

Salil Mahajan

Atmospheric and Oceanic Sciences,
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EDUCATION

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| PhD, Atmospheric Sciences (Degree Plan GPA: 3.7/4.0)
<i>College of Geosciences, Texas A&M University, College Station</i> | Dec. 2008 |
| M.S., Atmospheric Sciences (Degree Plan GPA: 4.0/4.0)
<i>College of Geosciences, Texas A&M University, College Station</i> | Dec. 2004 |
| Bachelor of Architecture
<i>Indian Institute of Technology (IIT), Kharagpur, India</i> | May 2002 |
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RESEARCH EXPERIENCE

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| Postdoctoral Research Associate/ Visiting Research Scientist
<i>Atmospheric and Oceanic Sciences (AOS) Program, Princeton University/ Geophysical Fluid Dynamics Laboratory (GFDL)</i> | October 2008- |
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Advisor: Dr. Rong Zhang, Dr. Thomas Delworth

- **Decadal Prediction of Atlantic Meridional Overturning Circulation (AMOC):** Identification of sub-surface and surface fingerprints of the AMOC in observations and ocean assimilation data and applying simple regressive and auto-regressive (AR) models for prediction. (*preliminary results:* http://people.tamu.edu/~salilmahajan/AMOC_prediction.pdf)
 - **Role of Atmosphere-Ocean Coupling in the North Pacific Response to AMOC Variability:** Executing water-hosing and other fully coupled and hybrid atmosphere-ocean model experiments and studying the response of the North Pacific to changes in the AMOC, and to Atlantic Multi-decadal Oscillation (AMO) through atmospheric tele-connections.
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| Graduate Research Assistant
<i>Department of Atmospheric Sciences, Texas A&M University, College Station</i> | Fall 2003-
Sept. 2008 |
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Advisors: Prof. R. Saravanan/ Prof. Gerald R. North

- **Dissertation:** Numerical simulations to identify the role of the Wind-Evaporation-Sea Surface Temperature (WES) Feedback in free and forced coupled tropical climate variability.
 - Modified boundary layer physics of a Pseudo-Spectral, Finite Difference atmospheric Global Climate Model (GCM) - NCAR-CCM3 coupled to a Slab Ocean Model (SOM), to isolate the free tropical variability associated with the WES feedback.
 - Modified a coupled GCM to identify non-linearities in the meridional mode of the tropical Atlantic using Singular Value Decomposition (SVD) analysis.
 - Analyzed the remote response of extra-tropical and tropical Atlantic by an Empirical Orthogonal Function (EOF) based, artificially generated El-Nino cycle.
 - Studied the thermodynamic tele-connection mechanisms of the propagation of abrupt climate change in the high-latitudes to the tropics by forcing a coupled GCM to prescribed Last Glacial Maximum sea-ice anomalies. The coupled GCM physics was modified to make the sea-ice non-interactive.
- **Atmospheric Response to Tropical Instability Waves:** Forced a Pseudo-Spectral, Finite Difference atmospheric GCM (NCAR-CAM3) to temporally high-resolution tropical sea surface temperature data derived from TRMM satellite to analyze the response of the atmosphere to tropical instability waves.
- **Analysis of Extremes of Precipitation in Greenhouse Gas Forced Climate Change:** Used parametric and non-parametric Monte-Carlo bootstrapping techniques to identify trends in the extremes of precipitation over the US in observational datasets and various IPCC AR4 GCM simulations.

- **Tropical Cyclone Genesis in a Warming Climate:** Analyzed IPCC AR4 GCM simulations for environmental conditions like Sahel rainfall, ENSO index, vertical shear, sea surface temperature, etc., correlated with cyclone genesis.
- **Master's Thesis:** Modified the boundary conditions of an atmospheric climate model (NCAR-CCM3) to create an all land zonally symmetric earth-like planet to study its linearity of response to designed steady and periodic forcings.

Oak Ridge Center for Advanced Studies (ORCAS) Graduate Summer Research Fellow/Intern

Summer 2007

Computer Science and Mathematics Division, Oak Ridge National Laboratory (ORNL), Oak Ridge, TN
 Advisor: Forrest M. Hoffman

- **Validation of Climate Simulation Results to Observations:** Used a parallel cluster analysis algorithm to compare vertical profiles of multi-variate observational data to NCAR-CCSM3 output for the current decade.

Collaborative Researcher

Summer 2005

National Center for Atmospheric Research (NCAR), Boulder
 Advisor: Dr. R. Saravanan

- **Analysis of Extremes of Precipitation in Greenhouse Gas Forced Climate Change**

PUBLICATIONS

- **Mahajan S.,** R. Saravanan, P. Chang (2008): The role of the Wind-Evaporation-Sea surface temperature (WES) feedback in air-sea coupled tropical variability, *Special edition: Atmosphere-Ocean Coupling, Atmospheric Research, De-zheng Sun (Ed.) (in press,* http://people.tamu.edu/~salilmahajan/WES_variability.pdf)
- Wu, Q., **S. Mahajan,** K. P. Bowman, and P. Chang (2008): Atmospheric response to Atlantic tropical instability waves in CAM3, *Journal of Geophysical Research,* 113, D15125. (<http://people.tamu.edu/~salilmahajan/TIW.pdf>)
- Hoffman, F. M., W. W. Hargrove, R. T. Mills, **S. Mahajan,** D. J. Erickson, and R. J. Oglesby. (2008): Multivariate Spatio-Temporal Clustering (MSTC) as a Data Mining Tool for Environmental Applications. Miquel Sánchez-Marrè, Javier Béjar, Joaquim Comas, Andrea E. Rizzoli, Giorgio Guariso (Eds.), *Proceedings of the iEMSs Fourth Biennial Meeting: International Congress on Environmental Modeling and Software (iEMSs 2008)* (http://people.tamu.edu/~salilmahajan/cluster_analysis.pdf)

In preparation:

- **Mahajan S.,** R. Saravanan, P. Chang (2008): Free and forced variability of tropical Atlantic: Role of the Wind-Evaporation-Sea surface temperature (WES) feedback. *Journal of Climate* (draft: http://people.tamu.edu/~salilmahajan/WES_ENSO.pdf)
- **Mahajan S.,** R. Saravanan, P. Chang (2008): Air-sea coupled thermodynamic pathways of the influence of high latitude cooling on the tropics. *Journal of Climate* (draft: http://people.tamu.edu/~salilmahajan/WES_sea_ice.pdf)
- **Mahajan S.,** G. R. North, R. Saravanan, M.G. Genton (2008): Statistical Analysis of the Trends in the Extremes of Precipitation over the US, *Climate Dynamics* (draft: <http://people.tamu.edu/~salilmahajan/extremes.pdf>)

Dissertation: Role of the Wind-Evaporation-Sea Surface Temperature Feedback in Free and Forced Tropical Variability, December 2008. (<http://people.tamu.edu/~salilmahajan/thesis.pdf>)

Master's Thesis: CCM3 as applied to a fictitious All Land Zonally Symmetric Planet, Terra Blanda 3; Texas A&M University, December 2004. (<http://people.tamu.edu/~salilmahajan/Masters.pdf>)

PUBLISHED ABSTRACTS/ PRESENTATIONS

Invited Presentations:

- Climate Impacts of Wind-Evaporation-Sea Surface Temperature (WES) Feedback: Atmospheric Ocean Sciences Program, **Geophysical Fluid Dynamics Laboratory (GFDL)/Princeton University**, May 2008
- Role of Wind-Evaporation-Sea Surface Temperature (WES) Feedback in tropical climate variability: Department of Earth System Science, **University of California, Irvine**, May 2008
- Global Climate Models: As Physical Tools and their Validation: Carnegie Institution for Science, **Stanford University**, April 2008
- A cluster analysis approach to comparing Atmospheric Radiation Measurement (ARM) and Global Climate Model (GCM) Results: Computational Earth Sciences, **Oak Ridge National Laboratory (ORNL)**, August 2007

Conference:

- **Mahajan, S.**, R. Saravanan, and P. Chang (2009): Free and forced variability of the tropical Atlantic Ocean: Role of the wind-evaporation-sea surface temperature (WES) Feedback, *89th AMS Annual Meeting, Phoenix*.
- **Mahajan, S.**, R. Saravanan, and P. Chang (2008): The Wind-Evaporation-Sea Surface Temperature (WES) Feedback as a Thermodynamic Pathway for the Equator-ward Propagation of High Latitude Sea-Ice Induced Cold Anomalies, *EOS Trans. AGU, 89(53)*, Fall Meet. Suppl., Abstract PP44A-06
- Hoffman, F. M., **S. Mahajan**, W. W. Hargrove, R. T. Mills, and A. D. DelGenio (2008): A cluster analysis approach to comparing Atmospheric Radiation Measurement (ARM) and Global Climate Model (GCM) Results. *ARM Science Team Meeting, Norfolk; iEMSS '08, Barcelona (Poster)*
- Saravanan, R., **S. Mahajan**, and P. Chang, (2007): Role of Wind-Evaporation-Sea Surface Temperature (WES) feedback in internal and forced tropical variability, *Eos Trans. AGU, 88(52)*, Fall Meet. Suppl., Abstract GC51A-0165 (**Poster**)
- **Mahajan, S.**, F. M. Hoffman, W. W. Hargrove, S. W. Christensen, and R. T. Mills. (2007): A cluster analysis approach to comparing Atmospheric Radiation Measurement (ARM) and Global Climate Model (GCM) Results. *Eos Trans. AGU, 88(52)*, Fall Meet. Suppl., Abstract A41F-0010 (**Poster**).
- Ghosh, S., A. S. Hering, **S. Mahajan**, M. G. Genton, M. Jun, B. Mallick and R. Saravanan (2007): Statistical Approaches to El Niño Forecasting, *Joint Statistical Meetings, Salt Lake City (Invited Poster)*
- **Mahajan S.**, R. Saravanan, and P. Chang (2007): Mechanistic studies of the role of Wind-Evaporation-SST feedback in ocean-atmosphere interaction, *Eos Trans. AGU, 88(23)*, Jt. Assem. Suppl., Abstract A41F-04 (**Presentation**). **Poster:** IUGG 07
- Saravanan, R. and **S. Mahajan** (2007): Statistical analysis of factors affecting the genesis of tropical Atlantic cyclones in NCEP data and GCM simulations, *Eos Trans. AGU, 88(23)*, Jt. Assem. Suppl.
- **Mahajan S.**, G. R. North, R. Saravanan, and M.G. Genton (2007): Statistical analysis of the trends in the Extremes of Precipitation over the US, *AMS, San Antonio (Presentation)*. **Posters:** *AGU Annual Meeting, San Francisco, 2005; Graduate Climate Conference, Seattle, 2006; Multi-variate Methods in Environmetrics Conference, Chicago, 2006*

RELEVANT GRADUATE COURSE WORK

- Climate Modeling
 - Computational Fluid Dynamics
 - Multivariate Analysis
 - Times Series Analysis
 - Statistical Methods
 - Climate Change
 - Atmospheric Dynamics I, II
 - Meteorological Oceanography
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TECHNICAL SKILLS:

- Scientific Codes: NCAR-CCM3, NCAR-CAM3, NCAR-CCSM3, GFDL-CM2.1
 - High Performance Computing: MPI, OpenMP
 - IDL, MATLAB, R, C, Fortran; Platforms: Mac OS X, Windows XP, Unix
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HONORS

- Gold Medal of the Peoples' Choice Awards at the ARM Science Team Meeting in Norfolk, Virginia (2008)
 - Awarded Summer Fellowship at Oak Ridge National Laboratory (ORNL) under ORCAS, 2007
 - First Prize, Student Research Week, Texas A&M University, 2006
 - Student Representative, Search committee for ODASES tenure-track faculty position in paleo-climate data analysis and modeling, Department of Atmospheric Sciences, Texas A&M University, College Station, 2006
 - Travel Scholarship for NCAR-IMAGE Workshop III: *Stochastic and Statistical Parameterization of Unresolved Features in the Atmosphere and Upper Ocean*, Boulder, 2006
 - Travel Scholarship, Graduate Climate Conference, Seattle, 2006, 2007
 - AUF Fellow, College of Geosciences, Texas A&M University, 2003-04
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WORK AUTHORIZATION

Permitted to work in the US for practical training.
