

MICHELLE TIGCHELAAR

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EDUCATION

University of Hawaii at Mānoa Honolulu, HI

PhD, Oceanography, December 2015.

Dissertation: Nonlinear rectification of Quaternary climate drivers at high and low latitudes

Utrecht University Utrecht, the Netherlands

Master of Science, Meteorology, Physical Oceanography and Climate, Cum Laude, June 2010.

Thesis: A new mechanism for the two-step $\delta^{18}\text{O}$ signal at the Eocene-Oligocene boundary.

University College Utrecht Utrecht, the Netherlands

Bachelor of Science, Physics and Earth Sciences, Cum Laude, June 2008.

RESEARCH EXPERIENCE

University of Washington, Dep. of Atmospheric Sciences Seattle, WA

Postdoctoral Researcher

Using a variety of data sets and modeling tools to quantify the impacts of climate change on global food security, including the variability of staple crop yields and prices, rice production in the Philippines, and changes in pest pressure. (Mar. 2016 – present)

International Pacific Research Center Honolulu, HI

Postdoctoral Researcher

Improved implementation of climate forcing in long-term experiments with an Antarctic ice sheet model. (Feb. 2016)

University of Hawaii at Manoa, Dep. of Oceanography Honolulu, HI

Research Assistant

Designed and ran experiments in a hierarchy of climate and ice sheet models to study the mechanisms through which orbital forcing drives long-term climate variability, such as precessional variability in tropical precipitation and the evolution of the Antarctic ice sheet over the last eight glacial cycles. (Aug. 2010 – Dec. 2015)

University of Tokyo, AORI Tokyo, Japan

Visiting Scholar

Studied role of subsurface ocean temperature anomalies in driving variations of the Antarctic ice sheet and performed multi-model comparison of Antarctic climate change on orbital timescales. (Sep. 2013 – Mar. 2014)

Utrecht University, IMAU

Utrecht, the Netherlands

Research Project

Designed experiments with an ocean-atmosphere box model to develop a new mechanism explaining the two-step $\delta^{18}\text{O}$ signal at the Eocene-Oligocene boundary. (Oct. 2009 – Jun. 2010)

Field and lab experience

- Research Assistant on board of R/V Mirai during Cruise MR11-05 to the sub-polar and subtropical North Pacific (5 weeks in Summer 2011)
- Research Assistant on board of R/V Pelagia during the STRATIPHYT Cruise to the subtropical and northern Atlantic (2 weeks in Summer 2009)
- Research Assistant at the Institute for Marine and Atmospheric Research Utrecht. Conducted isotope analysis of hydrogen samples. (Spring 2009)

TEACHING & SCIENCE COMMUNICATION

Pacific Science Center

Seattle, WA

Science Communication Fellow

Designed, in collaboration with Public to the Portal team, an activity to engage visitors of the museum in a conversation about my research and climate change impacts, including a Science on a Sphere presentation; presented this at various Meet a Scientist and other museum events. (May 2016 – present)

Environmental Science & Technology Practicum Co-Educator

Assisted with curriculum development, teaching activities and career mentorship for high school students participating in hands-on environmental science education program at PSC's Mercer Slough Environmental Education Center (Spring 2017)

King County Labor Council Climate Change Speakers Bureau

Seattle, WA

Collaborated with University of Washington graduate students and postdocs on creating and delivering tailored presentations on climate change impacts and labor in Washington State for various labor unions, such as the machinists union and grocery and commercial food workers. (Fall 2016 – present)

University of Washington, Dep. of Atmospheric Sciences

Seattle, WA

Guest lecture for ATM S 220 Exploring the Atmospheric Sciences on 'Climate Change & Food Security'. (June 2017)

Resilience Dialogues

Subject Matter Expert in a two-week online discussion with Community Leaders from Whitefish, MT to help frame the community's strategy around climate-resilience planning and identify action areas and resources. (May 2017)

Climate Science Teacher Institute

Majuro, Marshall Islands

Developed lectures and hands-on activities on climate science and climate change projections and presented these to Marshallese high school teachers. (Jun. 2015)

University of Hawaii at Mānoa, Dep. of Oceanography

Honolulu, HI

Global Environmental Change, Teaching Assistant

Assisted students with homework problems and questions. Led discussion sessions on ethical implications of climate change. Individually taught a lecture on paleo-climate. (Spring 2013)

Science of the Sea, Teaching Assistant

Instructed students during weekly lab sessions. Graded assignments and exams. Guided two groups of students on field trips. (Fall 2012)

Utrecht University, Dep. of Physics

Utrecht, the Netherlands

Geophysical Fluid Dynamics, Teaching Assistant

Supported students during lab sessions and with homework assignments. Graded problem sets and exams. (Fall 2009)

Examencursus, Stichting Studiebegeleiding Leiden

Leiden, the Netherlands

Helped high school students prepare for their final math exams in 3-day intensive courses using practical and confidence-building teaching methods. (Spring 2006 – 2010)

AWARDS

- J. Watumull Merit Scholarship for Outstanding Scholastic Achievement (2014)
- Graduate Climate Conference Travel Grant (2014)
- Bergen Summer Research School Travel Grant (2014)
- Student Travel Grant, AGU Fall Meeting (2012)
- UCSB Dean's Honor (2007)

PEER-REVIEWED PUBLICATIONS

Tigchelaar, M., Battisti, D. S., Naylor, R. L., Ray, D. K. (in preparation) *Future warming increases global maize yield variability with implications for food security*. PNAS.

Deutsch, C. A., Tewksbury, J. J., **Tigchelaar, M.**, Battisti, D. S., Merrill, S., Huey, R. B., Naylor, R. L. (in preparation) *Insect metabolism and population growth rates predict increasing crop pest pressure under climate warming*. Science.

Tigchelaar, M., Timmermann, A., Pollard, D., Friedrich, T., and Heinemann, M. (in preparation) *Nonlinear response of the Antarctic ice sheet to Quaternary sea level and climate forcing*. The Cryosphere.

Tigchelaar, M., Timmermann, A., Pollard, D., Friedrich, T., and Heinemann, M. (in preparation) *Decoupling of bipolar ice-sheet variability during low precession phases*. Earth and Planetary Science Letters.

Stuecker, M. F., **Tigchelaar, M.**, Kantar, M. B. (submitted) *Climate variability differentially impacts rice production systems in the Philippines depending on temporal and spatial scales*. Environmental Research Letters.

Friedrich, T., Timmermann, A., **Tigchelaar, M.**, Timm, O. E., and Ganopolski, A. (2016) *Nonlinear paleo climate sensitivity and its implications for future Greenhouse Warming*. Science Advances. DOI: 10.1126/sciadv.1501923

Tigchelaar, M., Timmermann, A. (2015) *Mechanisms rectifying the annual mean response of tropical Atlantic rainfall to precessional forcing*. Climate Dynamics. DOI: 10.1007/s00382-015-2835-3.

Tigchelaar, M., von der Heydt, A. S., and Dijkstra, H. A. (2011) *A new mechanism for the two-step $\delta^{18}O$ signal at the Eocene-Oligocene boundary*. Climate of the Past, 7, 235-247.

PRESENTATIONS

Tigchelaar, M., Timmermann, A., Pollard, D., Friedrich, T., Heinemann, M. (IMAU, Utrecht University, 2016) Precessional and CO₂ forcing of Antarctic ice sheet variability over eight glacial cycles.

Tigchelaar, M. (UW College of the Environment, Labs Unlocked, 2016) Climate change and global food security.

Tigchelaar, M. (Big History Project, Seattle Cluster Meeting, 2016) How has climate changed in the past, and how do we know that?

Tigchelaar, M., Timmermann, A., Pollard, D., Friedrich, T., Heinemann, M. (AGU Fall Meeting, 2015) Climatic drivers of past Antarctic ice sheet evolution add nonlinearly.

Friedrich, T., Timmermann, A., **Tigchelaar, M.**, Elison Timm, O., Ganopolski, A. (AGU Fall Meeting, 2015) Global climate sensitivity derived from ~784,000 years of SST data.

Sagawa, T., Timmermann, A., **Tigchelaar, M.**, Murayama, M., Okamura, K. (AGU Fall Meeting, 2015) Western Pacific thermocline variability in orbital and millennial timescale.

Tigchelaar, M., Timmermann, A., Pollard, D., Friedrich, T., and Heinemann, M. (INQUA, 2015) Modeling the evolution of the Antarctic ice sheet through the last eight glacial cycles.

Tigchelaar, M., Timmermann, A., Pollard, D., Friedrich, T., and Heinemann, M. (Graduate Climate Conference, 2014) What drives the long-term evolution of the Antarctic ice sheet?

Tigchelaar, M., Timmermann, A., Pollard, D., Heinemann, M., and Abe-Ouchi, A. (AORI Paleoclimate Symposium, 2014) Modeling the long-term evolution of the Antarctic ice sheet.

Tigchelaar, M., Timmermann, A. (AGU Fall Meeting, 2012) Understanding precessional variations in tropical precipitation.

Tigchelaar, M., Timmermann, A. (PMIP Workshop, 2012) Precessional cycles in tropical precipitation.

Von der Heydt, A. S., **Tigchelaar, M.**, Dijkstra, H. A. (EGU, 2011) A new mechanism for the two-step benthic stable isotope signal at the Eocene-Oligocene boundary.

LEADERSHIP & ACTIVITIES

University Service

UH Mānoa Graduate Student Organization, President

Elected president of the student government body representing UH Mānoa's 5,000 graduate students. (2014 – 2015)

- Oversaw a board of 14 elected and appointed officers and two office staff in their duties.
- Chaired monthly General Assembly meetings.
- Represented the organization in regular meetings with executive administrators, on a number of committees, and with the Board of Regents.
- Successfully lobbied the state legislature for collective bargaining rights for graduate assistants led student protests and advocated for fossil fuel divestment.
- Wrote articles for local news outlets and appeared on radio and television to discuss student issues.

UH Mānoa Graduate Student Organization, Newsletter Chair

Wrote monthly newsletters for the graduate student body, including campus events and announcements and highlighting travel grant awardees. (2013 – 2014)

UH Mānoa Graduate Student Organization, Campus Events Chair

Organized the New Graduate Student Orientation, with 250 incoming graduate students in attendance, as well as social and fundraising events. Represented the organization on the Strategic Planning Committee. (2012 – 2013)

UH Mānoa Graduate Student Organization, Department Representative

Represented the Department of Oceanography at the GSO General Assembly and participated in monthly reviews of student travel grant applications. (2011 – 2012)

Institute for Marine and Atmospheric Research Utrecht, Utrecht, the Netherlands

Evaluation manager of the Master's program 'Meteorology, Physical Oceanography and Climate'. (2009 – 2010)

Conducted and compiled course evaluations, provided feedback to teachers and program chair, represented program in departmental Education Advisory Committee.

Workshops & Symposia

- *Physical Oceanography Graduate Student Symposium, University of Hawaii at Mānoa, Honolulu, HI*
Contacted keynote speakers, collected titles and abstracts, composed schedule. (Aug. 2013, 2014, 2015)
- *Workshop "Using Paleo-Climate Model/Data Comparisons to Constrain Future Projections", Honolulu, HI*
Assisted with logistics; secured catering; organized closing banquet. (Spring 2012)
- *Symposium "European Energy Policy in the Face of Climate Change", Utrecht, the Netherlands*
Contacted speakers; assisted with event promotion and day-of logistics. (Spring 2009)

Relevant Coursework

- AMS Summer Policy Colloquium (2017)
- Potsdam Summer School on Dealing with Climate Change Impacts (2016)
- Bergen Summer Research School on Climate Governance (2014)
- INTIMATE Summer School on Climate Transitions (2012)
- NIOZ Marine Master Course (2009)
- Utrecht Summer School in Physics of the Climate System (2007)

Miscellaneous Outreach

- Collaborator on the development of an app called 'Climate Conversations' that aims to spark non-scientific, non-political dialogue about climate and climate change (Spring 2017 – present)
<http://climateconversations.org/>
- Moderator for online discussion on climate (change) and food security for Big History Project teacher community (Aug. 2016, Feb. 2017)
- Class presentations to high school students on climate change and global food security (Dec. 2016)
- Presentation on ocean acidification and demonstrations with a rotating fluid tank at the SOEST Open House at the University of Hawaii at Mānoa (Nov. 2011, 2015)
- Science judge for the 2013 Hawaii Ocean Science Bowl
- Produced a series of animations about orbital forcing for Science on the Sphere at the Bishop Museum
http://apdrc.soest.hawaii.edu/projects/SOS_MP/

OTHER PUBLICATIONS

Tigchelaar, M. and Goldman, J. (2017, Aug 24) *Becoming a Scientist 4.0* [Blog post].

Program on Climate Change

<https://pcc.uw.edu/blog/2017/08/24/becoming-a-scientist-4-0/>

Tigchelaar, M. (2015, Aug 24) *Climate science for Marshallese high school teachers* [Blog post]. Real Science at SOEST!

<https://earthscigradblog.wordpress.com/2015/08/24/climate-science-for-marshallese-high-school-teachers/>

Tigchelaar, M. and Dial, J. (2015, Feb 24) *Asking for more* [Guest editorial] Ka Leo O Hawai'i.

Carroll, R. and **Tigchelaar, M.** (2014, Oct 28) *Free speech should not be zoned* [Guest editorial]. Ka Leo O Hawai'i.

Zakimi, K., **Tigchelaar, M.**, and Polopolus-Meredith, B. (2014, Aug 6) *Apple should be reinstated as UH-Mānoa Chancellor* [Guest editorial]. Honolulu Star Advertiser.

SKILLS

Computer

Matlab, R, python, NCL, Fortran, Linux (bash), Ferret, NCO/CDO, LaTeX, Microsoft Office

Climate models: CESM, LOVECLIM

Ice sheet models: SICOPOLIS, Penn State University model

Languages

Dutch (native), English (fluent), French (beginner/intermediate), German (beginner/intermediate), Japanese (beginner)