Application of OOI Data to Acoustic, Oceanic, and Geophysical Modeling

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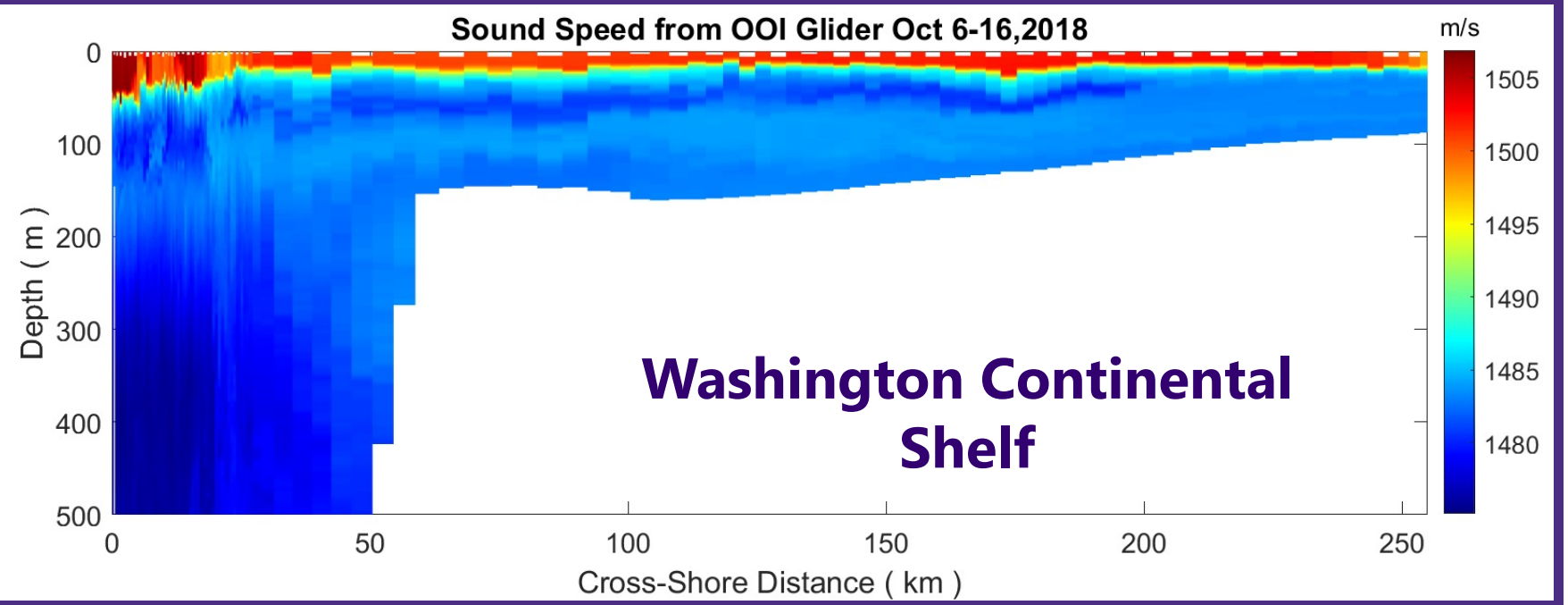
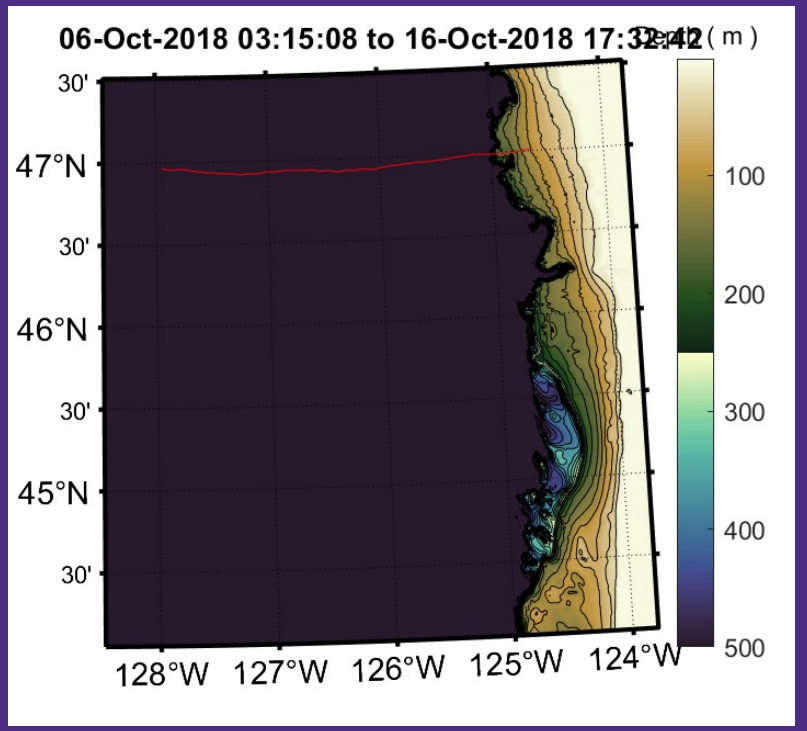
Subsurface Acoustic Duct off the Washington Coast





Sound speed determined from hydrographic data recorded by OOI Glider GL319 reveals a subsurface acoustic duct off the Washington Coast.

Collaborators: Dajun Tang, Ramsey Harcourt, John Mickett, APL-UW

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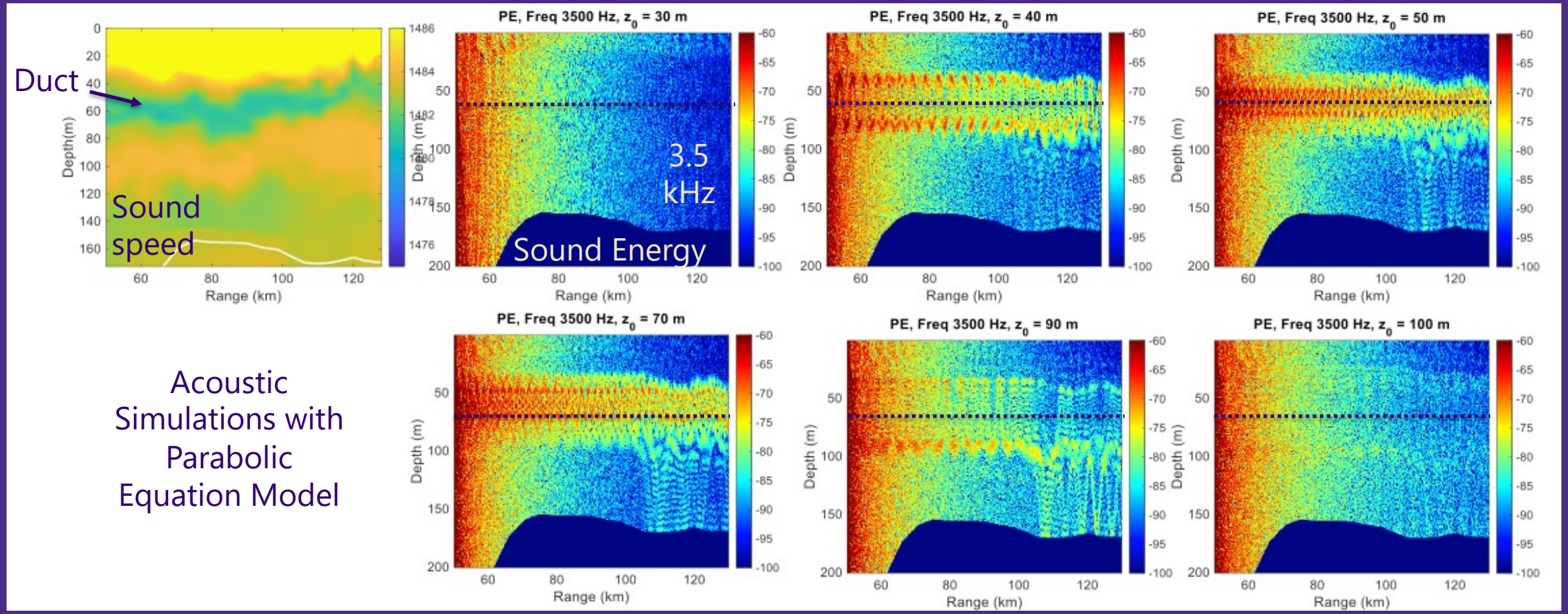
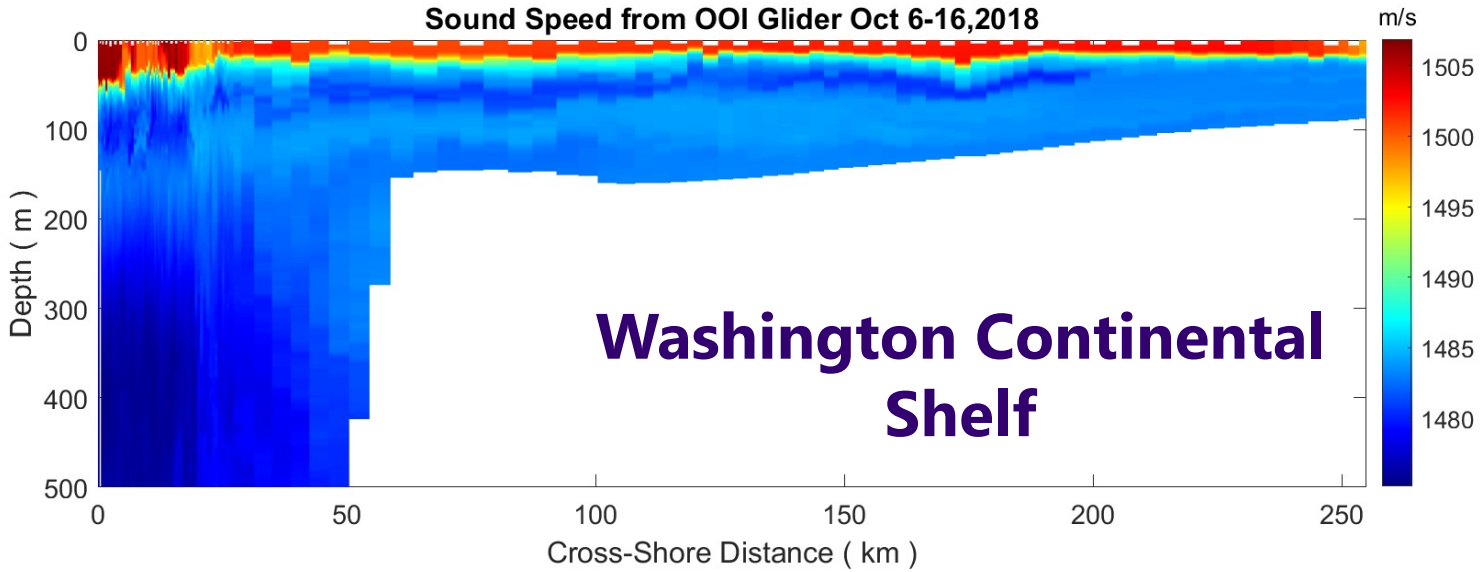
Simulation of Mid-Frequency Sound Propagation

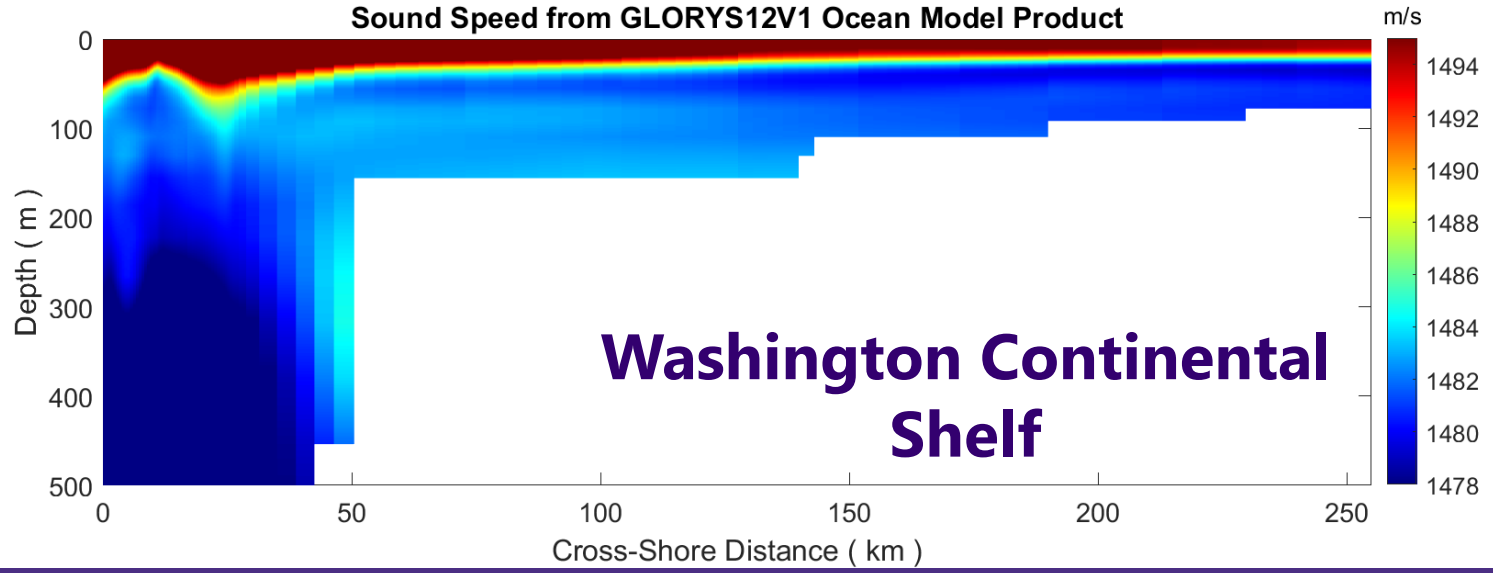


Acoustic Simulations with Parabolic Equation Model

Tang et al., TFO progress report, Mar 2022

Verification of Sound Speed Predicted by Ocean Models

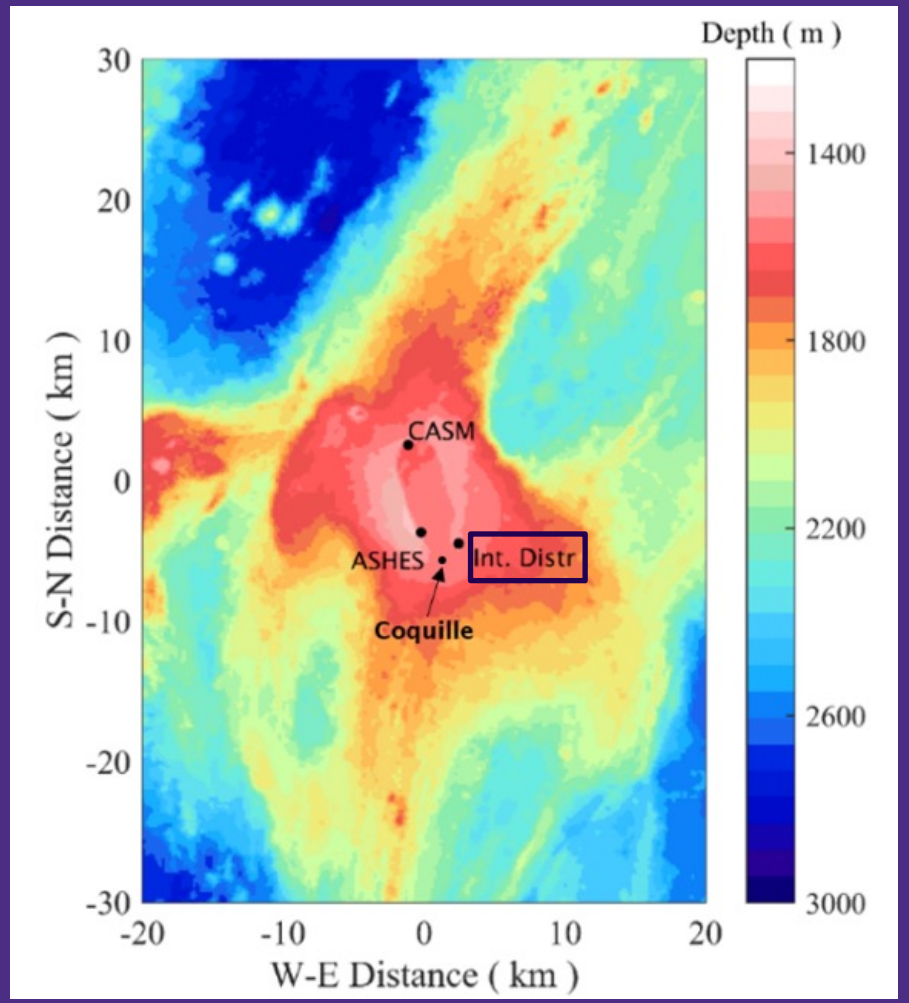


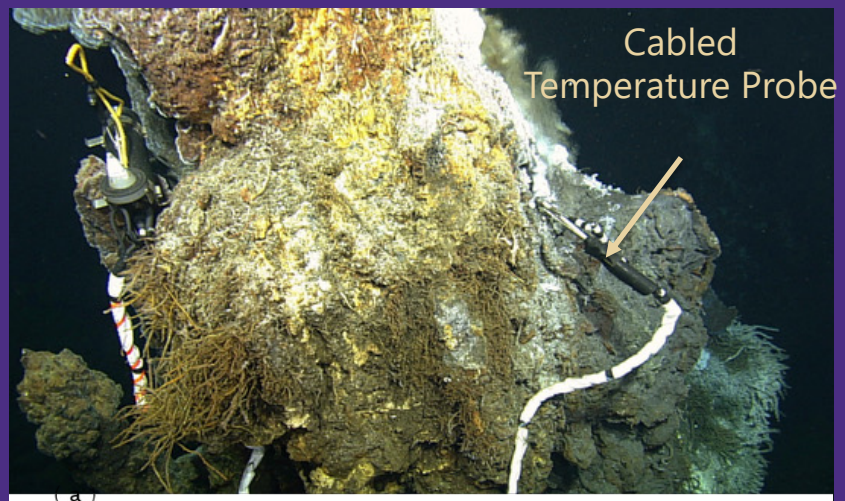


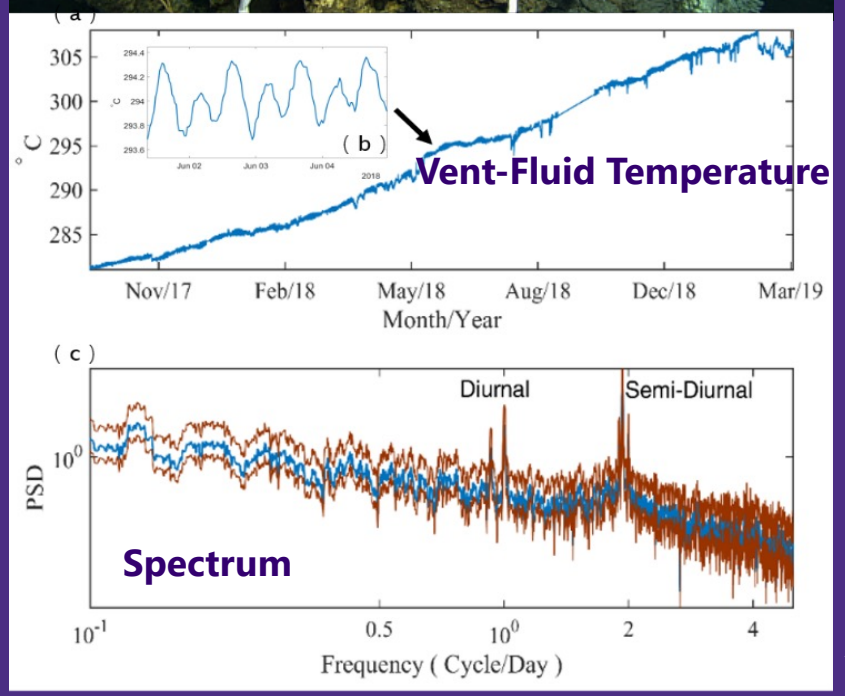
Sound speed determined from the global ocean reanalysis product GLORYS12V1 compares reasonably well with the observation.

Evaluation of model performance requires systematic model-data comparison.

Monitoring of Vent-Fluid Temperature on Axial Seamount







Long-term, real-time monitoring of vent-fluid temperature with a cabled high-temperature probe at the International District vent field on Axial.

Small ‘wiggles’ in measured vent-fluid temperature oscillate at tidal frequencies.

Collaborators:
Bill Chadwick (OSU), Yen Joe Tan (CHK), Karen Bemis (Rutgers), Dax Soule (Queens College)

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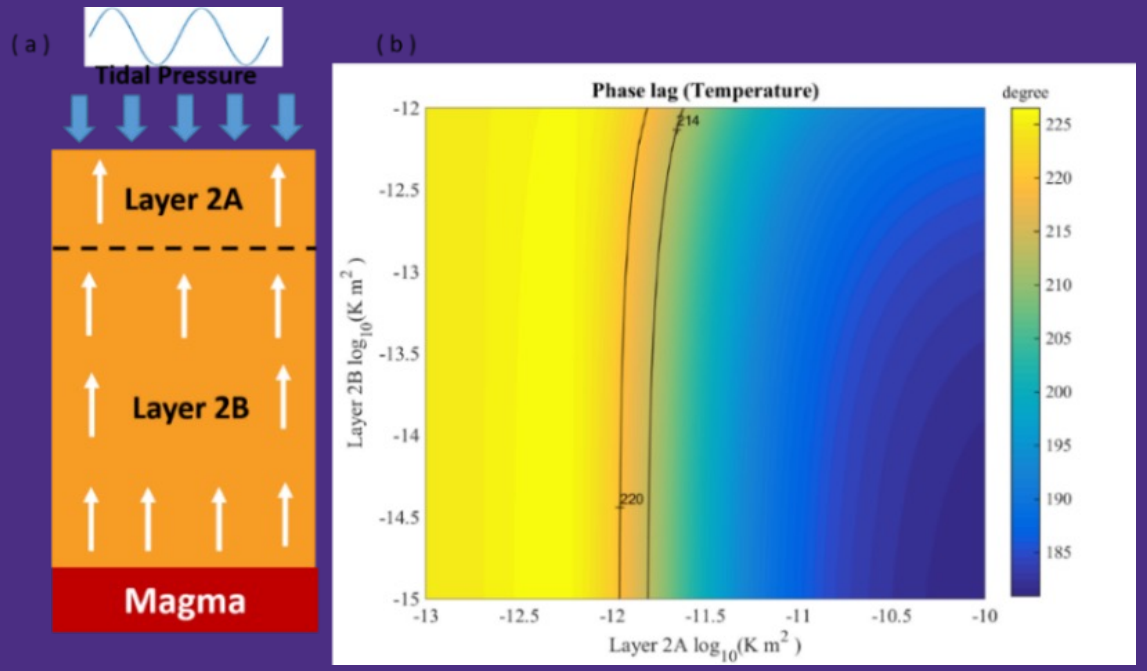
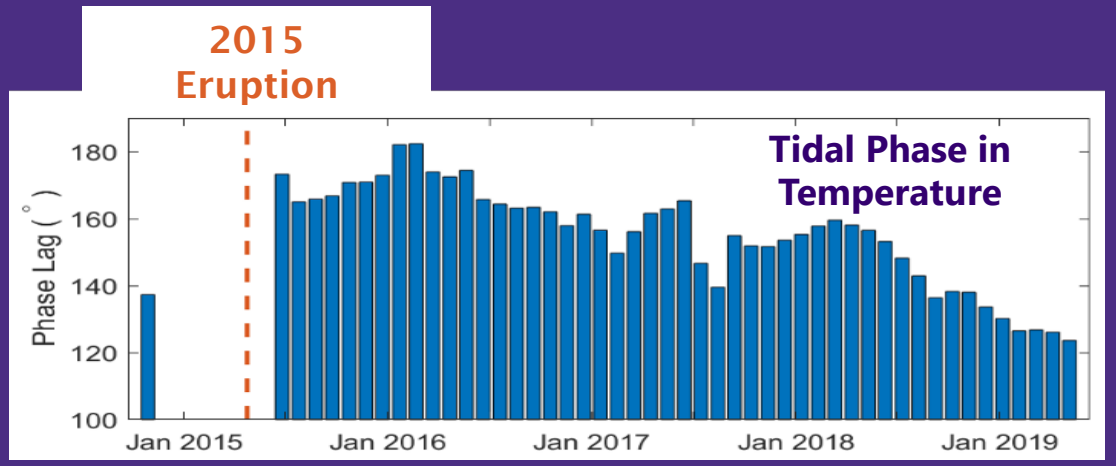
Estimation of Crustal Permeability using a 1-D Poroelastic Model



A one-dimensional poroelastic model predicts tidal phase lag in vent-fluid temperature as a function of crustal permeability.

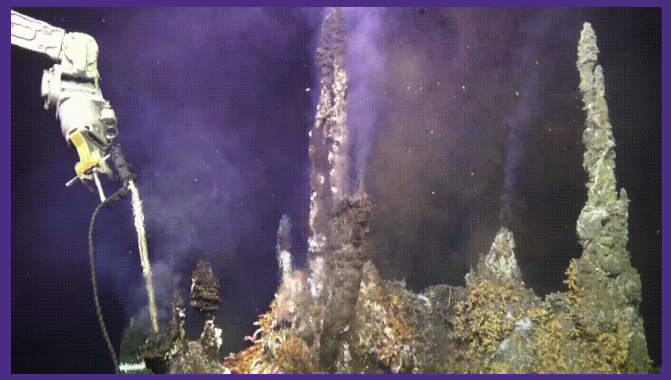
Comparing the predicted phase lag with the one determined from measured vent-fluid temperature time series yields estimates for crustal permeability.



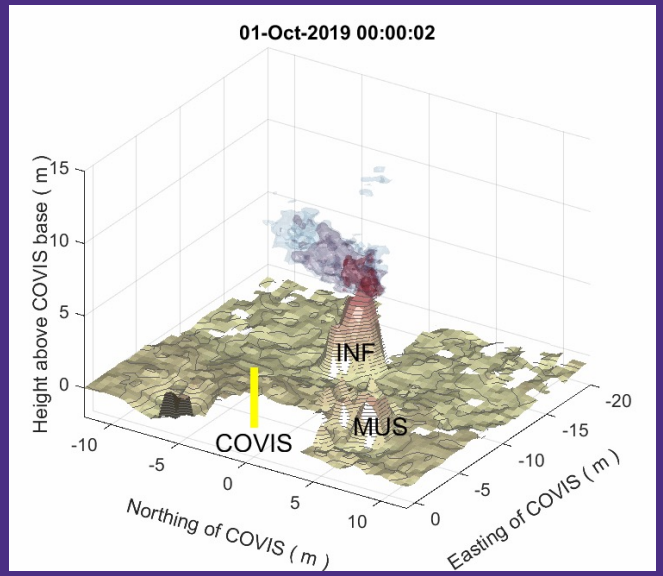
Increase in the phase of tidal oscillations in vent-fluid temperature after the 2015 eruption suggests a decrease in crustal permeability.

3-D Observations and Models of Hydrothermal Plumes

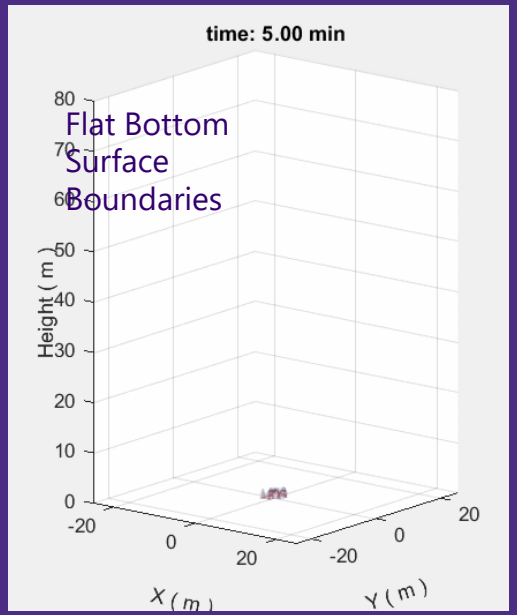
Inferno Vent



Acoustic Images from COVIS Data

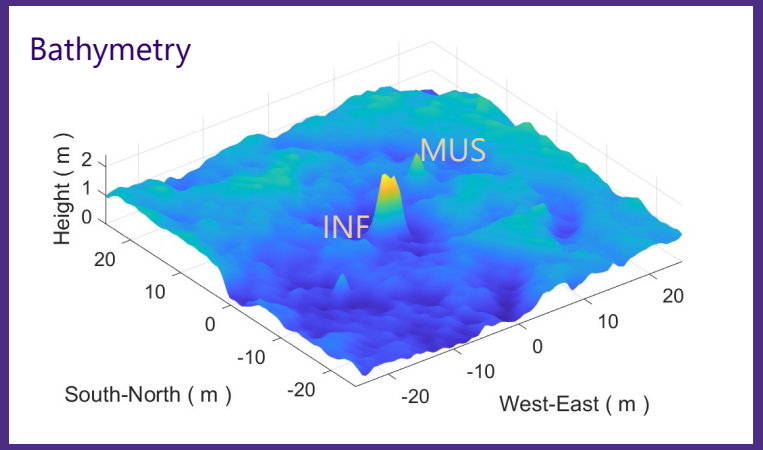


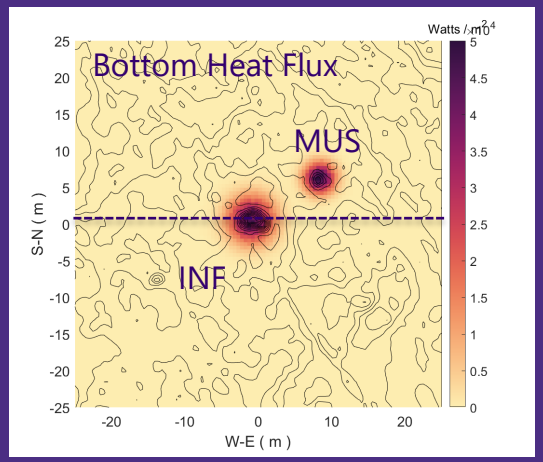
Idealized Simulation with HotCross

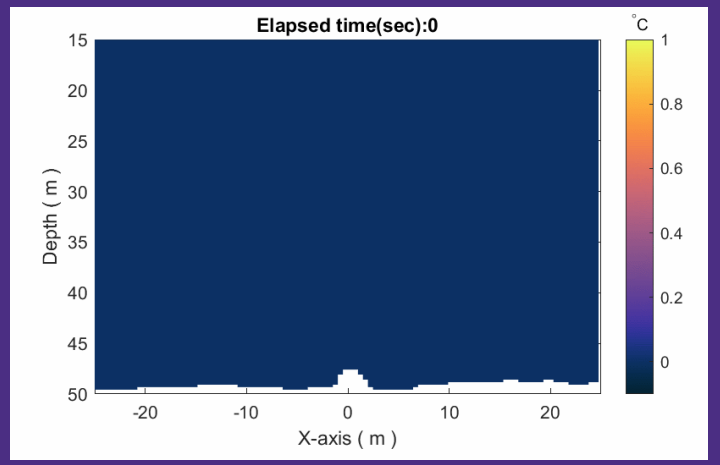


Xu et al., AUG Fall Meeting 2020

More Realistic Simulation with CROCO







Collaborators: Karen Bemis (Rutgers), Darrell Jackson and Anatoliy (APL-UW), Victoria Preston (Ph.D. Student, MIT-WHOI)

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