Sundararaman Gopalakrishnan (Gopal)
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“Better Prediction of weather could save lives and reduce property damages. A better understanding of weather leads to better prediction and better forecast models.”

About: Dr.Gopal is a senior meteorologist in the US National Oceanic and Atmospheric Administration (NOAA) Hurricane Research Division (HRD) of AOML and principal architect of NOAA's Hurricane Weather Research and Forecasting (HWRF) system. His research involves simulating a variety of complex, non-linear, scale interacting systems starting from dry thermals (Large Eddy Simulations) to hurricanes; examining the mesoscale structures and evolution as well as the mechanism(s) whereby they develop; testing theories, hypotheses, and various near-surface model physical representations; and finally interpreting, to the extent possible, the modeled and the observed behavior of these systems. He has over 60 publications in peer-reviewed international journals. In the past, he has served as an Associate Editor for the Monthly Weather Review and Weather and Forecasting. Dr.Gopal is the co-editor of the textbook entitled “Advanced Numerical Modeling and Data Assimilation Techniques for Tropical Cyclone Predictions (publishers: Capital Press, India, and Springer, Germany). Gopal is the head of the modeling group at the Division where he supervises and mentors advanced scientists and students at post-graduate as well as post-doc levels. He is also the leader of the Next-Generation Hurricane Prediction Program and Research to Operational transitions in NOAA. He is currently serving as the developmental manager for NOAA's Hurricane Forecast Improvement Program (HFIP).

Employment history

August 2007- Present	Meteorologist/ Modeling Team Leader	Hurricane Research Division, AOML, NOAA, Miami, FL
March 2007- August 2007	Meteorologist	Air Resources Laboratory, NOAA, Silver Spring, MD

April 2001-August 2007	Research Scientist	SAIC/Environmental Modeling Center, NCEP, MD
April 1999- April 2001	Research Scientist	SAIC, Center for Applied Physics, VA
June 1996- April 1999	Post Doctoral Associate	Rutgers University, NJ

Research Interest:

Numerical Weather Prediction, Model developments, Boundary-Layer Meteorology, Numerical modeling of hurricanes, Process studies related to rapid intensity changes in hurricanes, Fundamental studies related to the understanding of weather using models and observations.

Education:

Ph.D., Atmospheric Science, Indian Institute of Technology, New Delhi, India, 1991-96
(Thesis Title: Mesoscale dispersion modeling in a weak wind stable boundary Layer with a special reference to the Bhopal gas leak episode);

Master in Technology, Atmospheric Physics, Poona University, Poona, India, 1990.

Master in Physics, Tata Institute of Fundamental Research - Poona University, Poona, India, 1989

Awards:

(1) ***NOAA Leadership Competencies and Development Program (LCDP): Class X1, 2019-2021***
(2) ***NOAA gold medal, 2015:*** "For developing and implementing the high-resolution Hurricane Weather Research and Forecast System (HWRF) model, a major advance in operational hurricane intensity prediction."
(3) ***South Florida Federal Executive Board Scientific Employee of the Year award, 2014:*** "For contributions in developing the advanced high-resolution Hurricane Weather Research and Forecasting (HWRF) model that is used operationally to provide forecast guidance to the National Hurricane Center.
(4) ***OAR NOAA Employee of the year, 2012:*** For the creation of the high-resolution HWRF system in partnership with NWS/NCEP/EMC

NOAA Leadership Details:

(1) ***NOAA Research Budget Formulation Advisor at the Budget Formulation and Analysis Division, OAR (March 15-June 4, 2021).*** Providing scientific and budgetary guidance to lab/program management to facilitate the development of strong budget submissions; guide development and clearance of congressional appropriations reports; responding to inquiries from congressional appropriations committees, including high-profile issues under tight deadlines; preparing NOAA Research leadership to brief

congressional staff and other audiences, and developing and fostering effective working relationships with management and staff in NOAA Research and NOAA Headquarters on budget issues. Evaluation from the interim supervisor is enclosed

(2) **Senior Science Advisor to the Deputy Director at NOAA Office of the Chief Information Officer (OCIO; Dec 15-May 15, 2020)**: Engaged with the High Performance Computing (HPC) team on strategic planning processes, Part of the team that developed the OAR cloud computing strategic plan; Helped OCIO to restructure the High Performance Computing (HPC) allocation committee; Evaluated proposals for OCIO office related to pilot projects; Worked with the HPC-OCIO deputy director & labs to resolve issues with Orion**. Currently serving as the Chair of NOAA HPC User Group.**

(3) Developmental Manager, Hurricane Forecast Improvement Project (HFIP, 2015-present): HFIP provides the unifying organizational infrastructure for NOAA and other agencies supporting their efforts to coordinate the hurricane research needed to achieve the HFIP goals. HFIP's focus on multi-organizational research activities to develop, demonstrate, and implement enhanced operational modeling capabilities, have dramatically improved the numerical forecast guidance. The role of the developmental manager is to coordinate hurricane R&D across NOAA labs and other agencies, strategize on R2O activities, facilitate annual and bi-weekly meetings and to lead the annual HFIP report writing.

Publication list:

2021

(67) G. Alaka, X. Zhang, and S. Gopalakrishnan High-Definition Hurricanes -- Improving Forecasts with Storm-Following Nests (Under revision, BAMS)

(66) Gramer, Jun Zhang, Ghassan Alaka, Andy Hazelton, Gopal Coastal downwelling intensifies landfalling hurricanes (To be submitted to GRL)

(65) Gopalakrishnan, S., A. Hazelton, AND J.A. Zhang. Improving hurricane boundary layer parameterization scheme based on observations. AGU-Earth and Space Science, 8(3):e2020EA001422 , https://doi.org/10.1029/2020EA001422 2021

(64) Hazelton, A., G. Alaka, L. Cowan, M. Fischer, and S. Gopalakrishnan. Understanding the processes causing the early intensification of Hurricane Dorian through an ensemble of the Hurricane Analysis and Forecast System (HAFS). Atmosphere, 12(1):93, https://doi.org/10.3390/atmos12010093 2021

(63) Hazelton, A., Z. Zhang, B. Liu, J. Dong, G. Alaka, W. Wang, T. Matchok, A. Menra, S. Gopalakrishnan, X. Zhang, M. Bender, V. Tallapragada, and F. Marks. 2019 Atlantic hurricane forecasts from the Global-Nested Hurricane Analysis and Forecast System (HAFS): Composite statistics and key events. Weather and Forecasting, 36(2):519-538, https://doi.org/10.1175/WAF-D-20-0044.1 2021

(62) Alrick Green, S. Gopalakrishnan, Ghassan J. Alaka, Jr., Sen Chiao. Understanding the Role of Mean and Eddy Momentum Transport in the Rapid Intensification of Hurricane Irma (2017) and Hurricane Michael (2018) (Accepted in Atmosphere, 2021)

2020

(61) Dong, J., B. Liu, Z. Zhang, W. Wang, A. Mehra, A.T. Hazelton, H.R. Winterbottom, L. Zhu, K. Wu, C. Zhang, V. Tallapragada, X. Zhang, S. Gopalakrishnan, and F. Marks. The evaluation of real-time Hurricane Analysis and Forecast System (HAFS) Stand-Alone Regional (SAR) model performance in 2019 Atlantic hurricane season. Atmosphere, 11(6):617, https://doi.org/10.3390/atmos11060617

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(59) Hazelton, A.T., X. Zhang, S. Gopalakrishnan, W. Ramstrom, F. Marks, and J.A. Zhang. High-resolution ensemble HFV3 forecasts of Hurricane Michael (2018): Rapid intensification in shear. Monthly Weather Review, 148(5):2009-2032, https://doi.org/10.1175/MWR-D-19-0275.1 2020

(58) Hristova-Veleva, S., P.P. Li, B. Knosp, Q. Vu, F.J. Turk, W.L. Poulsen, Z. Haddad, B. Lambrigtsen, B.W. Stiles, T.-P. Shen, N. Niamsuwan, S. Tanelli, O. Sy, E.-K. Seo, H. Su, D.G. Vane, Y. Chao, P.S. Callahan, R.S. Dunbar, M. Montgomery, M. Boothe, V. Tallapragada, S. Trahan, A.J. Wimmers, R. Holz, J.S. Reid, F. Marks, T. Vukicevic, S. Bhalachandran, H. Leighton, S. Gopalakrishnan, A. Navarro, and F.J. Tapiador. An eye on the storm: Integrating a wealth of data for quickly advancing the physical understanding and forecasting of tropical cyclones. Bulletin of the American Meteorological Society, 101(10):e1718-e1742, https://doi.org/10.1175/BAMS-D-19-0020.1 2020

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(56) Leighton, H., R. Black, X. Zhang, F.D. Marks, and S.G. Gopalakrishnan. Ice particle size distribution from composites of microphysics observations collected in tropical cyclones. Geophysical Research Letters, 47(15):e2020GL088762, https://doi.org/10.1029/2020GL088762 2020

2019

(55) Alaka, G.J., X. Zhang, S.G. Gopalakrishnan, Z. Zhang, F.D. Marks, and R. Atlas. Track uncertainty in high-resolution ensemble forecasts of Hurricane Joaquin. Weather and Forecasting, doi:10.1175/WAF-D-19-0028.1 2019

(54) Bhalachandran, S., R. Nadimpalli, K.K. Osuri, F.D. Marks, S. Gopalakrishnan, S. Subramanian, U.C. Mohanty, and D. Niyogi. On the processes influencing rapid intensity changes of tropical cyclones over the Bay of Bengal. Scientific Reports, 9:3382, doi:10.1038/s41598-019-40332-z 2019

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(34) Gopalakrishnan, S.G., F. Marks, J.A. Zhang, X. Zhang, J.-W. Bao, and V. Tallapragada, 2013: A study of the impacts of vertical diffusion on the structure and intensity of tropical cyclones using the high

resolution HWRF system. Journal of the Atmospheric Sciences, 70(2):524-541, doi:10.1175/JAS-D-11-0340.1 2013

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Before 2010

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