

# Ian Eisenman

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## Research Description

Interests: Climate dynamics, including sea ice, paleoclimate, icebergs, and large-scale circulations of the atmosphere and ocean.

Approach: Construction and mathematical analysis of idealized physical models, numerical simulations using climate models with varying degrees of complexity, and analysis of observations.

## Preparation and Appointments

Assoc Professor	UC San Diego	Scripps Inst. Oceanogr.	2017–present	
Asst Professor	UC San Diego	Scripps Inst. Oceanogr.	2012–2017	
Postdoc	Caltech Univ. Washington	Environ. Sci. and Eng. Atmospheric Sci.	2008–2012	Hosts: Tapio Schneider & David Battisti
Ph.D.	Harvard University	Earth and Planet. Sci.	2008	Advisor: Eli Tziperman
S.M.	Harvard University	Applied Mathematics	2005	
M.A.	UC Santa Barbara	Physics	2002	
B.A.	Williams College	Philosophy and Physics	1999	

## Fellowships and Honors

Scripps Institution of Oceanography Graduate Teacher of the Year Award, 2017.

Hellman Fellowship, 2016–2017.

AGU Cryosphere Young Investigator Award, 2012.

Jerome Namias endowed faculty chair, Scripps Institution of Oceanography, 2012–present.

Chapman Chair Lecturer, University of Alaska Fairbanks, 2010.

NOAA Climate and Global Change Postdoctoral Fellowship, 2008–2011.

Caltech TPF Foundation Postdoctoral Fellowship, 2008–2011.

Woods Hole Oceanographic Institution Geophysical Fluid Dynamics Fellowship, 2006.

NASA Earth System Science Graduate Student Fellowship, 2005–2008.

Harvard University Certificate of Distinction in Teaching, 2004.

UC Santa Barbara Dept of Physics Outstanding Teaching Assistant Award, 2000–2001.

U.S. Department of Education Robert C. Byrd Scholarship, 1995–1999.

## Publications

[Members of group are underlined.]

- [37] K. Pistone, I. Eisenman, and V. Ramanathan (2019). Climate forcing of an ice-free Arctic Ocean. Submitted.
- [36] J. Rae, R. Wills, I. Eisenman, W. Gray, B. Taylor (2019). Glacial North Pacific warming and nutrient limitation driven by enhanced overturning circulation. Submitted.
- [35] T.J.W. Wagner, R. Dell, I. Eisenman, R. Keeling, L. Padman, and J. Severinghaus (2018). Wave inhibition by sea ice enables trans-Atlantic ice rafting of debris during Heinrich Events. *Earth Planet Sci Lett* 495, 157-163. ([pdf](#))
- [34] S. Sun, I. Eisenman, and A. Stewart (2018). Does Southern Ocean surface forcing shape the global ocean overturning circulation? *Geophys Res Lett* 45, 2413-2423. ([pdf](#))
- [33] T.J.W. Wagner, A. Stern, R. Dell, and I. Eisenman (2017). On the representation of capsizing in iceberg models. *Ocean Modelling* 117, 88-96. ([pdf](#))
- [32] T.J.W. Wagner and I. Eisenman (2017). How climate model biases skew the distribution of iceberg meltwater. *Geophys Res Lett* 44, GL071645. ([pdf](#))
- [31] T.J.W. Wagner, R. Dell, and I. Eisenman (2017). An analytical model of iceberg drift. *J Phys Oceanogr* 47, 1605-1616. ([pdf](#))
- [30] C. Strong, D. Foster, E. Cherkaev, I. Eisenman, and K. Golden (2017). On the definition and analysis of the width of the marginal ice zone. *J Atmos Oceanic Technol* 34, 1565-1584. ([pdf](#))
- [29] E. Rosenblum and I. Eisenman (2017). Sea ice trends in climate models only accurate in runs with biased global warming. *J Climate* 30, 6265-6278. ([pdf](#))
- [28] E. Rosenblum and I. Eisenman (2016). Faster Arctic sea ice retreat in CMIP5 than in CMIP3 due to volcanoes. *J Climate* 29, 9179-9188. ([pdf](#))
- [27] S. Sun, I. Eisenman, and A. Stewart (2016). The influence of Southern Ocean surface buoyancy forcing on glacial-interglacial changes in the global deep ocean stratification. *Geophys Res Lett* 43, 8124-8132. ([pdf](#))
- [26] J. Jones, S. Gille, H. Goosse, N. Abram, P. Canziani, D. Charman, K. Clem, X. Crosta, C. de Lavergne, I. Eisenman, M. England, R. Fogt, L. Frankcombe, G. Marshall, V. Masson-Delmotte, A. Morrison, A. Orsi, M. Raphael, J. Renwick, D. Schneider, G. Simpkins, E. Steig, B. Stenni, D. Swingedouw, T. Vance (2016). Assessing recent trends in high-latitude Southern Hemisphere surface climate. *Nature Climate Change* 6, 917-926. ([pdf](#))
- [25] T.J.W. Wagner and I. Eisenman (2015). False alarms: How early warning signals falsely predict abrupt sea ice loss. *Geophys Res Lett* 42, 10333-10341. ([pdf](#))
- [24] T.J.W. Wagner and I. Eisenman (2015). How climate model complexity influences sea ice stability. *J Climate* 28, 3998-4014. ([pdf](#))
- [23] J. Zhu, Z. Liu, X. Zhang, I. Eisenman, and W. Liu (2014). Linear weakening of the AMOC in response to receding glacial ice sheets in CCSM3. *Geophys Res Lett* 41, 6252-6258. ([pdf](#))

- [22] R. Ewing, I. Eisenman, M. Lamb, L. Poppick, A. Maloof, and W. Fischer (2014). New constraints on equatorial temperatures during a Late Neoproterozoic snowball Earth glaciation. *Earth Planet Sci Lett* 406, 110-122. ([pdf](#))
- [21] L. Li, A. Miller, J. McClean, I. Eisenman, and M. Hendershott (2014). Processes driving sea ice variability in the Bering Sea in an eddying ocean/sea ice model: anomalies from the mean seasonal cycle. *Ocean Dynamics* 64, 1693-1717. ([pdf](#))
- [20] L. Li, J. McClean, A. Miller, I. Eisenman, M. Hendershott, and C. Papadopoulos (2014). Processes driving sea ice variability in the Bering Sea in an eddying ocean/sea ice model: mean seasonal cycle. *Ocean Modelling* 84, 51-66. ([pdf](#))
- [19] I. Eisenman, W. Meier, and J. Norris (2014). A spurious jump in the satellite record: has Antarctic sea ice expansion been overestimated? *The Cryosphere* 8, 1289-1296. ([pdf](#))
- [18] K. Pistone, I. Eisenman, and V. Ramanathan (2014). Observational determination of albedo decrease caused by vanishing Arctic sea ice. *Proc Natl Acad Sci USA* 111, 3322-3326. ([pdf](#))
- [17] T. Merlis, T. Schneider, S. Bordoni, and I. Eisenman (2013). The tropical precipitation response to orbital precession. *J Climate* 26, 2010-2021. ([pdf](#))
- [16] T. Merlis, T. Schneider, S. Bordoni, and I. Eisenman (2013). Hadley circulation response to orbital precession. Part II: Subtropical continent. *J Climate* 26, 754-771. ([pdf](#))
- [15] T. Merlis, T. Schneider, S. Bordoni, and I. Eisenman (2013). Hadley circulation response to orbital precession. Part I: Aquaplanets. *J Climate* 26, 740-753. ([pdf](#))
- [14] I. Eisenman (2012). Factors controlling the bifurcation structure of sea ice retreat. *J Geophys Res-Atmos* 117, D01111. ([pdf](#))
- [13] K. Armour, I. Eisenman, E. Blanchard-Wrigglesworth, K. McCusker, and C. Bitz (2011). The reversibility of sea ice loss in a state-of-the-art climate model. *Geophys Res Lett* 38, L16705. ([pdf](#))
- [12] S. Finnegan, K. Bergmann, J. Eiler, D. Jones, D. Fike, I. Eisenman, N. Hughes, A. Tripathi, and W. Fischer (2011). The magnitude and duration of Late Ordovician-Early Silurian glaciation. *Science* 331, 903-906. ([pdf](#))
- [11] I. Eisenman, T. Schneider, D. Battisti, and C. Bitz (2011). Consistent changes in the sea ice seasonal cycle in response to global warming. *J Climate* 24, 5325-5335. ([pdf](#))
- [10] Y. Ashkenazy, I. Eisenman, H. Gildor, and E. Tziperman (2010). The effect of Milankovitch variations in insolation on equatorial seasonality. *J Climate* 23, 6133-6142. ([pdf](#))
- [9] D. Abbot, I. Eisenman, and R. Pierrehumbert (2010). The importance of ice vertical resolution for snowball climate and deglaciation. *J Climate* 23, 6100-6109. ([pdf](#))
- [8] I. Eisenman (2010). Geographic muting of changes in the Arctic sea ice cover. *Geophys Res Lett* 37, L16501. ([pdf](#))
- [7] I. Eisenman, C. Bitz, and E. Tziperman (2009). Rain driven by receding ice sheets as a cause of past climate change. *Paleoceanography* 24, PA4209. ([pdf](#))
- [6] I. Eisenman and J.S. Wettlaufer (2009). Nonlinear threshold behavior during the loss of Arctic

sea ice. *Proc Natl Acad Sci USA* 106, 28-32. ([pdf](#))

- [5] [I. Eisenman](#), N. Untersteiner, and J.S. Wettlaufer (2008). Reply to comment by E. T. DeWeaver et al. on “On the reliability of simulated Arctic sea ice in global climate models”. *Geophys Res Lett* 35, L04502. ([pdf](#))
- [4] G. Gebbie, [I. Eisenman](#), A. Wittenberg, and E. Tziperman (2007). Modulation of westerly wind bursts by sea surface temperature: a semistochastic feedback for ENSO. *J Atmos Sci* 64, 3281-3295. ([pdf](#))
- [3] [I. Eisenman](#), N. Untersteiner, and J.S. Wettlaufer (2007). On the reliability of simulated Arctic sea ice in global climate models. *Geophys Res Lett* 34, L10501. ([pdf](#))
- [2] [I. Eisenman](#), L. Yu, and E. Tziperman (2005). Westerly wind bursts: ENSO’s tail rather than the dog? *J Climate* 18, 5224-5238. ([pdf](#))
- [1] [I. Eisenman](#) (2005). Non-normal effects on salt finger growth. *J Phys Oceanogr* 35, 616-627. ([pdf](#))

### **Non-refereed**

- T.J.W. Wagner, R. Dell, and I. Eisenman (2017). The influence of winds versus ocean currents on iceberg drift. *B Am Meteorol Soc* 98, 2050-2051. ([pdf](#))
- K. Pistone, I. Eisenman, and V. Ramanathan (2014). Reply to Legates et al.: Negligible role of Arctic cloud albedo changes in observed darkening. *Proc Natl Acad Sci USA* 111, E2159-E2159. ([pdf](#))
- I. Eisenman and J.S. Wettlaufer (2009). Is Arctic sea ice approaching a tipping point? *B Am Meteorol Soc* 90, 1605-1606. ([pdf](#))
- I. Eisenman (2008). Abrupt climate change: North Atlantic volatility during the last ice age and modern Arctic sea ice retreat. PhD thesis, *Harvard University*, 138 pages.
- G. Gebbie, I. Eisenman, A. Wittenberg, and E. Tziperman (2007). Could ocean-modulated wind bursts lead to better El Niño forecasts? *B Am Meteorol Soc* 88, 1356-1357. ([pdf](#))
- I. Eisenman (2007). Arctic catastrophes in an idealized sea ice model. In *2006 Program of Study: Ice (Geophysical Fluid Dynamics Program)*, pp. 133-161. Woods Hole Oceanog Inst Tech Rept 2007-02. ([pdf](#))
- P. Huybers and I. Eisenman (2006). Integrated summer insolation calculations. *NOAA/NCDC Paleoclimatology Program*, Data Contribution Series #2006-079. ([url](#))
- T. Sasseen, I. Eisenman, and K. Mason (2002). New constraints on galaxy evolution from the optical monitor on XMM-Newton. In *New Visions of the X-ray Universe in the XMM-Newton and Chandra Era*, ed. F. Jansen, European Space Agency SP-488. ([pdf](#))

## **Advising**

### *PhD students*

Erica Rosenblum (2013-2018)

Shantong Sun (2014-present)

Emma Beer (2018-present)

*Postdoctoral scholars*

Rebecca Dell (2013-2014)

Till Wagner (2013-2017)

## **Selected Recent Presentations**

(2018) AGU Fall Meeting (*talk*)

(2018) NYU Courant Institute of Mathematical Sciences (*invited seminar*)

(2018) MIT PAOC Colloquium (*invited seminar*)

(2018) SIAM Conference on Mathematics of Planet Earth (*invited talk*)

(2018) UCSB Kavli Institute for Theoretical Physics (*invited talk*)

(2017) AGU Fall Meeting (*talk*)

(2017) Cambridge University Isaac Newton Institute of Mathematical Sciences (*invited talk*)

(2017) Oxford University (*seminar*)

(2017) University of Oregon (*invited seminar*)

(2016) UCSD Dept of Mechanical and Aerospace Engineering (*invited seminar*)

(2016) CLIVAR PSMI Meeting (*invited talk*)

(2016) Barrow Sea Ice Camp (*invited workshop presentation*)

(2016) Woods Hole Oceanographic Institution (*invited seminar*)

(2016) Harvard University (*seminar*)

(2016) UCLA (*invited seminar*)

(2016) University of Washington (*invited seminar*)

(2016) American Mathematical Society Joint Mathematics Meeting (*invited talk*)

(2015) PIMS Conference on the Mathematics of Sea Ice (*talk*)

(2015) SIAM Geosciences Meeting (*invited talk*)

(2015) Canadian Meteorology and Oceanography Society Meeting (*talk*)

(2015) World Climate Research Program (WCRP) Southern Ocean variability workshop (*talk*)

(2014) AGU Fall Meeting (*invited talk*)

(2014) Caltech (*invited seminar*)

(2014) University of Toronto (*invited seminar*)

(2014) ETH Zurich (*invited seminar*)

- (2014) NSF Mathematics and Climate Research Network (*invited seminar*)
- (2014) UC Irvine (*invited seminar*)
- (2013) Yale University (*invited seminar*)
- (2013) SIO Institutional Seminar (*local seminar*)
- (2013) US National Academy of Sciences Arctic/mid-latitude climate workshop (*invited*)
- (2013) SIAM Annual Meeting (*invited talk*)
- (2013) AMS Polar Meteorology & Oceanography meeting (*talk and poster*)
- (2013) SIAM Dynamic Systems conference (*invited talk*)
- (2013) US National Academy of Sciences abrupt climate change meeting (*invited talk*)
- (2012) AGU Fall Meeting (*talk*)
- (2012) SIO CASPO seminar (*local seminar*)
- (2012) NOAA Climate & Global Change Summer Institute (*talk*)
- (2012) University of British Columbia (*invited seminar*)

## **Selected Recent Professional Service**

- (2018) Helped prepare and present a course on climate science curricula for 6th grade teachers at the California Science Teachers Association annual conference.
- (2017) Co-convened session at AGU Fall Meeting.
- (2015) Co-organized “Mathematics of Sea Ice” conference at Pacific Institute for Mathematical Sciences (PIMS), Vancouver.
- (2015) Co-organized AMS Polar Meteorology and Oceanography Meeting, Whistler.
- (2013) Co-organized AMS Polar Meteorology and Oceanography Meeting, Seattle.
- (2008-2017) Member of AMS Polar Meteorology and Oceanography Committee.

Reviewer for *Science*, *Nature*, *Science Advances*, *Nature Geoscience*, *Nature Climate Change*, *Nature Communications*, *Scientific Reports* (Nature), *Proceedings of the National Academy of Sciences USA*, *Journal of Climate*, *Geophysical Research Letters*, *The Cryosphere* (EGU), *Paleoceanography*, *Journal of Geophysical Research–Oceans*, *Journal of Geophysical Research–Atmospheres*, *Quarterly Journal of the Royal Meteorology Society*, *Proceedings of the Royal Society A*, *SIAM Journal on Applied Dynamical Systems*, *Earth System Dynamics* (EGU), *Environmental Research Letters*, *Climate Dynamics*, *Current Climate Change Reports*, *PLoS ONE*, *Monthly Weather Review*, *Earth’s Future* (AGU), *Remote Sensing* (MDPI), NSF, Israel Science Foundation, and European Research Council.