Tanner M. Acquisto

Ph.D.

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Education

Postdoctoral Fellow Advisors: Shuoshou Han, Eric Attias 2024 – Present	UNIVERSITY OF TEXAS INSTITUTE FOR GEOPHYSICS University of Texas at Austin 10601 Exploration Way Building 196, Austin, TX 78758
Ph.D. Marine Geophysics Advisor: Anne Bécel 2018 – 2024	LAMONT-DOHERTY EARTH OBSERVATORY Columbia University 61 Rte 9W, Palisades, NY 10964 <i>Thesis title</i> : "Characterizing Incoming Plate Hydration and Over- riding Plate Structure at Subduction Zones: Implications for Plate Boundary Slip Behavior"
M.Res. Exploration Geophysics Advisor: Satish Singh 2017 – 2018	INSTITUT DE PHYSIQUE DU GLOBE DE PARIS 1 Rue Jussieu, 75005 Paris, France <i>Thesis title</i> : "Evidence of Lithospheric-Scale Buckling in the Wharton Basin, Indian Ocean"
B.S. Geophysics Advisor: Robert Reece 2014 – 2017	TEXAS A&M UNIVERSITY 400 Bizzell St College Station, TX 77843 <i>Thesis title</i> : "Seismic Imaging of Ocean Structure Near the Mid- Atlantic Ridge"

Research Interests

My research interests are in using marine geophysical data to study the structure and evolution of oceanic plates, particularly at subduction zones where the largest earthquakes are generated. I utilize various types of data, but specialize in applying imaging and inverse techniques to active source multichannel seismic (MCS) and ocean bottom seismometer (OBS) reflection/refraction data. These techniques include time and depth imaging (migration), travel-time tomography, and acoustic/elastic full-waveform inversion (FWI). I also have experience in using differential effective medium modeling to extract useful information like water content from seismic data and am interested in improving these techniques by incorporating additional constraints.

My Ph.D. work focused on the Alaskan, Sumatran, and Mexican subduction zones. During Chapter 1, I used 2D MCS data acquired offshore Alaska and Sumatra to constrain uppermost-crustal water content (Acquisto et al., 2022). For chapter 2, I used 3D active-source seismic data to examine how different properties and structures of both the incoming and overriding plates might relate to variations in megathrust slip behavior both downdip and across the margin (Acquisto et al., 2024). Offshore Mexico, I incorporated both MCS and OBS data to produce a more comprehensive image, and thus constraints on hydration, of both the oceanic crust and uppermost mantle (Acquisto et al., *in prep*).

Currently I continue to work on MCS/OBS data acquired offshore Mexico, with a focus on using FWI to create detailed images of the megathrust and upper plate.

Industry Experience

Intern Summer 2015 ORYX OILFIELD SERVICES 611 S Main St #400, Grapevine, TX 76051 Supervisor: Lee STANLEY

Publications

- Acquisto, T., A. Bécel, J. P. Canales, and E. Beaucé. "Structural Controls on Megathrust Slip Behavior Inferred From a 3D, Crustal-Scale, P-Wave Velocity Model of the Alaska Peninsula Subduction Zone". In: Journal of Geophysical Research: Solid Earth 129.11 (2024). e2024JB029632 2024JB029632, e2024JB029632
- Acquisto, T., A. Bécel, S. C. Singh, and H. Carton. "Evidence of Strong Upper Oceanic Crustal Hydration Outboard the Alaskan and Sumatran Subduction Zones". In: *Journal of Geophysical Research: Solid Earth* 127.10 (2022), e2022JB024751
- *Acquisto, T., A. Bécel, J. Canales, and E. Beaucé. "3D P-wave velocity model of the Alaska Peninsula subduction zone from the AACSE active-source data set [Data Set]". In: (2024)

Conference Proceedings

- Acquisto, T., A. Bécel, J. P. Canales, and E. Beaucé. "3D, long-wavelength, P-wave velocity structure of the Alaska subduction zone obtained through inversion of active-source data acquired during the Alaska Amphibious Community Seismic Experiment (AACSE)". in: AGU Fall Meeting Abstracts. Abstract T41C-0230. Presented at the 2023 AGU Fall Meeting, San Francisco, CA. 2023
- Acquisto, T., A. Bécel, and J. P. Canales. "3D first-arrival traveltime tomography of the Alaska subduction zone using controlled-source seismic data acquired during the Alaska Amphibious Community Seismic Experiment (AACSE).". In: AGU Fall Meeting Abstracts. Abstract T54A-01. Presented at the 2021 AGU Fall Meeting, New Orleans, LA. 2021
- Acquisto, T., A. Bécel, S. C. Singh, and H. D. Carton. "High-resolution upper crustal velocity structure of the Aleutian and Sumatran outer rises from traveltime tomography and elastic full waveform inversion applied downward continued long-offset multichannel seismic data." In: AGU Fall Meeting Abstracts. Abstract T018-0009. Presented at the 2020 AGU Fall Meeting, Online. 2020
- Acquisto, T., A. Bécel, S. C. Singh, D. Shillington, and K. Key. "Active source seismic study of upper oceanic crust in the Alaskan and Sumatran trench outer rise systems." In: AGU Fall Meeting Abstracts. Abstract T51F-0331. Presented at the 2019 AGU Fall Meeting, San Francisco, CA. 2019
- Acquisto, T., R. Reece, G. Christeson, R. Carlson, and R. Miller. "Seismic imaging of ocean structure in the vicinity of the Mid-Atlantic Ridge". In: AGU Fall Meeting Abstracts. Abstract T13B-2700. Presented at the 2016 AGU Fall Meeting, San Francisco, CA. 2016
- A. Bécel, Acquisto, T., S. C. Singh, and H. Carton. "Quantifying amount of free water stored in incoming upper oceanic crust outboard of the Alaska Peninsula and Sumatra Trenches". In: AGU Fall Meeting Abstracts. Abstract T45B-0228. Presented at the 2021 AGU Fall Meeting, New Orleans, LA. 2021
- M. Laurencin, Acquisto, T., S. C. Singh, N. Hananto, H. Carton, Y. Qin, K. E. Bradley, M. Hamahashi, F. Villanueva-Robles, J. Dyment, P. Tapponnier, and K. Sieh. "New insight on the deep structure of the Wharton Basin oceanic lithosphere in the vicinity of the 11 April 2012, Mw 8.6 strike-slip earthquake". In: AGU Fall Meeting Abstracts. Abstract T23E-0429. Presented at the 2016 AGU Fall Meeting, San Francisco, CA. 2018

^{*}Dataset available on the MGDS

- J. Wei, R. S. Reece, and Acquisto, T. "Water Circulation within South Atlantic Subtropical Gyre Constrained by Seismic Reflection Images". In: AGU Fall Meeting Abstracts. Abstract PP53D-1481. Presented at the 2016 AGU Fall Meeting, San Francisco, CA. 2018
- R. Miller, R. Reece, G. Christeson, R. Carlson, and Acquisto, T. "The Presence and Characterization of Antarctic Bottom Water Located Between the Mid-Atlantic Ridge and the Rio Grande Rise". In: AGU Fall Meeting Abstracts. Abstract T13B-2699. Presented at the 2016 AGU Fall Meeting, San Francisco, CA. 2016

Skills and Training

MCS data processing

I have a comprehensive understanding of conventional multichannel seismic data processing and imaging techniques. I have experience using standard industry academic softwares for seismic data processing as well as open source softwares available for processing and data visualization:

- ShearWater Reveal
- Paradigm Echos
- Seismic Unix (SU)

Geophysical data inversion

I have made extensive use of publicly available academic softwares/codes to invert primarily for subsurface velocity. These include:

- VMTomo (Van Avendonk et al., 2004)
- Tomo2D (Korenaga et al., 2000)
- Tomo3D (Melendéz et al., 2015)
- TWIST (Shipp & Singh, 2002)
- MARE2DEM (Key, 2016)
- OCCAM1D (Constable, 1986)

Programming languages

I have experience compiling and debugging mostly Fortran and some C++ codes, and very frequently utilize some combination of the following languages for daily scripting, data visualization efforts, as well as both primary and secondary analyses:

- MatLab
- Python
- Bash
- Julia