

Adam F. Holt

Assistant Professor

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Employment

University of Miami

Aug. 2019 – present

Assistant Professor

Department of Marine Geosciences,

Rosenstiel School of Marine, Atmospheric, and Earth Science

Massachusetts Institute of Technology

Aug. 2016 – Jul. 2019

Postdoctoral Associate/Fellow

Department of Earth, Atmospheric and Planetary Sciences

Education

University of Southern California, Los Angeles

2011 – 2016

Ph.D. in Geological Sciences

Advisor: Thorsten W. Becker

Dissertation title: Trench migration, slab bending, and mantle flow at subduction zones

Imperial College, London

2007 – 2011

M.Sci. Geophysics (First-class honors)

Publications

Hernandez-Urbe, D., Holder, R., and **Holt, A. F.** The feasibility of slab-top melting: implications for geochemical cycling in subduction zones. In review, *Science Advances*.

Holt, A. F., 2022. The Topographic Signature of Mantle Pressure Build-Up Beneath Subducting Plates: Insights from Spherical Subduction Models. *Geophys. Res. Lett.*, doi:10.1029/2022gl100330.

Behr, W. M., **Holt, A. F.**, Becker, T. W., and Faccenna, C., 2022. The effects of plate interface rheology on subduction kinematics and dynamics. *Geophys. J. Int.*, 230, doi:10.1093/gji/ggac075.

Holt, A. F., and Condit, C. B., 2021. Slab temperature evolution over the lifetime of a subduction zone. *Geochem., Geophys., Geosys.*, 22, doi:10.1029/2020GC009476.

Faccenna, C., Becker, T. W., **Holt, A. F.**, and Brun, J-P., 2021. Mountain building, mantle convection, and supercontinents: Holmes (1931) revisited. *Earth Planet. Sci. Lett. (Frontiers)*, 564, doi: 10.1016/j.epsl.2021.116905

Royden, L. H., and **Holt, A. F.**, 2020. Subduction dynamics and mantle pressure: (i) An Analytical Framework Relating Subduction Geometry, Plate Motion, and Asthenospheric Pressure. *Geochemistry, Geophysics, Geosystems.*, doi: 10.1090/2020GC009032, 2020.

- Holt, A. F.**, and Royden, L. H., 2020. Subduction dynamics and mantle pressure: (ii) Towards a Global Understanding of Slab Dip and Upper Mantle Circulation. *Geochemistry, Geophysics, Geosystems.*, doi: 10.1002/2019GC008771, 2020.
- Holt, A. F.**, Royden, L. H., Becker, T. W., and Faccenna, C., 2018. Slab interactions in 3-D subduction settings: The Philippine Sea Plate region. *Earth and Planetary Science Letters.* 489, 72-83.
- Király, A., **Holt, A. F.**, Funicello, C., Capitanio, F., and Faccenna, C., 2018. Modeling slab-slab interactions: Dynamics of a double-sided subduction system. *Geochemistry, Geophysics, Geosystems.*, doi: 10.1002/2017GC007199.
- Faccenna, C., **Holt, A. F.**, Becker, T. W., Lallemand, S., and Royden, L. H., 2017. Dynamics of the Ryukyu/ Izu-Bonin-Marianas double subduction system. *Tectonophysics.*, doi:10.1016/j.tecto.2017.08.011.
- Holt, A. F.**, Royden, L., and Becker, T. W., 2017. The dynamics of double slab subduction. *Geophys. J. Int.*, 209 250-265.
- Faccenna, C., Oncken, O., **Holt, A. F.**, and Becker, T. W., 2017. Initiation of the Andean Orogeny by lower mantle subduction. *Earth Planet. Sci. Lett.*, 463, 189-201.
- Holt, A. F.** and Becker, T. W., 2016. The effect of a power-law mantle viscosity on trench retreat rate. *Geophys. J. Int.*, doi:10.1093/gji/ggw392.
- Holt, A. F.**, Buffett, B. A., and Becker, T. W., 2015. Overriding plate thickness control on subducting plate curvature. *Geophys. Res. Lett.*, 42, 3802-3810, doi:10.1002/2015GL063834.
- Jagoutz, O., Royden, L., **Holt, A. F.**, and Becker, T. W., 2015. Anomalously fast convergence of India and Eurasia caused by double subduction. *Nature Geoscience*, 8, 475-478, doi: 10.1038/NGEO2418.
- Holt, A. F.**, Becker, T. W., and Buffett, B. A., 2015. Subduction dynamics and overriding plate stress in thermo-mechanical subduction models. *Geophys. J. Int.*, 201, 172-192, doi: 10.1093/gji/ggv011.
- Sun, D., Miller, M. S., **Holt, A. F.**, and Becker, T. W., 2014. Hot upwelling conduit beneath the Atlas Mountains, Morocco. *Geophys. Res. Lett.*, 41, 8037-8044, doi:10.1002/2014GL061884.

Teaching Experience

Course Instructor (University of Miami)

Earth Sciences general course: Natural Disasters (GSC 107)	Spring 2020, 2021, 2022, 2023
Graduate course: Geodynamics (MGS 723)	Fall 2021

Graduate Teaching Assistant (University of Southern California):

Earth Sciences major course, Geophysics and Geoengineering (GEOL 440)	2014
Earth Sciences general course, Earthquakes (GEOL 240)	2013
Earth Sciences general course, Crises of a Planet (GEOL 108)	2012

Grants and Awards

AGU Editors' Citation for Excellence in Refereeing	2022
NSF-EAR Geophysics: Collaborative Research: Probing feedbacks between thermal structure, petrologic transformation, and rheologic evolution within dynamically evolving subduction zones, Lead PI (UM: \$287,776)	2021
NSF-EAR Geophysics: Constraining multi-scale interactions between slabs and mantle flow	2021

within Western Pacific subduction zones, 06/2022-06/2025, Sole PI (\$349,874).

XSEDE/ACCESS Research Allocations (supercomputing time and storage) 2018, 2019, 2020, 2021
Most recent allocation (2021): 57,834 node hours (\$14,594 value).

JpGU Outstanding Student Presentation Award	2016
EGU Outstanding Student Poster Award	2016
Outstanding Teaching Awards, University of Southern California	2012, 2013
Provost's Ph.D. Fellowship, University of Southern California	2011
Edward Glorney Scholarship (highest geoscience degree score), Imperial College	2011

Service and Mentorship

Internal (University of Miami):

Ph.D. supervision: Valeria Turino (2020-present).

Postdoc supervision: Samuel Goldberg (NSF Postdoc; 2021-2022), Ryan Stoner (2022-present).

Ph.D. committee: Farzaneh Zanjani, Bhuvan Varugu, Sara Mirzaee.

Undergraduate mentees: Chantal Newallo (2020), Jazmin Garza (2021-2022), Reid Jansen (2022-present).

External:

External Ph.D. examiner: Roma Tre University [Italy]; Monash University [Australia]; Australia National University [Australia].

Proposal reviews: NSF EAR Earthscope/GeoPRISMS/CSEDI/Geophysics/Postdoctoral Fellowships, DFG (German Research Foundation), RSF (Russian Science Foundation).

Manuscript reviews: Nature; Nature Geosci.; Nature Comm.; Geology; J. Geophys Res.; Geochem., Geophys., Geosyst.; Tectonics; Phys. Earth Planet. Int.; Geophys. J. Int; Scientific Reports; Geophys. Res. Lett.; Earth Planet. Sci. Lett.; Tectonophysics; Solid Earth; Science Advances.

Workshops: Session convenor and workshop co-organizer - AGU/SEG convergent margins workshop (2022); Session convenor - GSA annual meeting (2022).

Committees: Computational Infrastructure for Geodynamics (CIG) Science Steering Committee (2023-).

Invited Seminars

University of Florida (Department seminar)	2021
University of Memphis (Department seminar)	2021
ETH Zurich (Geophysical Fluid Dynamics seminar)	2019
Royal Holloway, University of London	2019
Harvard University (Solid Earth weekly seminar)	2018
CEED, University of Oslo (Department seminar)	2018
Claude Bernard University Lyon 1 (Department seminar)	2018
Columbia LDEO (Geophysics weekly seminar)	2017
Roma Tre Università (Subduction short course)	2017

Conference Abstracts (Last ~5 years; *Invited)

Holt, A. F., and S. L. Goldberg (2022). Unraveling links between upper mantle pressure, flow, and dynamic topography using global subduction models. AGU Fall Meeting 2022, Chicago.

Neuharth, D. J., Behr, W. M., and **A. F. Holt** (2022). Numerically Modelling Along-strike Rheologic Variations in 3D Subduction Zones. AGU Fall Meeting 2022, Chicago.

Turino, V., and **A. F. Holt** (2022). Isolating the Thermal Effects of Continental Collision using Dynamic Subduction Models. AGU Fall Meeting 2022, Chicago.

Turino, V., and **A. F. Holt** (2022). Three-dimensionality of slab thermal structure within dynamic subduction models. Ada Lovelace Workshop on Numerical Modelling of Mantle and Lithosphere Dynamics, Hévíz, Hungary.

Wang, Y., Goldberg, S. L., and **A. F. Holt** (2022). The influence of far-field mantle density anomalies on subduction dynamics. Ada Lovelace Workshop on Numerical Modelling of Mantle and Lithosphere Dynamics, Hévíz, Hungary.

Holt, A. F., and S. L. Goldberg (2022). Using global numerical models to probe subduction-induced dynamic topography within oceanic basins. SEG/AGU Joint Meeting on Convergent Margins, Seattle.

Clennett, E., Becker, T. W., **Holt, A. F.**, Tetley, M., and C. Faccenna (2021). Investigating Plate Driving Forces in Plate Reconstruction Models using PyGPlates. AGU Fall Meeting 2021, New Orleans.

***Holt, A. F.**, and C. B. Condit (2021). Modeling slab temperature and dehydration evolution over the lifetime of a subduction zone [invited]. AGU Fall Meeting 2021, New Orleans.

***Condit, C. B.**, and **A. F. Holt** (2021). The effects of an evolving subduction thermal structure on dehydration and rheology: coupling geodynamic and thermodynamic models with the experimental and rock records [invited]. AGU Fall Meeting 2021, New Orleans.

Turino, V., and **A. F. Holt** (2021). Three-dimensionality of Slab Thermal Structure in Dynamic Subduction Models. AGU Fall Meeting 2021, New Orleans.

Becker, T. W., **Holt, A. F.**, Tetley, M. G., and C. Faccenna (2021). Investigating Plate Driving Forces in Plate Reconstruction Models using PyGPlates. AGU Fall Meeting 2021, New Orleans.

Condit, C. B., Guevara, V., French, M. E., **Holt, A. F.**, and J. R. Delph (2021). Warm thermal structures in subduction zones lead to ample dehydration at the depths of deep slow slip and tremor and resultant transformations in viscous rheology. EGU General Assembly 2021, Virtual.

McKeegan, R. C., Guevara, V., **Holt, A. F.**, and C. B. Condit (2021). Exhumation of subducted mafic rocks in a dynamically evolving thermal structure: constraints from phase equilibria modelling. EGU General Assembly 2021, Virtual.

Condit, C. B., Guevara, V., Delph, J. R., French, M. E., and **A. F. Holt** (2021). Forarc dehydration in warm subduction zones provides ample fluids at the depths of episodic slip and tremor. EGU General Assembly 2021, Virtual.

Holt, A. F., and C. B. Condit (2020). Modeling slab temperature evolution through the lifetime of a subduction zone. AGU Fall Meeting 2020, Virtual.

Behr, W. M., **Holt, A. F.**, Becker, T. W., and C. Faccenna (2020). Plate speeds modulated by sediment subduction: insights from numerical models. EGU General Assembly 2020, Virtual.

Miller, M. S., Alpert, L. A., Becker, T. W., Dahlquist, M. P., Harris, C. W., **Holt, A. F.**, Li, Y., Nugroho, H., O'Driscoll, L., Porritt, R., Roosmawati, N., West, J. A., Widiyantoro, S., and P. Zhang (2019). On the cusp of a tear: Continental subduction in the Banda Arc. AGU Fall Meeting 2019, San Francisco.

Holt, A. F. and L. H. Royden (2019). Subduction dynamics and mantle pressure: Towards a global understanding of slab dips AGU Fall Meeting 2019, San Francisco.

Behr, W. M., **Holt, A. F.**, Becker, T. W., and C. Tewksbury-Christie (2019). Sediment control on subduction plate speeds: insights from 2D dynamic models. EGU General Assembly 2019, Vienna.

Holt, A. F. and L. H. Royden (2018). Global subduction dynamics: links between slab dip angles, dynamic pressure, and lower mantle mass flux. AGU Fall Meeting 2018, Washington DC.

Tetley, M. G., **Holt, A. F.**, and T. W. Becker (2018). Exploring the range of reconstructed plate tectonic motions within global geodynamic constraints. AGU Fall Meeting 2018, Washington DC.

Holt, A. F. and L. H. Royden (2018). Western Pacific subduction dynamics: slab dip and mantle pressure [invited]. CIG/CGU Joint Meeting 2018, Niagara Falls.

Holt, A. F., L. Royden, T. W. Becker, and C. Faccenna (2017). 3-D subduction dynamics in the western Pacific: mantle pressure, plate kinematics, and dynamic topography. AGU Fall Meeting 2017, New Orleans.

Miller, M. S., Sun, D., and **A. F. Holt** (2017). Detecting slab structure beneath the Banda arc from waveform analysis of deep focus earthquakes. AGU Fall Meeting 2017, New Orleans.

Faccenna, C., Oncken, O., **Holt, A. F.**, and T. W. Becker (2017). Initiation of the Andean orogeny by lower mantle subduction. EGU General Assembly 2017, Vienna.

Sarr, A. C., Husson, L., Pastier, A. M., Becker, T. W., **Holt, A. F.**, Alpert, L., Ruiz, C. A., Elliot, M., Pedoja, K., and A. M. Imran (2017). Quantifying subsidence of the Sunda shelf (SE Asia) from coral reef morphology. EGU General Assembly 2017, Vienna.