

# Curriculum Vitae, Gidon Eshel

- Contact** (413) 717-2187, [geshel@gmail.com](mailto:geshel@gmail.com)
- Education** **Ph. D.** (physical oceanography), 1996, Columbia Univ., NY  
**M.A., M.Phil.** (physical oceanography), 1993 & '94, Columbia Univ., NY  
**B.A.**, 1988, Haifa Univ./Technion, Israel
- Dissertation** Coupling of deep water formation and the general circulation: A case study of the Red Sea, Mark A. Cane, Advisor, Columbia Univ., NY
- Postdoc.** Center for Earth and Planetary Physics, Harvard Univ., Brian F. Farrell, Host
- Honors**
- **PopTech Science and Public Leadership Fellow**, August 2010–July 2012
  - **University Corporation for Atmospheric Research Climate and Global Change Postdoctoral Fellowship**, 1996
  - **Scholar Award**, SUNY, Stony Brook, 1990
  - **Graduation with honors**, undergraduate studies, 1988
- Professional Experience**
- **Sr. Research Scientist**, Northwest Research Associates, Jun. '13–present
  - **Bard Research Professor**, Bard College, Jan. '12–present
  - **Bard Center Fellow**, Bard College, July '07–Jan. '12
  - **Columbia University**, Adjunct Associate research Scientist, Lamont Doherty Earth Observatory, August '07–present
  - **Assistant Professor**, The University of Chicago, 1999–2007
  - **Senior Fellow**, Center for Environmental Science, The University of Chicago and Argonne National Laboratory, 2002–2007
  - **Principal Investigator**, Center for Integrating Statistical and Environmental Science, The University of Chicago, 2001–2004
  - **Assistant Scientist**, Woods Hole Oceanographic Inst., 1998–1999
  - **UCAR Post-Doctoral Research Fellow**, Harvard University, 1996–1998
  - **Research Assistant**, Columbia University, 1991–1996
  - **Teaching Assistant**, Columbia University, Fall 1993
- Undergrad. Theses Supervised**
- **Nolan Gartren**, Tornadic Storm Recurrence Times in the Midwest and Climate Change, Physics, Spring '12
  - **Kylie Collins**, Organic vs. Conventional Land, Water and Agrochemical Efficiency, Env. Std., Spring '10, Bard
  - **Christopher (Jun) Harada**, A Greenhouse Gas Inventory of a Concentrated Solar Power Trough System, Env. Std., Spring '10, Bard
  - **Nicholas Heavens**, The effects of surrounding deserts on the marine boundary layer: A case study of the Red Sea (Chicago's Geophysical Sciences, now holds a PhD from CalTech)
  - **Joe Bernstein**, Non-normal perturbation growth in a 1-layer QG

- Ocean Gyre, **Sigma Xi Best Undergraduate Student Paper** (Chicago's Mathematics and Physics, now holds a PhD from Harvard)
- **Grace Lee**, Predictability of West Coast Winter Rainfall (Chicago's Geophysical Sciences, now holds a PhD from University of Kentucky)
- **Everest Ong**, North Atlantic SST Autocorrelation (Chicago's Geophysical Sciences, now a researcher at Argonne National laboratory)

**Graduate Students Committees** Served on 10 thesis committees for students in Ecology and Evolution, Climate Science, Geophysical Fluid Dynamics, Glaciology and Paleontology

**Recent Outreach Activities and selected Presentations**

- Invited Talk: *Modelling Yields' Response to Reactive Nitrogen Additions*, World Resource Institute/Princeton Environmental Institute/UNCESCO Reactive Nitrogen meeting, Paris, France, Oct. 18th 2012.
- Invited Talk: *Geophysical Aspects of Feeding the Nation: Current Footprints, and Tractable Future Prospects*, Northwest Research Associates, Redmond WA, Oct. 18th 2012.
- Invited Talk: *Short Term (Non-Asymptotic) Linear Stability of Ecosystems: The Role of Non-Self-Adjointness in Homogeneous and Heterogeneous Agricultural Systems*, The Mathematical Association of America and the American Mathematical Society Joint Mathematics Meeting, Boston, January 7th, MAA Invited Paper Session on Climate Change and Sustainability.
- Agricultural and Food Sustainability mini-course at UC Berkley curated by Michael Pollan and Alice Waters, Nov. 8th 2011, on the occasion of Chez Panisse's 40th Anniversary, sponsored by Alice Waters ([http://www.youtube.com/watch?v=tdbMGDdiqDY&feature=plcp&context=C2b0d8UDOEgsToPDskLZey2WBUQ9ozFxiuFu\\_WF5](http://www.youtube.com/watch?v=tdbMGDdiqDY&feature=plcp&context=C2b0d8UDOEgsToPDskLZey2WBUQ9ozFxiuFu_WF5))
- Featured extensively in the documentary PLANEAT (<http://planeat.tv/>, see also <http://planeat.tv/the-science>.)
- Invited panelist discussing the documentary PLANEAT (<http://planeat.tv/the-science>), *Environmental Film Festival in the Nation's Capital*, Washington, DC, March 24th, 2011.
- Invited speaker/panelist, NYU's Reynolds Program in Social Entrepreneurship, *The Food Network: How Economics, Sustainability and Safety Intersect to Influence the Way We Eat*, New York City ([http://www.nyu.edu/reynolds/speaker\\_series/1011/food\\_panel.html](http://www.nyu.edu/reynolds/speaker_series/1011/food_panel.html)), March 23rd, 2011.
- Modeling Sustainability: The Human Unknowns, *The Language and Thinking Lecture Series at Bard College*, August 23rd 2010, Annandale-on-Hudson.
- invited talk, Environmental Optimization of Human Diets: Application of Linear Programming to Food Choices and the US Farm Bill, *CompSust10: 2nd International Conference on Computational Sustainability*, June 28-30, 2010 MIT (<http://www.computational-sustainability.org/compsust10>)

- guest columnist, Reuters, April 2010  
(<http://blogs.reuters.com/environment/2010/04/08/grass-fed-beef-packs-a-punch-to-environment/>)
- guest commentator on COP15 conference, Reuters, December 2009 (e.g., <http://blogs.reuters.com/environment/2009/12/08/day-two-reaction-to-the-epa/>, <http://blogs.reuters.com/environment/2009/12/14/what-can-ordinary-people-do-to-slow-climate-change/>)
- invited talk, *Feeding a Hot and Hungry Planet*, April 29-May 1st 2009, Princeton Environmental Institute, Princeton  
(<http://www.princeton.edu/morefoodlesscarbon/>)
- invited talk, *CompSust09: 1st International Conference on Computational Sustainability*, June 8-11, 2009 Cornell  
(<http://www.computational-sustainability.org/compsust09>)
- invited talk, *Food, Fuel and the Future of Farming*, July 24-25 2008, Vermont Law School (<http://www.vermontlaw.edu>)
- interview, *The Current*, the Canadian Broadcasting Corporation, May 22nd 2007
- invited talk, panelist, *Food, Ethics and the Environment*, November 16-17 2006, Princeton (<http://www.princeton.edu/~eating/>)
- keynote speaker, 8th Plinius Conference on *Mediterranean Storms and Extreme Events in and Era of Climate Change*, October 17-20, the Dead Sea, Israel
- guest commentator on extreme events and global climate change, CBS2Chicago, Chicago, June 2006
- invited guest faculty, June 10-16 2006, the *Santa Fe Complex System Summer School*, The Santa Fe Institute
- invited talk, fall 2005 AGU, *The Buoyancy Budget of the Northern Red Sea*
- guest commentator on hurricanes and global climate change, NBC5 Chicago, September 2005
- guest commentator on the environmental significance of hurricane Katrina, CBS2 Chicago, September 2005
- briefed Senator Durbin (D-IL) and Representative Bobby Rush (D-IL) on global climate change, Capitol Hill, September 2005
- invited speaker, *UCAR/NOAA OGP 100th Global and Climate Change Post-doc Celebration*, Washington, DC, April 2005
- invited speaker, *Global Warming* conference, Chicago, 2005
- guest, *The Cliff Kelley Show*, V-103 (102.7 FM radio), Chicago, 2005
- panelist, *Mayor Daley's round table on global warming preparedness*, Chicago, 2004
- guest commentator for WVLM Radio, Chicago, 2004

- invited speaker, *World Hunger* conference, Chicago, 2004
- invited speaker, *Pew mathematical sciences undergraduate research* conference, Chicago, 2003, 2004
- guest commentator for NBC Television, Chicago, 2003
- guest commentator for Extension 720, WGN Radio, Chicago Tribune, 2002, 2005
- guest science mentor for minority high school students in the Museum of Science and Industry's *Inspiring Minds in Action Program*, Chicago, 2002
- invited talk, fall 2000 AGU, *North Atlantic Persistence and Decadal Forecasting*
- invited talk, fall 1997 AGU, *Troposphere-Planetary Boundary Layer Interactions and the Evolution of Ocean Surface Density in the Red Sea*

**Memberships** American Geophysical Union, American Meteorological Society, Society for Industrial and Applied Mathematics

**Classes Taught**

- Rotating Fluids in Weather, Climate and Climate Change
- Fundamentals of Environmental Science
- Climate Physics, Dynamics and Natural Variability
- Numerical Modelling
- Partial Differential Equations: Analytics and Numerics
- Intro. to Linear Algebra
- Geophysical Aspects of Agriculture: Radiation, Hydrometeorology, Biogeochemical Cycles and Land Surface processes
- Advanced Linear Algebra and Matrix Based Numerical Methods
- Geophysical Data Analysis
- The Atmosphere and Ocean in Motion
- Global Warming
- Environmental Science and Society
- Biological Evolution and Climate
- Mathematical Methods in Ecology and Paleontology
- The Planetary Consequences of Human Diet
- Field Courses (co-teaching):
  - Hawaii
  - San Salvador Island (Spring 2002 and 2003)
  - The Planetary Footprint of Farming (Hawthorne Valley Farm, Dec. '05)
  - the Chesapeake Bay continental-aquatic ecosystem: a watershed , perspective Jun. '06 (conducted using sea kayaks)

# Publications

## Book

**Eshel, G.**, 2011: *Spatiotemporal Data Analysis*, Princeton University Press, 338 pp., Dec. 2011, ISBN: 9781400840632, <http://press.princeton.edu/titles/9637.html>

## Book Reviews

- Climate Development and History of the North Atlantic Realm, by Gerold Wefer et. al, *Bull. Amer. Meteor. Soc.*, **85**(5), pp. 750-751, May 2004.
- Strategic Ignorance: Why the Bush Administration Is Recklessly Destroying a Century of Environmental Progress, by Carl Pope and Paul Rauber, *Perspectives in Biology and Medicine*, **48**(3), summer 2005.

## Publications Nearing Submission

**Eshel, G.**, A. Scott, O. Romeo and A. Ma: Multicropping and linear stability of agroecosystems under stochastic excitation: The role of non-self-adjointness, *J. Math. Bio.*

## Published or in Review

**Eshel, G.**: On the non-radiative origins of recent eastern U.S. climate change, *J. Clim. App. Meteor.*, submitted.

**Eshel, G.**, A. Shepon, T. Israeli and R. Milo, 2014: Multi-Metric Environmental Costs of Animal-Based Categories of the United States Diet, *Proc. Natl. Acad. Sci. U.S.*, **111**(33) 11996-12001, doi:10.1073/pnas.1402183111.

**Eshel, G.**, A. Shepon, T. Israeli and R. Milo, 2014: Partitioning United States Feed production Environmental Costs among Livestock Categories, *The J. Agri. Sci.*, doi: <http://dx.doi.org/10.1017/S002185961400> published online: 31 July 2014.

Collins, K. and **Eshel, G.**, 2013: Greenhouse gas inventory of Hudson Valley organic tomato production, *Renewable Ag. & Food Systems*, submitted.

Shepon A., **G. Eshel**, T. Israeli and R. Milo, 2012: EcoTime - An intuitive quantitative sustainability indicator utilizing a time metric, *Ecological Indicators*, **24**, 240-245, doi: 10.1016/j.ecolind.2012.06.018, <http://www.sciencedirect.com/science/article/pii/S1470160X1200249X>.

**Eshel, G.**, 2010: A Geophysical Foundation for Alternative Farm Policy, *Environmental Science & Technology*, **44**(10), 3651-3655 (the issue's Cover Feature Article, highlighted in a perspective piece by Chief Editor Gentleman's commentary entitled Verdant Models).

**Eshel, G.**, P. A. Martin and E. E. Bowen, 2010: Land Use and Reactive Nitrogen Discharge: Effects of Dietary Choices, *Earth Interactions*, **14**, paper 21, 1-15.

**Eshel, G.** and P. A. Martin, 2009: Geophysics and nutritional science: Toward a novel, unified, paradigm. *American Journal of Clinical Nutrition*, **89**, 1710S-1716S.

Hancock, M. A., D. Witonsky, A. Gordon, **G. Eshel**, J. K. Pritchard, G. Coop and A. Di Rienzo, 2007: Adaptations to Climate in Candidate Genes for Common Metabolic Disorders, *PLoS Genetics*, **4**, doi:10.1371/journal.pgen.0040032.

Mogultay, I., T. F. DuPont and **G. Eshel**, 2007: Dimension reduction applied to a model of sea breezes, *Univ. of Chicago Dept. of Applied Math. Technical Paper TR-2007-06*, available on-line from <http://www.cs.uchicago.edu/research/publications/techreports/TR-2007-06>

**Eshel, G.** and N. Heavens, 2007: Climatological evaporation seasonality in the northern Red Sea, *Paleoceanography*, **22**, PA4201.

Punyasena, S. W., **G. Eshel** and J. C. McElwain, 2007: The influence of climate on the spatial patterning of Neotropical plant families, *J. Biogeography*, **35**(1), 117-130.

Adkins, J., P. deMenocal, and **G. Eshel**, 2006: The "African humid period" and the record of marine upwelling from excess <sup>230</sup>Th in Ocean Drilling Program Hole 658C. *Paleoceanography*, **21**, PA4203, doi: 10.1029/2005PA001200.

Fehrenbacher, J. S., P. A. Martin and **G. Eshel**, 2006: Glacial deep water carbonate chemistry inferred from foraminiferal Mg/Ca: A case study from the Western Tropical Atlantic. *Geochemistry, Geophysics, Geosystems*, **7**, Q09P16, doi:10.1029/2005GC001156.

**Eshel, G.** and P. A. Martin, 2006: Diet, Energy and Global Warming. *Earth Interactions*, **10**, 1-17.

**Eshel, G.** and J. J. Bernstein, 2006: Relationship between large-scale atmospheric states, static stability and ground-level ozone in Illinois. *Water, Air & Soil Pollution*, **171**, 111-133.

**Eshel, G.**, 2006: Empirically evaluating divergence rates of atmospheric trajectories. *J. Atmos. Sci.*, **63**(2), 741-753.

Hacker, J., J. Hansen, J. Berner, Y.-Q. Chen, **G. Eshel**, G. Hakim, S. Lazarus, S. Majumdar, R. Morss, A. Poje, V. Sheremet, Y. Tang and C. Webb, 2005: Predictability. *Bull. Amer. Meteor. Soc.*, **86**(12), 1733-1737.

Ziegler, A. M. and **G. Eshel**, P. M. Rees, T. A. Rothfus, D. B. Rowley and D. Sunderlin, 2003: Tracing the tropics across land and sea: Permian to present. *Lethaia*, **36**, 227-254.

**Eshel, G.**, 2003: North Atlantic thermal persistence and coherent evolution. *J. Geophys. Res. (Oceans)* **108**(C2), 3029, doi:10.1029/2001JC001180.

**Eshel, G.**, 2003: Forecasting the North Atlantic Oscillation using Pacific surface pressure. *Mon. Weath. Rev.* **131**, 854-861.

**Eshel, G.**, 2002: Mediterranean climates. *Israel J. Earth Sci.* **51**, 157-168 (manuscript solicited by Chief Editor for a special issue honoring the retirement of a former Chief Editor).

**Eshel, G.** and B. F. Farrell, 2001: Thermodynamics of eastern Mediterranean rainfall variability. *J. Atmos. Sci.* **58**, 87-12.

**Eshel, G.**, M. A. Cane and B. F. Farrell, 2000: Forecasting eastern Mediterranean Droughts. *Mon. Weath. Rev.* **128**, 3618-3630.

**Eshel, G.** and B. F. Farrell, 2000: Mechanisms of eastern Mediterranean rainfall variability. *J. Atmos. Sci.* **57**, 3219-3232.

**Eshel, G.**, D. P. Schrag and B. F. Farrell, 2000: Troposphere-planetary boundary Layer interactions and the evolution of surface density: Lessons from Red Sea corals. *J. Climate* **13**, 339-351.

Archer, D. E., **G. Eshel**, A. Winguth, W. S. Broecker, R. T. Pierrehumbert, M. Tobis and R. Jacob, 2000: Atmospheric CO<sub>2</sub> sensitivity to the biological pump in the ocean. *Glob. Biogeochem. Cyc.* **14**, 1219-1230.

**Eshel, G.** and N. Naik, 1997: Climatological coastal jet collision, intermediate water formation and the general circulation of the Red Sea. *J. Phys. Oce.* **27**(7), 1233-1257.

**Eshel, G.**, Coupling of Deep Water Formation and the General Circulation: A Case Study of the Red Sea, Ph.D. Thesis, Columbia Univ., New York, 1996.

Cane, M.A., **G. Eshel**, and R. W. Buckland, 1994: Forecasting Zimbabwean maize yield using eastern equatorial Pacific sea surface temperature. *Nature* **370**, 204-205.

**Eshel, G.**, M.A. Cane, and M.B. Blumenthal, 1994: Modes of subsurface, intermediate, and deep water renewal in the Red Sea. *J. Geophys. Res.* **99**(C8), 15941-15952.

## External Peer Reviewed Funding

- Columbia Univ. Earth Inst., Research Initiatives in Science and Engineering (RISE), with Richard Seager (Columbia/Lamont) and Claire Wang (Mailman School of Pub. Health), Co-evaluation of the health and environmental impacts of current U.S. diets and plausible alternatives, total budget: \$176k.
- NSF Water Sustainability and Climate (WSC), with Richard Seager (Lamont) and Ben Cook and Michael Puma (NASA/GISS), Pacific teleconnections vs. local feedbacks/amplifiers in controlling land-vegetation-atmosphere interactions on the U.S. Great Plains.
- Columbia Univ. Earth Inst., Cross Cutting Initiative, with Richard Seager (Columbia/Lamont) and Claire Wang (Mailman School of Pub. Health), Optimizing Environmental performance of a Nutritionally Improved U.S. Diet, total budget: \$30k.
- NSF Hydrology Program, The Critical Role of Hydraulic Lift in Facilitating Soil-Vegetation-Atmosphere Coupling in Semi-Arid Grasslands: From Past Droughts to Future Change, with Marc Stieglitz (GA Tech.), pending, 2014-2016. Total budget: \$551,050, of which my share is \$356,574.

## Past

- NSF Dynamics of Coupled Human and Natural Systems Program, The U.S. food production and consumption system: understanding the synergies between environmental and public health goals within a changing climate, submitted in Nov., not funded.
- The Bard Faculty Research Fund, \$16,000, Numerical Design of a Thermodynamically High Performing Greenhouse for Carbon-Neutral Winter Production, Jul. 2011–Jun. 2012.
- *NSF, Math REU* (one of 4 co-Is) , \$244,980, Jun. 2010–May 2013.
- *The Jeffery Cook Charitable Trust*, \$17,200, Nov. 2009–Nov. 2010.
- *The United States Environmental Protection Agency*, ~ \$5M total grant, of which my share is ~ \$300K.
- *The George E. Block Research and Educational Fund*, ~ \$160K.
- *The University of Chicago Course Development Fund*, ~ \$1K.