

**Observations from the Seafloor: Low-
frequency Ambient Wavefield Seismology
on Large Ocean-Bottom Nodal Arrays**

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Room 265, UC Berkeley, McCone Hall,
and on [Zoom](#)**

Abstract:

Estimating accurate Earth models for 3-D seismic imaging and full waveform inversion (FWI) remains challenging due to limited low frequencies (i.e., below 2.0 Hz) typically available from active-source air gun arrays. Ambient wavefield energy acquired on large, continuously recording nodal arrays, though, presents a potential alternative energy source for subsurface investigation. By exploiting principles of seismic interferometry in deep-water marine settings, low-frequency virtual shot gathers (VSGs) from 1.0 Hz to as low as 0.04 Hz can be generated with surface-wave events that exhibit clear sensitivity to large-scale model features including salt bodies. The estimated VSG data also exhibit surface-wave scattering events consistent with the locations and depths of shallow salt pinnacles observed in active-source velocity model reconstructions. These observations suggest an alternative pathway forward for estimating long- (and potentially shorter-)

wavelength 3-D elastic models required for accurate FWI and seismic imaging analyses.

Author:

Jeffrey Shragge is a Professor in the Geophysics Department at the Colorado School of Mines and is a co-Leader of the Mines Center for Wave Phenomena (CWP) research consortium. He is a Visiting Professor of Geophysics at Stanford University during Q1 2024. Jeffrey received a BSc in Physics from Queen's University, a MSc in Geophysics from the University of British Columbia, and a PhD in Geophysics from Stanford University.



He is a former Editor-in-Chief of the journal *Geophysics* and the past Vice-President of Publications on the Society of Exploration Geophysicists Board of Directors. Jeffrey's research interests include seismic imaging and inversion, wave propagation, near-surface geophysics, scientific high-performance computing, archeological geophysics, and humanitarian applications of geophysics.

Zoom meeting information:

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