Gabriel A. Vecchi – NOAA/GFDL, Princeton, NJ, USA - 609-452-6583, Gabriel.A.Vecchi@noaa.gov

Research Interests

Tropical climate dynamics.

Ocean/atmosphere dynamics and coupling.

Impact of climate change and variability on extreme events.

Predictability and prediction of climate and its impacts.

Education

Ph.D. Physical Oceanography
Apr., 2000 University of Washington Seattle, WA
Thesis title: "Sub-seasonal wind variability and El Niño"

M.S. Applied Mathematics
Feb. 1999 University of Washington Seattle, WA

M.S. Physical Oceanography
Dec. 1996 University of Washington Seattle, WA

B.A. Mathematics
May 1994 Rutgers University New Brunswick, NJ

Professional Experience

Jun. 2006 – Present Research Oceanographer Princeton, NJ
NOAA – Geophysical Fluid Dynamics Laboratory

May 2012 – Present Lecturer Princeton, NJ
Princeton University, Dept. of Geosciences, Progr. in Atmospheric and Oceanic Sciences

May. 2010 – Sep. 2011 Visiting Research Collaborator Princeton, NJ
Princeton University, Program in Atmospheric and Oceanic Sciences

Nov. 2003 – Jun. 2006 UCAR Visiting Scientist Princeton, NJ
NOAA – Geophysical Fluid Dynamics Laboratory

May 2001 – Nov. 2003 Research Scientist Seattle, WA
University of Washington, Joint Institute for the Study of the Atmosphere and Oceans

May 2000 – Apr. 2001 Postdoctoral Research Associate Seattle, WA
University of Washington, Department of Atmospheric Sciences / JISAO

Sep. 1994 – Apr. 2000 Research Assistant Seattle, WA
University of Washington, School of Oceanography

Oct. 1993 – Sep. 1994 Research Assistant New Brunswick, NJ
Institute for Marine and Coastal Sciences, Rutgers University

Jun. 1993- Aug. 1993 Summer Research Fellow New Brunswick, NJ
Institute for Marine and Coastal Sciences, Rutgers University

Teaching Experience

Fall Semesters 2010-11 to present Lecturer Princeton, NJ
Princeton University, Geosciences 425 – Introductory Physical Oceanography.

Sep. 2004 – Jan. 2005 Lecturer New Brunswick, NJ
Rutgers University, Environmental Sci. 323 – Atmospheric Thermodynamics.

Sep. 1995 – Dec. 1995 Teaching Assistant Seattle, WA
University of Washington. Applied. Math. 505 – Intro. to Fluid Dynamics

Awards Received	Department of Commerce Gold Medal 2011 "*For excellence in research and data stewardship leading to a more confident assessment of the influence of human-induced climate change on hurricanes."*
	Presidential Early Career Award for Scientists and Engineers (PECASE), 2004-09 *"For fundamental contributions concerning the roles of subseasonal variability on the onset and termination of El Niño and on Indian Monsoon rainfall."*
	AGU Editor's Citation for Excellence in Refereeing for Geophys. Res. Lett., 2008
	NOAA Research Outstanding Paper of the Year, 2007
	AGU Editor's Citation for Excellence in Refereeing for Geophys. Res. Lett., 2004
	NASA Space Grant Scholarship, 1994-1996
	Cook College, Rutgers University Marine Sciences Student of the Year, 1994
	New Jersey Department of Education Garden State Scholar Scholarship, 1990-1994
Academic Committees	Jeffrey Strong, Princeton Univ., AOS Program, Ph.D. Thesis Advisor. Expected 2015
	Kityan Choi, Princeton Univ., AOS Program, Ph.D. Thesis Advisor. Expected 2014
	Anthony DeAngelis, Rutgers U., Dept. Envir. Sci., Ph.D. Committee Member, Expected 2014
	Angela Colbert, Univ. of Miami, RSMAS, Ph.D. Committee Member. Expected 2013
	Andrew Ballinger, Princeton Univ., AOS Program, Ph.D. Committee Member. Expected 2012
	Christine Standohar, Univ. of Miami, RSMAS, M.S. Committee Member. May 2012
	Ian Lloyd, Princeton Univ., AOS Program, Ph.D. Thesis Advisor. May 2011
	Pedro DiNezio, Univ. of Miami, RSMAS, Ph.D. Committee Member. Mar. 2011
	Daiwei Wang, Columbia University, Ph.D. Defense Examining Committee. Sep. 2010
Community Service	Lead Author for Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report
	NOAA-OAR Climate Observing Systems Council (2009-present)
	U.S.-CLIVAR Working Group on Hurricanes and Climate (Co-Chair, 2010-2011)
	U.S.-CLIVAR Predictability, Prediction, and Applications Interface Panel (2009-present)
	CLIVAR Asian/Australian Monsoon Panel (2008-present)
	CLIVAR Indian Ocean Panel (2007-present)
	Associate Editor, Journal of the Atmospheric Sciences (2007-present)
	Associate Editor, Journal of Climate (2008-present)
	Book Review Editor, Int. J. of Climate Change Strategies and Management (2009)
	AGU/TOS/ASLO Ocean Sciences 2006 Meeting Scientific Organizing Committee
	Judge 2005 NAACP ACT-SO Academic Competition
	Scientist in Residence, Exploratorium Museum, San Francisco, CA (Dec. 2011, May 2012)
	Speaker: Elementary through High School
	Article reviews for: J. Climate, Science, Nature, Proc. Nat. Acad. Sci., J. Physical Oceanography, Monthly Weather Review, J. of Geophys. Res., Geophys. Res. Lett., J. Atmospheric Sciences, J. Oceanic and Atmospheric Tech., Remote Sensing of the Environment, Tellus
	Proposal reviews for: NOAA, NSF, NASA, DOE
	Guest lectures at Princeton Univ., Rutgers Univ., Univ. of Pennsylvania, U.S. Naval Academy, Univ. of Miami
Professional Organizations	American Geophysical Union. American Meteorological Society. The Oceanography Society
Languages	Fluent in Spanish (lived in Venezuela from age 1 to 14) and Italian. Working knowledge of French. Learning Swedish.
Interests	Soccer, snowboarding, mountain biking, SCUBA, gardening

Publications

Vecchi, G.A., M. Zhao, I.M. Held, S.-J. Lin, & I.D. Lloyd (2012): Impact of Sea Surface Temperature on Tropical Cyclones in a 100km Global Atmospheric General Circulation Model. *J. Climate (in preparation).*

Vecchi, G.A., M. Zhao, and I.M. Held (2012): Simulation of Tropical Cyclones Over the 1880-2007 Period Using a 100km Global Atmospheric General Circulation Model. *J. Climate (in preparation).*

Vecchi, G.A., R. Msadek and co-authors (2012): Multi-year Predictions of North Atlantic Hurricane Frequency: Promise and limitations. *J. Climate (in prepapration).*

Chiodi, A.M., D.E. Harrison and G.A. Vecchi (2012): Subseasonal atmospheric variability and El Niño waveguide warming: observed effects of the MJO and Westerly Wind Events. *J. Climate (in preparation).*

Doi, T., G.A. Vecchi. T.R. Delworth, A.J. Rosati (2012): CO_2-forced enhancement of the year-to-year variations of surface temperature in the Atlantic hurricane main development region. *J. Climate (submitted).*

Colbert, A.J., B.J. Soden, G.A. Vecchi and B.P. Kirtman (2012): Impacts of Climate Change on North Atlantic Tropical Cyclone Tracks. *Geophys. Res. Lett. (submitted).*

Villarini, G., J.A. Smith and G.A. Vecchi (2012): Changing Frequency of Heavy Rainfall Over the Central United States. *J. Climate (submitted)*.

Yang., X. and co-authors (2012): A predictable AMO-like pattern in GFDL's fully-coupled ensemble initialization and decadal forecasting system. *J. Climate (submitted).*

Meehl, G., and co-authors (2012): Decadal Climate Prediction: An Update from the Trenches. *Bull. Amer. Meteorol. Soc. (submitted).*

Doi, T., G.A. Vecchi, A.J. Rosati and T.L. Delworth (2012): Tropical Atlantic biases in the mean state, seasonal cycle, and interannual variations for a coarse and high resolution coupled climate model. *J. Climate (in press).*

DiNezio, P.N., B.P. Kirtman, A.C. Clement, S.-K. Lee, G.A. Vecchi and A.T. Wittenberg (2012): ENSO Response to Global Warming: The Role of Background Ocean Changes. *J. Climate (in press).*

Villarini, G., and G.A. Vecchi (2012): 21st Century Projections of North Atlantic Tropical Storms from CMIP5 Models. *Nature Climate Change* doi:10:1038/NCLIMATE1530

Delworth, T.R., A. Rosati, W. Anderson, A.J. Adcroft, V. Balaji, R. Benson, K. Dixon, S.M. Griffies, H.-C. Lee, R.C. Pacanowski, G.A. Vecchi, A.T. Wittenberg, F. Zeng, and R. Zhang (2012): Simulated climate and climate change in the GFDL CM2.5 high-resolution coupled climate model. *J. Climate.* doi:10.1175/JCLI-D-11-00316.1

Knutson, T.R., I.M. Held and G.A. Vecchi (2012): Hurricanes and Typhoons: Present. In PAGES News, Paired Perspectives on Global Change. 20(1), 32.

Villarini, G., and G.A. Vecchi (2012): Statistical Modeling of the Power Dissipation Index (PDI) and Accumulated Cyclone Energy (ACE). doi:10.1175/JCLI-D-11-00146.1

Villarini, G., G.A. Vecchi, and J.A. Smith (2012): U.S. Landfalling and North Atlantic Hurricanes: Statistitcal Modeling of Their Frequencies and Ratios. *Mon. Wea. Rev.* doi:10.1175/MWR-D-11-00063.1

Villarini, G., J.A. Smith, M.L. Baeck, T. Marchok, and G.A. Vecchi (2011): Analysis of Rainfall Distribution for U.S. Landfalling Tropical Cyclones: Frances, Ivan and Jeanne (2004). *J. Geophys. Res.* doi:10.1029/2011JD016175

Lloyd, I.D., T. Marchok, and G.A. Vecchi (2011): Diagnostics for comparing operational hurricane forecasts to observations. *J. Atmos. Model. Earth Sys* doi:10.1029/2011MS000075

DiNezio, P.N., A.C. Clement, G.A. Vecchi, B.J. Soden, A.J. Broccoli, B. Otto-Bliesner, P. Branconnot (2011): The Response of the Walker Circulation to LGM Forcing: Implications for Detection in Proxies. *Paleoceanography* doi:10.1029/2010PA002083.

Fang, Y., A. Fiore, L. Horrowitz, A. Gnanadesikan, I.M. Held, G. Chen, G.A. Vecchi, H. Levy (2011): The impacts of changing transport and precipitation on pollutant distributions in a future climate. *J. Geophys. Res.* doi: 10.1029/2011JD015642.

Soden, B.J., and G.A. Vecchi (2011): The Vertical Distribution of Cloud Feedback in Coupled Ocean-Atmosphere Models. *Geophys. Res. Lett*, doi:10.1029/2011GL047632.

Villarini, G., G.A. Vecchi, T.R. Knutson, M. Zhao and J.A. Smith (2011): Reconciling Differing Model Projections of Changes in the Frequency of Tropical Storms in the North Atlantic Basin in a Warmer Climate. *J. Climate,* doi:10.1175/2011JCLI3853.1

Villarini, G., G.A. Vecchi, T.R. Knutson and J.A. Smith (2011): Is the Recorded Increase in Short Duration North Atlantic Tropical Storms Spurious? *J. Geophys. Res.* Doi:10.1029/2010JD015493.

Kirtman, B. and G.A. Vecchi (2011): Why Climate Modelers Should Worry About Atmospheric and Oceanic Weather. "The Global Monsoon System: Research and Forecast, 2nd Edition. Chang, C.-P., Y. Ding, N.-C. Lau, R. H. Johnson, B. Wang, and T. Yasunari, Eds., World Scientific Series on Asia-Pacific Weather and Climate, Vol. 5, World Scientific Publication Company, 608 pp., 511-524.

Vecchi, G.A., & T.R. Knutson (2011): Estimating annual numbers of Atlantic hurricanes missing from the HURDAT database (1878-1965) using ship track density. *J. Climate.* doi: 10.1175/2010JCLI3810.1.

Vecchi, G.A., M. Zhao, H. Wang, G. Villarini, A. Rosati, A. Kumar, I.M. Held and R. Gudgel (2011): Hybrid Statistical-Dynamical Predictions of Seasonal North Atlantic Hurricane Activity *Mon. Wea. Rev.,* doi: 10.1175/2010MWR3499.1.

Lloyd, I.D., & G.A. Vecchi (2011): Observational evidence for oceanic control on hurricane intensity. *J. Climate,* doi: 10.1175/2010JCLI3763.1.

Stock, C., and co-authors (2010): On the use of IPCC-class models to assess the impact of climate on living marine resources. *Progress in Oceanography* doi: 10.1016/j.pocean.2010.09.001.

Zhao, M., I.M. Held, and G.A. Vecchi (2010): Seasonal predictability of northern hemisphere hurricanes in an SST-forced AGCM. *Mon. Wea. Rev,* doi: 10.1175/2010MWR3366.1.

Seager, R. and G.A. Vecchi (2010): Greenhouse warming and the 21st Century hydroclimate of southwestern North America. *Proc. Nat. Acad. Sciences,* doi: 10.1073/pnas.0910856107.

Seager, R., N. Naik, and G.A. Vecchi (2010): Thermodynamic and dynamic mechanisms for large-scale changes in the hydrological cycle in response to global warming. *J. Climate* **23**, 4651-4668. doi: 10.1175/2010JCLI3655.1.

Collins, M., S-I An, W. Cai, A. Ganachaud, E. Guilyardi, F-F Jin, M. Jochum, M. Lengaigne, S. Power, A. Timmermann, G. Vecchi and A. Wittenberg (2010): The impact of global warming on the tropical Pacific and El Niño. *Nature Geosci. doi:10.1038/ngeo868.*

Villarini, G., G.A. Vecchi and J.A. Smith (2010): Modeling of the Dependence of Tropical Storm Counts in the North Atlantic Basin on Climate Indices. *Mon. Wea. Rev.* **138**(7), 2681-2705, doi: 10.1175/2010MWR3315.1

Gnanadesikan, A., K. Emanuel, G.A. Vecchi, W.G. Anderson, R. Hallberg (2010): How ocean color can steer Pacific tropical cyclones. *Geophys. Res. Lett.*, 37, L18802, doi:10.1029/2010GL044514

DiNezio, P, A. Clement, and G.A. Vecchi (2010): Reconciling Differing Views of Tropical Pacific Climate Change *EOS, Trans. Amer. Geophys. Union,* **91**(16), 141-152.

Vecchi, G.A. and A.T. Wittenberg (2010): El Niño and our future climate: where do we stand? *Wiley Interdisciplinary Reviews: Climate Change, doi: 10.1002/wcc.33.*

Bender, M.A., T.R. Knutson, R.E.Tuleya, J.J. Sirutis, G.A. Vecchi, S.T. Garner, and I.M. Held (2010): Model-Projected Impact of Anthropogenic Warming on Late 21st Century Intense Atlantic Hurricane Activity. *Science.* doi: 10.1126/science.1180568.

Lloyd, I.D., & G.A. Vecchi (2010): Submonthly Indian Ocean cooling events and their relation to large-scale conditions. *J. Climate,* doi: 10.1175/2009JCLI3067.1.

Landsea, C.W., G.A. Vecchi, L. Bengtsson & T.R. Knutson (2010): Impact of Duration Thresholds on Atlantic Tropical Cyclone Counts. *J. Climate*, doi: 10.1175/2009JCLI3034.1.

Xie, S.P., C. Deser, G.A. Vecchi, J. Ma, H. Teng and A.T. Wittenberg (2010). Global Warming Pattern Formation: Sea Surface Temperature and Rainfall. *J. Climate,* doi: 10.1175/2009JCLI3329.1.

Zheng, X-T, S-P Xie, G.A. Vecchi, Q. Liu, and J. Hafner (2010). Indian Ocean dipole response to global warming: Analysis of ocean-atmospheric feedbacks in a coupled model. *J. Climate*, doi: 10.1175/2009JCLI3326.1.

Chang Y.-S., A. J. Rosati, and G. A. Vecchi (2010): Basin patterns of global sea level changes for 2004-2007, *J. Mar. Syst*., doi: 10.1016/j.jmarsys.2009.11.003

Zhao, M., I.M. Held, S.-J. Lin & G.A. Vecchi (2009): Simulations of global hurricane climatology, interannual variability, and response to global warming using a 50km resolution GCM. *J. Climate*, doi: 10.1175/2009JCLI3049.1.

Harrison, D.E., A.M. Chiodi, and G.A. Vecchi (2009): Effects of surface forcing on the seasonal cycle of the eastern equatorial Pacific. *J. Marine Res.,* **67**(6), 701-729.

DiNezio, P.N., A.C. Clement, G.A. Vecchi, B.J. Soden, B.P. Kirtman & S.-K. Lee (2009): Climate Response of the Equatorial Pacific to Global Warming. *J. Climate*, **22**(18), 4873-4892.

Lengaigne, M., & G.A. Vecchi (2009): Contrasting the termination of moderate and extreme El Niño events in Coupled General Circulation Models. *Clim. Dyn. DOI:10.1007/s00382-009-0562-3.*

McPhaden, M.J., et al. (2009): Ocean-Atmosphere Interactions During Cyclone Nargis. *EOS Trans. Amer. Geophys. Union,* **90**(7), 53-60.

Vecchi, G.A., K.L. Swanson & B.J. Soden (2008): Whither Hurricane Activity? *Science*, **322**(5902), 687. DOI: 10.1126/science.1164396.

Vecchi, G.A., & T.R. Knutson (2008). On Estimates of Historical North Atlantic Topical Cyclone Activity *J.* Climate, **21**(14), 3580-3600.

Knutson, T.R., J.J. Sirutis, S.T. Garner, G.A. Vecchi & I.M. Held (2008). Simulated impact of 21st Century warming on Atlantic hurricane activity. *Nature Geoscience*, doi:10.1038/ngeo202.

Vecchi, G.A., A. Clement & B.J. Soden (2008). Examining the Tropical Pacific's Response to Global Warming. *EOS, Trans. Amer. Geophys. Union*, **89**(9), pp.81,83.

Song, Q., G.A. Vecchi & A. Rosati (2007). Predictability of Indian Ocean Sea Surface Temperature Anomalies in the GFDL Coupled Model. *Geophys. Res. Lett.*, ***5,*** L02701, doi:10.1029/2007GL031966.

Vecchi, G.A., & B.J. Soden (2007). Effect of remote sea surface temperature change on tropical cyclone potential intensity. *Nature*, doi:10.1038/nature06423.

Vecchi, G.A., & B.J. Soden (2007). Global Warming and the Weakening of the Tropical Circulation. *J. Climate*, **20**(17) 4316-4340.

Vecchi, G.A., & B.J. Soden (2007). Increased tropical Atlantic wind shear in model projections of global warming. *Geophys. Res. Lett.,* doi:10.1029/2006GL028905.

Vecchi, G.A., & M. Harrison (2007). An Indian Ocean Observing System Simulation Experiment. *J. Climate*, **20**, 3300-3319.

Song, Q.N., G.A. Vecchi, & A. Rosati (2007). Indian Ocean Variability in the GFDL CM2 Coupled Climate Model. *J. Climate*, **20**, 2895-2916.

Song, Q.N., G.A. Vecchi, & A. Rosati (2007). Impact of the Indonesian Throughflow on Climate Variability in the GFDL Coupled Climate Model. *J. Clim.*, **20**, 2434-2451.

Seager, R., et al (2007). Model projections of an imminent transition to a more arid climate in southwestern North America. *Science* **316**, 1181-1184.

Lu, J., G.A. Vecchi & T.J. Reichler (2007). Expansion of the Hadley cell under global warming. *Geophys. Res. Lett.* doi:10.1029/2006GL028443.

Vecchi, G.A., B.J. Soden, A.T. Wittenberg, I.M. Held, A. Leetmaa & M.J. Harrison (2006): Weakening of Tropical Pacific Atmospheric Circulation due to Anthropogenic Forcing. *Nature*, doi:10.1038/nature04744.

Vecchi, G.A. (2006). The termination of the 1997-98 El Niño. Part II: Mechanisms of Atmospheric Change. *J. Climate*, **19**(12), 2647-2664.

Vecchi, G.A., & D.E. Harrison (2006). The termination of the 1997-98 El Niño. Part I: Mechanisms of Oceanic Change. *J. Climate*, **19**(12), 2633-2646.

Gnanadesikan, A. et al., (2006): GFDL's CM2 global coupled climate models - Part 2: The baseline ocean simulation, *J. Climate***, 19**(5), 675-697.

CLIVAR/GOOS Indian Ocean Panel and Collaborators (2006). Understanding the Role of the Indian Ocean in the Climate System—Implementation Plan for Sustained Observations. Southampton, UK, International CLIVAR Project Office, 76pp. (ICPO Publication Series, 100) http://eprints.soton.ac.uk/20357/

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Vecchi, G.A., A. Rosati & D.E. Harrison (2004): Setting the timing of El Niño termination. *Bull. Amer. Meteorol. Soc.*, **85**(8), 1065-1066**.**

Bhat, G. S., G. A. Vecchi & S. Gadgil (2004). Sea Surface Temperature of the Bay of Bengal derived from TRMM. *J. Mar. Tech.*. **21**, 1283-1290.

Vecchi, G.A., & D.E. Harrison (2004): Interannual Indian rainfall variability and Indian Ocean sea surface temperature anomalies. In *Earth Climate: The Ocean-Atmosphere Interaction,* C. Wang, S.-P. Xie, and J.A. Carton (eds.), AGU, Geophysical Monograph 147, Washington D.C., 247–260

Vecchi, G.A., & N.A. Bond (2004): The Madden-Julian Oscillation (MJO) and northern high latitude wintertime surface air temperatures. *Geophys. Res. Lett*. **31**, L04104, doi:10.1029/2003GL018645.

Vecchi, G.A., S.-P. Xie, & A. Fischer (2004). Air-Sea Coupling over Western Arabian Sea Cold Filaments. *J. Climate*, **17**(6), 1213–1224.

Vecchi, G.A. & D.E. Harrison (2003). On the termination of the 2002-3 El Niño event. *Geophys Res. Lett.*, **30**(18), 1964-1967.

Bond, N.A., & G.A. Vecchi (2003). On the Madden Julian Oscillation and Precipitation in Oregon and Washington. *Weather and Forecasting*, **18**(4), 600-613.

Vecchi, G.A., & D.E. Harrison (2002). Monsoon Breaks and sub-seasonal sea surface temperature variability in the Bay of Bengal. *J. Climate*, **15**(12), 1485-1493.

Harrison, D.E., R.D. Romea, & G.A. Vecchi (2001). Central Equatorial Pacific Zonal Currents II: The seasonal momentum balances and the boreal spring eastward surface current surge. *J. Mar. Res.*, **59**, 921-948.

Harrison, D.E., & G.A. Vecchi (2001). January 1999 Indian Ocean cooling event. *Geophys. Res. Lett.* **28**(19), 3717-3720.

Harrison, D.E. & G.A. Vecchi (2001). El Niño and La Niña: Equatorial Pacific surface temperature and thermocline variability, 1986-98. *Geophys. Res. Lett.*, **28**, 1051-1054.

Harrison, D.E., G.A. Vecchi & R.H. Weisberg (2000). Eastward surface jets in the central equatorial Pacific. November 1991-March 1992. *J. Marine Res.*. **58**, 735-754.

Vecchi, G.A. (2000). Tropical Pacific sub-seasonal wind variability and El Niño. Ph.D. Dissertation, University of Washington.

Vecchi, G.A. & D.E. Harrison (2000). Tropical Pacific sea surface temperature anomalies, El Niño and equatorial westerly wind events. *J. Climate*, **13**(11), 1814-1830.

Harrison, D.E. & G.A. Vecchi (1999). On the termination of El Niño. *Geophys. Res. Lett.* **26**(11).

Vecchi, G.A. & D.E. Harrison (1997). Westerly wind events in the tropical Pacific, 1986-1995: An atlas from the ECMWF operational surface wind fields. NOAA Technical Memorandum ERL PMEL-109 (NTIS PB97-188213).

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