Sang-Ik Shin

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EDUCATION

May, 2002	Ph.D. in Atmospheric and Oceanic Sciences (Climate Dynamics) University of Wisconsin-Madison THESIS: Understanding the Climate of the Last Glacial Maximum Using a Climate System Model (Advisor: Dr. Zhengyu Liu)
Feb., 1993	M.Sc. in Oceanography (Physical Oceanography) Inha University, Korea THESIS: A Numerical Experiment of the Tidal Front in the mid-Yellow Sea off Korea (Advisor: Dr. Young-Ho Seung)
Feb., 1991	B.S. in Oceanography Inha University, Korea

PROFESSIONAL EXPERIENCE

01/2010-	College of Marine Science, University of South Florida, St. Petersburg, FL 01/2010- Assistant Professor
06/2010-08/2010	Visiting Scientist, CIRES Climate Diagnostics Center, University of Colorado & NOAA Earth System Research Laboratory, Boulder, CO
06/2002-12/2009	CIRES Climate Diagnostics Center, University of Colorado & NOAA Earth System Research Laboratory, Boulder, CO 07/2005-12/2009 Research Scientist II 06/2002-06/2005 Research Scientist I
02/2000-04/2000	Visiting Scientist, National Center for Atmospheric Research (NCAR) Climate Dynamics Division, Boulder, CO

09/1997-05/2002 Research Assistant, Center for Climatic Research, University of Wisconsin-Madison

05/1993-04/1995 Military Service (Korean Army, Mandatory)

03/1992-06/1992 Teaching Assistant, Department of Oceanography, Inha University, Korea

RESEARCH

Research Interests :

Large-Scale Atmosphere-Ocean Dynamics; Climate System Modeling; Paleoclimate Modeling

Research Experience :

CIRES Climate Diagnostics Center & NOAA/ESRL/PSD

- Climate Dynamics
  - Investigations of the nature and impacts of atmosphere-ocean coupling using analytical, observational, and coupled climate modeling approaches.
  - Sensitivity of global and regional hydroclimates to the patterns of tropical sea surface temperature changes in the past, present and future climates.
  - Development of an intermediate complexity coupled climate model for studies of ENSO and its global impacts. An upper layer ocean model (from 1.5 to 4.5 layers) was coupled to the NCAR atmospheric general circulation model.
  - Using an atmospheric general circulation model coupled to an oceanic slab mixed layer to investigate 1) the formation mechanisms of Intertropical Convergence Zone (ITCZ), tropical climate regimes, and their impacts on global climate, and 2) the impact of general tropical SST variability on global climate changes on seasonal and longer time scales.
- Paleoclimate
  - Investigations of the role of tropical Pacific SST conditions on the mid-Holocene climate.
  - Investigations of the effect of reduced atmospheric CO_2 concentration on the oceanic thermohaline circulation at the Last Glacial Maximum using a fully coupled atmosphere-ocean-sea-ice model (NCAR-CCSM).

University of Wisconsin-Madison

- Paleoclimate
  - Ph.D. Research on the coupled atmosphere-ocean-sea-ice model (NCAR-CCSM) simulations on the climate at the Last Glacial Maximum (with Drs. Z. Liu, University

of Wisconsin-Madison; J. E. Kutzbach, University of Wisconsin-Madison; B. L. Otto-Bliesner, NCAR).

- Large-scale Ocean Dynamics
  - Investigations of the dynamics of oceanic ventilated thermocline circulation using oceanic general circulation models (GFDL-MOM, MICOM).

Inha University, Korea

- Coastal Ocean Modeling
  - M.S. Research on the generation mechanism of tidal front using an oceanic general circulation model.

Research Grants :

Pending

- **How has the Tropical Ocean Warmed?** (DOE; 2010-2013)
  PI/PD : Sang-Ik Shin
  Co-PIs : Prashant D. Sardeshmukh (University of Colorado & NOAA ESRL)
  Award : $448,899.34 (USF), $225,000 (CU)

- **Investigating Low-Frequency Barotropic Transport Fluctuations in the Southern Ocean, North Pacific, and Atlantic using GRACE** (NASA; 2010-2014)
  PI/PD : Don P. Chambers
  Co-Is : Sang-Ik Shin, Ichiro Fukumori (NASA JPL), Josh K. Willis (NASA JPL)
  Award :

- **Regional Meteorological Marine Reanalysis of Gulf of Mexico and Caribbean Sea** (DOE INCITE)
  PI/PD : Qingnog Xiao
  Co-PIs : Sang-Ik Shin
  Award : 26,000,000 computing hours and 3,000 TB storage space

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- **Diagnosing local and remote coupling errors in the tropics** (NOAA CPO-CVP; 2008-2011)
  PI : Prashant D. Sardeshmukh
  Co-PIs : Sang-Ik Shin

- **Changes in the impacts of tropical SSTs on the global and regional hydroclimate** (DRICOMP; 2007-2008)
  PI : Sang-Ik Shin
  Co-PIs : Prashant D. Sardeshmukh, Robert S. Webb

- **The role of extratropical cooling in determining the level of ENSO** (NSF; 2006-2009)

PI : DeZheng Sun
Co-PIs : Sang-Ik Shin, Amy Solomon

- **Extratropical forcing of the tropical Pacific: The role of Pacific Subtropical Cells in climate** (NOAA OGP-CLIVAR; 2005-2008)
  PI : Amy Solomon
  Co-PIs : Sang-Ik Shin, Mike Alexander, Julian P. McCreary

- **Assessing ENSO and its impacts in a changed climate** (NOAA OGP-CLIVAR; 2004-2007)
  PI : Sang-Ik Shin
  Co-PIs : Prashant D. Sardeshmukh, Robert S. Webb

TEACHING

The goal of my teaching would be to *help students build a strong background understanding of climate, an ability to see the nature of problems, and an ability to apply their knowledge to the analysis of scientific problems*. Through my experience as a student, I have realized that many students including myself struggled to visualize and mentally organize the theories learned in class. It is crucial for students to be able to apply theories they have learned to real scientific problems. To help students realize this goal, I will provide demonstrations and visualizations of the theories learned in class by using computer simulations. Specific classes of interest include:

Our Changing Environments-Past, Present and Future; Dynamics of Atmosphere and Ocean; Dynamical Climatology; Climate System Modeling

Classes Taught or In Progress
Fall 2010 Climate Dynamics

PROFESSIONAL SERVICE

Post-doctorial Advisees and Direct Supervisees

Kathy Pegion	2009-2009	Science Advisor (CU CIRES / NOAA ESRL)

Committee Member:

Carlie Williams	2010-	Ph.D. Geological Oceanography

College of Marine Science Computer Committee *since* 2010

Reviewed Papers For:
Advances in Atmospheric Sciences
Climatic Change

Climate Dynamics
Journal of Climate
Journal of Geophysical Research
Geophysical Research Letters
Nature Geoscience

PEER-REVIEWED PUBLICATIONS

Shin S.-I., P. D. Sardeshmukh, and K. Pegion, 2010: Realism of local and remote feedbacks on Tropical sea surface temperatures in climate models. *J. Geophys. Res.*, doi:10.1029/2010JD013927, in press.
(*Available online publication at http://www.agu.org/journals/pip/jd/2010JD013927-pip.pdf*)

Shin S.-I., and P. D. Sardeshmukh, 2010: Critical influence of the pattern of Tropical Ocean warming on remote climate trends. *Clim. Dyn.*, doi:10.1007/s00382-009-0732-3, in press.
(*Available online publication at http://www.springerlink.com/content/c53775r72n26021t/*)

Shin S.-I., P. D. Sardeshmukh, and R. S. Webb, 2010: Optimal Tropical sea surface temperature forcing of North American drought. *J. Climate*, **23**, 3907-3917.

Solomon, A., S.-I. Shin, M. A. Alexander, and J. P. McCreary, 2008: The relative importance of tropical variability forced from the North Pacific through ocean pathways. *Clim. Dyn.* **31**, 315-331.

Shin S.-I., P. D. Sardeshmukh, R. S. Webb, R. J. Oglesby, and J. J. Barsugli, 2006: Understanding the mid-Holocene climate. *J. Climate*, **15**. 2801-2817.

Barsugli, J., S.-I. Shin, and P. D. Sardeshmukh, 2006: Sensitivity of global warming to the pattern of tropical ocean warming. *Clim. Dyn.*, **27**, 483-492.

Liu, Z., S.-I. Shin, R. S. Webb, W. Lewis, and B. L. Otto-Bliesner, 2005: Atmospheric CO_2 forcing on glacial thermohaline circulation and climate. *Geophys. Res. Lett.,* **32**, doi:10.1029/2004GL021929.

Barsugli, J., S.-I. Shin, and P. D. Sardeshmukh, 2005: Tropical climate regimes and global change in a simple setting. *J. Atmos. Sci.*, **62**, 1226-1240.

Sun, D. -Z., T. Zhang, and S.-I. Shin, 2004 : The effect of subtropical cooling on the amplitude of ENSO: A numerical study. *J. Climate*, **17**, 3786-3798.

Shin, S.-I., Z. Liu, B. L. Otto-Bliesner, J. E. Kutzbach, and S. J. Vavrus, 2003: Southern Ocean sea-ice control of the glacial North Atlantic thermohaline circulation. *Geophys. Res. Lett.*, **30**, doi:10.1029/2002GL015513.

Shin, S.-I., Z. Liu, B. Otto-Bliesner, E. C. Brady, J. E. Kutzbach, and S. P. Harrison, 2003: A simulation of the Last Glacial Maximum climate using the NCAR-CCSM. *Clim. Dyn.,* **20**, 127-151.

Otto-Bliesner, B. L., E. C. Brady, S.-I. Shin, Z. Liu, and C. Shields, 2003: Modeling El Niño and its tropical teleconnections during the last glacial-interglacial cycle. *Geophys. Res. Lett.*, **30**, doi:10.1029/2003GL018553.

Smith, L. M., G. H. Miller, B. Otto-Bliesner, and S.-I. Shin, 2003: Sensitivity of the Northern Hemisphere climate system to extreme changes in Holocene arctic sea-ice. *Quat. Sci. Rev.*, **22**, 645-658.

Liu, Z., S.-I. Shin, B. Otto-Bliesner, J. E. Kutzbach, E. C. Brady, and D. Lee, 2002: Tropical cooling at the Last Glacial Maximum and extratropical ocean ventilation. *Geophys. Res. Lett.*, **29**, DOI:10.1029/2001GL013938.
(Corrections : DOI:10.1029/2002GL016795).

Shin, S.-I. and Z. Liu, 2000: Response of the equatorial thermocline to extratropical buoyancy forcing. *J. Phys. Oceanogr.*, **30**, 2883-2905.

Liu, Z., S.-I. Shin, P. Behling, W. Prell, M. Trend-Staid, S. P. Harrison, and J. E. Kutzbach, 2000: Dynamical and observational constraints on tropical Pacific sea surface temperatures at the Last Glacial Maximum. *Geophys. Res. Lett.*, **27**, 105-108.

Liu, Z. and S.-I. Shin, 1999: On thermocline ventilation of active and passive tracers. *Geophys. Res. Lett.*, **26**, 357-360.

Seung, Y.-H. and S.-I. Shin, 1996: A simple model of the formation of thermohaline front in the southeastern Yellow Sea in winter. *J. Korean Soc. Oceanogr.*, **31**, 23-31.

Shin, S.-I. and Y.-H. Seung, 1993: A numerical modeling of the tidal front in the mid-Yellow Sea off Korea using a concept of mixing rate. *J. Oceanol. Soc. Korea*, **28**, 121-131. (in Korean).

PRESENTATIONS

Shin S.-I., and P. D. Sardeshmukh, 2010: Optimal Tropical sea surface temperature forcing of North American drought. 90th American Meteorological Society Annual Meeting, Atlanta, GA.

Sardeshmukh, P. D., and S.-I. Shin, 2010: The misrepresentation of Tropical SSTs in climate models. 90th American Meteorological Society Annual Meeting, Atlanta, GA.

Sardeshmukh, P. D., and S.-I. Shin, 2009: The misrepresentation of Tropical SSTs in climate models. 2009 AGU Fall Meeting, San Francisco, CA.

Shin, S.-I., and P. D. Sardeshmukh, 2009: Rethinking the impacts of atmosphere-ocean coupling. 89th American Meteorological Society Annual Meeting, Phoenix, AZ.

Sardeshmukh, P. D., and S.-I. Shin, 2009: Do extratropical stormtracks substantially feed back on the response to ENSO? 89th American Meteorological Society Annual Meeting, Phoenix, AZ.

Shin, S.-I., R. S. Webb, and P. D. Sardeshmukh, 2008: The impacts of tropical SSTs on the Regional Hydroclimate. 33rd Climate Diagnostics and Prediction Workshop, Lincoln, NE.

Sardeshmukh, P. D., and S.-I. Shin, 2008: Why the Indian Ocean is important for North Atlantic Climate. 2008 AGU Fall Meeting, San Francisco, CA.

Sardeshmukh, P. D., and S.-I. Shin, 2007: Possibility of abrupt climate change in the next several decades. 2007 AGU Fall Meeting, San Francisco, CA.

Shin S.-I., and P. D. Sardeshmukh, 2007: Coupled versus uncoupled atmospheric model integrations. 2007 AGU Fall Meeting, San Francisco, CA.

Barsugli, J. J., P. D. Sardeshmukh, R. S. Webb, S.-I. Shin, and H. Kilbourne, 2007: A new approach to global climate reconstructions of the last 1000 years. 2007 AGU Fall Meeting, San Francisco, CA.

Barsugli, J. J., S.-I. Shin, and P. D. Sardeshmukh, 2005: Tropical climate regimes in a simple setting. 2005 AGU Fall Meeting, San Francisco, CA.