Ganesh Gopalakrishnan

CONTACT
INFORMATION

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Scripps Institution of Oceanography
University of California San Diego
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RESEARCH
INTERESTS

Ocean modeling, Variational and sequential data assimilation, Oceanographic data analysis, Observational oceanography, Ocean observation, forecasting and predictability

EDUCATION

Ph.D., Ocean Engineering   **August, 2008**
Stevens Institute of Technology, Hoboken, New Jersey, USA
Department of Civil, Environmental and Ocean Engineering

- Dissertation Title: "Surface Current Observations using High Frequency Radar and its Assimilation into the New York Harbor Observing and Prediction System"
- Advisor: Prof. Alan F. Blumberg
- Co-Advisor: Prof. Richard I. Hires

M.S., Ocean Engineering   **December, 2002**
Indian Institute of Technology Madras, Chennai, India
Department of Ocean Engineering

- Dissertation Title: "Numerical Modeling for the Transformation of Waves in Coastal Waters"
- Advisor: Prof. V. Sundar

B.Tech., Civil Engineering   **August, 1998**
National Institute of Technology Calicut, Kerala, India
Department of Civil Engineering

- Dissertation Title: "Optimized Design of Reinforced Concrete Structures using Genetic Algorithm Technique and Analysis using Finite Element Method"
- Advisor: Prof. Mohammed Ameen

HONORS
AND AWARDS

- John P. Breslin Award for outstanding research in Ocean Engineering, Stevens Institute of Technology, 2009.
- Outstanding Teaching Assistant Award by American Society of Civil Engineers (ASCE) Student Chapter, 2006.

RESEARCH
EXPERIENCE

Scripps Institution of Oceanography, University of California San Diego, La Jolla, California USA
Assistant Project Scientist   **April 2013 - present**

Host: Prof. Bruce Cornuelle (Physical Oceanography Department)

- Four dimensional variational (4D-VAR) and sequential Ensemble Kalman filter (EnKF) Data Assimilation methods
- State estimation and prediction of the Loop current circulation in the Gulf of Mexico
- Origins of the Kuroshio and Mindanao currents and its predictability
- State estimation and short-term prediction of the California current system

Scripps Institution of Oceanography, University of California San Diego, La Jolla, California USA

Post-Doctoral Researcher **November 2008 - March 2013**

Host: Prof. Bruce Cornuelle (Physical Oceanography Department) & Prof. Eric Terrill (Marine Physical Laboratory)

- Four dimensional variational (4D-VAR) and sequential Ensemble Kalman filter (EnKF) Data Assimilation methods
- Hindcasting and forecasting the Loop current in the Gulf of Mexico
- Coastal upwelling and shelf intrusion of the Kuroshio waters near the north-east coast of Taiwan
- Sea surface height and current response to atmospheric winds for the coast of San Diego
- Adjoint sensitivity studies, impulse-response, and uncertainty estimation

Stevens Institute of Technology, Department of Civil, Environmental, and Ocean Engineering, Hoboken, New Jersey USA

Graduate Research Assistant **June 2005 - October 2008**

- Data Assimilation into the New York Harbor Observing and Prediction System
- Surface current observations in the New York Harbor and New York Bight using High Frequency Radar
- Maintenance of real-time HF radar database and surface current representation for the NYHOPS website

Indian Institute of Technology Madras, Department of Ocean Engineering, Chennai, India

Graduate Research Assistant **January 2000 - May 2002**

- Numerical model studies for the feasibility and wave tranquility inside harbors/marinas
- Estimation of long-shore sediment budgets and morphological evolution due to breakwaters and groins using numerical models
- Structural analysis and design of breakwaters and groins

TEACHING EXPERIENCE

Stevens Institute of Technology, Department of Civil, Environmental, and Ocean Engineering, Hoboken, New Jersey USA

Teaching Assistant **August 2004 - May 2005**

Probability and Statistics for Engineers and Scientists.

- Taught two recitations every week, graded home works, and administered quizzes
- Managed online course records of homework grades, assignments, solutions for homework and quizzes, and course notes
- Maintained regular office hours and conducted individual tutoring sessions

INDUSTRIAL EXPERIENCE

Mentor Subsea Technology Services Inc (MSTS), J.Ray Mc Dermott, Dubai, Middle East, S.A. (JRM)

Subsea & Pipeline Engineer **August 2003 - July 2004**

Azerbaijan International Oil Company (AIOC), Caspian Sea, Client: British Petroleum

- Detailed piping stress analysis, pipeline expansion spool piece design, tie-in spool & riser analysis including seismic assessments
- Analysis and design of subsea pipeline crossing supports
- Shore approach design for pipelines, pipeline in-trench stability analysis incorporating wave refraction and diffraction

Journals & Reviewed Conference Publications

Ganesh Gopalakrishnan, Alan Blumberg, and Richard Hires. (2007). "Assimilating Surface current Data into a Model of Estuarine and Coastal Ocean Circulation". Proceeding of the Tenth International Conference on Estuarine and Coastal Modeling Congress 2007, 685-703. `ASCE Proceedings`.

Zheng, Z.-W., C.-R. Ho, Q. Zheng, Y.-T. Lo, N.-J. Kuo, and **G. Gopalakrishnan**. (2010). " Effects of preexisting cyclonic eddies on upper ocean responses to Category 5 typhoons in the western North Pacific". J. Geophys. Res., 115, C09013, `doi:10.1029/2009JC005562`.

Ganesh Gopalakrishnan and Alan Blumberg. (2011). "Surface currents in Raritan Bay, New Jersey: Importance of HF radar first-order Doppler settings". J. Operational Oceanography., `Vol 4 No. 2, 41-53`.

Gawarkiewicz, G., S. Jan, P.F.J. Lermusiaux, J.L. McClean, L. Centurioni, K. Taylor, B. Cornuelle, T.F. Duda, J. Wang, Y.J. Yang, T. Sanford, R.-C. Lien, C. Lee, M.-A. Lee, W. Leslie, P.J. Haley Jr., P.P. Niiler, **G. Gopalakrishnan**, P. Velez-Belchi, D.-K. Lee, and Y.Y. Kim. (2011). "Circulation and intrusions northeast of Taiwan: Chasing and predicting uncertainty in the cold dome". Oceanography 24(4):110121, `http://dx.doi.org/10.5670/oceanog.2011.99`.

Ganesh Gopalakrishnan and Alan Blumberg. (2012). "Assimilation of HF radar-derived surface currents on tidal-timescales". J. Operational Oceanography., `Vol 5 No. 1, 75-87`.

Ganesh Gopalakrishnan., B. D. Cornuelle, G. Gawarkiewicz, and J.L. McClean. (2013). "Structure and evolution of the cold dome off northeastern Taiwan: A numerical study". Oceanography 26(1):66-79, `http://dx.doi.org/10.5670/oceanog.2013.06`.

Ibrahim Hoteit, Tim Hoar, **Ganesh Gopalakrishnan**, Nancy Collins, Jeffrey Anderson, Bruce Cornuelle, A. Köhl, and P. Heimbach. (2013). "An MITgcm/DART Ensemble Analysis and Prediction System: Development and Application to the Gulf of Mexico". Dynamics of Atmospheres and Ocean 63:123, `http://dx.doi.org/10.1016/j.dynatmoce.2013.03.002`.

Ganesh Gopalakrishnan., Bruce D. Cornuelle, Ibrahim Hoteit, Daniel L. Rudnick, and W. Brechner Owens. (2013). "State estimates and forecasts of the loop current in the Gulf of Mexico using the MITgcm and its adjoint". J. Geophys. Res., 118: 1-23, `doi:10.1002/jgrc.20239`.

Ganesh Gopalakrishnan., Bruce D. Cornuelle, and Ibrahim Hoteit. (2013). "Adjoint sensitivity studies of Loop Current and Eddy Shedding in the Gulf of Mexico". J. Geophys. Res., 118: 1-21, `doi:10.1002/jgrc.20240`.

Thomas Höllt, Ahmed Magdy, Guoning Chen, **Ganesh Gopalakrishnan**, Ibrahim Hoteit, Charles D Hansen, Markus Hadwiger. (2013). "Visual Analysis of Uncertainties in Ocean Forecasts for Planning and Operation of Off-Shore Structures". Proceedings of IEEE Pacic Visualization 2013, pp. 185-192, 2013. **Honorable mention for best paper award**.

Journals in Review and Preparation

Thomas Hölt, Ahmed Magdy, Peng Zhan, Guoning Chen, **Ganesh Gopalakrishnan**, Ibrahim Hoteit, Charles D Hansen, Markus Hadwiger. (2013). "Visual Analysis of Uncertainties in Ocean Forecasts". *(in review, submitted to IEEE Transactions on Visualization and Computer Graphics)*.

Fengchao Yao, Ibrahim Hoteit, Larry Pratt, Amy Bower, Ping Zhai, Armin Köhl, **Ganesh Gopalakrishnan**. (2013). "Seasonal overturning circulation in the Red Sea. Part 1. Model validation and summer circulation". *(in revision, submitted to J. Geophys. Res)*.

Fengchao Yao, Ibrahim Hoteit, Larry Pratt, Amy Bower, Armin Köhl, **Ganesh Gopalakrishnan**, David Rivas . (2013). "Seasonal Overturning Circulation in the Red Sea. Part 2. Winter circulation". *(in revision, submitted to J. Geophys. Res)*.

Ganesh Gopalakrishnan, I. Hoteit and B. Cornuelle. (2013): " Comparison of 4DVAR and EnKF state estimates and forecasts in the Gulf of Mexico". *(in preparation)*.

Ganesh Gopalakrishnan., Bruce D. Cornuelle, and Daniel L. Rudnick. (2013). "Impact of Glider Data Assimilation on the Loop Current Forecasts in the Gulf of Mexico". *(in preparation)*.

Sung Yong Kim, **Ganesh Gopalakrishnan**, Bruce D. Cornuelle, and Aurelien Ponte. (2013). "Analysis using complementary statistical and dynamical frameworks on the wind-driven coastal circulation". *(in preparation)*.

Ganesh Gopalakrishnan., B. D. Cornuelle, and I. Hoteit. (2013). "On the adjoint sensitivity and uncertainties of the cold-dome off northeastern Taiwan". *(in preparation)*.

Daniel L. Rudnick, **Ganesh Gopalakrishnan**, Bruce Cornuelle. (2013). Cyclonic eddies in the Gulf of Mexico: Observations by underwater gliders and simulations by numerical model. *(in preparation)*.

CONFERENCE
PRESENTATIONS
/ABSTRACTS

Ganesh Gopalakrishnan., Ibrahim Hoteit, and Bruce D. Cornuelle. "Comparison of 4DVAR and EnKF state estimates and forecasts in the Gulf of Mexico". 6th WMO International Symposium on Data Assimilation, Mary Land, October 2013 *(accepted for oral presentation)*.

Ganesh Gopalakrishnan., Bruce D. Cornuelle, Ibrahim Hoteit, Daniel L. Rudnick, and W. Brechner Owens. "State Estimates and Forecasts in the Gulf of Mexico". 6th Coastal Altimetry Workshop, Riva del Garda, Italy, September 2012 *(oral presentation)*.

Ganesh Gopalakrishnan and Alan Blumberg. "Assimilation of HF radar-derived surface currents on tidal-timescales". Ocean Sciences Meeting, Salt Lake City, Utah, February 2012 *(poster presentation)*.

Ganesh Gopalakrishnan., Bruce D. Cornuelle, Ibrahim Hoteit, Daniel L. Rudnick, and W. Brechner Owens. "State Estimates and Forecasts in the Gulf of Mexico". Ocean Sciences Meeting, Salt Lake City, Utah, February 2012 *(poster presentation)*.

Ganesh Gopalakrishnan., Bruce D. Cornuelle, Ibrahim Hoteit, Daniel L. Rudnick, and W. Brechner Owens. "Loop Current Analysis and Forecasts in the Gulf of Mexico". Coastal Ocean Modeling, Gordon Research Conferences, South Hadley, June 2011 *(poster presentation)*.

G. Gopalakrishnan., B. Cornuelle., I. Hoteit. "Adjoint sensitivity studies of coastal upwelling at northeast of Taiwan". AGU Fall Meeting , San Francisco, December 2010 *(poster presentation)*.

Curran, B.R., Routhier, M., Mulukutla, G.K., **Gopalakrishnan, G.**. "Development of an Integrated Model for the Assessment of Climate Change Adaptation Methods Relating to the Preservation of Urban Coastal Cultural Heritage". AGU Fall Meeting , San Francisco, December 2010.

Bruce D. Cornuelle, **Ganesh Gopalakrishnan**, Matthew A. Dzieciuch, and Peter F. Worcester. "Deepwater acoustic propagation in the northern Philippine Sea: Comparison of modeled and observed ray travel times". Journal of the Acoustical Society of America / Volume 128 / Issue 4 / Second PAN-AMERICAN/IBERIAN Meeting on Acoustics, November 2010.

John Dugan, Cindy Piotrowski, Seth Zuckerman, Alan Blumberg, Nickitas Georgas, **Ganesh Gopalakrishnan**. "Surface Currents in Raritan Bay: Simultaneous Views using Four Different Systems". Mid Atlantic Bight Physical Oceanography and Meteorology (MABPOM), Stevens Institute of Technology, Hoboken, October 2010.

Gopalakrishnan, G, I. Hoteit, T. Hoar, B. Cornuelle, and E. Terrill. "A Nested Ensemble Kalman-Based Forecasting System for the Gulf of Mexico Circulation". 2010 Meeting of the Americas, Iguazu Falls, Brazil, August 2010 *(Invited presentation)*.

Gopalakrishnan, G., B. Cornuelle, and I. Hoteit. "Adjoint sensitivity studies of Loop Current and Eddy Shedding in the Gulf of Mexico". Ocean Sciences Meeting, Portland, Oregon, February 2010 *(oral presentation)*.

Ganesh Gopalakrishnan, Alan Blumberg, and Nickitas Georgas. "Assimilating HF Radar Surface Current Data into The New York Harbor Observing and Prediction System". Mid Atlantic Bight Physical Oceanography and Meteorology (MABPOM), Woods hole, Massachusetts, September 2008 *(poster presentation)*.

Ganesh Gopalakrishnan, Alan Blumberg, and Michael Bruno. "Assimilation of HF Radar Data into Ocean Circulation Model during an Extreme Weather Event". 2008 Ocean Sciences Meeting, Orlando, Florida, March 2008 *(oral presentation)*.

Ganesh Gopalakrishnan, Alan Blumberg, and Richard Hires. "Assimilating Surface current Data into a Model of Estuarine and Coastal Ocean Circulation". 10th International Conference on Estuarine and Coastal Modeling., Newport, Rhode Island, November 2007 *(oral presentation)*.

Ganesh Gopalakrishnan, Alan Blumberg, and Richard Hires. "HF Radar Data Assimilation into the New York Harbor Observing and Prediction System: A Nudging Approach". Mid Atlantic Bight Physical Oceanography and Meteorology (MABPOM), Rutgers University, New Brunswick, October 2007 *(oral presentation)*.

PREVIOUS PUBLICATIONS

V. Sundar, R. Sundaravadivelu, **G. Ganesh**, K.A. Roopsekhar. "Numerical model study for the coastal protection works at Kanyakumari district, Tamilnadu".National Seminar on Harbor Structures NASHAR2003.,IIT-Madras, India, February 2003.

Sundar,V., Roopsekhar, K.A., **Ganesh, G**. and YogaChandran, L. "River mouth improvement works - Muara Sungai Kuantan experience". Second world Engineering Congress., Kuching, Malaysia, 22-25, July 2002.

Ganesh, G and Sundar,V. "Numerical model for the prediction of wave transformations". International Conference in Ocean EngineeringICOE2001., IIT- Madras, India, December 2001, Vol: 2, pp.539-544 *(oral presentation)*.

Ganesh, G and Sundar, V. "Numerical modeling of combined refraction and diffraction of waves and its application". 2nd International Conference on Theoretical, Applied, Computational, and Experimental Mechanics-ICTACEM2001., IIT-Kharagpur, India, December 2001, Paper no: 050 *(oral presentation)*.

Ganesh, G and Sundar,V. "Numerical model for the prediction of the wave climate in the near shore". 3rd International Conference on Marine IndustryMARIND2001., Varna, Bulgaria, June 2001, Vol:2, pp 253-264.

DISSERTATIONS

Ganesh Gopalakrishnan. "Surface Current Observations using High Frequency Radar and its Assimilation into the New York Harbor Observing and Prediction System". Ph.D Thesis, Stevens Institute of Technology, USA, 2008.

Ganesh Gopalakrishnan. "Numerical Modeling for the Transformation of Waves in Coastal Waters". Masters Thesis, Indian Institute of Technology Chennai, India, 2002.

GRADUATE COURSE WORKS	Wave Hydrodynamics, Advanced Hydrodynamics Laboratory, Coastal Engineering, Sediment Transport, Introduction to Dynamics Meteorology, Stochastic Analysis of Ocean Waves, Numerical Solutions of partial Differential Equations, Dynamic Oceanography, Mixing processes in Inland and Coastal Waters, Ocean Measurements and Analysis, Estuarine Oceanography.

SCIENTIFIC TRAINING
Joint Center for Satellite Data Assimilation Summer Colloquium on Data Assimilation, Stevenson, Washington. 2009

TECHNICAL SKILLS
Programming Languages: FORTRAN 77/90, MATLAB, some use of Unix shell scripts, MPI parallel processing library
Applications: MathCAD, SURFER, GRAPHER, LaTeX, common Windows database, spreadsheet, and presentation software
Operating Systems: Unix/Linux, Windows.
Scientific Software:
- MIKE 21 (DHI Wave Model)
- LITPACK (DHI Sediment Transport Model)
- RCP-WAVE (USACE Wave Model)
- CAESAR II (Non-linear Piping Analysis Software)
- MicroSAS(Offshore Structural Analysis Software)

Ocean Models:
- Estuarine Coastal and Ocean Model (ECOM)
- Princeton Ocean Model (POM)
- MIT General Circulation Model (MITgcm)

ACTIVITIES
Reviewer for New Hampshire Sea Grant Research Proposal
Reviewer for Journal of Geophysical Research.
Reviewer for Journal of Marine Systems.
Reviewer for Continental Shelf Research.
External reviewer for Ph.D thesis.
Climate, Atmospheric Sciences, Physical Oceanography (CASPO) Seminar coordinator at Scripps Institution of Oceanography, June 2009 - December 2011.

PROFESSIONAL AFFILIATIONS
American Geophysical Union (AGU)
American Meteorological Society (AMS)
American Society of Civil Engineers (ASCE)

REFERENCES
Available upon request