

Oak Ridge Associated
Universities / National
Aeronautics and Space
Administration Postdoctoral
Program Fellow

Alex C. Ruane
aruane@giss.nasa.gov
<http://alexruane.com>
(212) 678-5640 (office)
(212) 678-5648 (fax)
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NASA Goddard Institute for
Space Studies
2880 Broadway
New York, NY 10025

EDUCATION

Scripps Institution of Oceanography, UC San Diego, La Jolla, CA. 2002-2007

- Ph.D. Earth Sciences: June, 2007
- Dissertation Title: “Diurnal to Annual Variations in the Atmospheric Water Cycle”
- Research Summary: Ph.D. research examined the simulation and observation of the atmosphere using a water and energy budget approach, with particular attention to the transient properties of hydrometeorological phenomena in the atmosphere and at the land surface. Global and regional reanalyses were evaluated for their abilities to match observations from the diurnal cycle to seasonal frequencies, as well as their sensitivities to land-surface schemes and convective parameterizations.
- Ph.D. Committee: John Roads, advisor (Atmospheric Science); Joel Norris (Atmospheric Science); Richard Salmon (Physical Oceanography); Arthur Miller (Atmospheric Science and Physical Oceanography); Masao Kanamitsu (Atmospheric Science); Jeffrey Vincent (International Relations / Pacific Studies).

Cornell University, Ithaca, NY. 1998-2002

- B.S. Atmospheric Science *magna cum laude with honors*, 2002.
- Honors Thesis Title: “Examining Wave Propagation Patterns in the Jovian Atmosphere Using the EPIC Model”
- Research Summary: Advised by Dr. Joseph Harrington (Planetary Science), examined the response of Jupiter’s atmosphere to observed heating patterns, finding meridional and altitudinal variations in propagation behaviors.

RESEARCH AND PROFESSIONAL EXPERIENCE

Postdoctoral Fellow – *Regional applications of climate variability and change* 2007-present
ORAU / NASA Postdoctoral Program, NASA Goddard Institute for Space Studies,
New York, NY. (Advised by Cynthia Rosenzweig):

- Co-Principal Investigator for World Bank study investigating the impact of climate change on agriculture in Bangladesh, using an innovative probabilistic approach that incorporates the suite of IPCC AR4 GCMs, DSSATv4.5 crop simulations, and land hydrology and coastal inundation modeling.

- Developed translating routine to allow simulations of the Weather Research and Forecasting (WRF) model with IPCC and reanalysis output over Central America, the Southeastern United States, and the Mid-Atlantic coastal cities, examining extreme hydrologic events and climate change impacts on agriculture and water resources.
- Examining the atmospheric water cycle at fundamental temporal and spatial scales as well as related extremes in regional climate models, reanalyses, and high-resolution precipitation products.

Postdoctoral Researcher - *Sensitivity of precipitation's temporal variability* 2007

Scripps Institution of Oceanography / UCSD, La Jolla, CA:

- Performed four long-running free simulations using reanalysis modeling systems with varying convective and land surface schemes.
- Tested the sensitivity of precipitation's variance distribution and water cycle component interactions among parameterization sets and data assimilation methods.

Research Assistant - *Development of an atmospheric spectral model for global and regional use*; Scripps Institution of Oceanography / UCSD, La Jolla, CA: 2002-2007

- Integrated new land-surface model into global spectral models with a closed water budget.
- Established an in-house global reanalysis to provide initial conditions for seasonal prediction experiments.
- Assisted in international training workshops to build regional modeling capacities.

Center Representative – *The Coordinated Enhanced Observing Period (CEOP)*, Experimental Climate Prediction Center, Scripps Institution of Oceanography, La Jolla, CA: 2003-2007

- Produced >3 terabytes of global model output from four experiment types and archived it in the CEOP database at the Max Planck Institute for Meteorology in Germany.
- Participated in bimonthly international teleconferences to coordinate model procedures and the development of CEOP phase 2.

Undergraduate Research Assistant – *Studies of Jupiter's Atmosphere* 2000-2002
Cornell University, Ithaca, NY:

- Developed interpolation schemes to process telescopic observations of Jovian atmosphere.
- Used the Explicit Planetary Isentropic-Coordinate (EPIC) Model to examine Jovian atmospheric dynamics, reproducing observations of unique propagation behaviors.

Summer Research Assistant - *Development of a Coupled Ocean/Atmosphere Modeling System*, Massachusetts Institute of Technology, Cambridge, MA: 2000

- Ran diagnostic tests to determine stability issues in model spin up.

Undergraduate Research Assistant - *Analysis of the MM5 Regional Atmospheric Model*, Cornell University, Ithaca, NY: 2000

- Compared model output to reanalyses to identify major dynamical discrepancies.

TEACHING EXPERIENCE

Forum Founder and Developer, SIO 209: ESP Climate Change Forum. 2006
Scripps Institution of Oceanography/UCSD, La Jolla, CA.

- Created weekly course aimed at investigating the areas of legitimate scientific debate in climate science, challenging misconceptions and assumptions of both climate skeptics and advocates of change. This course is now under consideration for permanent establishment at Scripps.
- Developed curriculum, course format and layout. Arranged the participation of weekly guest experts from across Scripps and UCSD, led class discussions, and presented related current events each week. The format created for this class is still used for all ESP fora today.
- Identified the (often separate) areas of contention in the popular, scientific, and policy debates.
- Attracted 65+ regular graduate student and faculty participants from diverse disciplines of the Earth Sciences, UCSD's Business School and Economics, International Relations, Political Science, and Engineering departments, as well as representatives of the Birch Aquarium and members of the San Diego community.

Forum co-Developer, SIO 209: Interdisciplinary Policy Solutions to Scientific Problems in the Environment, Scripps Institution of Oceanography/UCSD, La Jolla, CA. 2006

- Co-created weekly forum with economics graduate student aimed at bridging the communication divide between scientists, social scientists, and business to develop solutions concerning environmental impacts (particularly related to climate).
- Developed curriculum, using course format and layout that proved successful in the Climate Change and Energy Policy Fora. Attracted 35+ interdisciplinary participants.

Forum Founder and Developer, SIO 209: Energy Policy. 2005
Scripps Institution of Oceanography/UCSD, La Jolla, CA.

- Created weekly forum aimed at better understanding the pros and cons of energy policy directions. Analyzed the potential and pitfalls of many alternative fuels, as well as the ecological impact of policy decisions.
- Developed curriculum, course format and layout. Led class discussions and presented related current events each week.
- Identified the (often separate) areas of contention in the popular, scientific, and policy debates.
- Attracted 20+ regular graduate student participants from diverse disciplines across Scripps and UCSD, as well as members of the San Diego community.

Forum co-Developer, SIO 209: Adaptation and Mitigation Strategies for Climate Change, Scripps Institution of Oceanography/UCSD, La Jolla, CA. 2007

- Co-created weekly forum to address the scientific, engineering, economic, and political merits of geoengineering, diplomatic, and technological devices that may aid to our ability to adapt to and reduce climate changes in the next half-century.

- This class will be led by another member of the Environmental Science and Policy group at Scripps during the Fall of 2007.

Seminar Developer, Scripps Institution of Oceanography/UCSD, La Jolla, CA. 2003-2006

- Developed and recruited faculty to guide seminar classes to extend the standard climate science curriculum at Scripps.
- Topics included Large-scale Dynamics, Atmospheric and Oceanic Modeling, Model Parameterizations, Boundary-Layer Physics and Stratocumulus Clouds, and Hydrologic Science.

Teacher's Assistant, ES 20: The Atmosphere. 2007

Scripps Institution of Oceanography/UCSD, La Jolla, CA.

- Duties include developing test questions and leading review sessions.

Teacher's Assistant, EAS 131: Principles of Meteorology. 2001

Cornell University, Ithaca, NY.

- Taught laboratory session for 20+ freshman atmospheric science majors, developing teaching and examination materials.

RELATED EXPERIENCE

Fully-funded Participant, *the American Meteorological Society's Summer* 2006

Policy Colloquium, Washington, DC

- Gained invaluable access and insight into the policy-making process of the federal government, as well as outside groups that have a stake in environmental science policy.
- Learned about the many roles and interactions scientists may develop to influence policy decisions and actions in Washington and beyond.

Member/Coordinator, *the Environmental Science and Policy (ESP) Group*, 2002-present

Scripps Institution of Oceanography/UCSD, La Jolla, CA.

- Led the growth and expansion of group focused on the societal impacts relating to environmental science and policy, with special attention placed on identifying career opportunities outside of academia.
- Vastly expanded the role of ESP fora to engage a larger number of people and the awareness of current events. Invited guest speakers, held special awareness events, and participated in discussions with the University administration to increase campus sustainability.

Climate Expert Media Contact, *Scripps Institution of Oceanography Media* 2006-2007

Advisory, La Jolla, CA

- Included on media advisory's list of Scripps climate experts preceding the theatrical release of "An Inconvenient Truth", as well as preceding the release of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Interviewed on-camera for upcoming Sierra Club documentary.

Scientific Contributor, *Birch Aquarium at the Scripps Institution of* 2007

Oceanography, La Jolla, CA

- Advised the development of “Feeling the Heat”, an award-winning climate change exhibit displaying for three years at the Birch Aquarium; assisted in related staff training.

Invited Contributions, *Scripps Institution of Oceanography*, La Jolla, CA 2007

- Invited talk at the Birch Aquarium at Scripps to prepare aquarium employees for potential questions regarding new climate change exhibit.
- Authored short article on El Niño teleconnections for Explorations magazine.
- Invited to speak about climate change at community events

HONORS AND AWARDS

American Geophysical Union Outstanding Student Paper Award – Hydrology Section at the Fall Meeting , San Francisco, CA	2006
American Meteorological Society’s Summer Policy Colloquium funding Recipient from the National Science Foundation , Washington, DC	2006
California Space Institute and California Space Grant Consortium recipient , Scripps Institution of Oceanography	2003-2004
Scripps Admiral Nimitz Fellowship , Scripps Institution of Oceanography	2002-2003
Academic Excellence Award for the Atmospheric Sciences , Cornell University	2002
New York NASA Space Grant Consortium recipient , Cornell University	2001

PROFESSIONAL MEMBERSHIP and ACADEMIC SERVICE

Member , American Meteorological Society	2001-present
Co-President , Cornell Chapter of the American Meteorological Society	2001-2002
Member , American Geophysical Union	2007-present
Member , European Geophysical Union	2008
Student Committee Member for Climate Faculty Candidate Search , Scripps Institution of Oceanography	2007
Reviewer , <u>Journal of Climate</u>	
Reviewer , <u>Journal of Hydrometeorology</u>	
Reviewer , <u>Journal of the Meteorological Society of Japan</u>	
Reviewer , <u>Journal of Geophysical Research - Atmosphere</u>	
Reviewer , <u>Meteorologische Zeitschrift</u>	
Reviewer , <u>Journal of Applied Meteorology and Climatology</u>	
Reviewer , <u>Journal of Hydrology</u>	
Reviewer , <u>Global Environmental Change: Human and Policy Dimensions</u>	
Reviewer , <u>Journal of Natural Resources Policy Research</u>	

PUBLICATIONS

- Ruane, A.C., 2008: The effects of precipitation assimilation on NARR’s atmospheric water cycle – Part I: 20-year mean and annual balance. *in preparation*.
- Ruane, A.C., 2008: The effects of precipitation assimilation on NARR’s atmospheric water

- cycle – Part II: Summertime and diurnal balance. *in preparation*.
- Anderson, B.T., M. Kanamitsu, J.O. Roads, and A.C. Ruane, 2008: The influence of evaporation and moisture-flux convergence upon seasonal precipitation rates over North America. *J. Hydrometeorology*, in press.
- Bosilovich, M.G., D. Mocko, J.O. Roads, and A.C. Ruane, 2008: A multi-model analysis for the Coordinated Enhanced Observing Period (CEOP). *J. Hydrometeorology*, submitted.
- Ruane, A.C., and J.O. Roads, 2008a: Diurnal to annual precipitation sensitivity to convective and land surface schemes. *Earth Interactions*, **12**(5), 1-13. doi:10.1175/2008EI256.1
- Ruane, A.C., and J.O. Roads, 2008b: Dominant balances and exchanges of the atmospheric water cycle in the Reanalysis-2 at diurnal, annual, and intraseasonal time scales. *J. Climate*, **21**(16), 3951-3966. doi:10.1175/2007JCLI2015.1
- Horton, R., C. Herweijer, C. Rosenzweig, J. Liu, V. Gornitz, and A.C. Ruane, 2008: Sea level rise projections for current generation CGCMs based on the semi-empirical method. *Geophys. Res. Lett.*, **35**(2). doi:10.1029/2007GL032486
- Anderson, B.T., A.C. Ruane, J.O. Roads, M. Kanamitsu, and G. Salvucci, 2008: A new metric for estimating local moisture cycling and its influence upon seasonal precipitation rates. *J. Hydrometeorology*, **9**(3), 576-588. doi: 10.1175/2007JHM968.1
- Ruane, A.C., and J.O. Roads, 2007b: 6-hour to 1-year variance of five global precipitation sets. *Earth Interactions*, **11**, doi:10.1175/EI225.1.
- Ruane, A.C., and J.O. Roads, 2007a: The diurnal cycle of water and energy over the continental United States from three reanalyses. *J. Meteor. Soc. Jpn.* **85A**, 117-143.
- Bosilovich, M., D. Mocko, W.K.-M. Lau, A. Ruane, and J. Roads, 2006: Initial comparisons of model analyses during the North American Monsoon Experiment (NAME). *CEOP Newsletter*, **10**, 2-3.

SELECTED RESEARCH PRESENTATIONS

- Ruane, A.C.: “Dominant Balances and Exchanges of NARR’s Atmospheric Water Cycle”. Solicited oral presentation at the European Geophysics Union Annual Meeting, Vienna, Austria, 2008.
- Ruane, A.C., and J.O. Roads, “Dominant Balances and Exchanges of the Atmospheric Water Cycle in the Reanalysis-2”. Orally presented at the 88th AMS Annual Meeting, New Orleans, LA, 2008.
- Ruane, A.C., and J.O. Roads: “The Temporal Distribution of Water Cycle Exchanges”. Invited oral presentation at the Center for Hydrometeorology and Remote Sensing, UC Irvine, Irvine, CA, 2007.
- Ruane, A.C., and J.O. Roads: “6-hour to 1-year Variance of Five Global Precipitation Sets”. Orally presented at the 87th AMS Annual Meeting, San Antonio, TX, 2007.
- Ruane, A.C., and J.O. Roads: “6-hour to 1-year Variance of Five Global Precipitation Sets”. Orally presented at the 2006 AGU Fall Meeting, San Francisco, CA, 2006.
- Ruane, A.C., and J.O. Roads: “Wide Band Power and Harmonic Amplitude of Precipitation”. Orally presented at the 7th International Regional Spectral Model Workshop, Tel Aviv, Israel, 2006.
- Ruane, A.C., J.O. Roads, and M. Kanamitsu: “Diurnal Water and Energy Cycles over the Continental United States”. Orally presented at the 5th International Implementation Meeting for the Coordinated Enhanced Observing Period, Paris, France, 2006.
- Ruane, A.C., J.O. Roads, and M. Kanamitsu: “The Diurnal Cycles of Water and Energy Over

- the Continental United States from Three Reanalyses”. Orally presented at the 86th AMS Annual Meeting, Atlanta, GA, 2006.
- Ruane, A.C., J.O. Roads, and M. Kanamitsu: “Global Variations in Water and Energy Cycles”. Orally presented at the 6th International Regional Spectral Model Workshop, Palisades, NY, 2005.
- Ruane, A.C., J.O. Roads, and M. Kanamitsu: “Characterizing the Diurnal Cycle in a Global Forecast/Analysis System”. Orally presented at the 4th International Implementation Meeting of the Coordinated Enhanced Observing Period, Tokyo, Japan, 2005.
- Ruane, A.C., J.O. Roads, and M. Kanamitsu: “Diurnal Cycle Performance in a Global Analysis/Forecast System”. Orally presented at the 85th AMS Annual Meeting, San Diego, CA, 2005.
- Ruane, A.C., J.O. Roads, and M. Kanamitsu: “Coordinated Enhanced Observing Period (CEOP) Global Model Evaluations”. Orally presented at the 5th International Regional Spectral Model Workshop, Seoul, Korea, 2004.

OUTREACH PRESENTATIONS

- Ruane, A.C.: “Challenges in Communicating Climate Science to the Public”. Invited presentation at the Birch Aquarium at the Scripps Institution of Oceanography, La Jolla, CA, 2007.
- Ruane, A.C.: “Challenges in Understanding and Preparing for Climate Change”. Invited presentation at the Pacific Regent Retirement Community, La Jolla, CA, 2007.

LANGUAGES and INTERESTS

- Conversational Spanish
- Experience with Fortran, Matlab, IDL, GrADS, Unix shell scripting, C, Java, HTML.
- Motivated to contribute applications-driven research that connects the environmental sciences to societal use, as well as increase communication between non-scientists and researchers.
- Personal interests include hiking, cooking, playing amateur baseball, and travel

REFERENCES

References available upon request