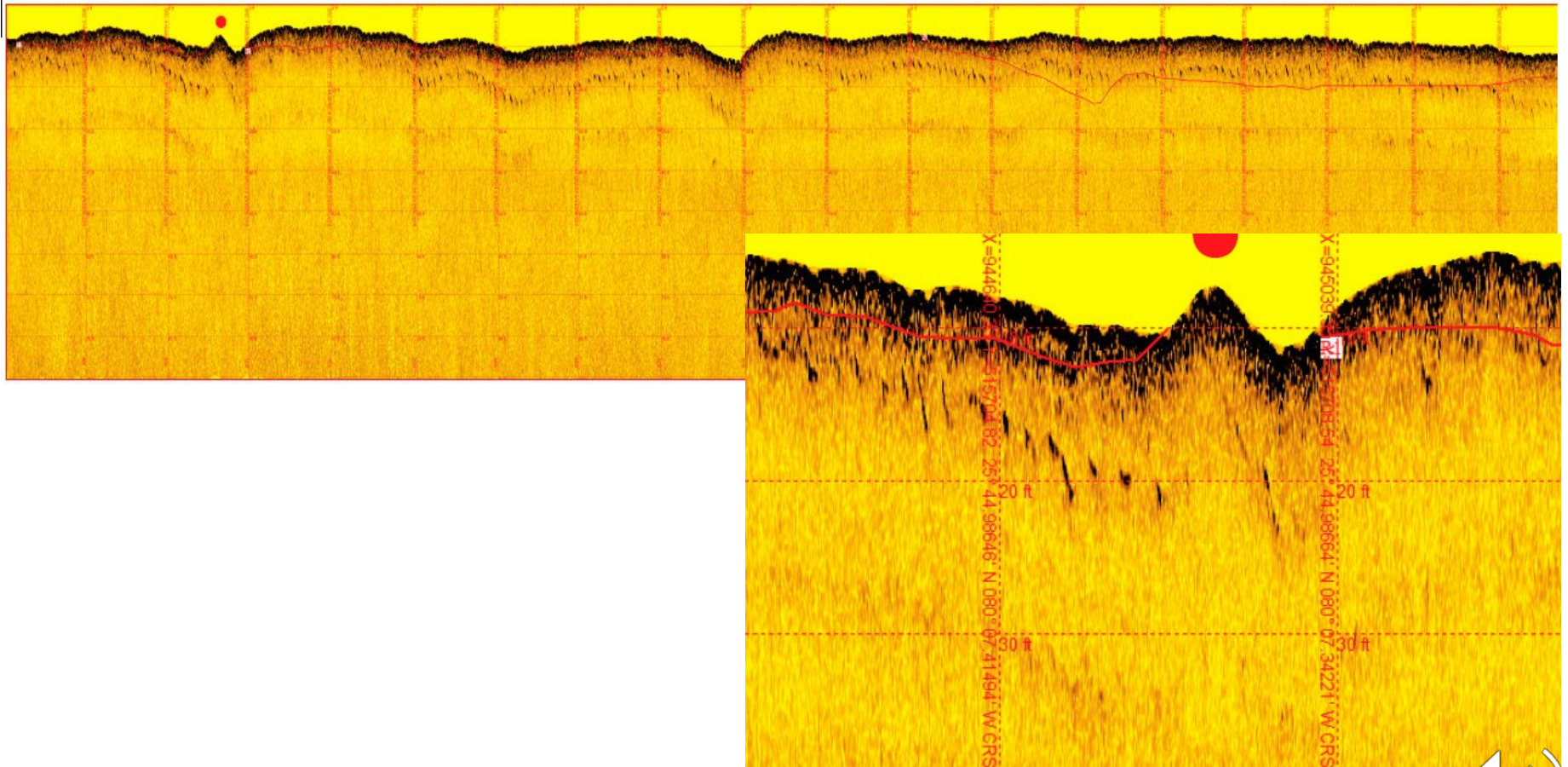
# Geophysics – Magnetometer Data

- Magnetic Anomalies

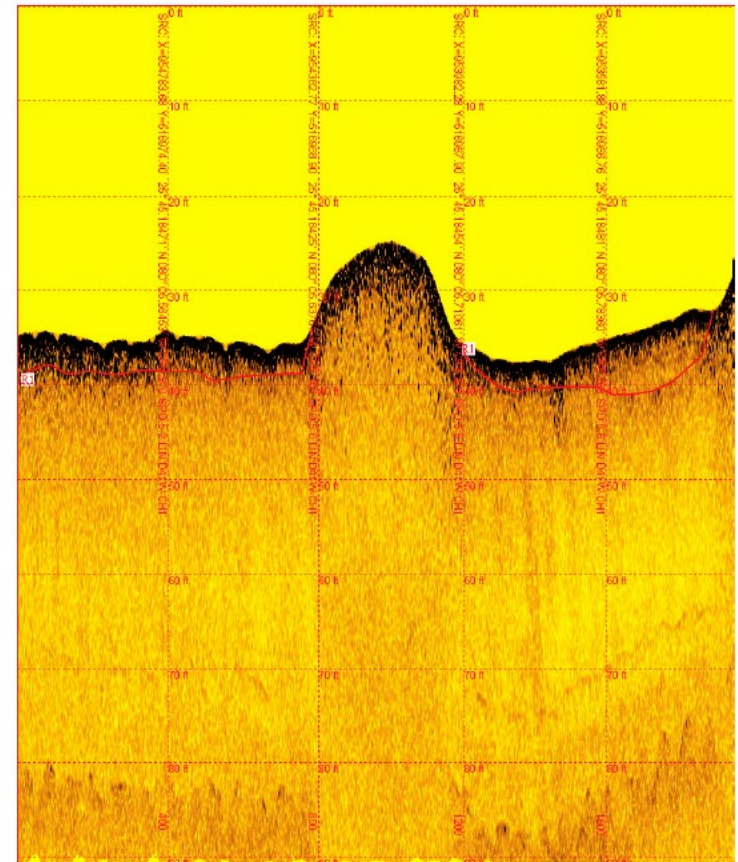
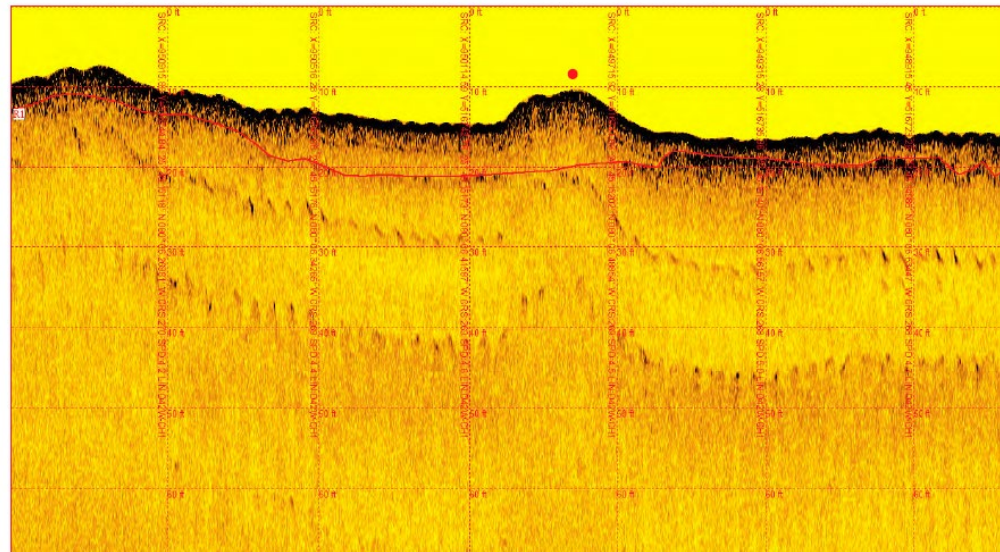
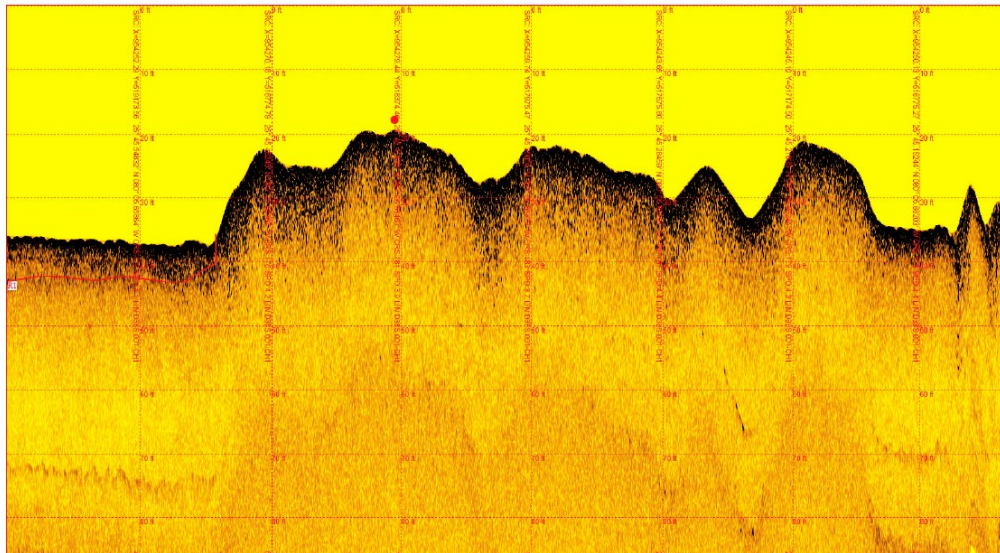


# Geophysics – Sub-Bottom Seismic Images

- Seismic images collected are inconclusive
  - High Frequency = Low Penetration



# Geophysics – Sub-Bottom Seismic Images

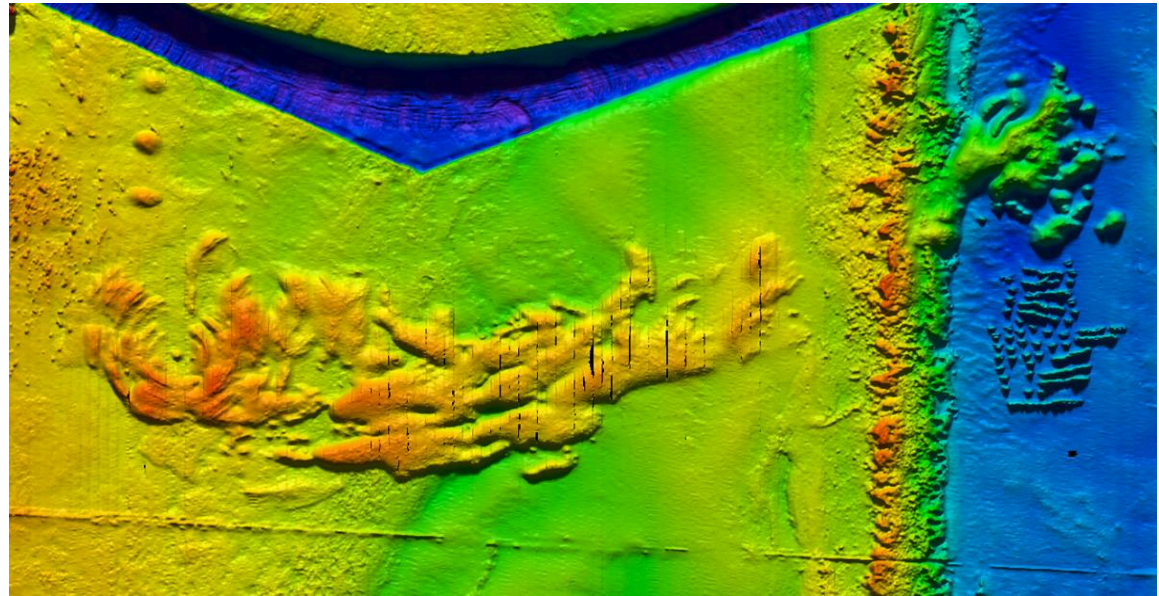


# Sediments



# Potential Origins

1. Dredged Material Disposal (Spoils)
2. Maritime Explosion
3. Radial Lava Flow
4. Karst Solution Feature
5. Meteorite Impact





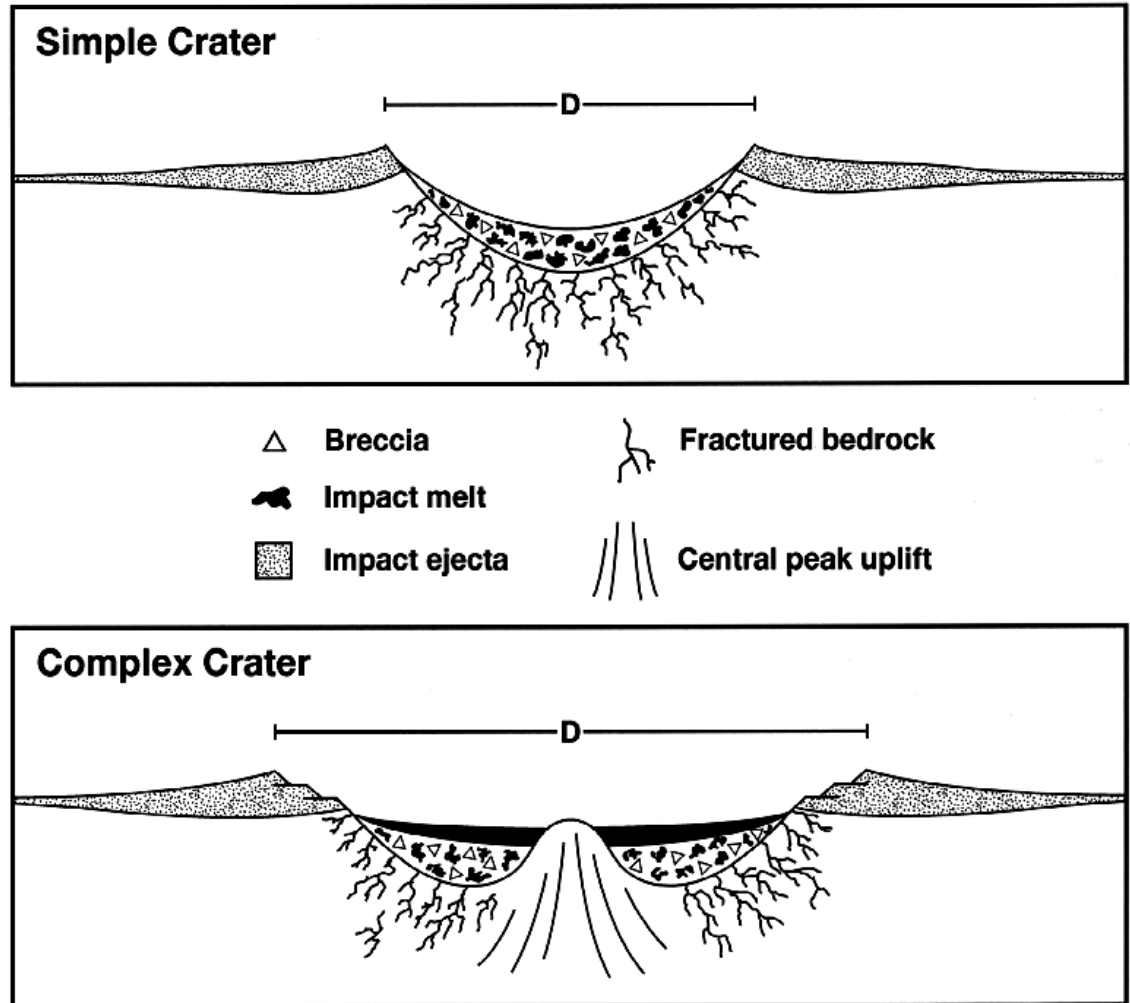
# Potential Origins – Dredged Material Disposal



# Potential Origins – Meteorite Impact

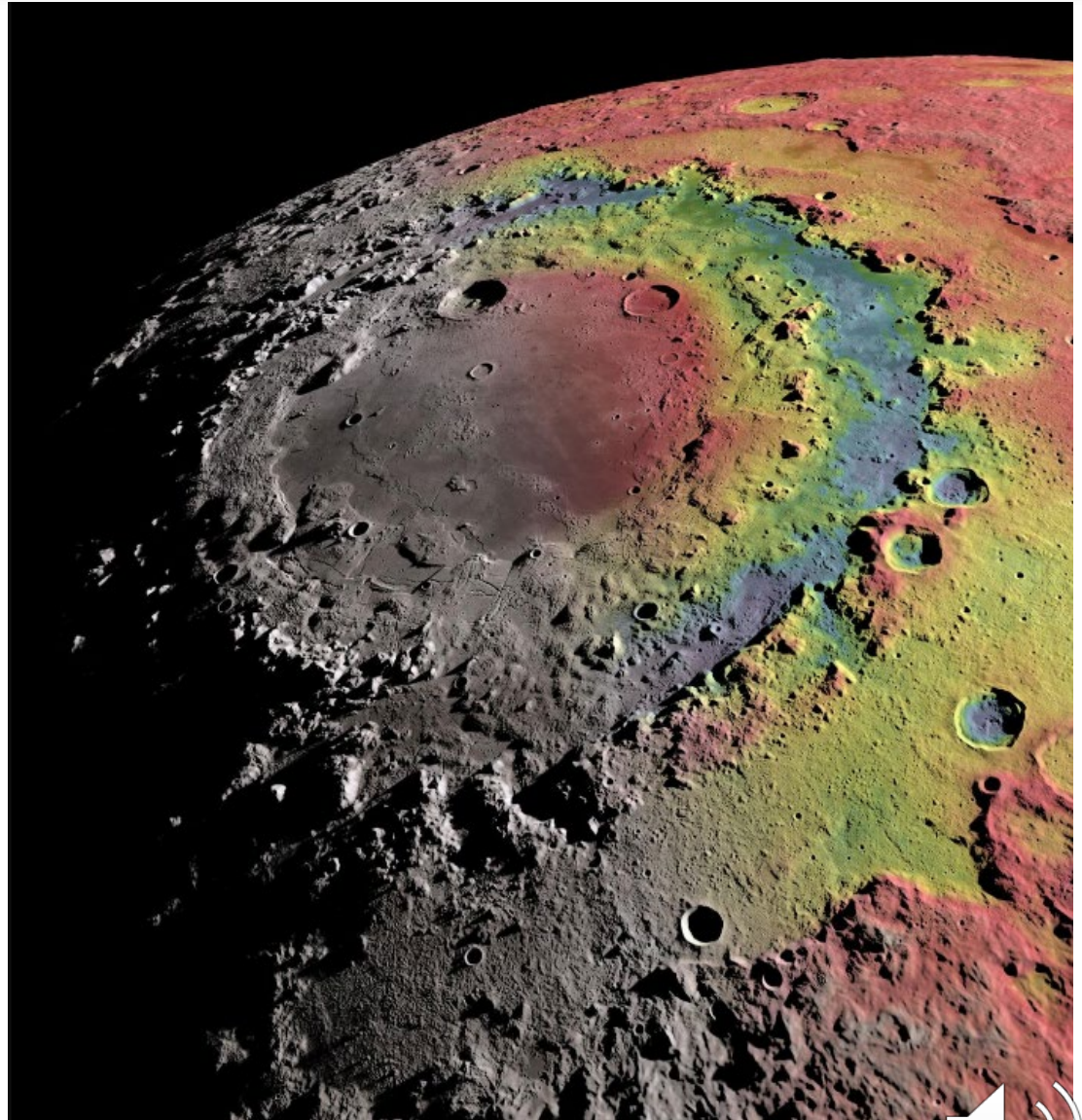
- Meteorite Impact
  - Crater Structure
  - Other craters
  - Other impact events
  - Age

Impact Crater Structure



# Potential Origins – Other Multi-Ring Craters

- Mare Orientale – Earth's Moon



# Potential Origins – Other Multi-Ring Craters

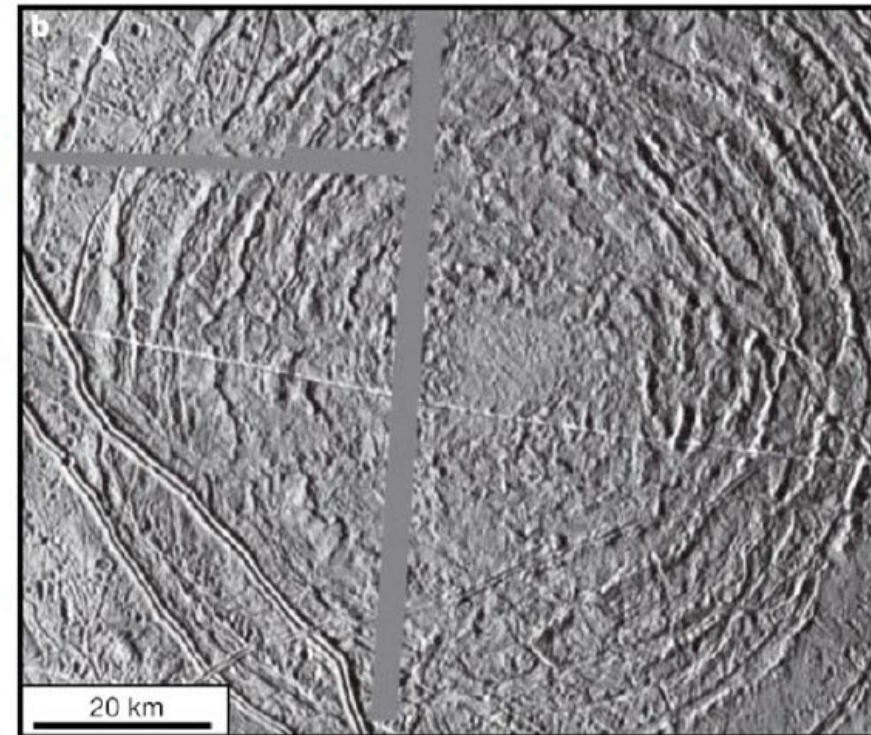
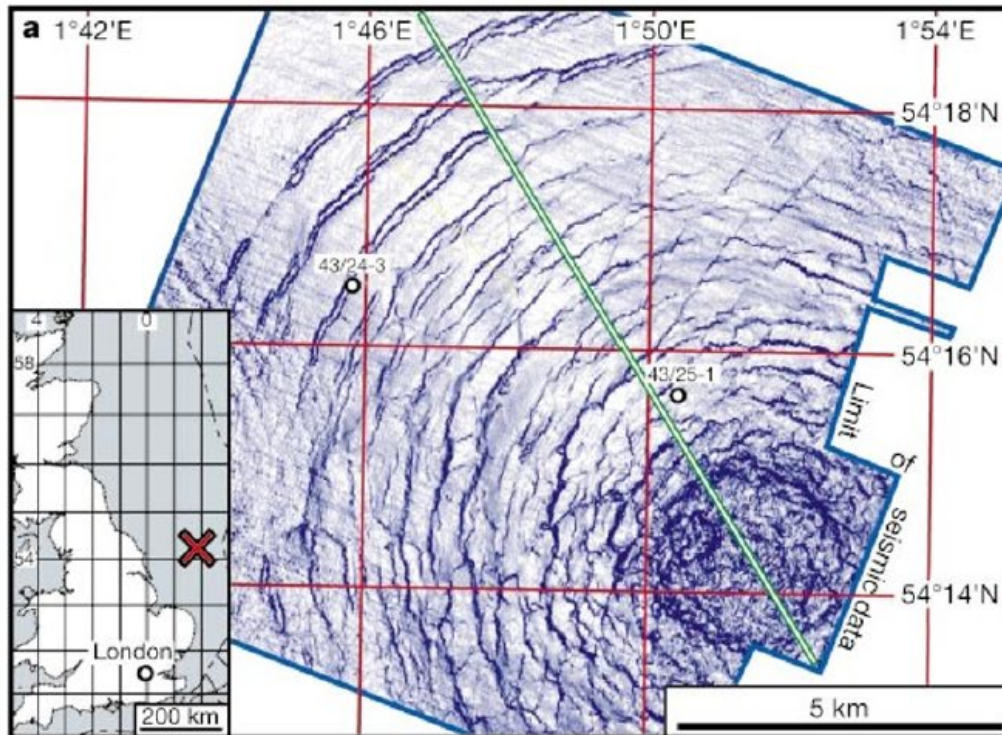
- Richat Structure – North Western Africa



Photo: Nasa Earth Observatory

# Potential Origins – Other Multi-Ring Craters

- Silverpit Structure – Britain's North Sea





# Potential Origins – Other Impact Events

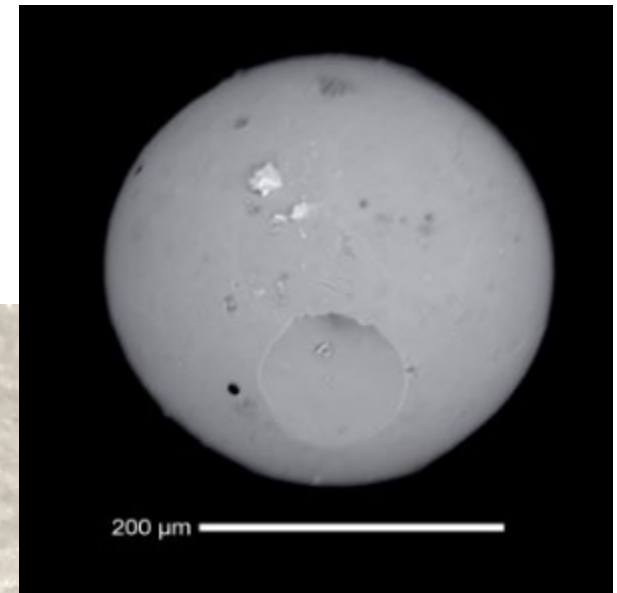
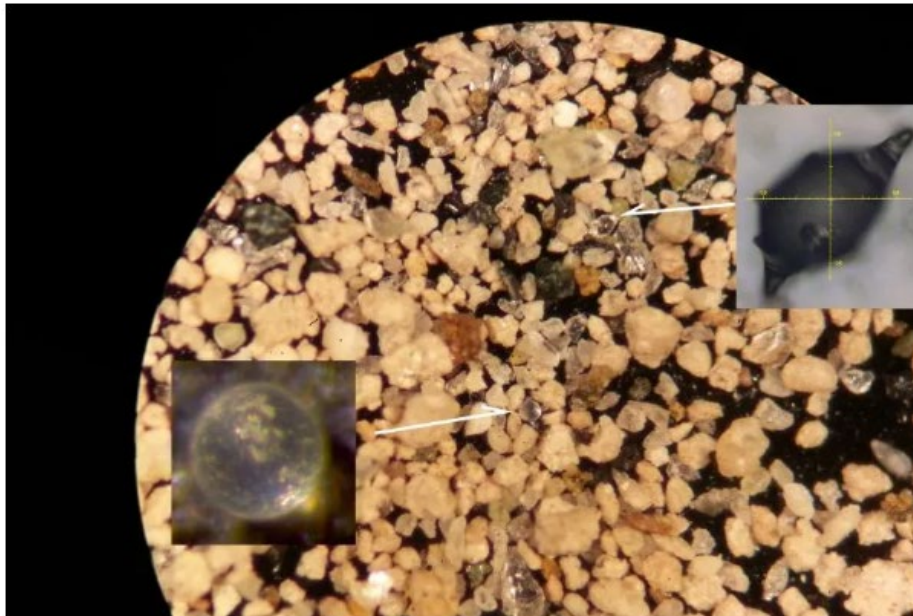
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## 1. Well known North American Impact Events

- Late Eocene Impact, (Chesapeake Bay) – 36 mybp
- Early Pleistocene, Chub Crater (Canada) – 2 mybp
- Late Pleistocene, Barringer Crater Arizona – 50,000 ybp
- Holocene, Haviland Impact Kansas – 1,000 ybp

# Remaining Thoughts and Questions

1. Continue search for records of dredged material placement
2. Further, microscopic, evaluation of sediments
  - Microtektites, Shocked Quartz, Metallic Fragments



Microtektites, as first seen in a sediment sample from the onset of the Paleocene-Eocene Thermal Maximum



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***THANK YOU***  
***Questions?***

