

## Malte F. Stuecker, Ph.D.

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### Research Interests & Skills

Research Interests: (i) Dynamics and predictability of large-scale climate variability (e.g., El Niño-Southern Oscillation (ENSO), Asian Monsoon, Multi-decadal variability, ice-ocean-atmosphere interactions), (ii) Interactions of climate variability with other components of the Earth System (including the carbon cycle and the anthroposphere), (iii) Climate variability and its role in the Earth System in the past and in response to greenhouse warming

### Educational Background

**Ph.D. Meteorology**, UH Mānoa, 01/2011 – 05/2015 (Dissertation adviser: Fei-Fei Jin)

**M.Sc. (equiv.) Marine Environmental Sciences (German Diplom)**, C.v.O. University Oldenburg, 08/2005 – 09/2009 (Thesis adviser: Richard Zeebe)

**B.Sc. (equiv.) Marine Environmental Sciences (German Vordiplom)**, C.v.O. University Oldenburg, 10/2003 – 07/2005

### Honors & Awards

**EGU 2016 Outstanding Young Scientist Award of the "Climate: Past, Present & Future (CL)" Division**

**NOAA Climate & Global Change postdoctoral fellowship** recipient 2016 (alumni class 26)

**EGU 2016 Outstanding Student Poster and PICO (OSPP) Award of the "Nonlinear Processes in Geosciences (NP)" Division**

**Best Student Presentation**, ENSO workshop at the University of New South Wales, 2015

**M.Sc. degree: Excellent with Distinction** (highest grade awarded by the University), 2009

### Academic Appointments

**NOAA Climate & Global Change postdoctoral fellow**, Department of Atmospheric Sciences, University of Washington, 11/2016 – Present

**Research Affiliate**, Department of Atmospheric Sciences, UH Mānoa, 12/2016 – Present

**NOAA Affiliate**, Geophysical Fluid Dynamics Laboratory (GFDL), 08/2015 – 08/2017

**Postdoctoral Researcher**, Department of Atmospheric Sciences, UH Mānoa, 06/2015 – 11/2016

**Research Assistant**, Department of Atmospheric Sciences, UH Mānoa, 01/2011 – 05/2015

**Research Assistant**, Coastal Marine Group, University of Waikato, 10/2009 – 10/2010

**Research Assistant**, Department of Oceanography, UH Mānoa, 01/2009 – 09/2009

**Research Assistant**, Institute for Chemistry and Biology of the Marine Environment, C.v.O. University Oldenburg, 03/2008 – 09/2008

### Awarded Research Funding

2016 – 2018: NOAA Climate & Global Change fellowship (6.4% acceptance rate in 2016): ~145k USD + benefits

2015: Bjerknes visiting fellowship, Bjerknes Centre, University of Bergen

2011 – Present: numerous travel grants

2006 – 2007: Floyd and Lili Biava foundation fellowship, Carl von Ossietzky University Oldenburg

### Temporary Research Stays

ICCP, Pusan National University, Host: Axel Timmermann, 02/2017

Nanjing University of Information Science & Technology (NUIST), Host: Wenjun Zhang, 08/2016

China Meteorological Administration (CMA), Host: Hong-Li Ren, 07/2016 – 08/2016

Bjerknes Centre, University of Bergen, Host: Odd Helge Otterå, 09/2015 – 10/2015

GFDL, Princeton, Host: Andrew Wittenberg, 08/2015

AORI, University of Tokyo, Host: Masahiro Watanabe, 06/2015

## Publications

### Published or accepted peer-reviewed articles

23. Geng, X., W. Zhang, F.-F. Jin, and **M. F. Stuecker** (2017): A new method for interpreting nonstationary running correlations and its application to the ENSO-EAWM relationship, *Geophys. Res. Lett.*, In Press
22. Kang, S. M., K. Park, F.-F. Jin, and **M. F. Stuecker** (2017), Common warming pattern emerges irrespective of forcing location, *J Adv Model Earth Sy*, doi:10.1002/2017MS001083
21. **Stuecker, M. F.**, C. M. Bitz, and K. C. Armour (2017), Conditions leading to the unprecedented low Antarctic sea ice extent during the 2016 austral spring season, *Geophys. Res. Lett.*, doi:10.1002/2017GL074691
20. Geng, X., W. Zhang, **M. F. Stuecker**, and F.-F. Jin (2017), Strong sub-seasonal wintertime cooling over East Asia and Northern Europe associated with super El Niño events, *Scientific Reports*, **7**:3770, doi:10.1038/s41598-017-03977-2
19. **Stuecker, M. F.**, A. Timmermann, F.-F. Jin, Y. Chikamoto, W. Zhang, A. T. Wittenberg, E. Widiastih, and S. Zhao (2017), Revisiting ENSO/Indian Ocean Dipole phase relationships, *Geophys. Res. Lett.*, **44**, doi:10.1002/2016GL072308
18. Levine, A. F. Z., F.-F. Jin, and **M. F. Stuecker** (2017), A simple approach to quantifying the noise-ENSO interaction. Part II: the role of coupling between the warm Pool and equatorial zonal wind anomalies, *Clim Dyn*, **48**, 19–37, doi:10.1007/s00382-016-3268-3
17. Geng, X., W. Zhang, **M. F. Stuecker**, P. Liu, F.-F. Jin, and G. Tan (2016), Decadal modulation of the ENSO-East Asian winter monsoon relationship by the Atlantic Multidecadal Oscillation, *Clim Dyn*, doi:10.1007/s00382-016-3465-0
16. Zhang, W., F.-F. Jin, **M. F. Stuecker**, A. T. Wittenberg, A. Timmermann, H.-L. Ren, J.-S. Kug, W. Cai, and M. Cane (2016), Unraveling El Niño's Impact on the East Asian Monsoon and Yangtze River Summer Flooding, *Geophys. Res. Lett.*, doi:10.1002/2016GL071190
15. **Stuecker, M. F.**, F.-F. Jin, A. Timmermann, and S. McGregor (2016), Reply to "Comments on 'Combination Mode Dynamics of the Anomalous Northwest Pacific Anticyclone'", *J. Climate*, **29**, 4695–4706, doi:10.1175/JCLI-D-15-0558.1
14. Zhang, W., H. Li, **M. F. Stuecker**, F.-F. Jin, and A. G. Turner (2016), A New Understanding of El Niño's Impact over East Asia: Dominance of the ENSO Combination Mode, *J. Climate*, **29**, 4347–4359, doi:10.1175/JCLI-D-15-0104.1
13. **Stuecker, M. F.**, F.-F. Jin, and A. Timmermann (2015), El Niño-Southern Oscillation frequency cascade, *Proceedings of the National Academies of the Sciences*, **112**, 13490–13495, doi: 10.1073/pnas.1508622112
12. **Stuecker, M. F.**, A. Timmermann, J. Yoon, and F.-F. Jin (2015), Tropospheric Biennial Oscillation (TBO) indistinguishable from white noise, *Geophys. Res. Lett.*, **42**, 7785–7791, doi: 10.1002/2015GL065878
11. Zhang, W., Y. Wang, F.-F. Jin, **M. F. Stuecker**, and A. G. Turner (2015), Impact of different El Niño types on the El Niño/IOD relationship, *Geophys. Res. Lett.*, **42**, 8570–8576, doi: 10.1002/2015GL065703
10. Ren, H.-L., J. Zuo, F.-F. Jin, and **M. F. Stuecker** (2015), ENSO and annual cycle interaction: The combination mode representation in CMIP5 models, *Clim Dyn*, **46**, 3753–3765, doi: 10.1007/s00382-015-2802-z
9. Zhang, W., H. Li, F.-F. Jin, **M. F. Stuecker**, A. G. Turner, and N. Klingaman (2015), The Annual-Cycle Modulation of Meridional Asymmetry in ENSO's Atmospheric Response and Its Dependence on ENSO Zonal Structure, *J. Climate*, **28**, 5795–5812, doi:10.1175/JCLI-D-14-00724.1
8. **Stuecker, M. F.**, F.-F. Jin, A. Timmermann, and S. McGregor (2015), Combination Mode Dynamics of the Anomalous Northwest Pacific Anticyclone, *J. Climate*, **28**, 1093–1111, doi:10.1175/JCLI-D-14-00225.1
7. McGregor, S., A. Timmermann, **M. F. Stuecker**, M. H. England, M. Merrifield, F.-F. Jin, and Y. Chikamoto (2014), Recent Walker circulation strengthening and Pacific cooling amplified by Atlantic warming, *Nature Climate Change*, **4**, 888–892, doi:10.1038/nclimate2330
6. Stein, K., A. Timmermann, N. Schneider, F.-F. Jin, and **M. F. Stuecker** (2014), ENSO seasonal synchronization theory, *J. Climate*, **27**, 5285–5310, doi:http://dx.doi.org/10.1175/JCLI-D-13-00525.1
5. Widlansky, M., A. Timmermann, S. McGregor, **M. F. Stuecker**, and W. Cai (2014), An inter hemispheric tropical sea level seesaw due to El Niño Taimasa, *J. Climate*, **27**, 1070–1081, doi:10.1175/JCLI-D-13-00276.1
4. Ren, Hong-Li, F.-F. Jin, **M. F. Stuecker**, and R. Xie (2013), ENSO Regime Change since the Late 1970s as Manifested by Two Types of ENSO, *Journal of the Meteorological Society of Japan*, **91**, 835–842, doi:10.2151/jmsj.2013-608
3. **Stuecker, M. F.**, A. Timmermann, F.-F. Jin, S. McGregor, and H.-L. Ren (2012), A Combination Mode of Annual Cycle and the El Niño - Southern Oscillation, *Nature Geoscience*, **6**, 540–544, doi:10.1038/ngeo1826
2. McGregor, S., A. Timmermann, N. Schneider, **M. F. Stuecker**, and M. H. England (2012), The effect of the South Pacific Convergence Zone on the termination of El Niño events and the meridional asymmetry of ENSO, *J. Climate*, **25**, 5566–5586, doi:10.1175/JCLI-D-11-00332.1
1. **Stuecker, M. F.**, and R. E. Zeebe (2010), Ocean chemistry and atmospheric CO<sub>2</sub> sensitivity to carbon perturbations throughout the Cenozoic, *Geophys. Res. Lett.*, **37**, L03609, doi:10.1029/2009GL041436

*In Review*

7. Park, K., S. M. Kang, D. Kim, **M. F. Stuecker**, and F.-F. Jin: Contrasting local and remote effects of surface heating on polar warming and amplification
6. Zhang, W., Z. Wang, **M. F. Stuecker**, A. G. Turner, F.-F. Jin, and X. Geng: Impact of ENSO longitudinal position on teleconnections to the NAO
5. McGregor, S., **M. F. Stuecker**, J. B. Kajtar, M. H. England, and M. Collins: Model Tropical Atlantic biases underpin diminished Pacific decadal variability
4. **Stuecker, M. F.**: Revisiting the Pacific Meridional Mode
3. Timmermann, A., S.-I. An, J.-S. Kug, F.-F. Jin, W. Cai, A. Capotondi, K. Cobb, M. Lengaigne, M. J. McPhaden, **M. F. Stuecker**, K. Stein, A. Wittenberg, K.-S. Yun, T. Bayr, H.-C. Chen, Y. Chikamoto, B. Dewitte, D. Dommenges, P. Grothe, E. Guilyardi, Y.-G. Ham, M. Hayashi, S. Ineson, D. Kang, S. Kim, W. M. Kim, J.-Y. Lee, T. Li, J.-J. Luo, S. McGregor, Y. Planton, S. Power, H. Rashid, H.-L. Ren, A. Santoso, K. Takahashi, A. Todd, G. Wang, G. Wang, R. Xie, W.-H. Yang, S.-W. Yeh, J. Yoon, E. Zeller, and X. Zhang: El Niño-Southern Oscillation Complexity
2. **Stuecker, M. F.**, M. Tigchelaar, and M. B. Kantar: Climate variability differentially impacts rice production systems in the Philippines depending on temporal and spatial scale
1. Zhao, S., F.-F. Jin, and **M. F. Stuecker**: Improved predictability of the Indian Ocean Dipole using seasonally modulated ENSO forcing

## Presentations

*Invited Seminars (19 since 2012)*

**University of Washington**, School of Oceanography, 04/2017. **New York University (NYU)**, Courant Institute of Mathematical Sciences, 04/2017. **Pohang University of Science and Technology (POSTECH)**, 03/2017. **Ulsan National Institute for Science and Technology (UNIST)**, 03/2017. **IBS Center for Climate Physics (ICCP)**, 02/2017. **University of Washington**, Department of Atmospheric Sciences, 01/2017. **China Meteorological Administration (CMA)**, 07/2016. **University of Hawai'i at Mānoa**, Department of Atmospheric Sciences, 05/2016. **Max-Planck-Institute for Meteorology**, 04/2016. **University of Hawai'i at Mānoa**, Department of Atmospheric Sciences, 11/2015. **University of Bergen**, Bjerknes Centre for Climate Research, 10/2015. **Columbia University**, Lamont-Doherty Earth Observatory, 09/2015. **Geophysical Fluid Dynamics Laboratory (GFDL)**, 08/2015. **University of Tokyo**, Atmosphere and Ocean Research Institute (AORI), 06/2015. **University of Tokyo**, Research Center for Advanced Science and Technology (RCAST), 06/2015. **University of New South Wales**, Climate Change Research Centre (CCRC), 02/2015. **University of Hawai'i at Mānoa**, Department of Meteorology, 12/2014. **University of Bergen**, Bjerknes Centre for Climate Research, 9/2013. **University of Hawai'i at Mānoa**, Department of Meteorology, 4/2012.

*Oral Conference and Workshop Presentations*

17. Revisiting the interpretation of lead/lag correlations as exemplified by the relationship between ENSO and the Indian Ocean Dipole, Tropical interbasin interactions workshop, Xiamen, China, 01/2018, **(invited talk)**
16. Seasonal ENSO dynamics, teleconnections and predictability, ENSO complexity workshop, ICCP, South Korea, 10/2017 **(invited 30 min talk)**
15. ENSO as a potential source for global seasonal climate predictability: From Yangtze River flooding events to Indian Ocean Dipole variability to the 2016 extreme low Antarctic sea ice extent, 16<sup>th</sup> CTWF International Symposium on Advances in Seasonal to Decadal Prediction, Beijing, China, 09/2017 **(invited 30 min talk)**
14. Cause of the unprecedented low Antarctic sea ice extent during the 2016 austral spring season, sea ice prediction workshop, University of Washington, Seattle, USA, 07/2017
13. Interconnected climate variability in the Pacific and Indian Oceans, SIAM Conference on Applications of Dynamical Systems, Snowbird, USA, 05/2017 **(invited mini symposium talk)**
12. El Niño And The East Asian Monsoon: Unraveling The Roles Of The Annual Cycle And Air/Sea Interactions, AGU Fall Meeting, San Francisco, USA, 12/2016
11. The El Niño-Southern Oscillation Frequency Cascade, EGU General Assembly, Vienna, Austria, 04/2016 **(invited talk for the Outstanding Young Scientist Award)**
10. Tropospheric Biennial Oscillation (TBO) indistinguishable from white noise, EGU General Assembly, Vienna, Austria, 04/2016
9. The El Niño-Southern Oscillation Frequency Cascade, AMS 96th Annual Meeting, New Orleans, USA, 01/2016
8. Tropospheric Biennial Oscillation (TBO) indistinguishable from white noise, AMS 96th Annual Meeting, New Orleans, USA, 01/2016
7. Mathematical peculiarities of El Niño, Mathematics and Climate Research Network (MCRN) annual meeting, Chapel Hill, North Carolina, USA, 09/2014 **(invited talk)**
6. Combination Mode Dynamics of the Indo-Pacific Response to the El Niño-Southern Oscillation, 11th Asia Oceania Geosciences Society (AOGS) annual meeting, Sapporo, Japan, 07/2014

5. Combination Mode of Annual Cycle and the El Niño - Southern Oscillation: Genesis, Impacts and attribution of air/sea coupling, Ocean Sciences Meeting, Honolulu, USA, 02/2014
4. Combination Mode of Annual Cycle and the El Niño - Southern Oscillation, Tropical Weather and Climate Dynamics (TWCD) Workshop in Honolulu, USA, 10/2013
3. A Combination Mode of Annual Cycle and the El Niño - Southern Oscillation, Third CLIVAR Workshop on the Evaluation of ENSO Processes in Climate Models, Hobart, Australia, 01/2013
2. The role of atmospheric nonlinearity in the phase-transition of ENSO, Summer Workshop on ENSO at the University of Hawai'i at Mānoa, USA, 06/2012
1. The impact of the South Pacific Convergence Zone on the phase transition of ENSO - Insights from CGCM results, 10th International Conference on Southern Hemisphere Meteorology and Oceanography (ICSHMO10), New Caledonia, 04/2012

### Poster Presentations

10. *upcoming*: Conditions leading to the unprecedented low Antarctic sea ice extent during the 2016 austral spring season, Ocean Sciences Meeting, Portland, USA, 02/2018
9. Cause of the unprecedented low Antarctic sea ice extent during the 2016 austral spring season, AGU Fall Meeting, New Orleans, USA, 12/2017
8. El Niño And The East Asian Monsoon: Unraveling The Roles Of The Annual Cycle And Air/Sea Interactions, AMS 97th Annual Meeting, Seattle, USA, 01/2017
7. The ENSO frequency cascade, AOGS 2016 annual meeting, Beijing, China, 08/2016
6. Tropospheric Biennial Oscillation (TBO) indistinguishable from white noise, AOGS 2016 annual meeting, Beijing, China, 08/2016
5. El Niño-Southern Oscillation frequency cascade, EGU General Assembly, Vienna, Austria, 04/2016 (**Outstanding Student Poster and PICO (OSPP) Award**)
4. A new framework explaining linkages between ENSO and the Monsoon, Monsoons and the ITCZ: the annual cycle in the Holocene and the future workshop at Columbia University, New York, USA, 09/2015
3. New insights in the genesis and persistence of the anomalous low-level North-West Pacific Anticyclone, ENSO workshop at the University of New South Wales, Sydney, Australia, 02/2015 (**Best Student Presentation Award**)
2. A combination mode of annual cycle and the El Niño-Southern Oscillation: Genesis, impacts and attribution of air/sea coupling, The Latsis Symposium 2014: Atmosphere and Climate Dynamics, Zuerich, Switzerland, 06/2014
1. Evidence for combination tones between the El Niño - Southern Oscillation and the Annual Cycle, AGU Fall Meeting, San Francisco, USA, 12/2012

### Synergistic Activities

**Member and contributor** in the Mathematics and Climate Research Network (MCRN): facilitating collaborations between climate scientists and mathematicians, giving talks, organizing a "hackathon", since 09/2014

**Local Organizing Committee:** ENSO workshop at the University of Hawai'i at Mānoa (06/2012), PCC workshop "Using past observations to constrain future climate variability and change" (proposed for 02/2018)

**Convener:** ENSO dynamics, observations, and predictability in light of the recent 2015/16 El Niño (AGU 2016); Dynamics, Prediction, Impacts and Changes of ENSO (AOGS 2016), El Niño complexity and change (proposed for AOGS 2018)

**Chair:** ENSO dynamics, observations, and predictability in light of the recent 2015/16 El Niño (AGU 2016); Dynamics, Prediction, Impacts and Changes of ENSO (AOGS 2016); Decadal Variability and Predictability (AMS 2017)

**Reviewer:** National Science Foundation, Nature Geoscience, Nature Climate Change, Nature Communications, Geophysical Research Letters, Journal of Climate, Journal of Geophysical Research - Atmospheres, Climate Dynamics, Theoretical and Applied Climatology

**Outreach Volunteer:** SOEST open house science demonstrations ("Weather in a tank") - 10/2013, SOEST open house: green screen demonstrations - 10/2015, Interview with Radio New Zealand about El Niño predictability and impacts (Airing date: 25. July 2013; 20 minutes), ClimateSnack Blog contributing author, ClimateFeedback.org contributing reviewer

**Outreach Consultant:** Scientific advise for a general audience science publication ("Ozeanbuch Klimawandel" by Esther Gonstalla, publication in May 2016 in Germany; planned translation to Japanese)

**Aid work Volunteer:** Exploring the possibilities of low-technology sustainable aquaculture in rural Indonesia (Lombok, Indonesia), 03/2007 - 08/2007

### Teaching Experience

**Invited Guest Instructor:** "Exploring the Atmospheric Sciences" (ATMS 220), University of Washington summer quarter 2017 and fall quarter 2017

**Substitute Instructor:** "Climate Modeling" (ATM S 559), University of Washington spring quarter 2017, Instructor: Cecilia Bitz

**Substitute Instructor:** invited guest lecture in special topics graduate course on ENSO dynamics, Pusan National University (PNU) spring semester 2017, Instructor: June-Yi Lee

**Substitute Instructor:** "Climate modeling, Data Analysis and Applications (ATMO 752)", UH Manoa fall semester 2016, Instructor: Christina Karamperidou

**Instructor:** tutorials on "Geospatial data analysis with Ferret" during MCRN annual meeting (09/2014) and ACDC summer school (08/2013)

**Teaching Assistant:** Undergraduate Mathematics, Institute for Chemistry and Biology of the Marine Environment, Carl von Ossietzky University, Spring semesters 2005 and 2006

**Assistant Teacher:** special school for the blind and visually impaired (von-Vincke-Schule), Germany, 09/2001–07/2002

### Other Academic Training

**Participant:** PCC Summer Institute: "Population Health and Climate Change", Friday Harbor, USA, 09/2017

**Participant:** STATMOS/SAMSI workshop on climate statistics at NCAR, Boulder, USA, 07/2017

**Participant:** Mathematics and Climate Research Network (MCRN) annual meeting in Philadelphia, USA, 09/2016

**Participant:** Mathematics and Climate Research Network (MCRN) annual meeting in Chapel Hill, USA, 09/2014

**Participant:** Sustainable Climate Risk Management (SCRiM) summer school at Penn state University, USA, 08/2014

**Participant:** Alpine summer school "Dynamics, Stochastics and Predictability of the Climate System" in Valsavarenche, Italy, 06/2014

**Participant:** Advanced Climate Dynamics Course (ACDC) "Dynamics of the Last Deglaciation" in Nyksund, Norway, 08/2013

**Participant:** NCAR Community Earth System Model tutorial in Boulder, USA, 07/2012

**Internship:** ASR Ltd. (Marine Consulting, New Zealand), 08/2006 – 01/2007

### Research Cruise Participant

RV Kilo Moana (Hawai'ian Islands), 01/2009

RV Heincke (North Sea), 03/2006

RV Heincke (North Sea), 03/2005

Various measuring campaigns on small vessels in Germany, Australia, and New Zealand, 2003 – 2010

### Professional Societies & Associations

American Geophysical Union (AGU), Asia Oceania Geosciences Society (AOGS), Mathematics and Climate Research Network (MCRN), European Geosciences Union (EGU), American Meteorological Society (AMS), CLIVAR Early Career Scientist Network

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