

R/V *Roger Revelle* RR2102

24 Mar - 25 Apr 2021

Team Biology, Co-Chief Scientist Lauren Mullineaux

Team Geology, Co-Chief Scientist Dan Fornari

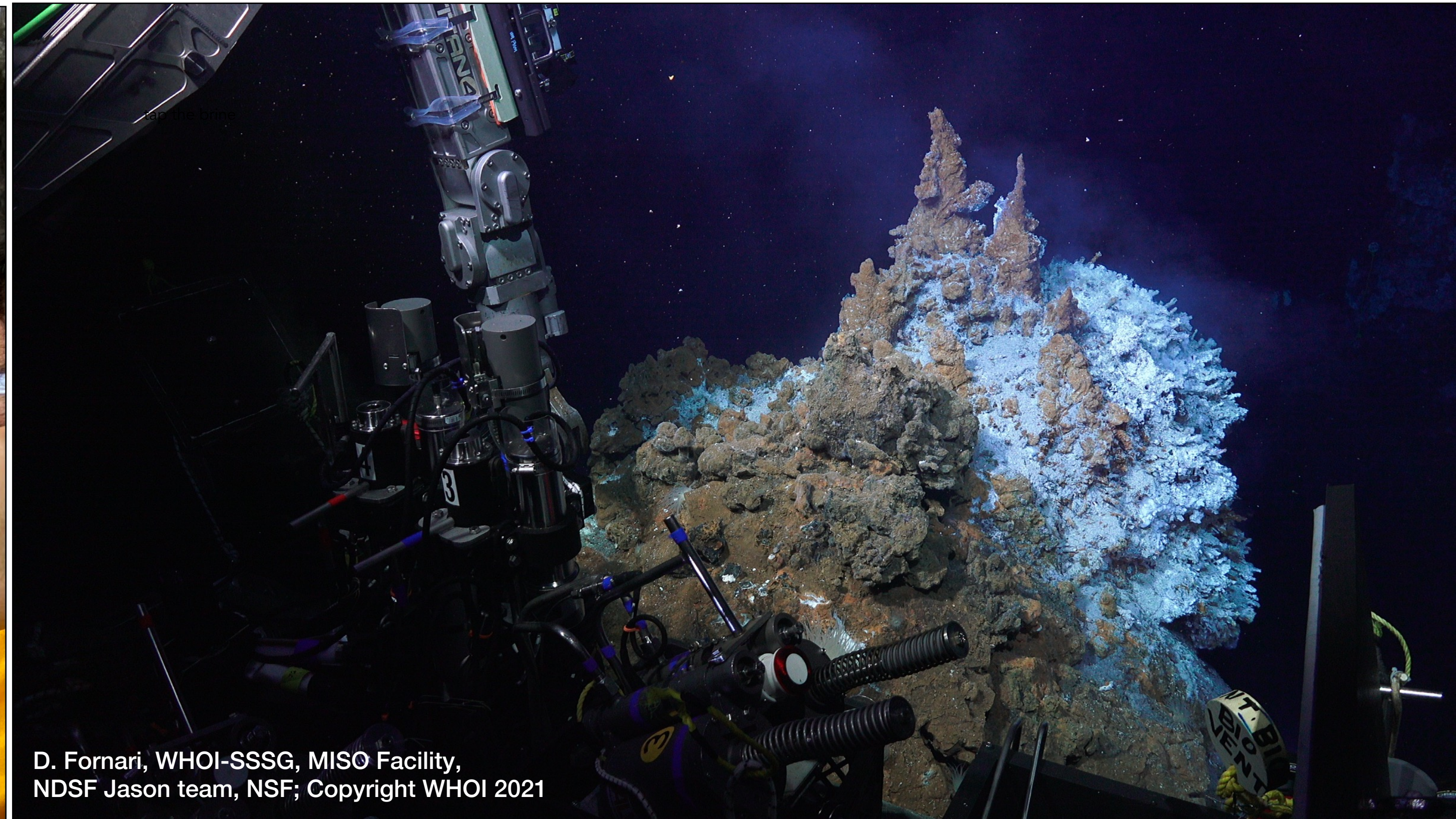
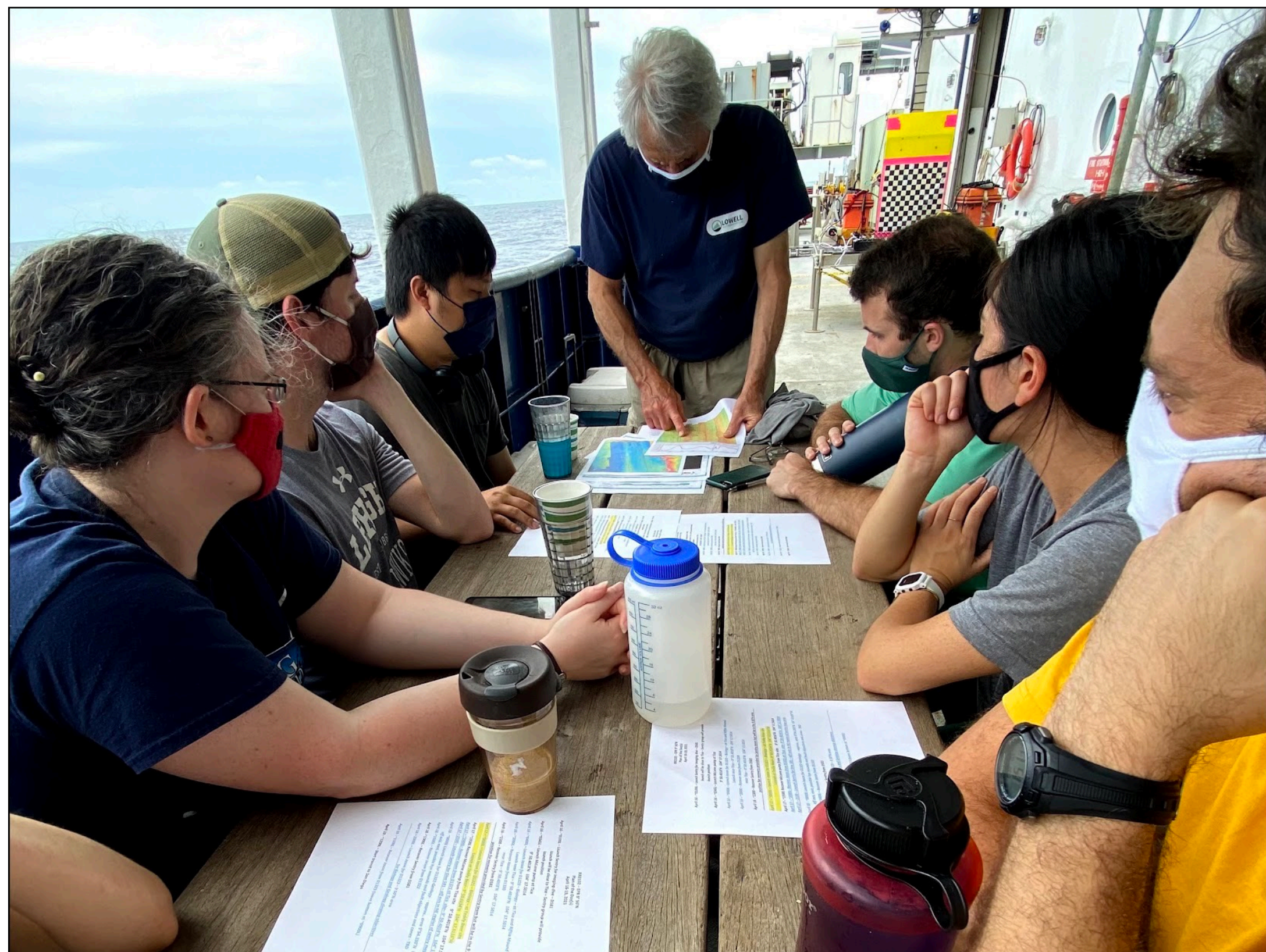
ROV *Jason* and AUV *Sentry*



OCE-1949485 (DJF, TB)

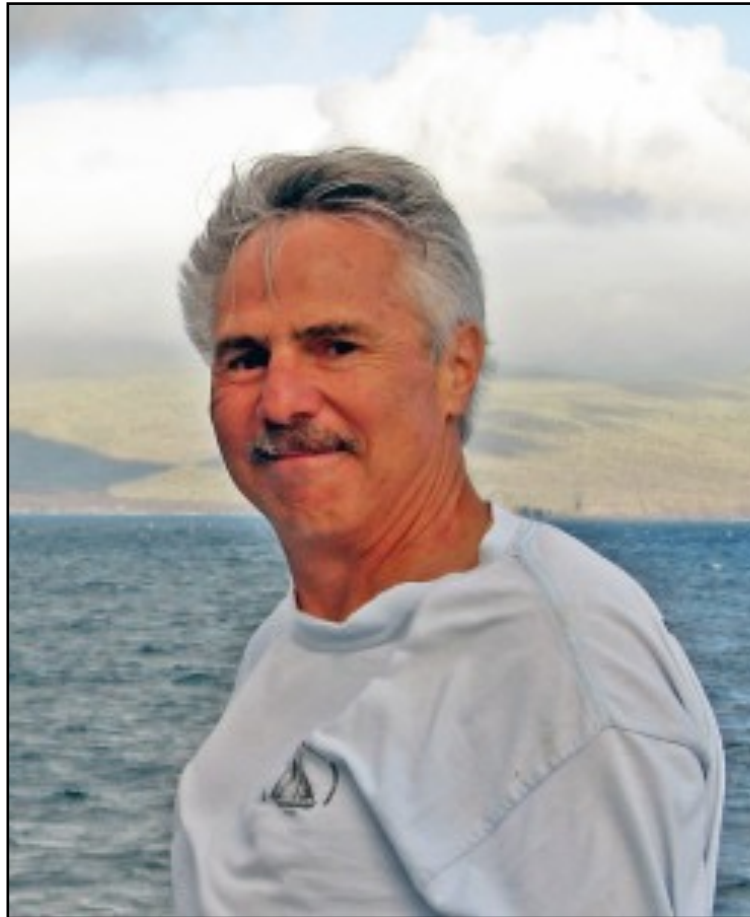
OCE-1948936 (RPT)

OCE-1949938 (JMM)



D. Fornari, WHOI-SSSG, MISO Facility,
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Monitoring hydrothermal fluid origin, crustal permeability and seafloor morphology in preparation for the next volcanic eruption at the East Pacific Rise axis, 9° 45'-53'N



**PI D. Fornari
(WHOI)**



**Co-PI McDermott
(Lehigh U.)**



**Co-PI Parnell-Turner
(SIO)**



**Co-PI T. Barreyre
(U. Bergen)**

We predict that the build-up to the next eruptive event will be associated with changes in crustal dynamics that can be observed in the **vent fluid geochemistry** (McDermott) and **thermal response to tidal forcing** (Fornari, Barreyre) across multiple sites. **High-resolution multi beam and sidescan mapping** (Parnell-Turner) and **near-bottom photography** (Fornari) will serve as the baseline comparison to any post-eruption map and image data.

AUV *Sentry* highlights

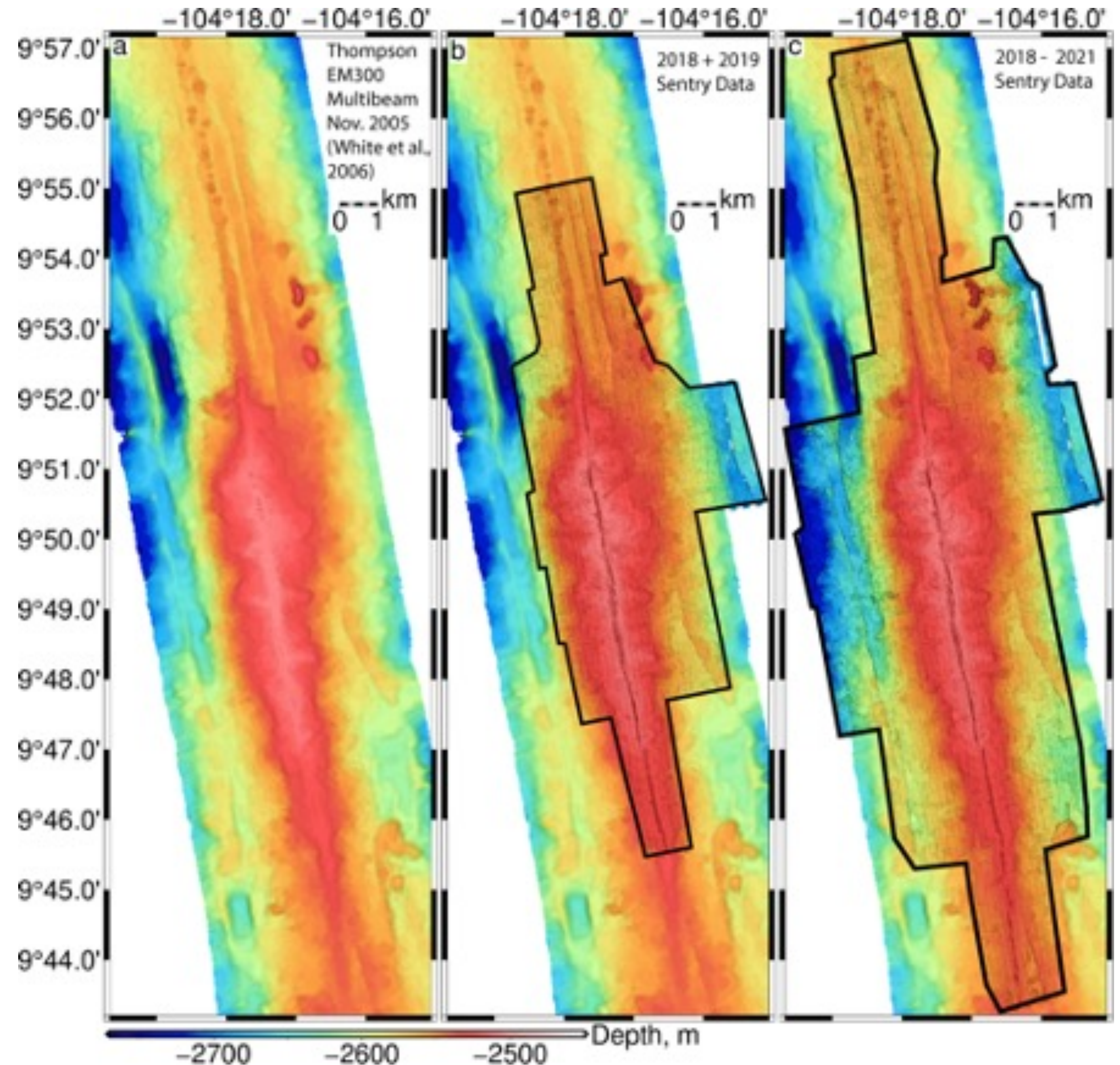
10 AUV *Sentry* dives total, 9 of 10 dedicated to science

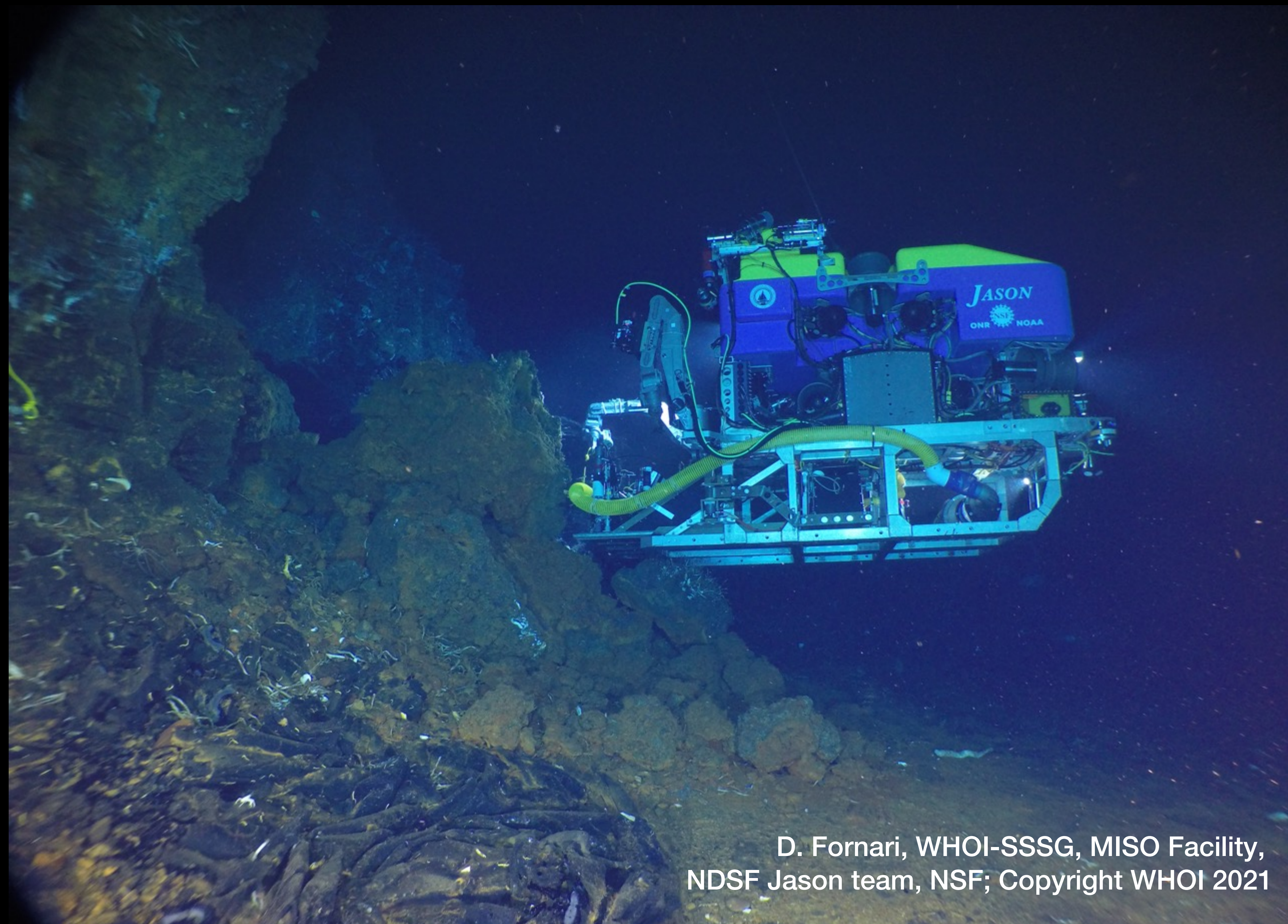
Mapping (Rightmost panel):

- Increased coverage area west of the 2018-2019 map
- Extended coverage north and south to areas thought to have been affected by the 2005-2006 volcanic eruptions
- See Wu et al., *G³*, 2022

Digital still photography

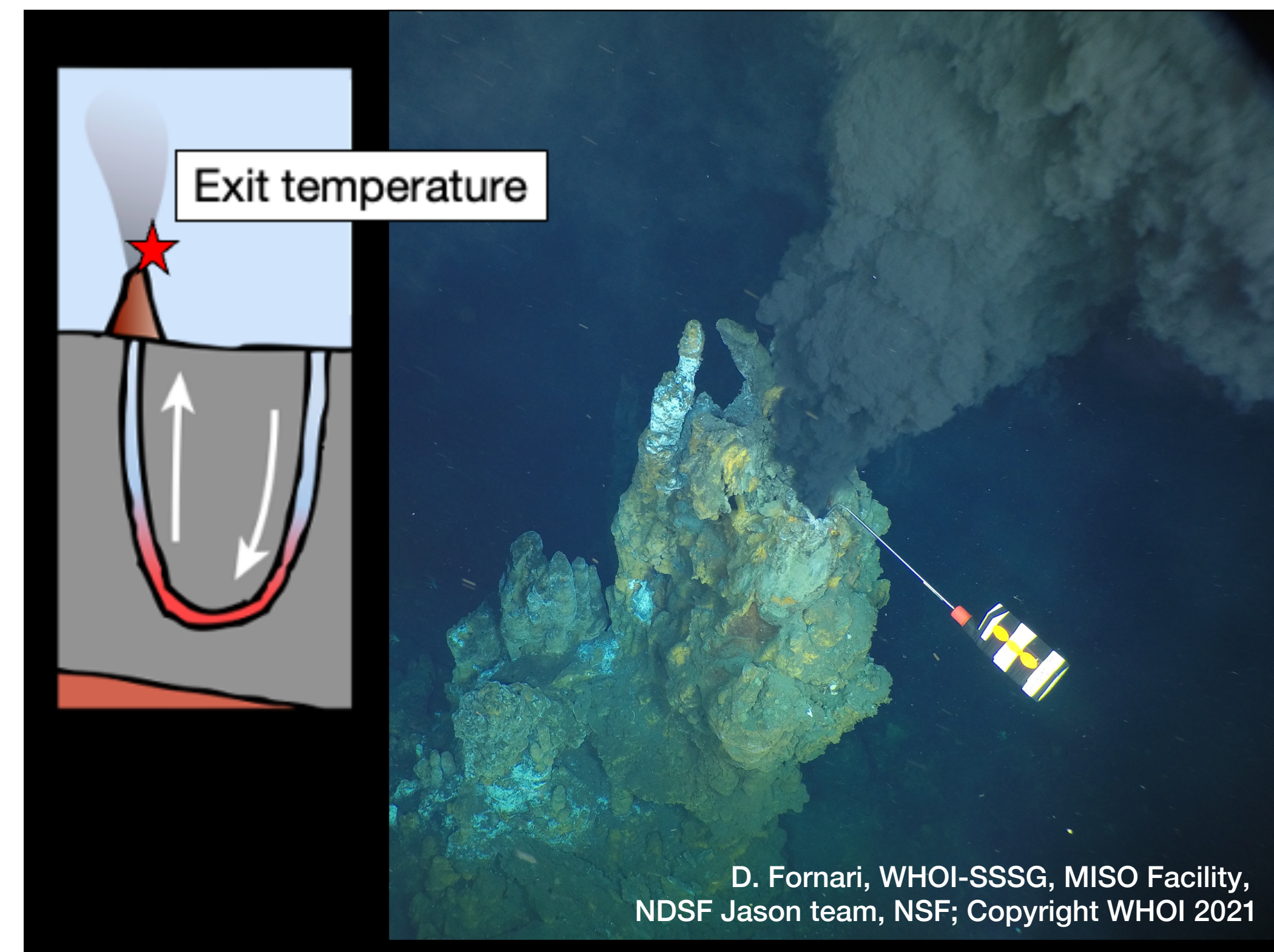
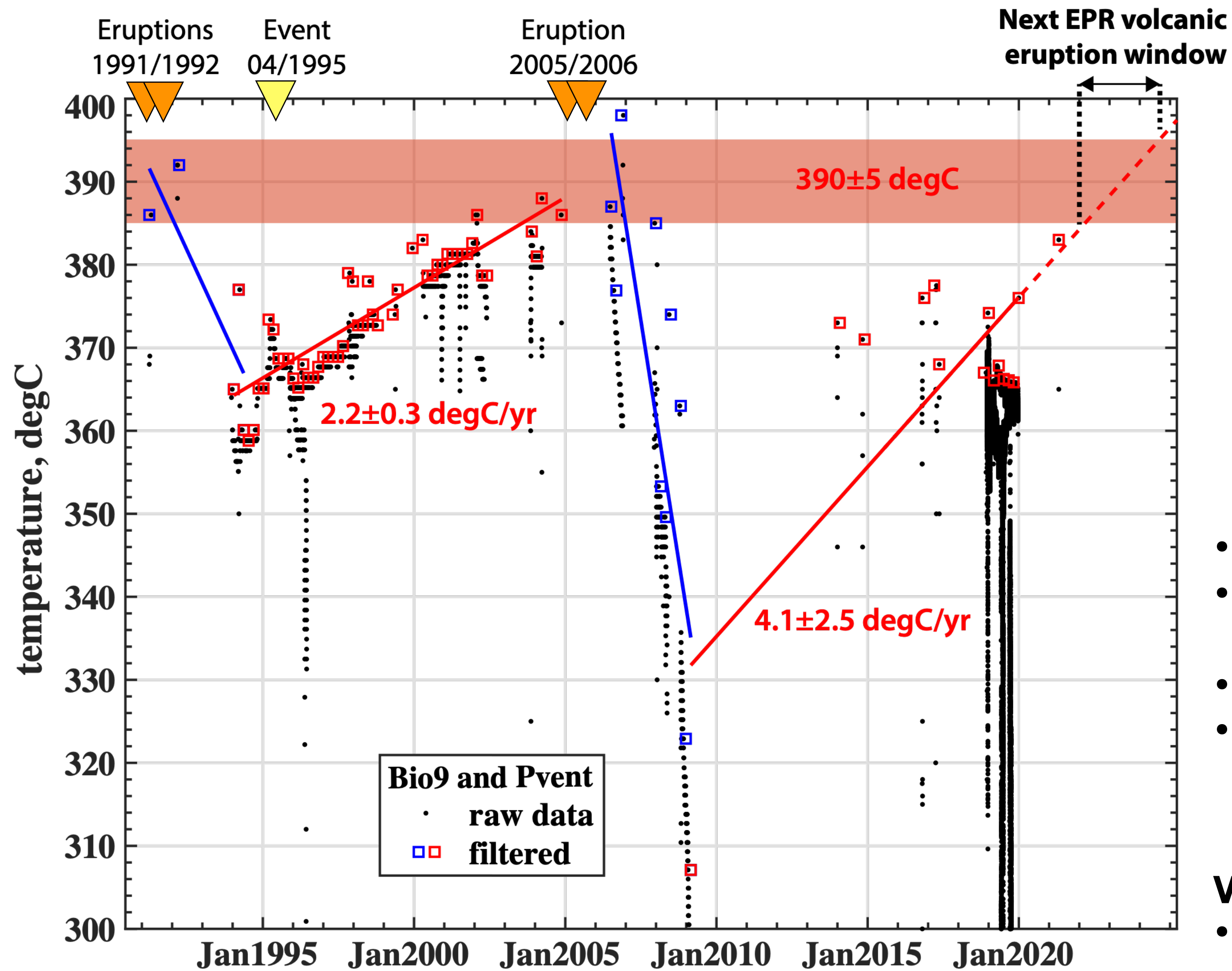
- Equipped with a high-resolution, 24MP digital still camera (WHOI-MISO facility) synched to 300 watt/sec strobe
- The strobe was upgraded (from 200 watt/sec output) for this cruise
- ~39,000 images acquired along mapping tracks and in dedicated surveys through the study area





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ROV *Jason* highlights

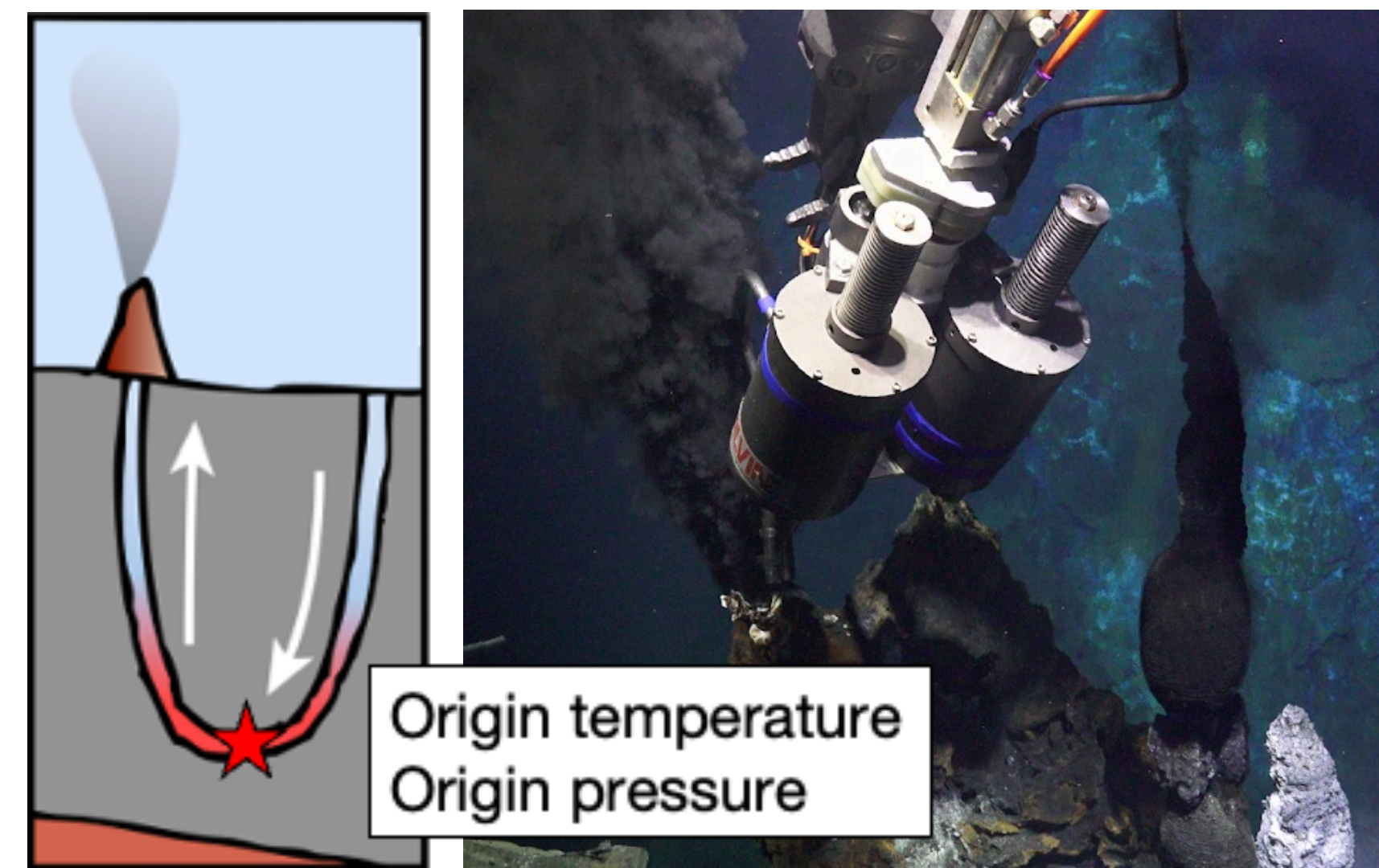
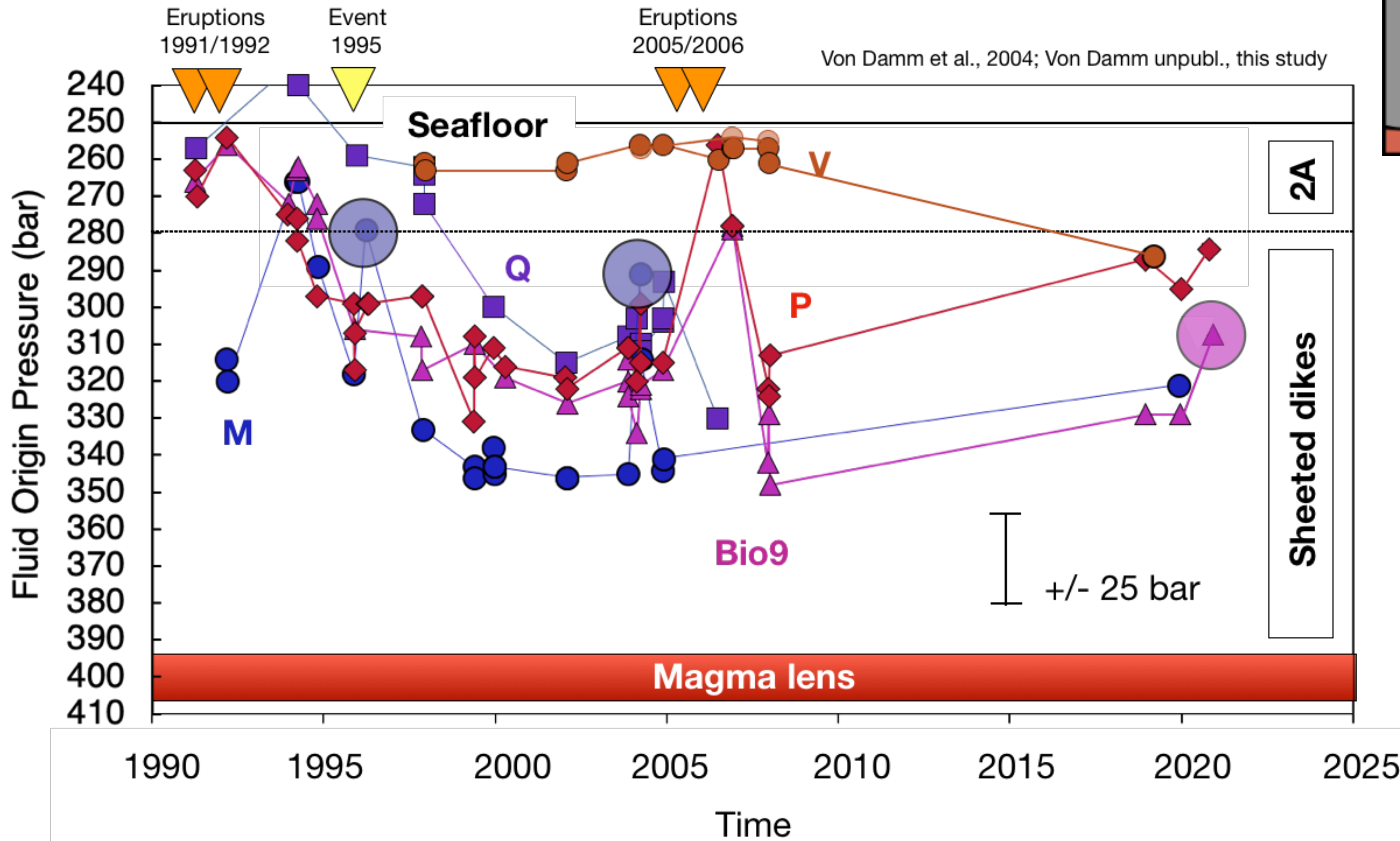


- **9 ROV Jason dives total, 8 of 9 dedicated to science**
- 6 high-T MISO-EPO vent fluid loggers recovered (December 2019 deployment)
- 12 loggers deployed
- Continual monitoring of fluid exit temperature is ongoing. These data will be used to derive crustal permeability changes.

Vent fluid exit temperatures:

- Drop in the years following eruptions
- Rise in the years leading up to eruptions
- Forecast an eruption in ~2022-2024

ROV Jason highlights



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- Collected **64 discrete vent fluid samples** using 3 sampler types (Majors, Seewald IGTs, Lilley GTs)

Recent data capture a diking event in November 2020:

- M shallowed in response to dike intrusions in 1995, 2004
- Bio9 was affected by diking in 2020
- Logger data show a contemporaneous temperature rise up to 5°C in Biovent, M, P and Bio9 exit temperature in November 2020, likely reflecting diking event(s)

Telepresence

- Expanded bandwidth supported by NSF was optimized for:
- Uplink of one ROV Jason **real-time video link** to shore from the ship; also recorded to Zoom cloud and distributed immediately to shore-based scientists
 - Sulis Z70 4K forward-looking camera feed
- **Videoconference links** from shore to the ship for shore-based PIs to communicate with those at sea
- First 12 hr dives streamed to the public via Zoom to a channel on YouTube
 - 4700+ views as of 04/21/21
 - 9000+ views as of 02/24/22

