

Thomas J. Kilpatrick

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Current Position

Assistant Project Scientist, Scripps Institution of Oceanography, Climate, Atmospheric Sciences, and Physical Oceanography.

Research Interests

Satellite observations of surface winds, sea level, clouds, and rainfall; winds and ocean circulation around capes and islands; atmosphere–ocean interaction and its role in climate; Ekman boundary layer dynamics; mesoscale atmospheric (WRF) and ocean (ROMS) modeling; machine learning and its application to earth science.

Education

Ph.D., Oceanography, University of Hawaii at Manoa, 2013.

M.S., Oceanography, University of Hawaii at Manoa, 2009.

B.S., Mathematics, Massachusetts Institute of Technology, 2006.

Non-degree student, Dept. of Mathematics, University of Michigan, Ann Arbor, 2000–2001.

Publications

Chapman W., T. Kilpatrick, S.-P. Xie, D. Gagne, and B. Cornuelle, in preparation: Hawaii lee wind reconstruction using deep learning for satellite ambiguity selection.

Hutchings N., T. Kilpatrick, and D. Long, 2020: Ultrahigh resolution scatterometer winds near Hawaii. *Remote Sensing*, **12**, doi:10.3390/rs12030564.

Kilpatrick T., S.-P. Xie, H. Tokinaga, D. Long, and N. Hutchings, 2019: Systematic scatterometer wind errors near coastal mountains. *Earth and Space Science*, **6**, 1900–1914, doi:10.1029/2019EA000757.

Kilpatrick T., S.-P. Xie, A. J. Miller, and N. Schneider, 2018: Satellite observations of enhanced chlorophyll variability in the Southern California Bight. *Journal of Geophysical Research: Oceans*, **123**, 7550–7563, doi:10.1029/2018JC014248.

Kilpatrick T., S.-P. Xie, and T. Nasuno, 2017: Diurnal convection–wind coupling in the Bay of Bengal. *Journal of Geophysical Research: Atmospheres*, **122**, 9705–9720, doi:10.1002/2017JD027271.

Kilpatrick T. and S.-P. Xie, 2016: Circumventing rain-related errors in scatterometer wind observations. *Journal of Geophysical Research: Atmospheres*, **121**, 9422–9440, doi:10.1002/2016JD025105.

Kilpatrick T., N. Schneider, and B. Qiu, 2016: Atmospheric response to a midlatitude SST front: Along-front winds. *Journal of the Atmospheric Sciences*, **73**, 3489–3509, doi:10.1175/JAS-D-15-0312.1.

Kilpatrick T. and S.-P. Xie, 2015: ASCAT observations of downdrafts from mesoscale convective systems. *Geophysical Research Letters*, **42**, 1951–1958, doi:10.1002/2015GL063025.

Kilpatrick T., N. Schneider, and B. Qiu, 2014: Boundary layer convergence induced by strong winds across a midlatitude SST front. *Journal of Climate*, **27**, 1698–1718, doi:10.1175/JCLI-D-13-00101.1.

Kilpatrick T., N. Schneider, and E. Di Lorenzo, 2011: Generation of low-frequency spiciness variability in the thermocline. *Journal of Physical Oceanography*, **41**, 365–377, doi:10.1175/2010JPO4443.1.

Honors and Awards

2018 study *Satellite observations of enhanced chlorophyll variability in the Southern California Bight* (see Publications) was featured on the cover of *J. Geophys. Res.-Oceans*: <https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1002/jgrc.22477>.

AGU Research Spotlight, for *ASCAT observations of downdrafts from mesoscale convective systems* (see Publications), 2015. The manuscript was highlighted in *EOS* magazine (Oct 15 issue) and on the AGU web page for its innovative use of satellite wind observations around tropical storms.

Physical Oceanography Dissertation Symposium (PODS) attendee, Kauai, HI, 2014. Presented graduate work on atmosphere–ocean interaction around midlatitude SST fronts.

Outstanding oral presentation by a student (second place) at the AMS 17th Conference on Air–Sea Interaction, Annapolis, MD, 2010.

University of Hawaii oceanography department Ka Malama Kai award for outstanding thesis/paper by a graduate student, for master’s thesis on spiciness variability, 2009.

Woods Hole Oceanographic Institution Summer Student Fellowship, 2004.

Research Experience

Postdoctoral Scholar 2013–2018
Advisor: Prof. Shang-Ping Xie Scripps Institution of Oceanography
Researched atmosphere–ocean interactions by synthesizing satellite observations of surface winds, sea level, sea surface temperature, clouds, and rainfall; and model simulations. Utilized satellite observations of sea level, SST, and winds to study coastal winds and ocean circulation. Developed a novel technique to circumvent rain-related errors in satellite observations of surface winds.

Research Assistant 2006–2013
Advisor: Prof. Niklas Schneider Department of Oceanography, U. Hawaii/IPRC
Researched the impact of SST fronts on the atmosphere, in particular the boundary layer wind profile, boundary layer convergence, vertical motion, free atmosphere response, and role in climate variability. Performed numerical modeling experiments with the Weather Research and Forecasting (WRF) atmospheric model.

Professional Service

Member of AMS Air–Sea Interaction Committee.

Co-chair: Winds and currents session, Ocean Sciences Meeting, 2018; air–sea interaction session, Ocean Sciences Meeting, 2016.

Co-chair: Meteorological Applications session, IOVWST Meeting, 2015–2017; Ocean Applications session, IOVWST Meeting, 2019.

Reviewer: *Journal of Climate*, *Journal of Physical Oceanography*, *Journal of the Atmospheric Sciences*, *Journal of Geophysical Research: Oceans*, *Journal of Geophysical Research: Atmospheres*, *Climate Dynamics*, *Quarterly Journal of the Royal Meteorological Society*, *Journal of Advances in*

Modeling Earth Systems, Progress in Oceanography, Atmospheric Science Letters, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Remote Sensing.

Member: American Geophysical Union

Selected Presentations

Kilpatrick T., S.-P. Xie, A. J. Miller, H. Tokinaga, N. Hutchings, and W. Chapman: Satellite observations of orographic winds and coastal upwelling (invited talk). NASA Jet Propulsion Laboratory, 3 October 2019.

Chapman, W., T. Kilpatrick, and S.-P. Xie: Machine learning to improve QuikSCAT ambiguity selection near Hawaii's Big Island (poster). International Ocean Vector Winds Science Team (IOVWST) Meeting, Portland, ME, 2019.

Kilpatrick T., S.-P. Xie, H. Tokinaga, D. Long, and N. Hutchings: Systematic scatterometer wind errors near coastal mountains (talk). IOVWST Meeting, Portland, ME, 31 May 2019.

Kilpatrick T., S.-P. Xie, and N. Schneider: Upwelling hot spot in the Southern California Bight (talk). IOVWST Meeting, Barcelona, Spain, 24 April 2018.

Kilpatrick T. and S.-P. Xie: Satellite observations of interannual wind variability and ocean response in the California Current System (talk). Ocean Sciences Meeting, Portland, OR, 15 February 2018.

Kilpatrick T. S.-P. Xie, and T. Nasuno: Diurnal convection–wind coupling in the Bay of Bengal (talk). IOVWST Meeting, Portland, OR, 20 May 2015.

Kilpatrick T., S.-P. Xie, and T. Nasuno: Exploring the relationship between surface wind convergence and convective rainfall in the tropics (talk). AGU Fall Meeting, San Francisco, December 2014.

Teaching and Mentorship

Mentored UCSD graduate student Will Chapman on a project applying deep learning (convolutional neural networks) to satellite wind data; Mr. Chapman's presentation based on this work won first prize for best student presentation at the AMS AI for Environmental Science Conference, at the AMS 2020 annual meeting.

Mentored undergraduate students Kaiyuan Li and Xinyue Wei on a project that analyzed a southern California "marine heat wave" event, summer 2019.

Guest lecturer for Prof. Roger Lukas's graduate course on large-scale ocean–atmosphere interactions at the University of Hawaii, fall 2012.

Led outreach sessions at the 2011 and 2009 University of Hawaii oceanography open houses, including geophysical fluid dynamics demonstrations with a rotating tank.

Visited classrooms at Ann Arbor (Mich.) Pioneer High School and Ann Arbor Skyline High School to discuss the use of applied mathematics in physical oceanography and climate science, 2009.

Teaching assistant for graduate course *Introduction to Physical Oceanography* at the University of Hawaii, fall 2008. Graded homeworks; maintained the course web site; and filmed and edited lecture videos.