CURRICULUM VITAE

Ramachandran (Ram) D. Nair

Contact Information

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Education

Ph.D. (Numerical Weather Prediction)	Indian Institute of Technology (IIT),	Kharagpur (India), 1994
M.Tech. (Atmospheric Sciences)	Indian Institute of Technology (IIT),	Kharagpur (India), 1988
M.Sc. (Mathematics)	Calicut University (India),	1984

Professional Appointments

- 5/2009 - Present: Scientist-III, National Center for Atmospheric Research (NCAR).

- 5/2005 - 5/2009: Scientist-II, National Center for Atmospheric Research (NCAR).

- 5/2002 - 5/2005: Scientist-I, National Center for Atmospheric Research (NCAR).

- 5/2009 - Present: Adjunct Associate Professor, Department of Marine, Earth and Atmospheric Science (MEAS), North Carolina State University (NCSU), Raleigh, USA.

- 11/1999 - 5/2002, Visiting Asst. Professor at Department of Mathematics, North Carolina State University (NCSU), Raleigh; Postdoctoral research scientist, Dept. of Marine Earth Sciences, NCSU, Raleigh.

- 10/1998-10/1999, Visiting research scientist, Max Planck Institute for Meteorology, Hamburg, Germany.

- 8/1997-10/1998, Consultant, RPN Montréal (Numerical Prediction Division, Environment Canada).

- 1995-97, Natural Science and Engineering Research Council of Canada (NSERC) Post-doctoral research fellow at RPN (Environment Canada), Montréal.

- 1994-95, Science and Technology Agency (STA) Japan, international research fellowship (1994-1995), at the National Institute for Earth Sciences and Disaster Prevention (NIED), Tsukuba, Japan.

- 1988-93, Research fellow, Indian Institute of Technology, Kharagpur, India.

Student and Academic Program Advising

Post-docs: Peter Lauritzen (ASP, 2005-07, *Ph.D., University of Copenhagen, Denmark*),
Vani Cheruvu (ASP, 2005-06, *Ph.D., IIT Madras, India*),
Hae-Won Choi (SciDAC/CU, 2004-07, *Ph.D., University of Toronto, Canada*),
Saroj Mishra (SciDAC/CU, 2008-10, *Ph.D., IISc Banglore, India*)

Graduate Students: Mike Levy, CU Boulder (*Ph.D. Thesis committee*)
Matthew Norman, NCSU, Raleigh, (*ASP student visitor advisor, Ph.D. thesis co-advisor*),
Reghu Nathan, University of Wyoming (*Mentor 2008 SIParCS*),
David Applehans, Colorado School of Mines (*Mentor 2010 SIParCS*),
Kiran Katta, University of Texas, El Paso (*Mentor, 2010 SIParCS*).

Journal Review

Reviewed over 70 research articles for the following journals:
Monthly Weather Review, Quarterly Journal of Royal Meteorological Society, Journal of Computational Physics, Journal of Atmospheric Science, Journal of Applied Meteorology and Climatology, Computers & Fluids, International Journal for Numerical Methods in Fluids, Chemical Engineering Communication, Atmospheric Chemistry and Physics Discussions (EGU), Ocean Modeling, ICCS.

Conferences/Lecture series

- Co-organizer for the NCAR Advanced Study Program Summer Colloquium 2008 on Numerical Techniques for Global Atmospheric Models June 1-13, 2008, Boulder, Colorado, U.S.A.

- Co-organizer for the SIAM Geoscience mini symposium in SIAM Conference on Mathematical and Computational Issues in the Geosciences (GS07), March 19- 22, 2007, Santa Fe, New Mexico USA.

Editorial Position

- Associate editor for the *Monthly Weather Review*.

- Lecture Notes in Computational Science and Engineering: *Numerical Techniques for Global Atmospheric Models*, Springer.

- International Journal of Ecology, special issue on *Mathematical Modeling for Earth System Sciences* (guest editor)

Honors and Awards

- Visiting Scientist fellowship awarded by Max Planck Institute for Meteorology, Hamburg, Germany (1998-99).

- Natural Science and Engineering Research Council of Canada (NSERC). Post-doctoral fellowship, at RPN (Environment Canada), Montréal, Canada (1995-1997).

- International Fellowship of Science and Technology Agency (STA) Japan, (1994-1995) at the National Institute for Earth Sciences and Disaster prevention (NIED), Tsukuba, Japan.

- Junior Research Fellowship award by the Indian Institute of Technology (IIT), Kharagpur, India (1988-1993).

Research Grants

- Co-PI for the DOE SciDAC 2009 BER proposal, "Toward a Non-Hydrostatic HOMME." With H. Tufo (PI), P. Lauritzen (Co-PI) [funded, $ 700K for 3 years.].

- A Co-PI for the NCAR proposal (collaboration across CGD and CISL) "Seamless Global Decadal Earth System Prediction at Regional Resolution," proposed by team of NCAR scientists.

- DOE SciDAC, "Improved Transport Processes for CCSM," $683, 100, 9/15/04 - 9/14/07, Co-PI; H. Tufo (PI), P. Rasch (Co-PI)

- DOE SciDAC, "Petascale atmospheric general circulation models for CCSM," 8/14/07- 8/14/10, $2, 700, 000, Co-PI; H. Tufo (PI), A. St-Cyr (Co-PI) and J. Tribbia (Co-PI)

Publications

Refereed Journal Article

1. **Nair, R.D.** and P.H. Lauritzen, 2010: A class of deformational flow test cases for linear transport problems on the sphere. *Journal of Comput. Phys.*, Vol.229, 8868-8887.

2. Lauritzen, P.H., **R.D. Nair** and P.A. Ulrich, 2010: A conservative semi-Lagrangian multi-tracer transport scheme (CSLAM) on the cubed-sphere grid. *Journal of Comput. Phys.* Vol.229, 1401-1424.

3. **Nair, R.D.**, 2009: Diffusion experiments with a global discontinuous Galerkin shallow water model. *Mon. Wea. Rev.*, Vol.137, 3339–3350.

4. Lauritzen, P.H., C. Jablonowski, M. Taylor and **R. D. Nair**, 2010: Rotated versions of the Jablonowski steady-state and baroclinic w ave test cases: A dynamical core intercomparison. *Journal of Advances in Modeling Earth Systems - Discussions* [In Press]

5. Norman, M.R, F.H.M. Semazzi, and **R.D. Nai**r, 2009: Conservative cascade interpolationon the sphere: An intercomparison of various non-oscillatory reconstructions. *Quart. J. Roy. Meteor. Soc.*, Vol.135, 795-805.

6. **Nair R. D.**, C.-W. Choi and H. M. Tufo, 2009: Computational aspects of a high-order discontinuous Galerkin atmospheric dynamical core, *Computers & Fluids,* Vol. 38, 309-319.

7. Norman, M.R and **R. D. Nair**, 2008: Non-polynomial based remapping schemes: Application to semi-Lagrangian advection, *Monthly Weather Review*, Vol.136, 5044-5061.

8. **Nair, R. D.**, and C. Jablonowski, 2008: Moving vortices on the sphere: A test case for horizontal advection problems. *Monthly Weather Review*, Vol. 136, No. 2, pp 699-711.

9. Levy M.N., **R. D. Nair** and H.M. Tufo, 2008: A high-order element-based Galerkin method for the barotropic vorticity equation, *Int. J. of Numer. Meth. Fluids,* doi: 10.1002/fld.1874.

10. Lauritzen, P. H., and **R. D. Nair**, 2008: Monotone and conservative Remapping between spherical grids (CaRs): Regular latitude-logitude and cubed-sphere grids. *Monthly Weather Review*, Vol.136, pp 1416-1432.

11. **Nair R.D.** and H. M. Tufo, 2007: Petascale atmospheric general circulation models, *Journal of Physics: Conference Series,* Vol. 78, SciDAC 2007, IOP Publishing, doi: 10.1088/1742-6596/78/1/012078.

12. Taylor M.A., J. Edward, S. Thomas, and **R. Nair**, 2007: A mass and energy conserving spectral element atmospheric dynamical core on the cubed-sphere grid, *Journal of Physics: Conference Series,* Vol. 78, SciDAC 2007, IOP Publishing, doi:10.1088/1742-6596/78/1/012074.

13. Dennis, J.M., **R. D. Nair**, H.M. Tufo, M. Levy, and T. Voran, 2008: Development of a Scalable Global Discontinuous Galerkin Atmospheric Model. *Int. J. of Comput. Sci. Eng.*, in press.

14. Levy, M. N., **R. D. Nair**, and H. M. Tufo, 2007: High-order Galerkin method for scalable global atmospheric models. *Computers and Geosciences*, Vol. 33, Issue 8, pp 1022-1035.

15. Cheruvu V., **R. D. Nair**, and H. M. Tufo, 2007: A spectral finite volume transport scheme on the cubed-sphere. *Applied Numerical Mathematics*, Vol. 57, Issue 9, pp 1021-1032.

16. **Nair, R. D.**, S. J. Thomas and R. D. Loft, 2005: A discontinuous Galerkin global shallow water model. *Monthly Weather Review*, Vol. 133, 876-888.

17. **Nair, R. D.**, S. J. Thomas and R. D. Loft, 2005: A discontinuous Galerkin transport scheme on the cubde-sphere. *Monthly Weather Review*, Vol. 133, 814-828.

18. **Nair, R. D.**, 2004: Extension of a conservative cascade scheme on the sphere to large Courant numbers. *Monthly Weather Review*, Vol. 132, 390-395.

19. **Nair, R. D.**, J. S. Scroggs, and F.H.M. Semazzi, 2003: A Forward-Trajectory global semi-Lagrangian transport scheme. *Journal of Computational Physics*, Vol. 193, 275-294.

20. **Nair, R. D.**, J. S. Scroggs, and F.H.M. Semazzi, 2002: Efficient conservative global transport schemes for climate and atmospheric chemistry models. *Monthly Weather Review*, Vol.**130**, 2059-2073.

21. **Nair, R.D.**, and B. Machenhauer, 2002: The mass-conservative cell-integrated semi-Lagrangian advection scheme on the sphere. *Monthly Weather Review*, Vol.**130**, 647-667.

22. **Nair, R.** , J. Côté, and A. Staniforth, 1999: Cascade interpolation for semi-Lagrangian advection over the sphere. *Quart. J. Royal Meteorological . Soc.*, **125**, 1445-1468.

23. **Nair, R.**, J. Côte and A. Staniforth, 1999: Monotonic Cascade interpolation for semi-Lagrangian advection. *Quart. J. Royal Meteorological Soc.*, Vol. **125**, 197-212.

24. Majumdar, S., **D. R. C. Nair** , R. S. Saraswat and A. Chandrasekar, 1997: A comparative study of an explicit and implicit normal mode initialization for a tropical limited area model. *Proc. Indian Academy of Sciences (Earth & Planetary sciences)*, **106**, No. 3, 1-9.

25. **Nair, D. R. C.**, B. Chakravarty, and P. Niyogi 1993: Implicit nonlinear normal mode initialization: A multigrid approach. *Acta Meteorologica Sinica*, **7**, 19 - 30.

26. **Nair, D. R. C.**, B. Chakravarty, and P. Niyogi 1993: Implicit nonlinear normal mode initialization for a barotropic primitive equation limited area model. *Mausam*, **44**, 1 - 8.

In Progress (or Submitted)

26. Norman, M.R., **R.D. Nair** and F.H.M. Semazzi, 2010: A Low Communication and Large Time Step Explicit Finite-Volume Solver for Non-Hydrostatic Atmospheric Dynamics. *Journal of Comput. Phys.* [Revised and Submitted]

27. Mishra, S.K., M. Taylor, **R.D. Nair**, P.H. Lauritzen, H.M. Tufo and J. Tribbia, 2010: Performance of the HOMME Dynamical Core in the Aqua-Planet Configuration of NCAR CAM4: Rainfall Simulation. *Journal of Climate* [Revised and Submitted]

28. Lauritzen, P.H., P. A. Ullrich and **R.D. Nair**, 2010: Atmospheric transport schemes: Desirable properties and a semi-Lagrangia n view on finite-volume discretizations. A Chapter in Springer book on *Numerical Techniques for Global Atmospheric Models.* [To Appear].

29. **Nair, R.D.**, M.N. Levy and P. H. Lauritzen, 2010: Emerging numerical methods for the Atmospheric Modeling. A Chapter in Springer book on *Numerical Techniques for Global Atmospheric Models.* [To Appear].

Other External Refereed Publications

31. Choi H-W., **R. D. Nair**, and H. M. Tufo, 2006: A scalable high-order discontinuous Galerkin method for global atmospheric modeling. Proceedings of the *Parallel Computational Fluid Dynamics 2006*, 8 pp, May 15-18, Busan, South Korea.

32. J.M. Dennis, M. Levy, **R.D. Nair**, H.M. Tufo, and T. Voran, 2005: Towards an Efficient and Scalable Discontinuous Galerkin Atmospheric Model, Proceedings of the 19th IEEE International Parallel and Distributed Processing Symposium, 8 pp.

33. Thomas, S.J., St-Cyr, A., and **R.D. Nair**, 2005: A hybrid Galerkin atmospheric model, Elsevier book, proceedings of the MIT conference on Computational Fluid and Solid Mechanics, 5 pp.

34. **Nair, R. D.**, J. Scroggs, and F.H.M. Semazzi, 2001: The conservative cascade transport scheme for global atmospheric models. World Climate Research Programme (WCRP), *WGNE Report No. 31*, WMO/TD-No. 1064.

35. **Nair, R.**, A. Staniforth and J. Côté, 1998: Cascade interpolation on a variable-resolution global grid. World Climate Research Programme (WCRP), Research activities in atmospheric and oceanic modelling, *WGNE Report*, WMO/TD, ICSU, Issue 865.

36. **Nair, R.**, J. Côté, and A. Staniforth, 1997: Cascade interpolation schemes for semi-Lagrangian advection. Proceedings of the 3rd *Workshop on Computational Methods for Oceanic, Atmospheric and Ground Water Flows,* 5pp, Rio de Janeiro, Brazil.

37. Sugi M., **R. D. Nair**, and N. Sato 1994: The climate simulated by the JMA Global model Part 2: Tropical Precipitation. Tech. Report, NIED, Tsukuba, Japan.

Recent Scientific Presentation (select)

- *A Vector Formulation of the Momentum and Mass Conserving Shallow-Water Equations on the Cubed-Sphere.* International conference on the solutions to Partial Differential Equations on the Sphere (PDEs-10), August 24–27th, 2010, Potsdam, Germany.

- *Discontinuous Galerkin Methods for Atmospheric Numerical Modeling*, June 18th, 2009, RPN, Montréal, Canada. [Invited]

- "Cubed-sphere grids, Galerkin approaches." Global Atmospheric Solvers for Next-Generation Weather and Climate Models, Workshop held on 23-24 Sept., 2008, Boulder Colorado. (http://www.mmm.ucar.edu/projects/global_cores/) [invited]

- "Emerging methods for conservation laws." 2008 ASP (NCAR) Colloquium: Numerical Techniques for Global Atmospheric Models, June 1-15th, Boulder CO.

- "A scalable conservative dynamical core for climate simulation." PDEs on the sphere international conference, Exeter, Sept. 24-27, 2007, UK.

- "A nodal high-order discontinuous Galerkin climate model." The International Conference On Spectral and High Order Methods (ICOSAHOM), June 18-22, 2007, Beijing, China.