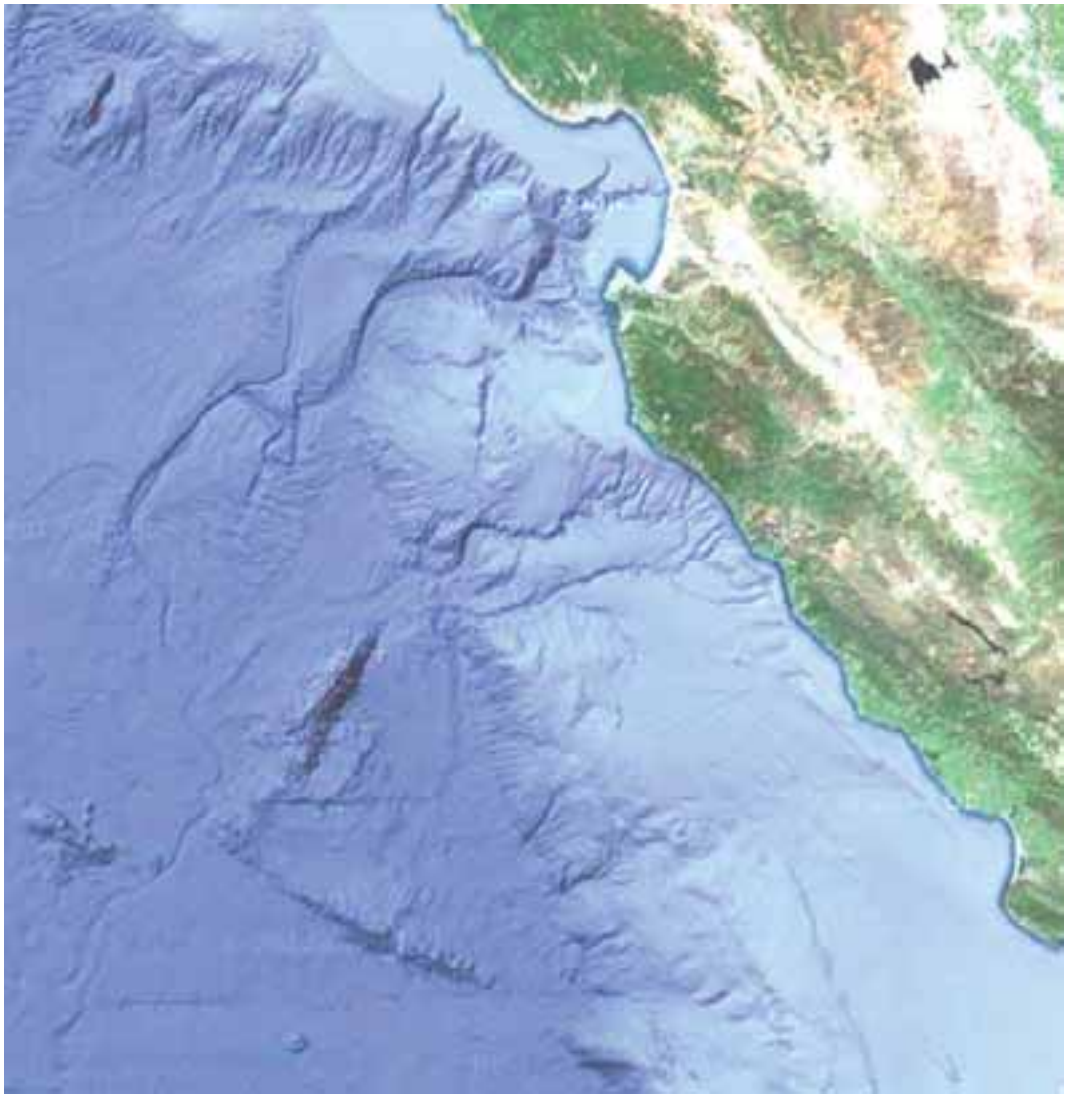
Underwater Canyons: A Cosmic, Novel Explanation of their Formation

Michael Jaye

Kristen Tsolis

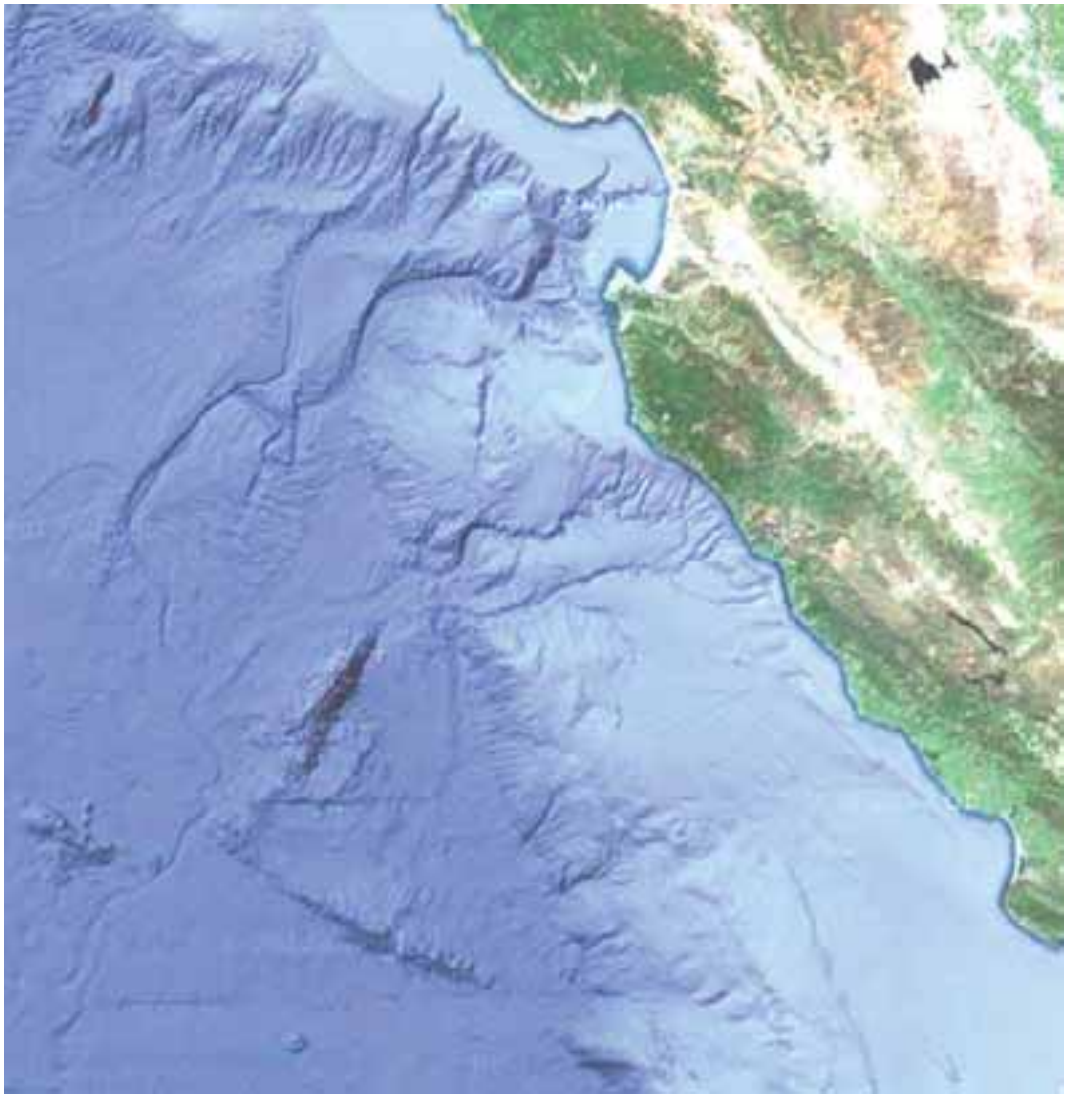
It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.

- Arthur Conan Doyle

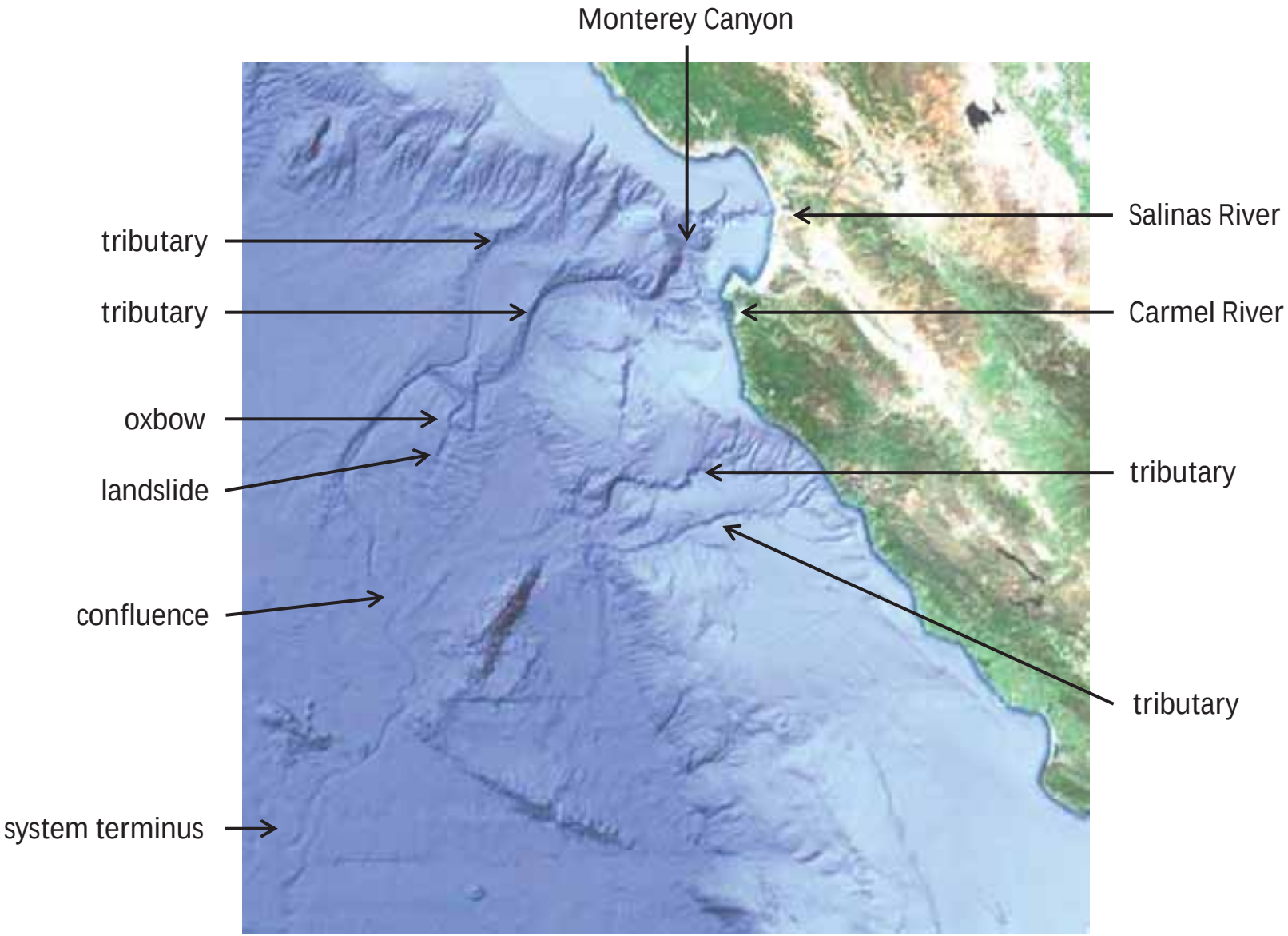


We offer an alternative explanation for the formation of Monterey Canyon and other submerged drainage systems found worldwide.

Unless otherwise noted, all maps from either Google Maps (satellite view) or Google Earth.

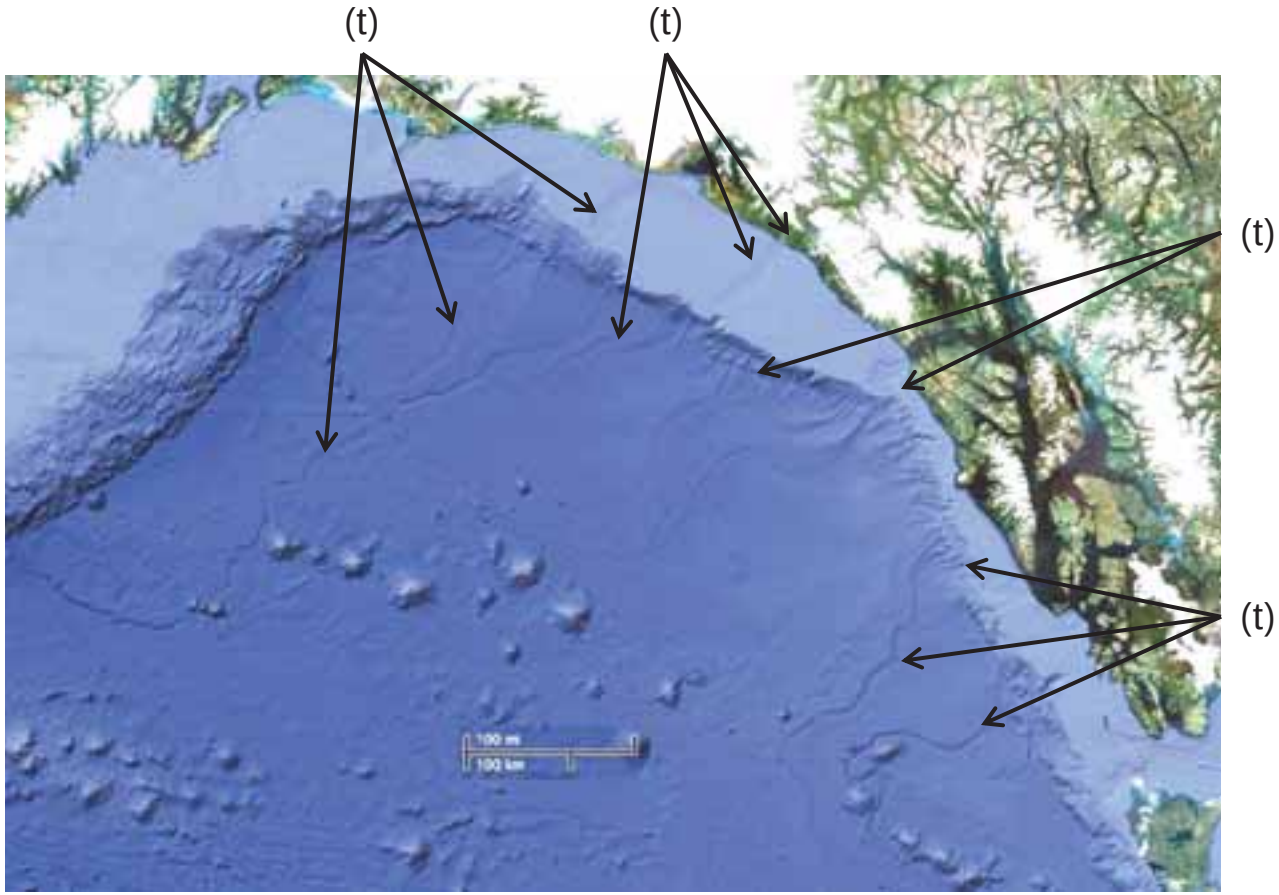


Presently accepted explanation for the formation of Monterey Canyon: carved by subsurface currents and turbidity flows. Explanation began in the 1950s when the full extent of the system was unknown.



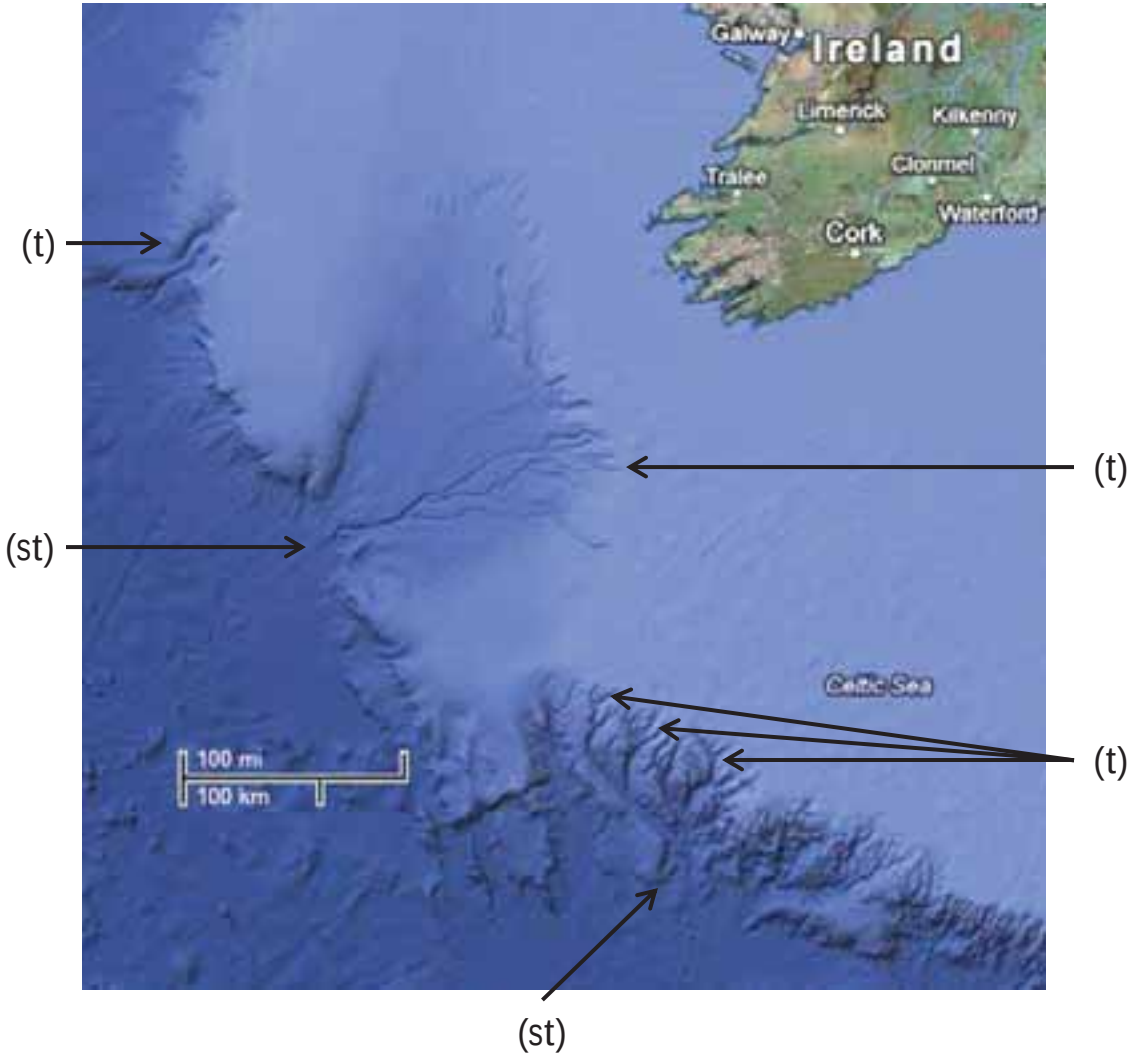
Nearly all of submarine geomorphology follows from insensible theories based on incomplete data or bad assumptions; cause and effects have been conflated.

Data: Google Maps (satellite view) image



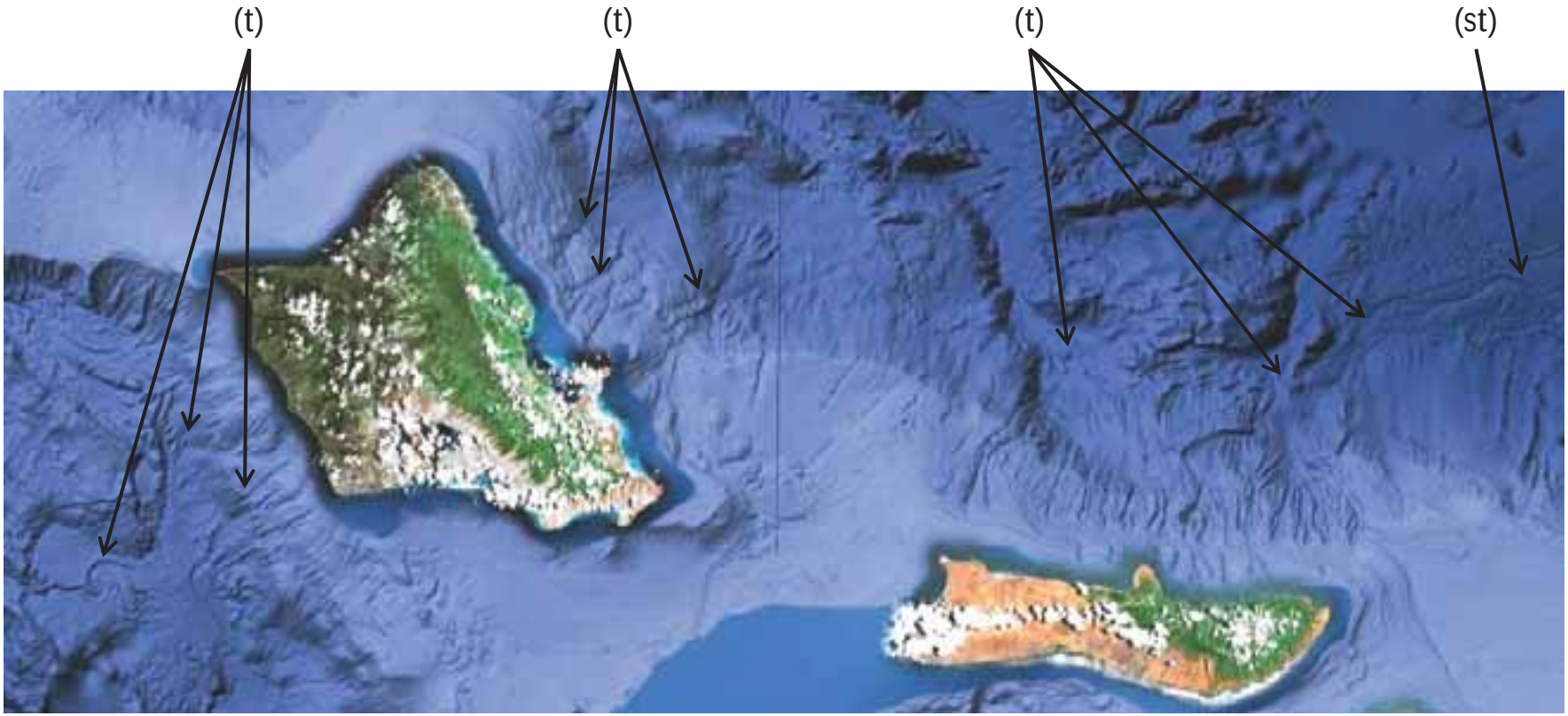
The Gulf of Alaska is shown in this Google Maps (satellite view) image. The submerged river beds and tributaries (t) in this image can be traced back to presently flowing drainages. Note that the now submerged river bed in the lower right of the image wound its way between hills or volcanoes. Note also that the submerged rivers once flowed hundreds of miles from the continental shelf. It is impossible that subsurface “down canyon density currents” could remain focused and energetic over such distances to create these topographic features.

Data: Google Maps (satellite view) image



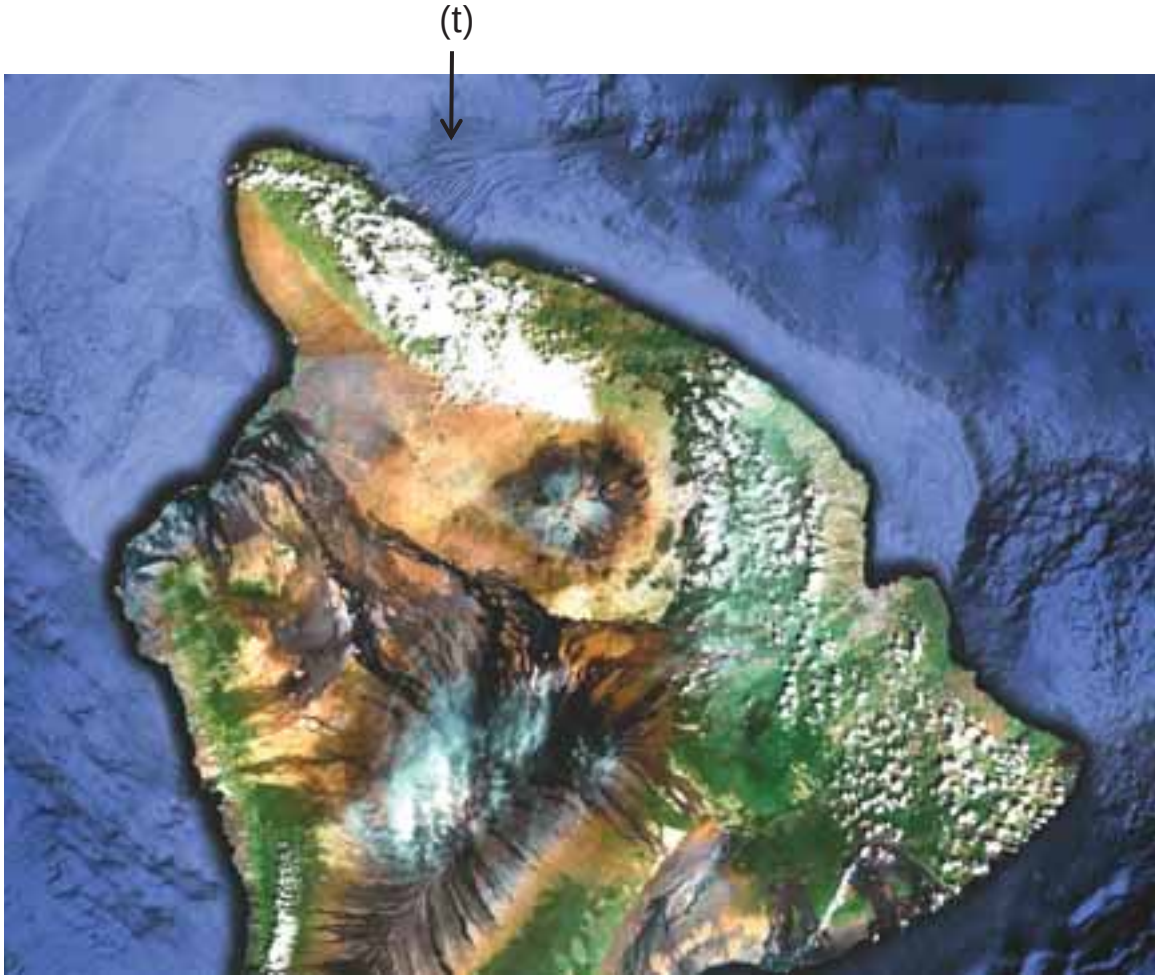
In the center of this image is a prominent drainage system and its tributaries (t), found in the Celtic Sea southwest of Ireland. The upper portions of the tributaries begin at a depth 2000 feet below present sea level, and the systems' terminus (st) is 10000 feet deeper.

Data: Google Maps (satellite view) image



The submerged topography off the coasts of Oahu and Molokai show river drainage systems with many tributaries (t). The details of the drainage system off the north coast of Molokai allow for the identification of the system's terminus at a depth of nearly 18,000 feet below present sea level. Many of the tributaries originated on presently exposed landscapes where flowing waters carved steep gulches and canyons that can be found on the islands' coasts. In some cases, the continuity of the gulches is lost in littoral regions, but it can be inferred by images such as that on the next slide.

Data: Google Maps (satellite view) image



The north coast of the Big Island (Hawaii) had a river drainage system with many tributaries (t). Note that newer portions of the island created by lava flows from Mauna Kea and Mauna Loa and now submerged in the Pacific Ocean do not manifest similar erosion, so the newer lava flows submerged off Hawaii cannot be confused with erosions caused by flowing water. Note the prevailing cloud cover over the northern part of the island.

Data: Google Maps (satellite view) image

Note the series of submerged drainages along the north African coastline in the western portion of the Mediterranean Sea. We will re-visit this site later.

Analysis

Subsurface currents and presumed turbidity flows could not remain focused over the distances involved to erode and create such features.

- ⇨ The drainage systems were subaerially carved.
- ⇨ For the substantial period of time required for flowing water to carve the now-submerged drainage systems - and the entire time preceding it, the Earth had substantially less water than the present.

The now-submerged river systems are well preserved, meaning that they were covered in a short period of time.

The volume of water required to cover the river systems by filling the ocean basins with over two miles of water cannot be stored in frozen form at the planet's poles – there is insufficient room, atmosphere only extends so far.

A brief word on comets

Long Period comets thought to originate in Oort Clouds

- attracted by passing solar system
- presumed hyperbolic trajectories

Either icy dirtballs or dirty snowballs

- nuclei of smaller comets: rock, dust, ice, frozen gases (rather than iron or manganese)
- outer layer thin, bonded by ice (e.g. Deep Impact: Tempel1 75% open space, mass approximately 25% ice)
- fragment easily (e.g. Ison disintegrated after passing Sun recently)

The water's source: a massive comet that impacted in what is now the Southern Ocean

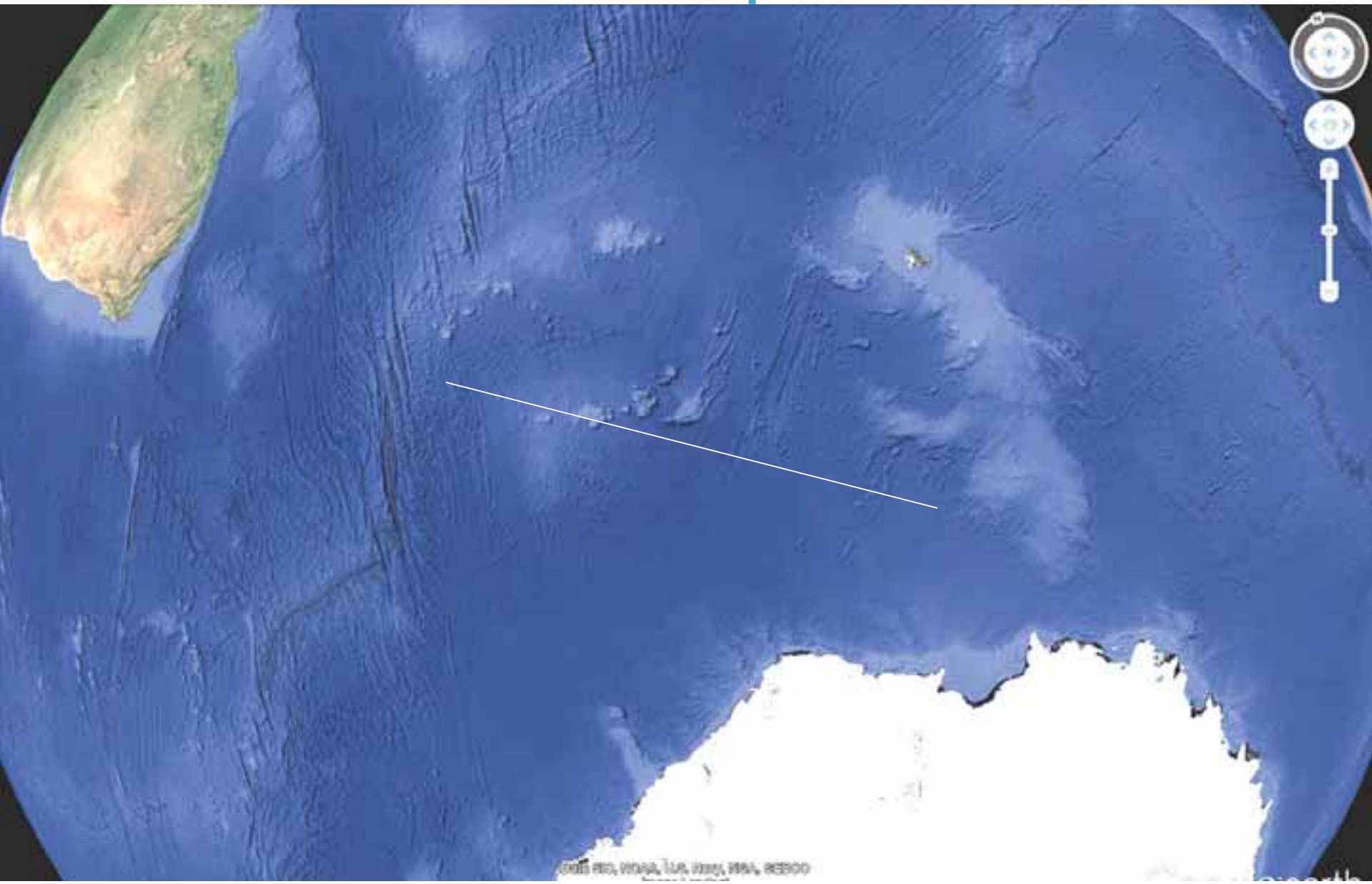
Effects

- Rapid event (in geologic terms) preserves evidence in bathymetry
- Upon melting added more than two miles to average ocean depth
- Likely to have been an extinction event; adaptations continue to present.

Evidence

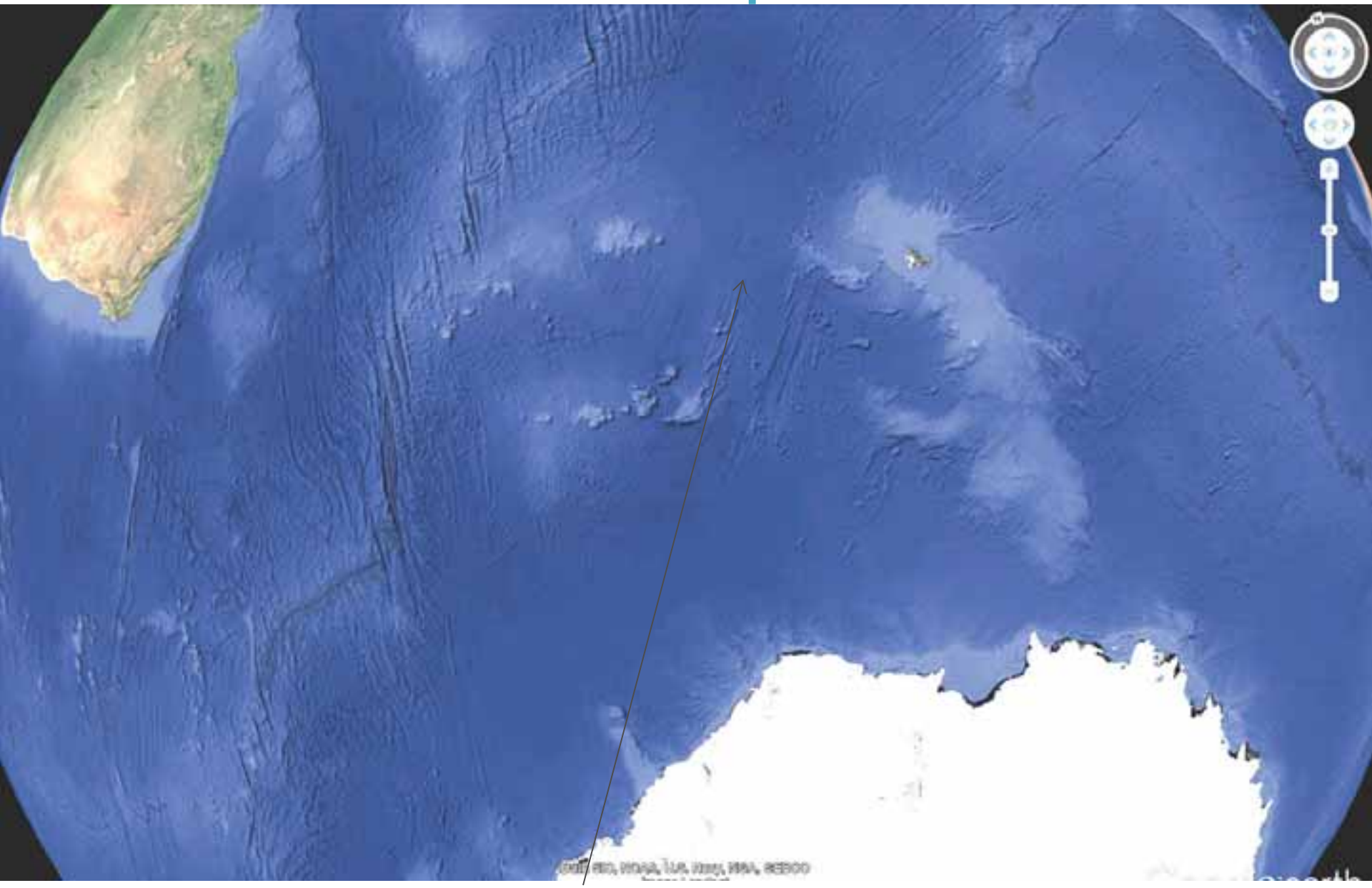
- Well-preserved, subaerially carved but now submerged terrain features
- Comet composition, impact effects (Google Earth, Google Maps)
- Magnetic anomaly features
- IODP core samples from interior & exterior of impact crescent
- Ice core findings & analyses, as well as other evidence, indicate timing
- Recent finding: glacial valley two kilometers below present sea level
- Submerged features in the Mediterranean Sea
- Human witnesses.

The Comet Impact Site



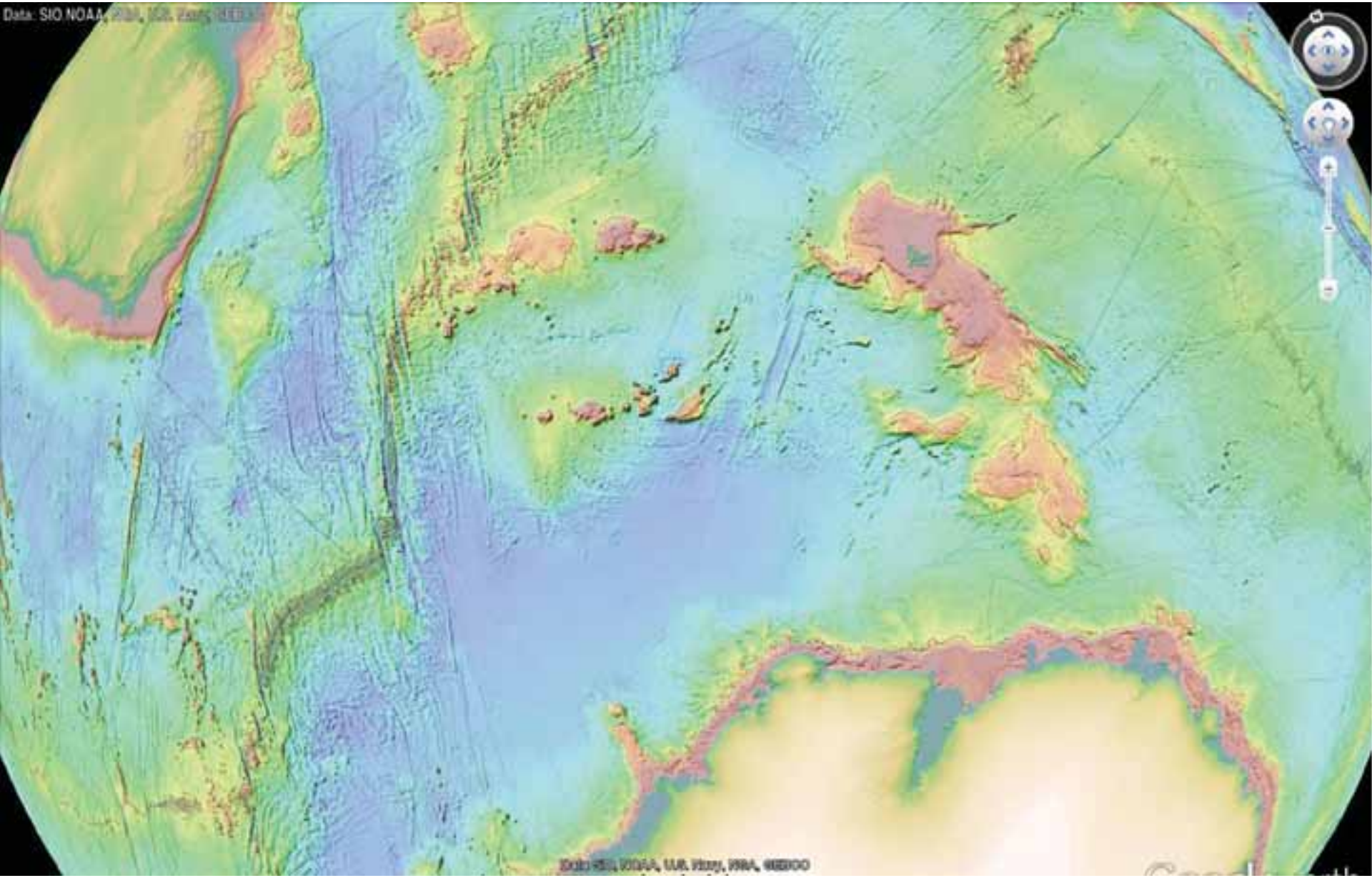
Remnant diameter is on order of 2500 km. Since comets are porous and an amalgamation of ice and rock, the impact causes its disintegration and less damage to the planet than might otherwise be expected from such a massive object.

The Comet Impact Site



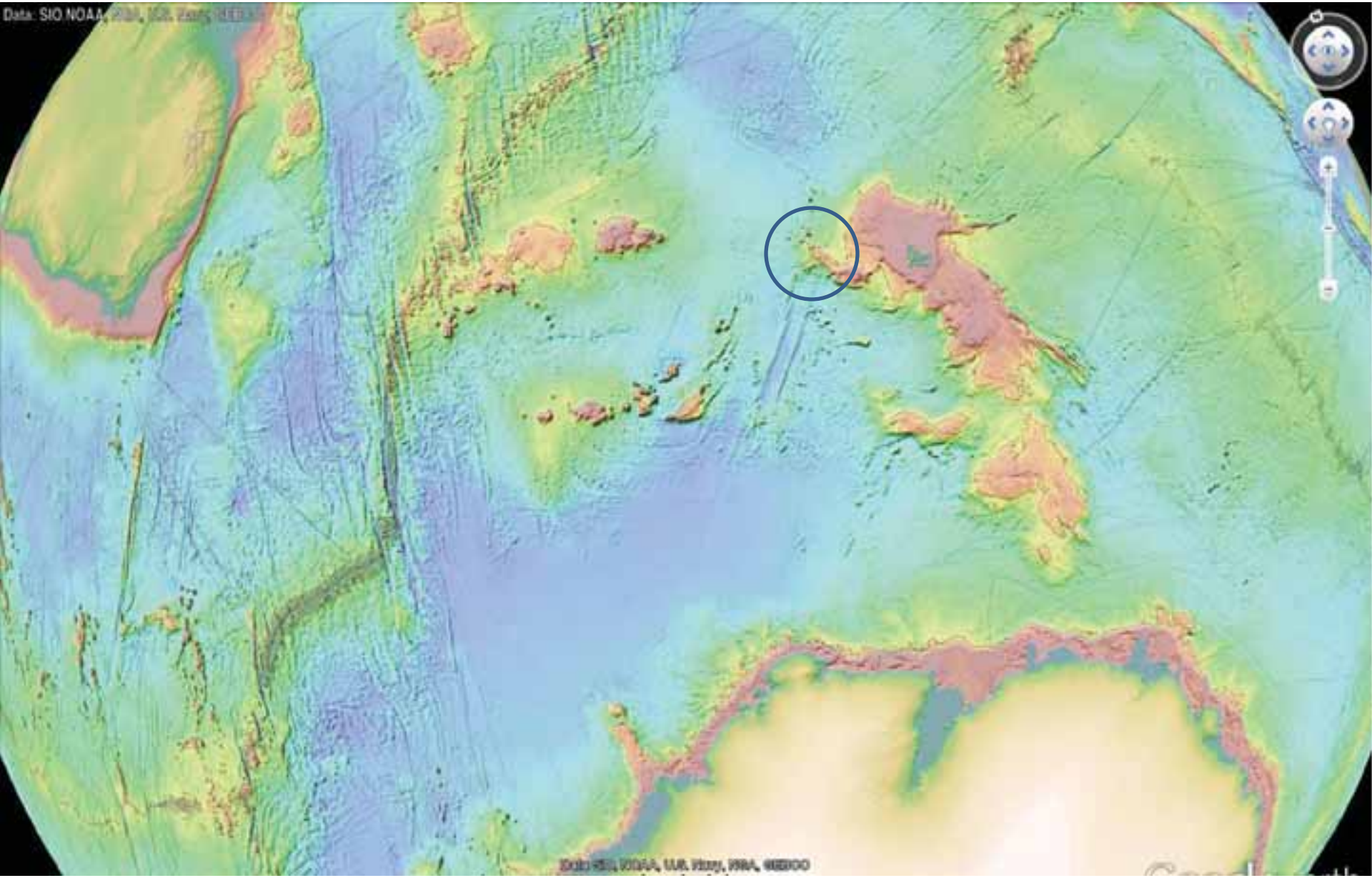
The gap in the crescent center is likely due to entry and fragmentation effects.

Comet Impact Site



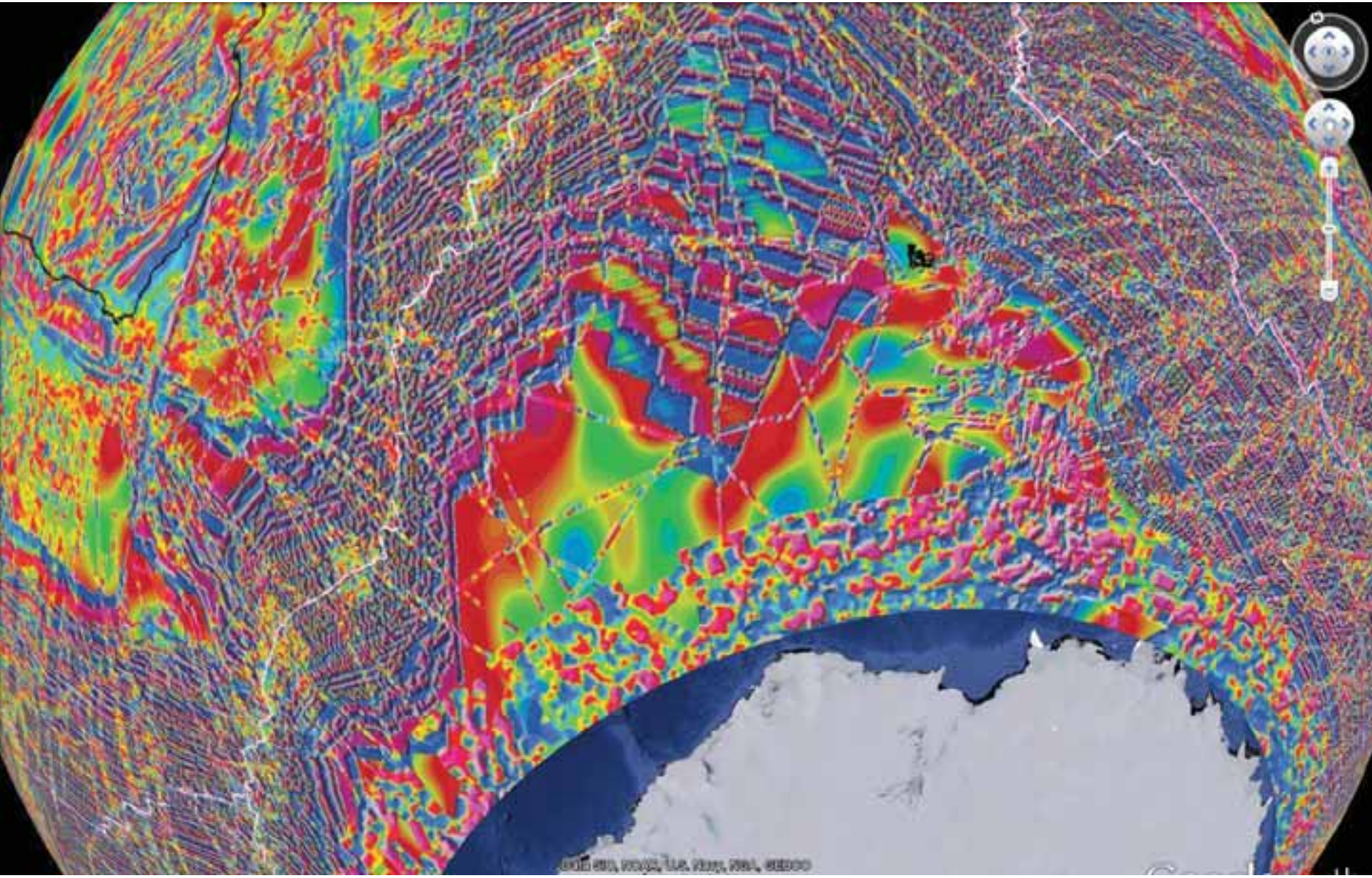
This relief map depicts raised regions in the impact crescent interior that contain solid materials borne and deposited by the comet.

Comet Impact Site



The comet's core material came to rest in the circled region.

Comet Impact Site



Deposit mounds and the nucleus-gouged trough correspond to the most intense magnetic anomalies (red); minerals strewn nearly 1000 miles through the crescent gap are evident.

Comet equivalent water volume estimate:

- Assume that the irregularly shaped comet had a volume equivalent to that of a sphere 2200 km in diameter: volume = $5.58*10^9$ km^3.

- Assume that the comet was similar in composition to Tempel1 – porous; ~25% ice.

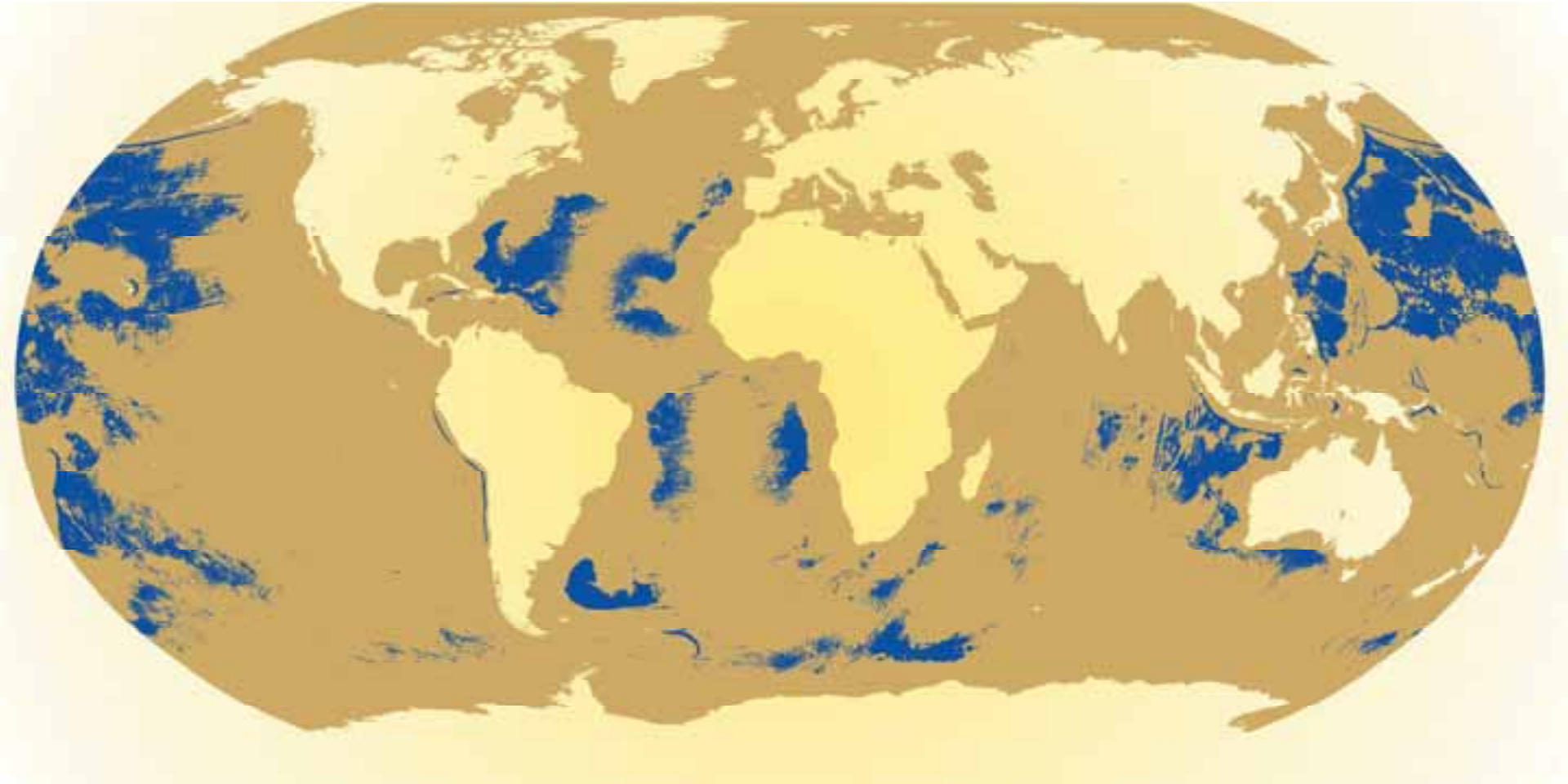
- Comet's equivalent water volume ~ $1.29*10^9$ km^3 (this accounts for the volumetric difference between ice and water).

- Earth's oceans cover $3.62*10^8$ km^2.

- **Comet volume yields an average ocean depth of 3.57 km**, which is very close to estimates of the Earth's present average ocean depth (4.3 km).

- **This is not to say that the Earth did not have sizeable water reservoirs prior to the comet impact. It did, but the seas were unconnected.**

Pre-comet Earth, an approximation

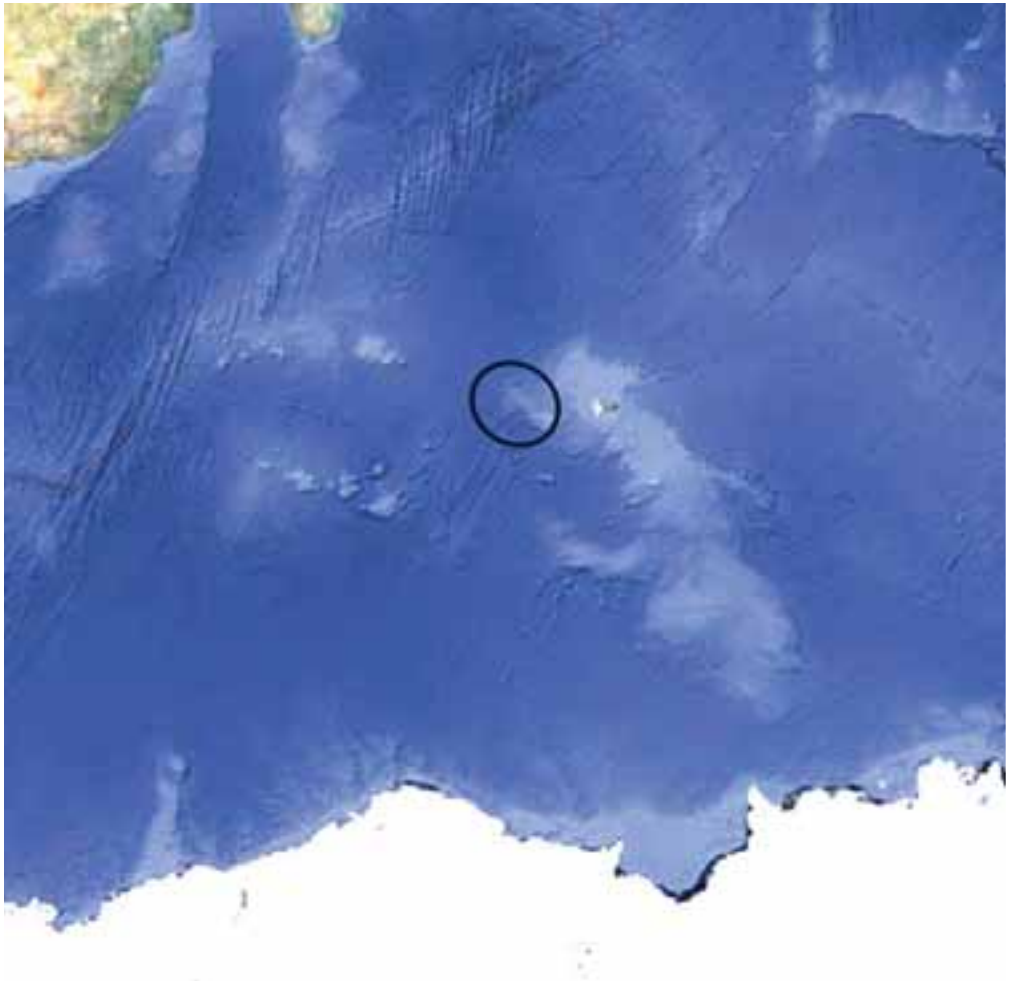


Blue: extent of oceans and seas prior to the comet impact.
Dark tan: exposed landscapes prior to the comet impact.

Important note: presently exposed landscapes were not covered by the comet's flood waters.

Map data obtained from http://www.ngdc.noaa.gov/mgg/global/global.html

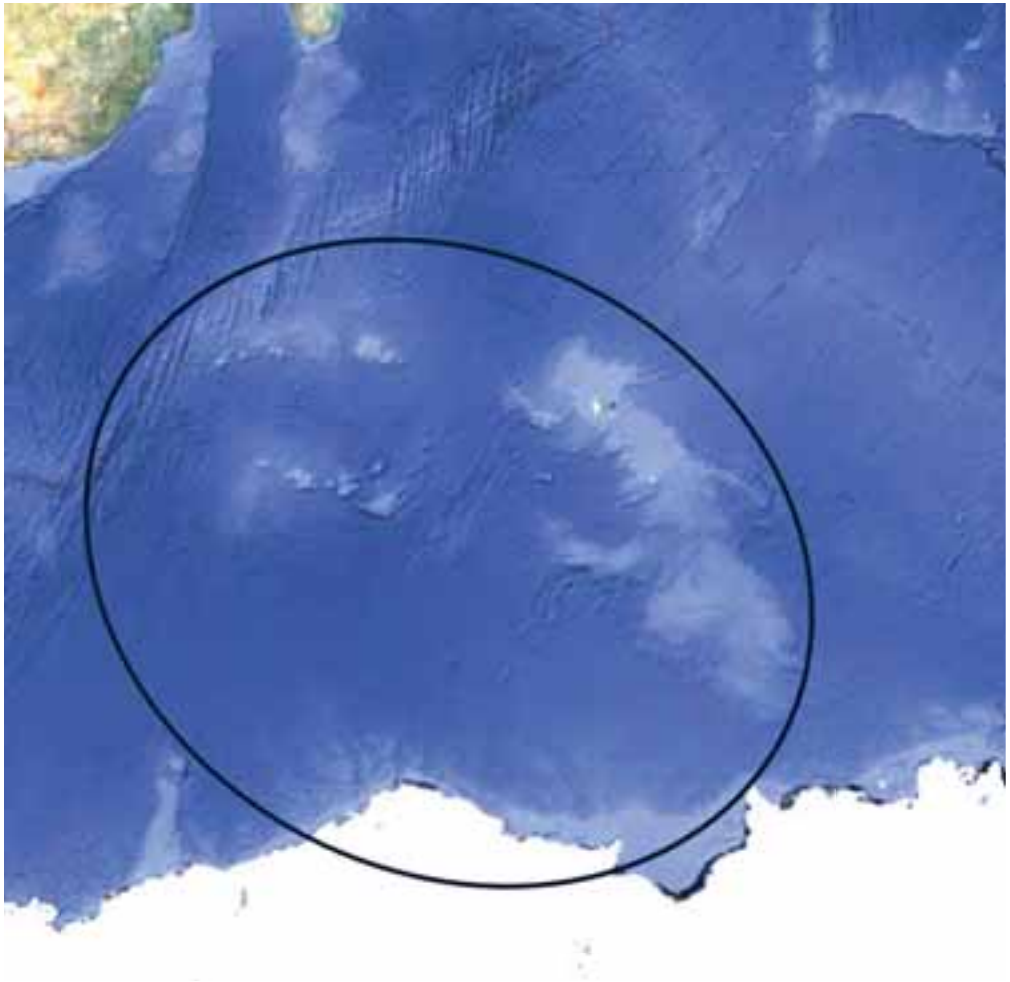
Validation



Recovering comet nucleus materials.

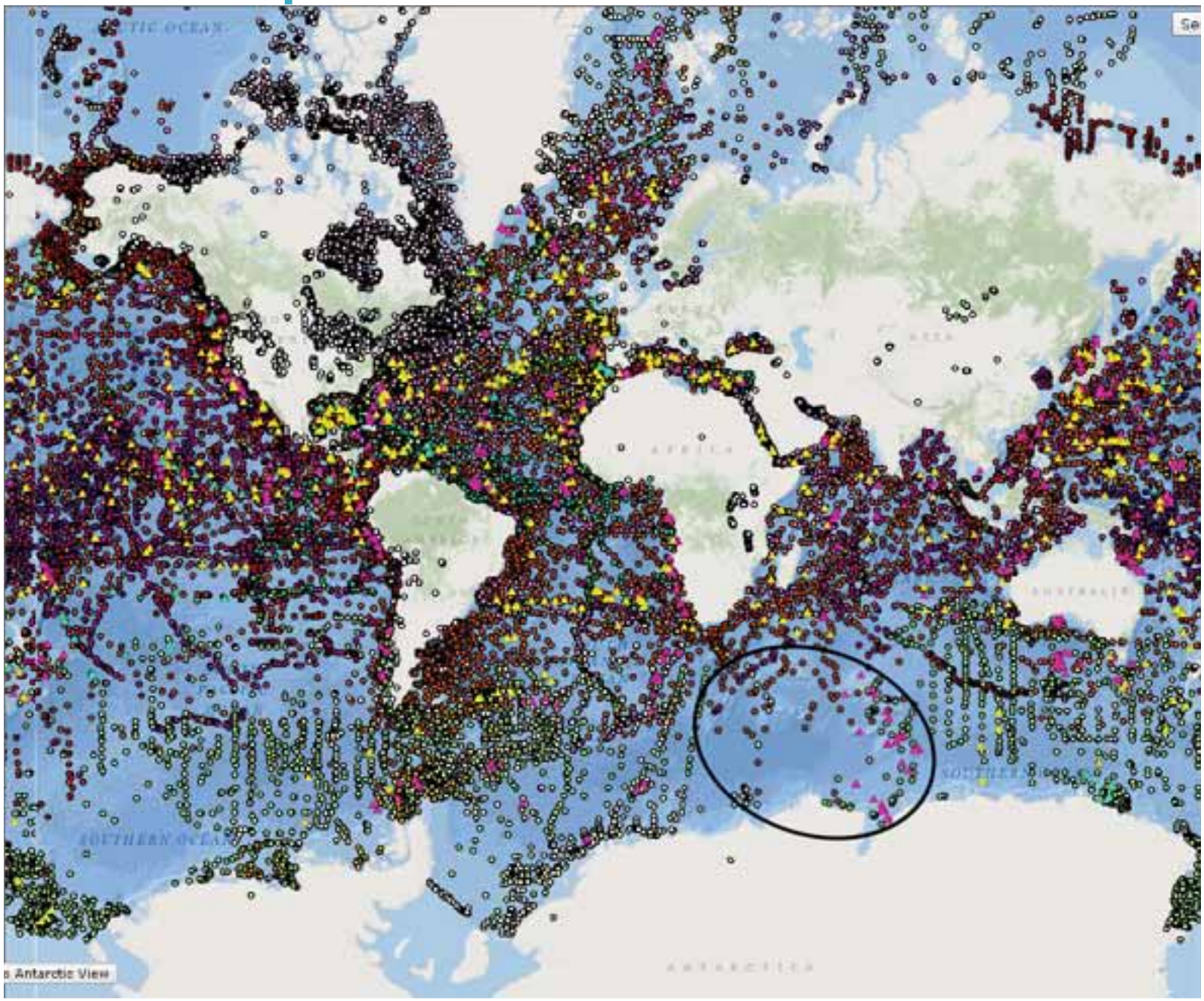
IODP: *"It is thinking like this that moves science forward. However, it is so contrary to accepted geology that we have no choice but to reject the proposal."*

Validation



Cores obtained from the vast impact region might be compared to cores from the exterior.

Map of available core information



From http://maps.ngdc.noaa.gov/viewers/sample_index/

NASA - NASA's Spitzer and Deep Impact Build Recipe for Comet Soup Sept 7, 2005

"...These solid ingredients include many **standard comet components**, such as **silicates, or sand**. And like any good recipe, there are also **surprise ingredients, such as clay and** chemicals in seashells called **carbonates**. **These compounds were unexpected** because they are thought to require liquid water to form."

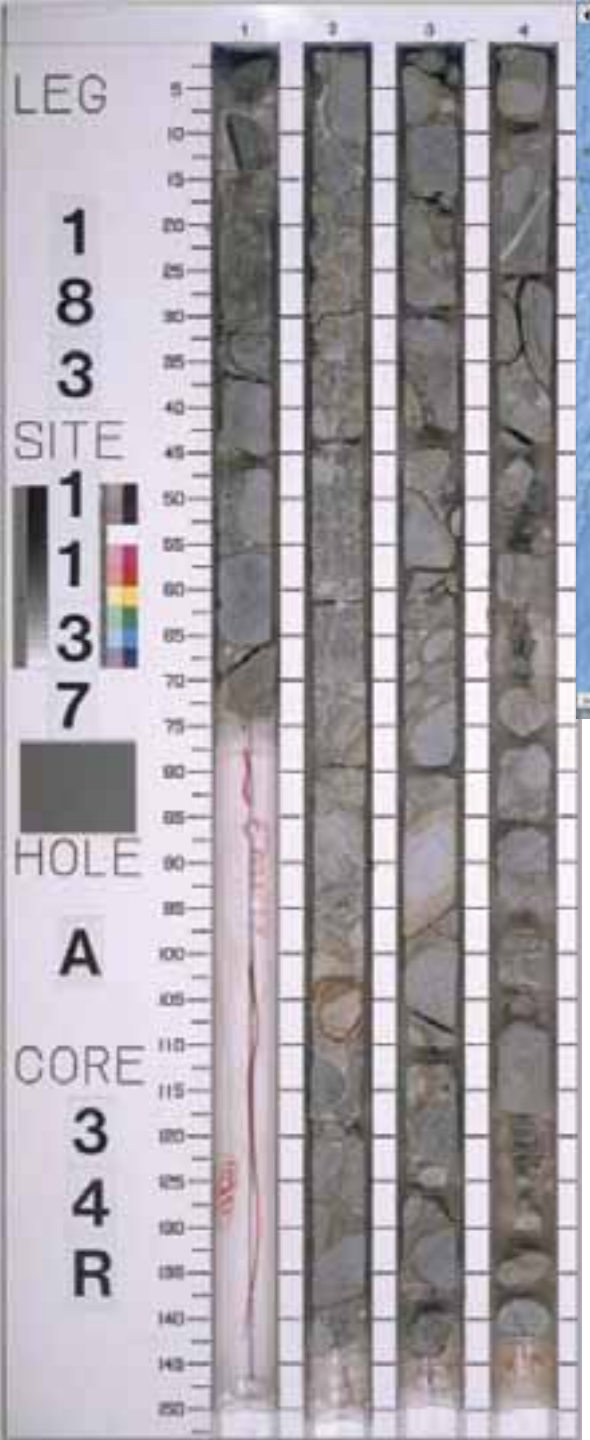
"How did clay and carbonates form in frozen comets?" asked Lisse. "We don't know, but their presence may imply that the primordial solar system was thoroughly mixed together, allowing material formed near the Sun where water is liquid, and frozen material from out by Uranus and Neptune, to be included in the same body."

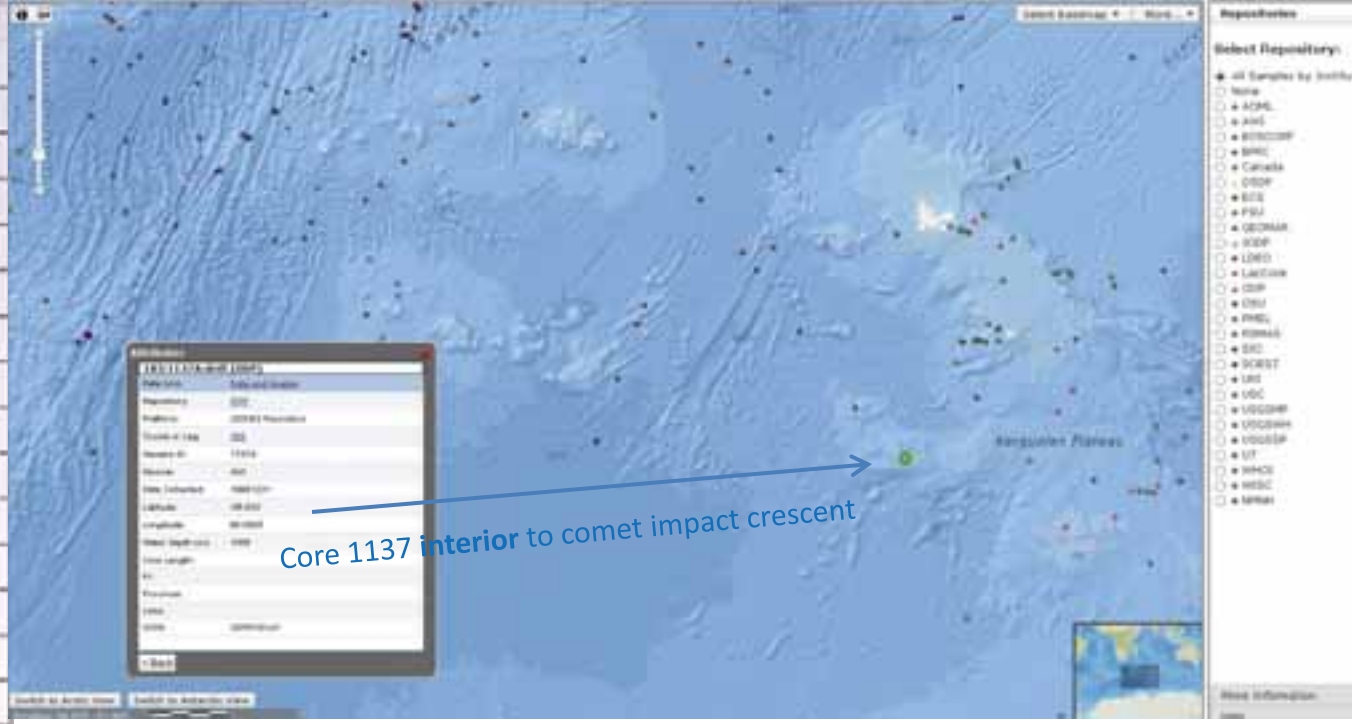
Also found were chemicals never seen before in comets, such as iron-bearing compounds and aromatic hydrocarbons, found in barbecue pits and automobile exhaust on Earth.

The silicates spotted by Spitzer are crystallized grains even smaller than sand, like crushed gems. **One of these silicates is a mineral called olivine**, found on the glimmering shores of Hawaii's Green Sands Beach.

Planets, comets and asteroids were all born out of a thick soup of chemicals that surrounded our young Sun about 4.5 billion years ago. Because comets formed in the outer, chilly regions of our solar system, some of this **early planetary material is still frozen inside them**....

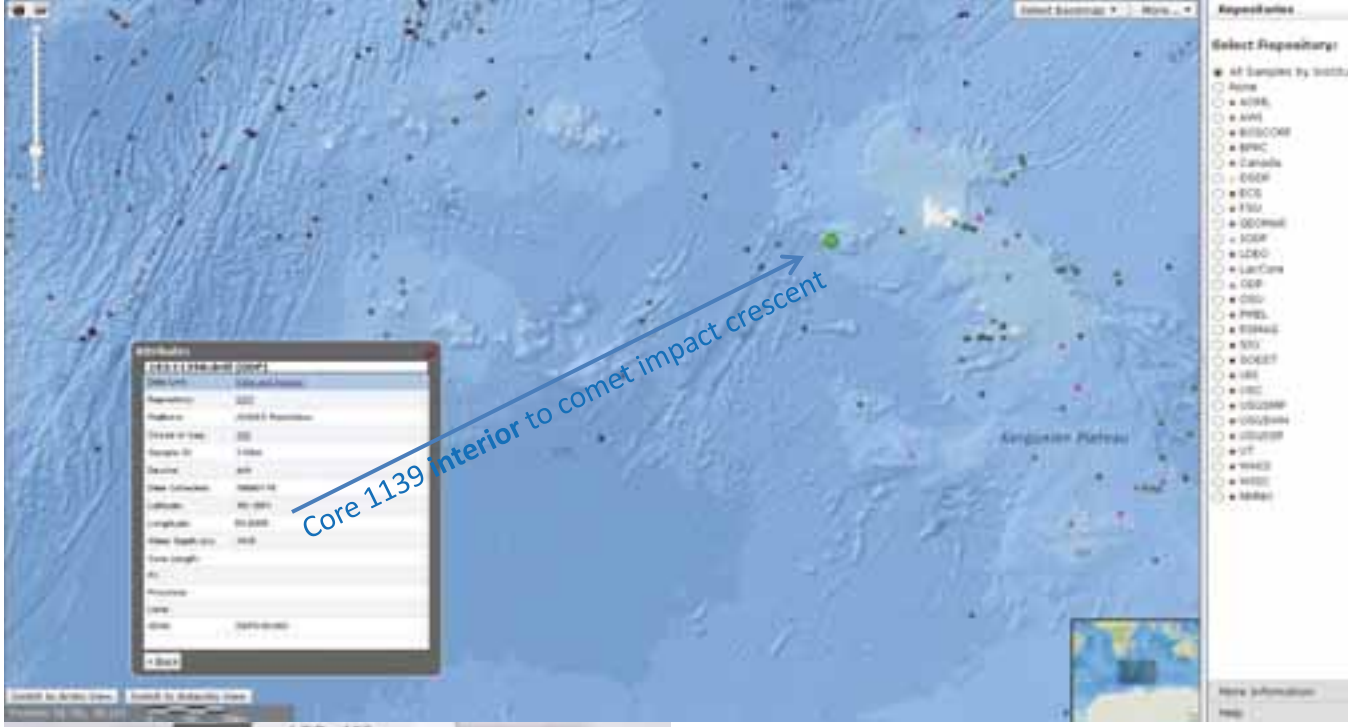
"**Now, we can stop guessing at what's inside comets**," said Dr. Mike A'Hearn, principal investigator for the Deep Impact mission, University of Maryland, College Park. "This information is invaluable for piecing together how our own planets as well as other distant worlds may have formed."


LEG
183
SITE
1137
HOLE
A
CORE
34R


Core 1137 interior to comet impact crescent


LEG: 183
HOLE: 1137A
CORE: 34R-2
CM: 80-110


LEG
183
SITE
1139
HOLE
A
CORE
41R
TAL
MT
EMPTY


Core 1139 interior to comet impact crescent

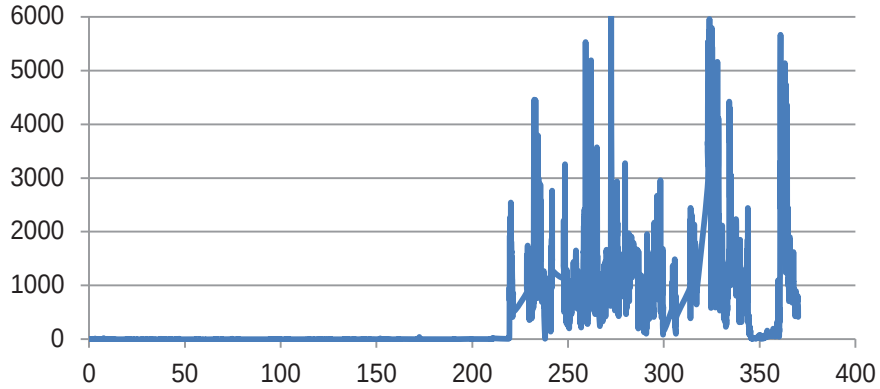

LEG: 183
HOLE: 1139A
CORE: 40R-6
CM: 73-94


LEG: 183
HOLE: 1139A
CORE: 65R-1
CM: 42-67

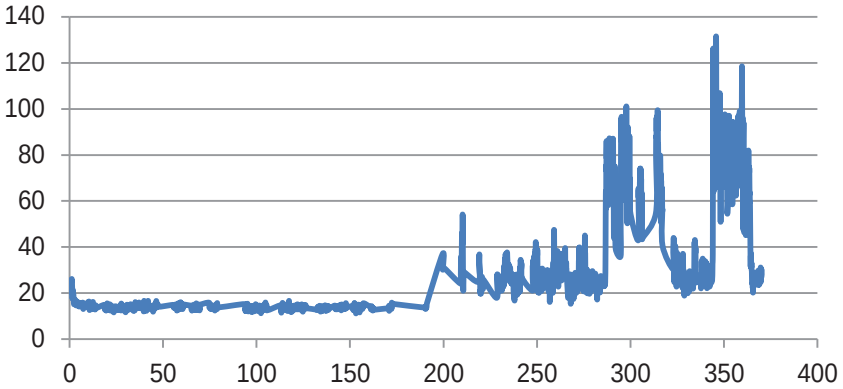

LEG: 183
HOLE: 1139A
CORE: 41R-2
CM: 49-55

Crescent Interior Core Data

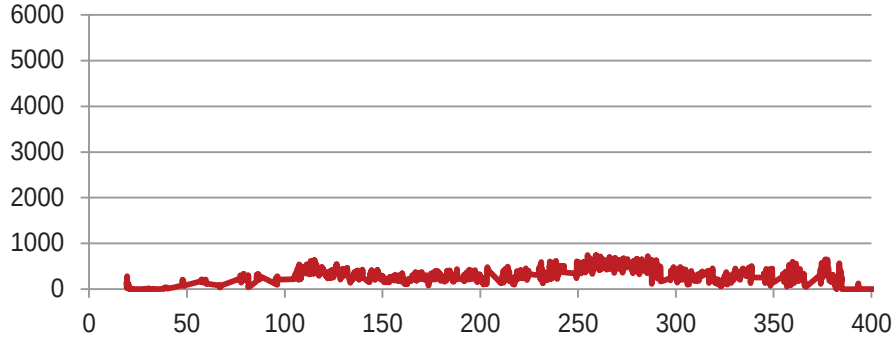
Core 1137 Magnetic Susceptibility vs Depth



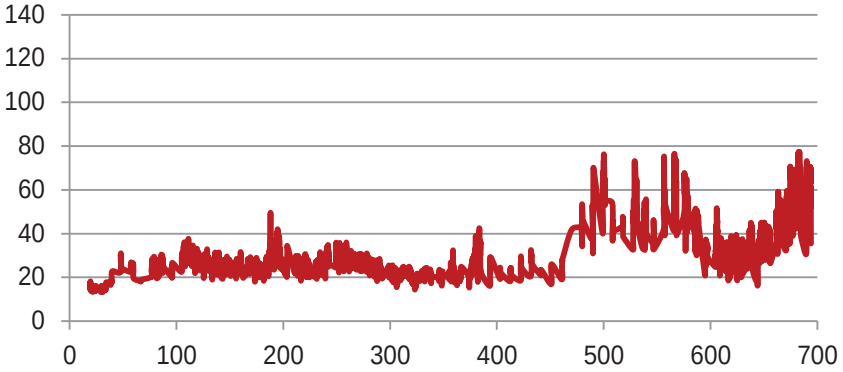
Core 1137 Gamma Counts vs Depth



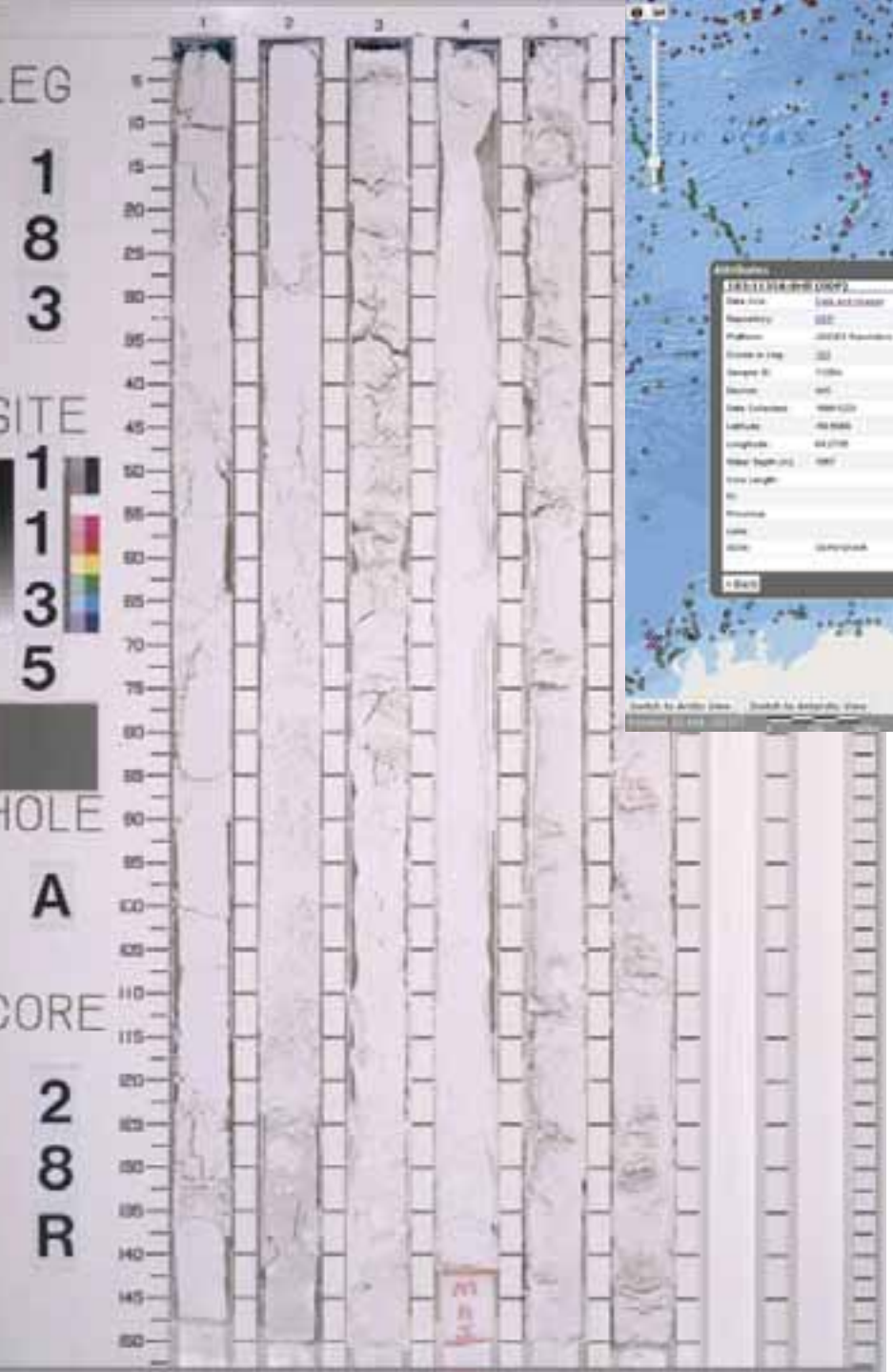
Core 1139 Magnetic Susceptibility vs Depth

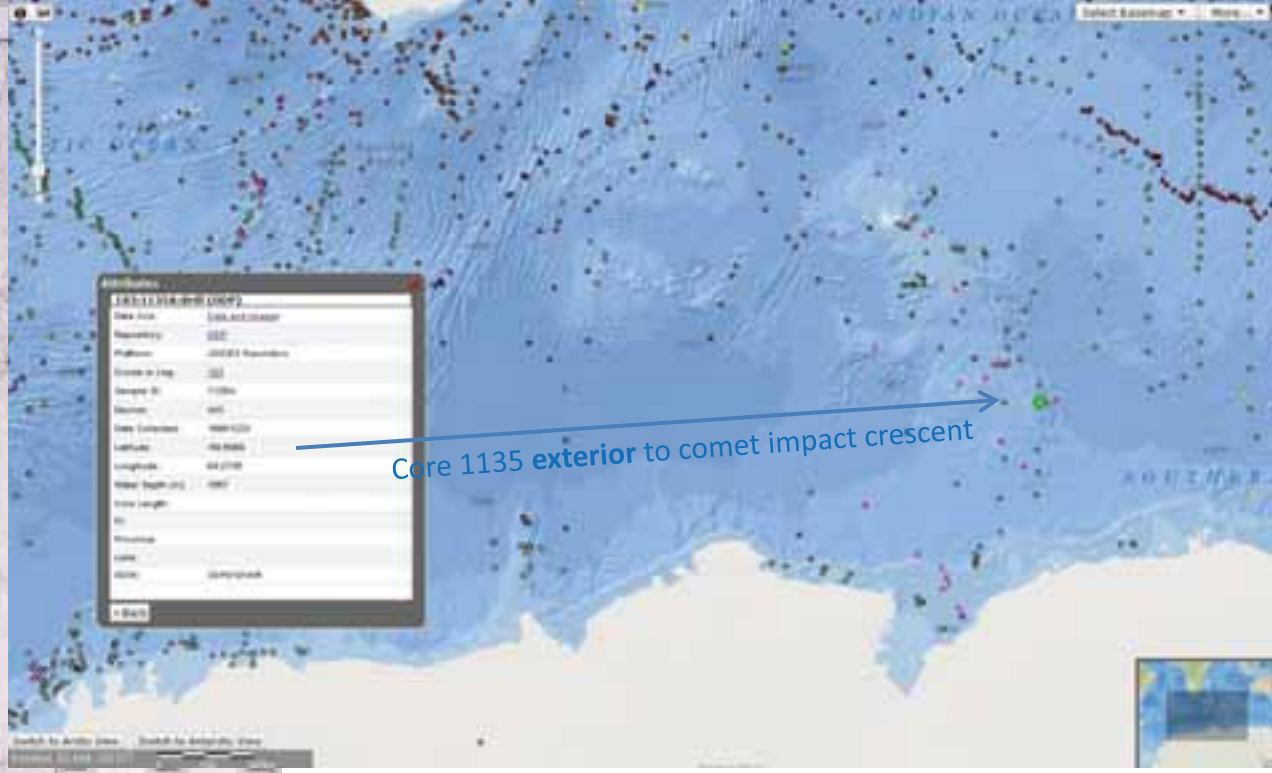


Core 1139 Gamma Counts vs Depth

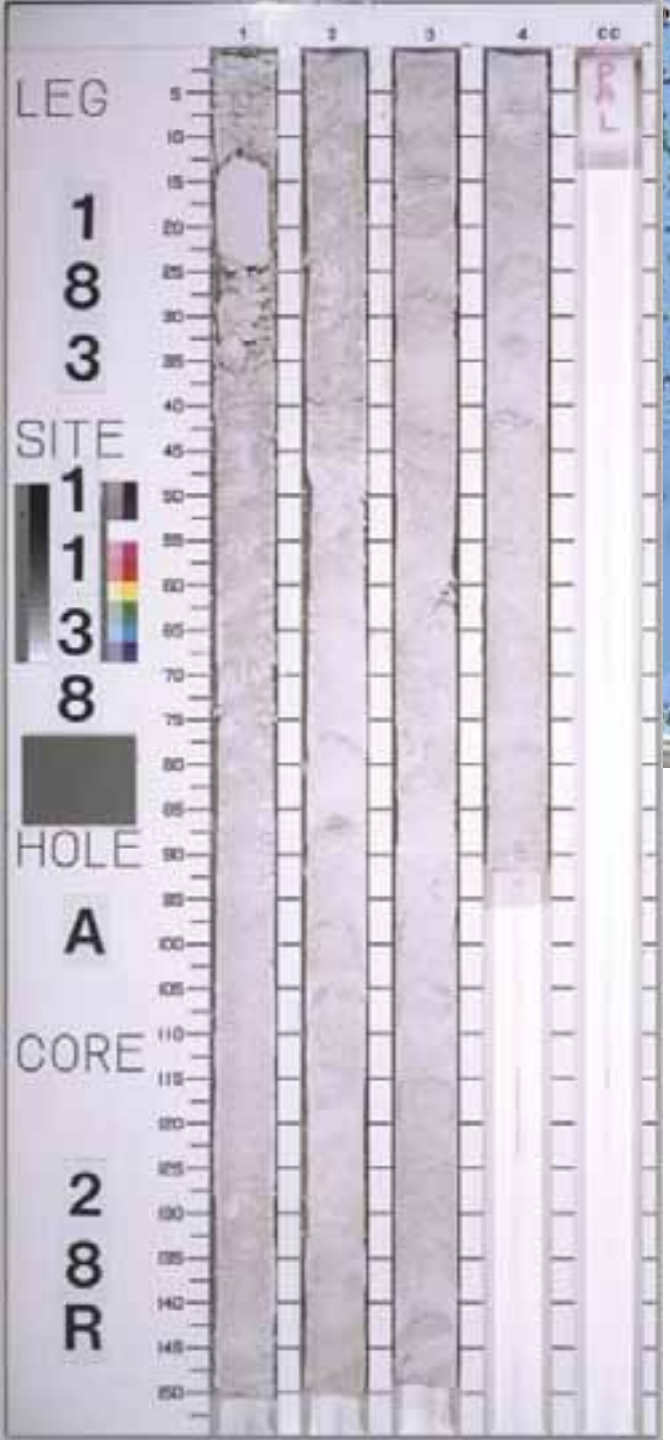


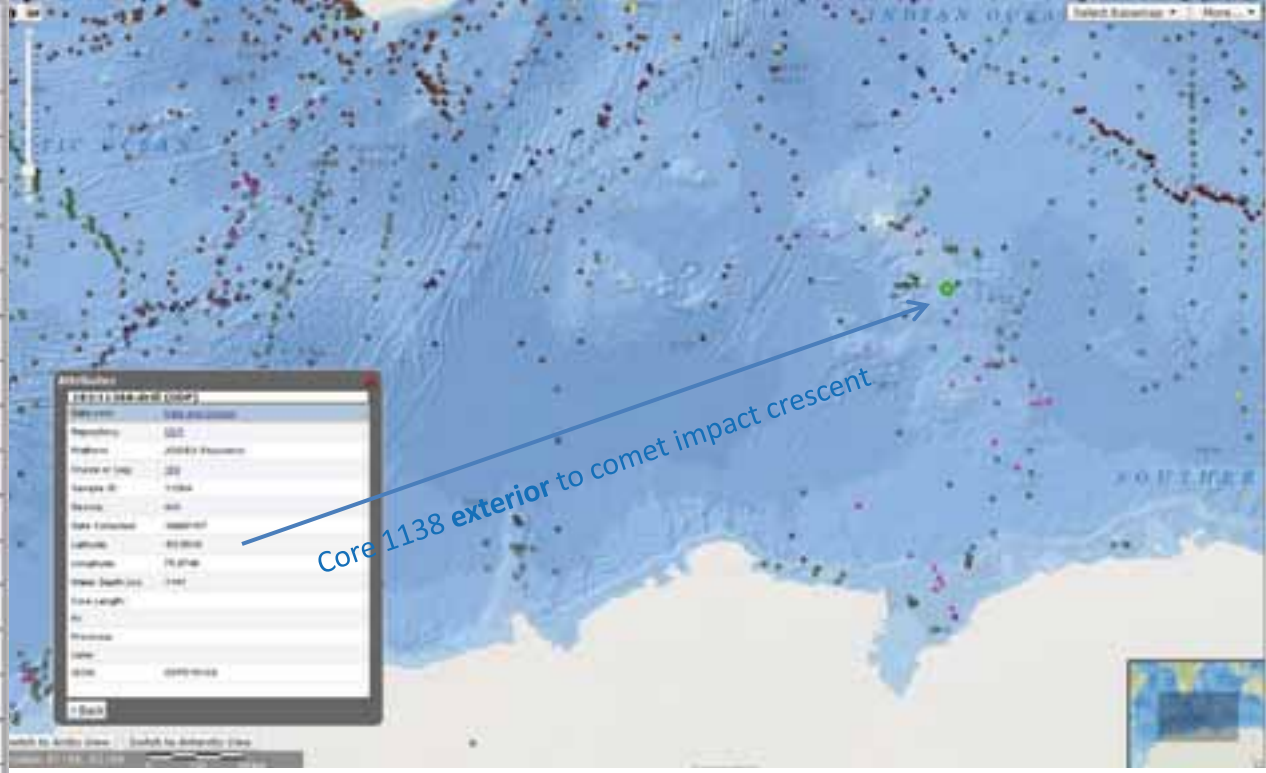
Data obtained from http://iodp.tamu.edu/janusweb/general/dbtable.cgi?leg=183


LEG
183
SITE
1135
HOLE
A
CORE
28R


Core 1135 **exterior** to comet impact crescent


LEG: 183
HOLE: 1135A
CORE: 28R-2
CM: 120-150

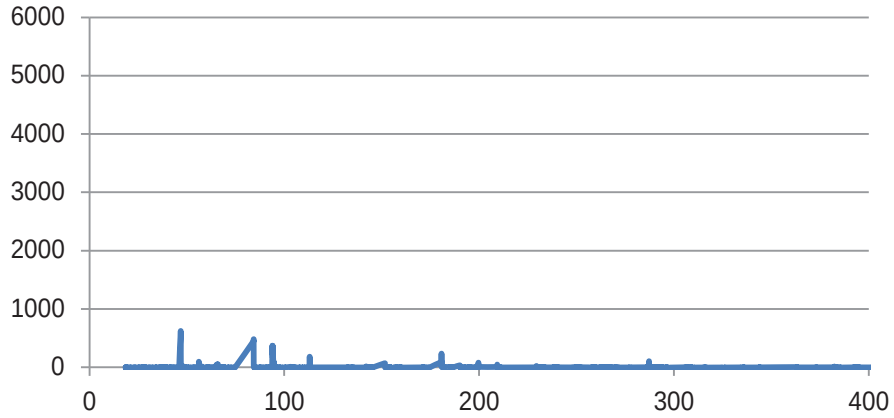

LEG
183
SITE
1138
HOLE
A
CORE
28R


Core 1138 **exterior** to comet impact crescent

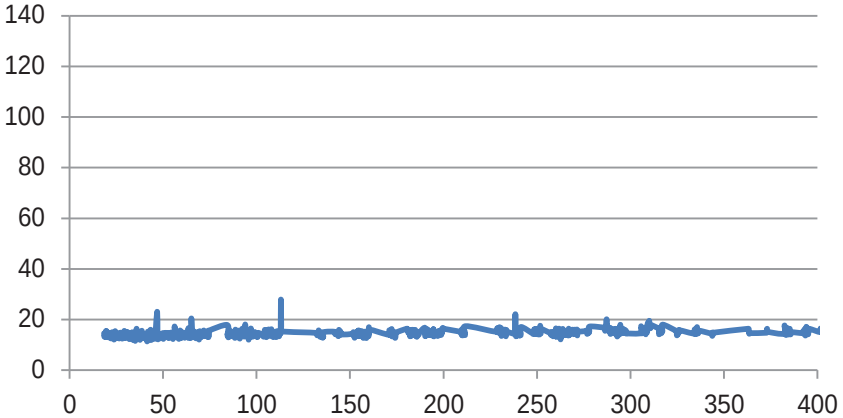

LEG: 183
HOLE: 1138A
CORE: 52R-3
CM: 122-147

Crescent Exterior Core Data

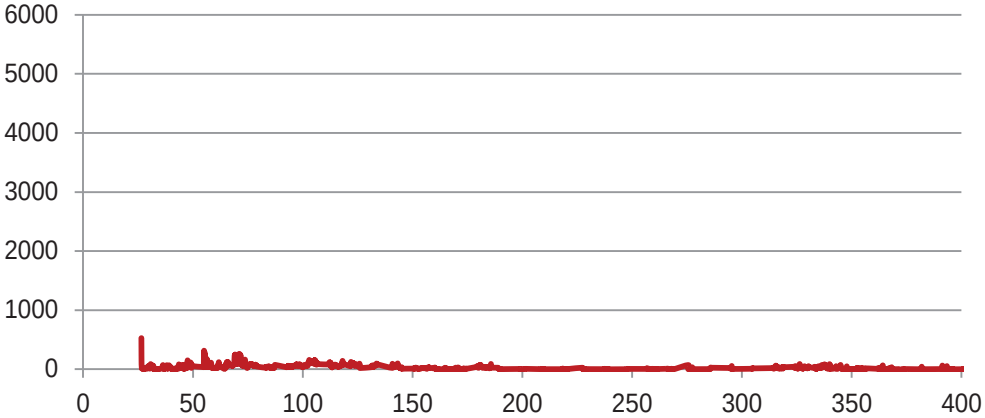
Core 1135 Magnetic Susceptibilty vs Depth



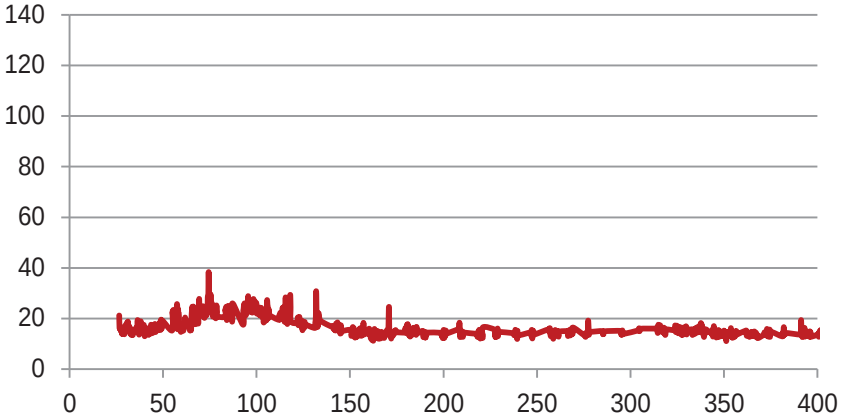
Core 1135 Gamma Counts vs Depth



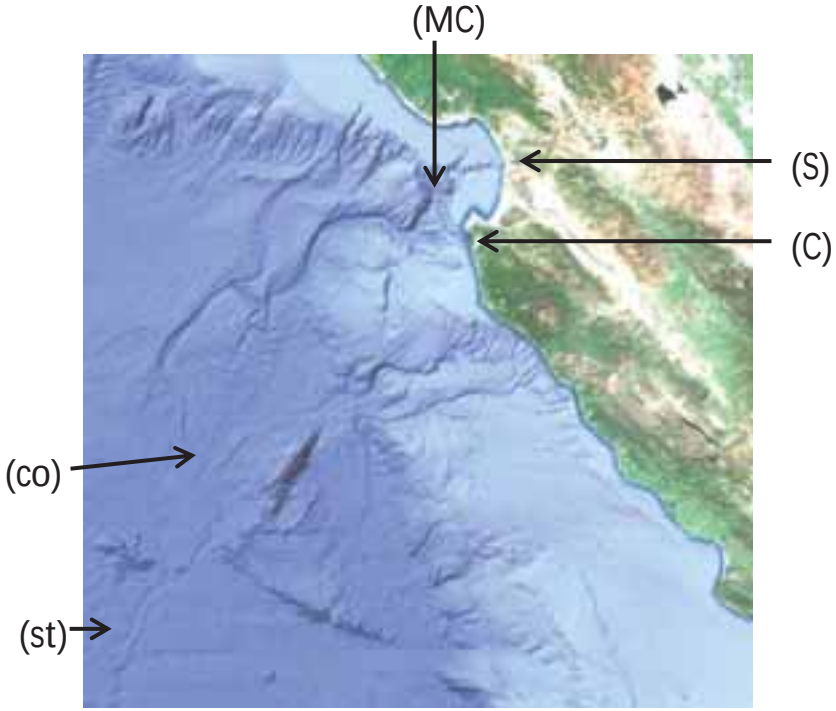
Core 1138A Magnetic Susceptibility vs Depth



Core 1138A Gamma Counts vs Depth



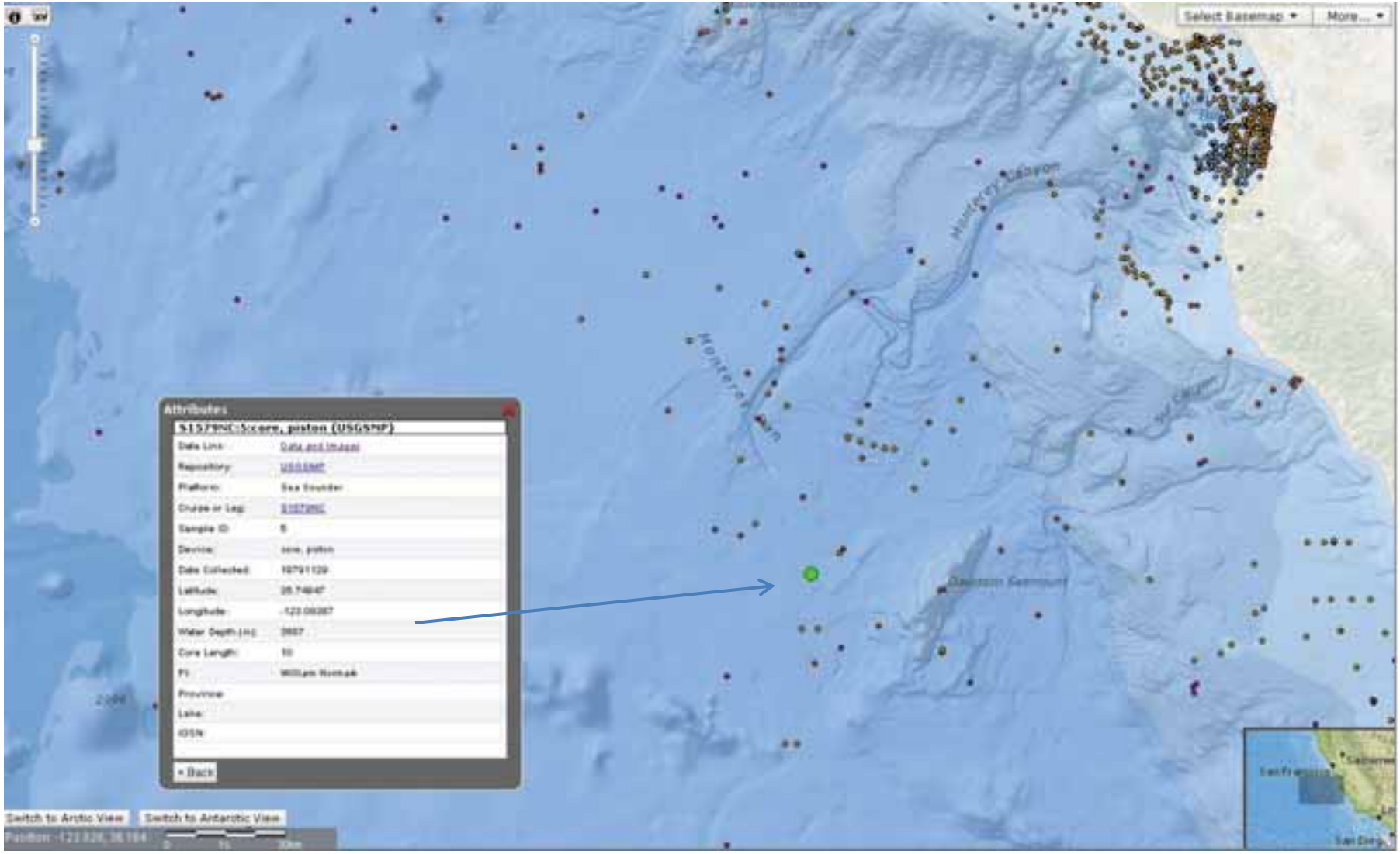
Validation



The period during which the comet melted would have seen vastly increased flows in the Salinas and Carmel River drainage systems: as the Earth's relative humidity increased, prevailing winds uplifted two miles by the continental shelf condensed and increased local rainfall. The sediments carried by the swollen Monterey Canyon system flowed into the rising ocean waters and deposited sand, silt, and other river-borne material into the flat, plane-like confluence region (co) in a manner similar to how rivers create deltas.

This confluence region is important to substantiating the comet water hypothesis: if there is organic matter corresponding to species in upland-California in core samples taken from the delta-like region (analyzed, dated), then the hypothesis could be supported or refuted.

Validation



The core obtained from this channel bed near the confluence of two former drainage systems is void. It contains no solid materials because sandy sediments are difficult if not impossible to collect by traditional coring techniques. (I visited the core, disappointed by the vacuity.)

From http://maps.ngdc.noaa.gov/viewers/sample_index/

Validation

The dunes along the coast near Monterey were deposited by the Salinas River during the climate transition immediately after the comet impact – upland regions flooded due to increased atmospheric humidity. If the impact was 5200 ybp, then obtaining organic matter buried in the sand deposits and performing ^{14}C dating would substantiate the claim.

Validation

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Can you spot it? Massive trough deeper than the Grand Canyon found under the ice in Antarctica

- Ancient mountain range found buried beneath kilometres of Antarctic ice
- It is 3 kilometres deep, more than 300 kilometres long and up to 25 kilometres across
- Valley is so vast that scientists say it can be seen from space
- Discovery sheds light on how the West Antarctic Ice Sheet originated and grew

By MARK PRIGG

PUBLISHED: 18:48 EST, 14 January 2014 | UPDATED: 09:56 EST, 15 January 2014

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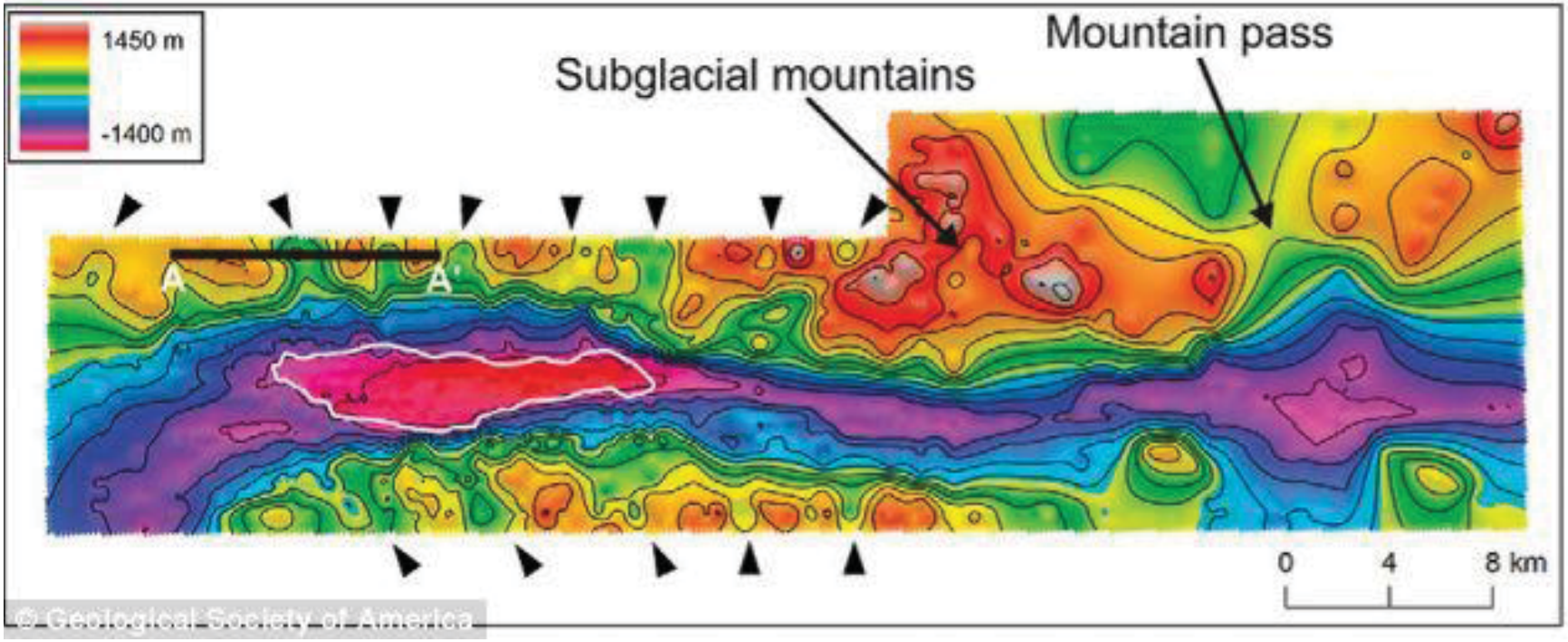
A massive ancient subglacial trough deeper than the Grand Canyon has been discovered under Antarctica.

Part of a massive ancient mountain range, it was found buried under several km of ice using specially developed penetrating radars.

The massive subglacial valley is up to 3 kilometres deep, more than 300 kilometres long and up to 25 kilometres across, and in places, the valley floor is more than 2000 metres below sea level.

http://www.dailymail.co.uk/sciencetech/article-2539554/Massive-trough-deeper-Grand-Canyon-ice-Antarctica.html

Validation



"The massive subglacial valley is up to 3 kilometres deep, more than 300 kilometres long and up to 25 kilometres across, **and in places, the valley floor is more than 2000 metres below sea level**."

Ross N, et al, (2013) The Ellsworth Subglacial Highlands: Inception and retreat of the West Antarctic Ice Sheet. Bulletin of the Geological Society of America published online http://gsabulletin.gsapubs.org/content/126/1-2/3.abstract.

Invalidating the old paradigm by revisiting submerged canyons in the Mediterranean

Submerged drainage systems off the north coast of Africa indicate that the region had a vastly different climate prior to the comet impact. The drainage features share a common terminal depth, approximately 7800 feet below present sea level despite having available several thousand more feet through which to carve, generally to the north. Note that geologists do not assume that these features were carved by turbidity flows (see next slide from *Nature*). How is it that these features are subaerially carved yet the ones off Monterey were not? Rhetorical: why did the carving stop?

Invalidating the present paradigm by revisiting submerged canyons in the Mediterranean

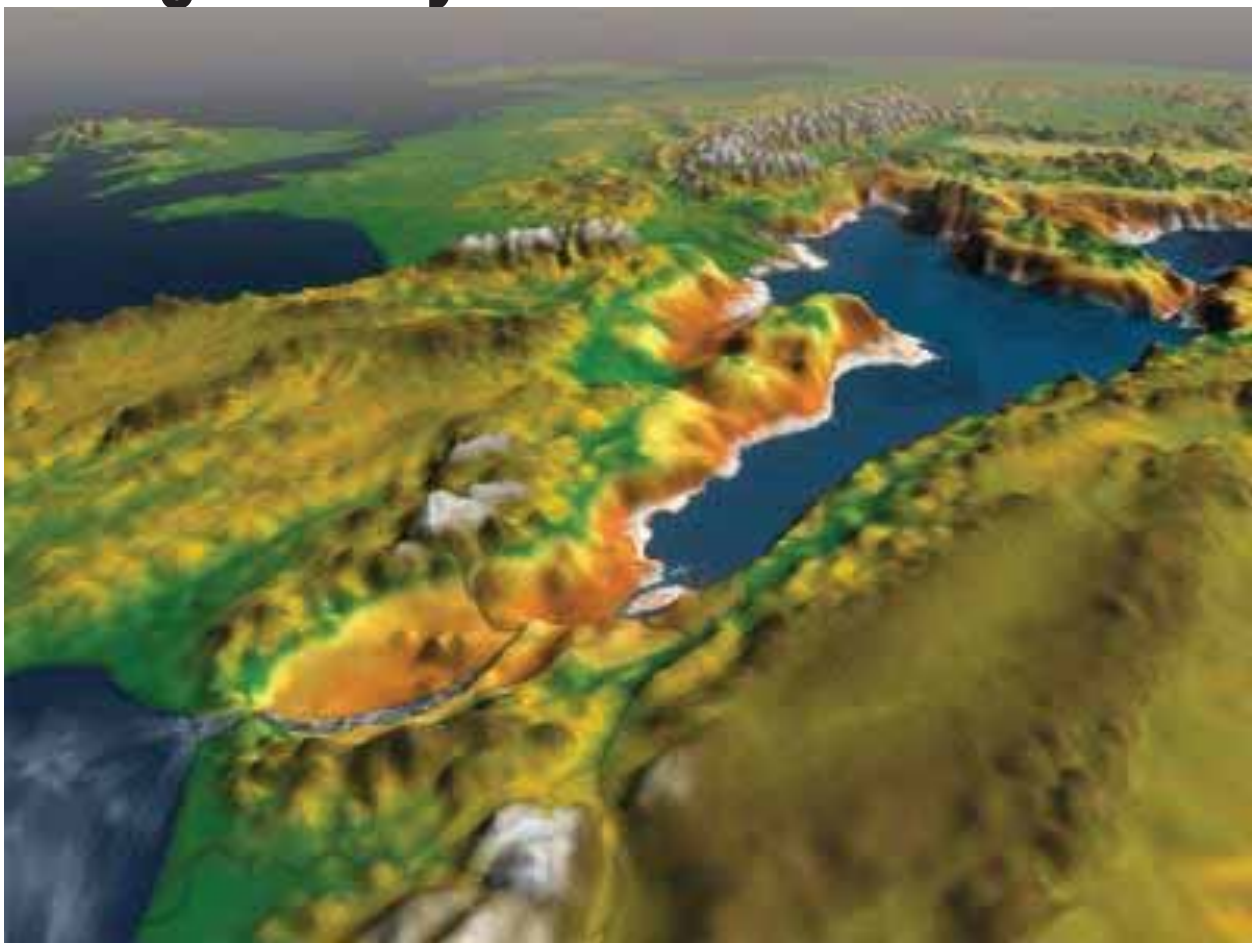
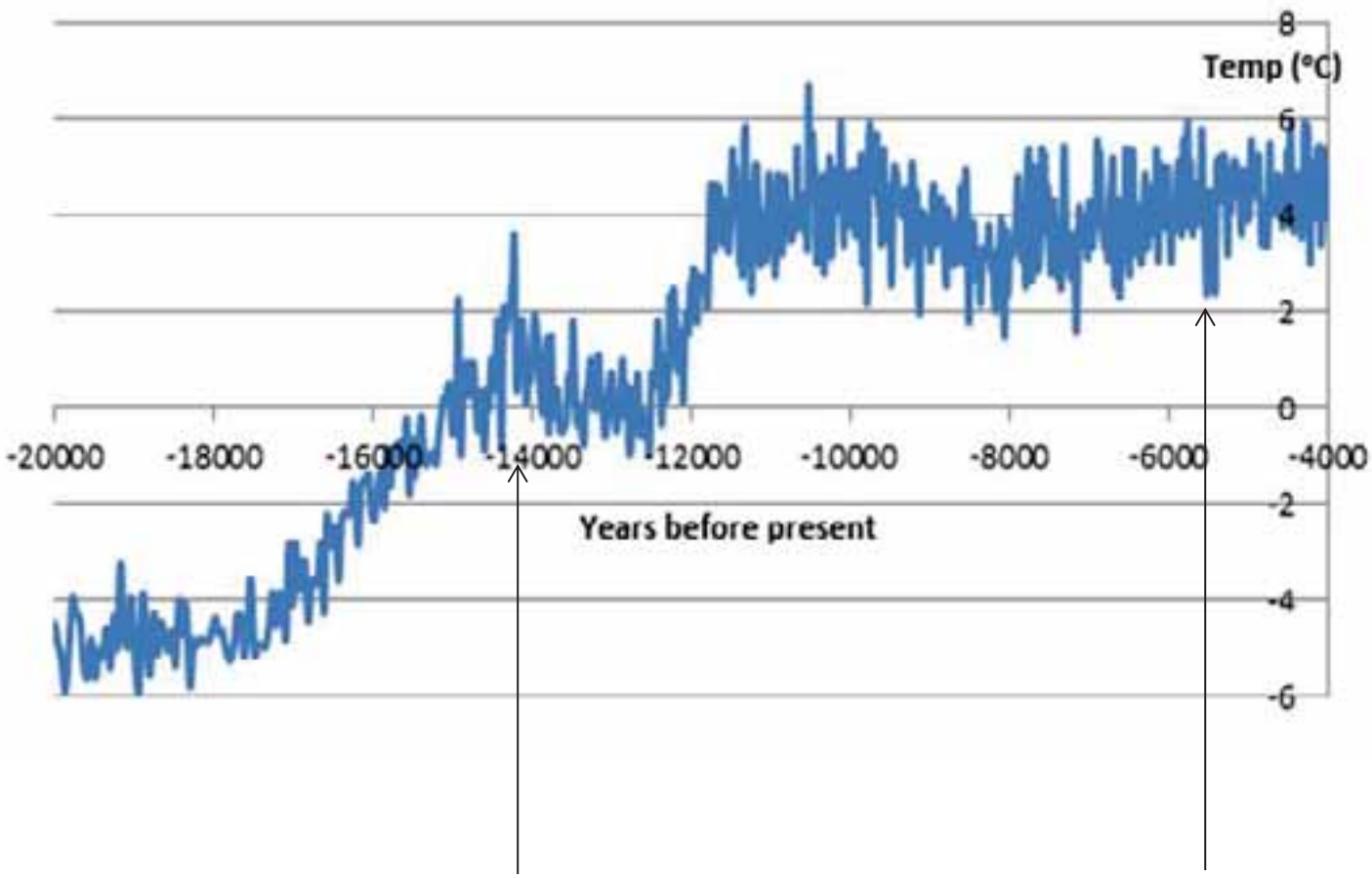


Image from “Catastrophic flood of the Mediterranean after the Messinian salinity crisis” by Garcia-Castellanos et al, Nature, 2009. The formerly subaerially carved drainages along the south shore once flowed into the western Med basin. The drainage waters lost momentum upon contact with the sea waters, and the carving stopped. This is exactly what happened to the submerged structures found throughout the planet… despite submarine geomorphology.

When did the impact occur?



Younger Dryas?

Major Earth event 5200 ybp?

Chart data from http://www.ncdc.noaa.gov/paleo/icecore/antarctica/domec/domec_epica_data.html

Conclusions:

- There was a worldwide flood.
- We are an invasive species.

Implications

Most of human history is buried under more than two miles of water.

- **The comet-borne water accounts for why human activity seems to have appeared so suddenly and recently in lands that were mostly or completely unoccupied by humans prior to the comet impact.**
- **The planet on which humans evolved is vastly changed.**
- **Humans are not "out of Africa."**

This was an extinction event, and original inhabitants of presently occupied landscapes are adjusting to the new environment as well as to newly introduced species.

A rigorous investigation of the comet's core remnants and its debris will yield a better understanding about their nature and formation.

If the comet impact occurred 5200 ypb, then what of the next ice age? Snowball Earth?

If the onset of glacial periods is due to the cooling effects from volcanic activity, then will the submersion of so many volcanoes preclude future ice ages?

Implications to Cosmology

- The more familiar, smaller comets are remnants of much larger ones of unknown status or fate.

- The recent discovery of water on an asteroid 24 Themis might indicate that it was once a comet's nucleus shorn of smaller fragments (comets).

- The similarity in materials comprising Tempel 1 to materials recovered from the comet impact region, coupled with Tempel 1's orbit and the fact that comets are known to fragment, and the gap in the impact crescent, suggest that Tempel 1 could be a remnant of this larger comet.

- Manganese is common to most core descriptions in the comet impact region and therefore should be considered an important component of materials comprising comets and their nuclei. (Deep Impact did not test for manganese or other heavier elements – email discussion with Prof A'Hearn, project lead.)

Next year: correcting another fundamentally bad assumption in geology

Information available to geologists when they accepted "continental drift."

Simultaneous impacts configured Earth's landforms and instilled its obliquity

Information available to nearly everyone today.