Amrapalli Garanaik, Ph. D.

https://github.com/amrapallig

Physical Oceanographer/ Fluid Dynamicist.

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scholar.google.com/citations?user=7nq9s04AAAAJ&hl=en

EDUCATION:

- **Ph.D**. Civil and Environmental Engineering, Colorado State University, USA. 2018
- **M. Tech**. Civil Engineering, Indian Institute of Technology Kanpur, UP, India. 2010
- **B. Tech**. Civil Engineering, University College of Engineering, Orissa, India. 2007

SKILLS:

- **Technical skills**: - Python (matplotlib, pandas, xarray, NumPy, SciPy, scikit-K, Basemap, CartoPy), MATLAB, Julia, FORTRAN, Microsoft office suit (Excel, Word, PPT), Latex (Overleaf), ParaView, AutoCAD, Linux, and command line scripting (bash, zsh)
- **Computational skills**: Flow3D, HEC-RAS, ocean model (E3SM-MPAS-O) on HPC, DNS, LES, RANS, GOTM, Oceananigans.jl
- **Quantitative skills**: Statistical data (netCDF, jld2) analysis, visualizations, ANN
- **Experimental skills**: Laser doppler Anemometer (LDA), Acoustic doppler velocimeter (ADV), in open channel flow and Conductivity-Temperature-Depth (uCTD) in the ocean
- **Soft skills**: Quick learner in dynamic work environment, Volunteering in seminar and conferences, Strong interpersonal skills, Teamwork, Excellent writing and communication skills, Mentoring, Solution oriented

PROFESSIONAL EXPERIENCES:

- **Postdoctoral Scholar,** Oregon State University. 2021-Cont'd
  - Developing a new OSBL parameterization for Langmuir turbulence
- **Postdoctoral Researcher,** Los Alamos National Laboratory. 2019-2021
  -Worked on interdisciplinary DOE funded E3SM and InteRFACE projects
  - Ran high-resolution ocean model simulations (MPAS-O) on HPC (NERSC, CORI-knl)
  - Familiar with unstructured FORTRAN based ocean model
  - Lage data analysis and visualization using Python and ParaView
  - Lagrangian global ocean isopycnal mixing by particle clustering, statistical analysis
  - Developed a new boundary layer turbulence closure model using LES and plume method
  - Presented findings in international conference and in all hand meetings
- **Research Scientist,** Colorado State University. 2018-2019
  -Study ocean mixing, helping mentor with NSF grant writing, mentoring undergraduate
- **Graduate Teaching Assistant,** Colorado State University. 2017-2018
  -Course- fluid mechanics for undergraduates
- **Graduate Research Assistant,** Colorado State University. 2012-2018
  - Worked on Individual as well as collaborative NSF and ONR funded projects
  - Developed sub-grid parameterizations of internal wave induced ocean mixing
  - Ran FORTRAN based three directional Direct Numerical Simulations (DNS)
  - Observational data analysis from vertical microstructure profiler (VMP), Glider, ADCP
  - Ran GOTM simulations to study turbulence closure model in stratified flow
  - Experiments using LDA and ADV
  - Data analysis and visualization with MATLAB
- **Lecturer,** Dept. of Civil Engineering at ITER, India. 2011-2012
  -Courses: Fluid mechanics, Water recourse engineering, Engineering mechanics

-Lab: Surveying, Fluid mechanics, Environmental Eng.

- **Graduate Teaching Assistant**, Dept. of Civil Engineering at IIT Kanpur, India. 2009-2010
  -Tutoring in Engineering drawing using autoCAD, Fluid mechanics lab.
- **Graduate Research Assistant,** Dept. of Civil Engineering at IIT Kanpur, India. 2008-2010
  -Experimental and 2D numerical study of shallow water past cylinder using Finite difference and volume of fluid (VOF) method
  -Stochastic hydrology, Autoregression model, Neural network
- **Engineer,** Eigen Tech. services Pvt. Ltd, Gurgaon, India 2007-2008
  -Quantity surveying, Structural analysis, AutoCAD

MENTORING

- Mentoring graduate student at OSU with Oceananigan.jl and LES
- Mentored postbacc student in visualization of large ocean data using ParaView at LANL
- Mentored undergraduate student in Fluid Lab with LDA and ADV at CSU
- Co-guided undergraduate students in thesis/projects at ITER, India

OUTREACH

- Successfully chaired weekly POA seminars at OSU (2021-2022)
- Career development Pattullo conference of MPOWIR (2019)
- Student volunteer in organizing international conference, APS-DFD, Denver, USA (2017)
- Organized weekly departmental seminars for two semesters at CSU (2016-2017)
- Helped advisor with successful establishment of Fluid lab and open house at CSU (2017)
- Volunteered for open house- Inspiring young minds at IITK, India (2010)
- Co-founded non-profit GATECounsellor to promote higher education, India (2008)

CAREER DEVELOPMENT WORKSHOPS

- MPOWIR
- Grant writing, OSU
- Center of Teaching, OSU

BROADER RESEARCH PARTICIPATION:

- CLIMATE PROCESS TEAM (CPT) (Newark, November 2019)
- DOE-E3SM all hand meetings (Westminster, June 2019 and DC, November 2019)
- CLIVAR MESOSCALE MIXING (Tallahassee, March 2019)
- DOE-InteRFACE (Santa Fe, January 2020)

HONOURS/AWARDS:

- Gordon research conference and Gordon Research Seminar grant (2022)
- APS travel grant (2018)
- Borland scholarship Hydraulics (2012)
- MHRD scholarship for graduate study (2008-2010)
- Certificate of merit in securing highest position in high-school board examination (2000)

PEER REVIEWER:

- Reviewed for Peer-reviewed journal: Journal of Advances in Modeling Earth Systems (JAMES), Journal of Fluid Mechanics (JFM), Journal of Physical Oceanographer (JPO)

SCIENCE JUDGE:

- Science judge for student poster evaluation in Ocean Science Meeting 2022
- Session co-chair and Ocean Science Meeting 2022
- Science judge, Salmon Bowl, regional national ocean science bowl, NOSB 2022 OSU

RELEVENT COURSES:

- Advanced Engineering Mathematics, Fluid mechanics, Fluid turbulence and modeling, CFD, Atmospheric dynamics, Models and computational methods in Civil Eng., Open channel flows, Engineering Hydraulics, Stochastic hydrology, Erosion and sedimentation, Groundwater hydrology and pollutant transport, Introduction to AI techniques

VOCATION TRAINING:

- STAAD-pro at OCAC, Bhubaneswar (June 2006)
- National Highway Development Project, Orissa (June 2005)
- Dask system Pvt. Ltd for training AutoCAD (June 20005)

RESEARCH CRUISE:

- R/V Roger Revelle, BoB, Indian Ocean, June-July (2014), ASIRI program

PUBLICATIONS:

Peer reviewed Journals:

1. **Garanaik, A**., Venayagamoorthy, S. K., 2019 "On the inference of the state of turbulence and mixing efficiency in stably stratified flows", J. Fluid Mech. 867, 323-333
2. **Garanaik, A**., Venayagamoorthy, S. K., 2018 "Assessment of small-scale anisotropy in stably stratified turbulent flows using direct numerical simulations", *Phys. Fluids* 30, 126602
3. Shroyer, E. L., Rudnick, D. L., Farrar, T., Lim, B., Venayagamoorthy, S. K., Laurent, L. C. St., **Garanaik, A**., Moum, J. N. 2016 "Modification of upper ocean temperature structure by subsurface mixing in presence of strong salinity stratification", *Oceanography* 29(2), 62-71.
4. Rastello, M., Klema, M.R., Carpenter, A., **Garanaik, A.,** Venayagamoorthy, S. K., Gates, T. K., Marie, J. L. 2021, "Velocity measurements in an open-channel flow with high free-stream turbulence: Acoustic Doppler Velocimetry (ADV) vs Laser Doppler Anemometry (LDA)", Flow Measurement, and Instrumentation. **Accepted.**
5. **Garanaik, A**., Smith, K., Robey, R., Li, Q., Pearson, B., Roekel, L. V., "A new hybrid mass-flux/high-order turbulence closure for ocean vertical mixing", JAMES, In **review.**
6. **Garanaik, A**., Venayagamoorthy, S. K. "Some new insights for inferring diapycnal diffusivity in stably stratified turbulence", *Physics of Fluid,* **Submitted**

Work-in-Progress:

1. **Garanaik, A**., Karimpour, F., Venayagamoorthy, S. K. "Evaluation of the standard k-epsilon closure scheme for modeling stably stratified wall-bounded turbulence", nearing submission, J. Ocean modelling.
2. **Garanaik, A**., Petersen, M. R., Wolfram, P. J., "Horizontal and vertical variability of isopycnal diffusivity from online Lagrangian particles in high resolution global ocean model", Work in Progress
3. **Garanaik, A,** Roekel, L. V., Pearson, B., "ADC approach for parameterization of Langmuir turbulence in upper ocean", Work in progress.

INTERNATIONAL CONFERENCES:

1. **Garanaik, A.**, Roekel, L. V., Pearson, B., "Assumed distribution closure for wave-driven turbulence in the ocean surface boundary layer," Ocean Mixing, Gordon Research Conference, June 2022, MA, USA.
2. **Garanaik, A**., Smith, K., Robey, R., Li, Q., Pearson, B., Roekel, L. V, "A hybrid mass-flux/higher-order closure parameterization for OSBL convective mixing", Ocean Sciences Meetings, American geophysical union, February 2022 (Online).
3. Pearson, B., **Garanaik, A.,** Roekel, L. V., Smith, K., Li, Q., "A mass-flux model for Langmuir turbulence in the upper ocean", Ocean Sciences Meetings, American geophysical union, February 2022 (Online).
4. **Garanaik, A,** On the Importance of Accurate Parameterization of Turbulent Mixing in Geophysical Flows, SIAM CSE, March 2021 (Online).
5. **Garanaik, A**., Robey, R., Roekel L. V., Li, Q., Vertical mixing parameterization for the ocean surface boundary layer based on assumed distribution higher order closure, Ocean Sciences Meetings, American geophysical union, February 2020, San Diego, California.
6. **Garanaik, A.,** Petersen, M. R., Wolfram, P. J., Eddy-driven diffusivity using Lagrangian particles in global ocean simulations, E3SM meeting, 2019, Westminster, Colorado.
7. Carpenter, A., **Garanaik, A**., Rastello, M., Venayagamoorthy, S. K. and Gates, T. K., "Flow velocity measurements in a laboratory flume with ADV and LDA: a comparative study", 38th Annual American Geophysical Union Hydrology Days, Colorado State University, March 2018, Fort Collins, Colorado, USA.
8. **Garanaik, A**. and Venayagamoorthy, S. K., "Some insights to infer turbulent diapycnal mixing in geophysical flows", 71st Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2018, Atlanta, Georgia, USA.
9. Venayagamoorthy, S.K. and **Garanaik**, **A**., "Utility of Thorpe and Ozmidov length scales to infer state of turbulence and mixing in geophysical flows. 71st Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2018, Atlanta, Georgia, USA.
10. **Garanaik, A**. and Venayagamoorthy, S. K., "Evaluation of small-scale anisotropy in stably stratified turbulence", 8th International Symposium on Environmental Hydraulics, June 2018, University of Notre Dame, Indiana, USA.
11. **Garanaik, A**. and Venayagamoorthy, S. K., "Some insights for parameterizing mixing in stably stratified turbulence", 38th Annual American Geophysical Union Hydrology Days, Colorado State University, March 2018, Fort Collins, Colorado, USA.
12. **Garanaik, A**. and Venayagamoorthy, S. K., "Assessment of small-scale anisotropy in stably stratified turbulence", 70th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2017, Denver, Colorado, USA.
13. **Garanaik, A**. and Venayagamoorthy, S. K., "Mixing efficiency of turbulent patches in stably stratified flows", Rocky Mountain fluid mechanics symposium, University of Colorado, August 2016, Boulder, Colorado, USA.
14. **Garanaik, A**. and Venayagamoorthy, S. K., "Turbulent mixing and transport in oceanic flows", Graduate student showcase, Colorado state University, November 2016, Fort Collins, Colorado, USA.
15. **Garanaik, A**. and Venayagamoorthy, S. K., "Mixing efficiency of turbulent patches in stably stratified flows", 69th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2016, Portland, Oregon, USA.

16. **Garanaik, A**., Venayagamoorthy, S. K., Laurent, L. S., and Stretch. D. D., "A discussion on diapycnal mixing efficiency in stably stratified geophysical flows", Ocean Sciences Meetings, American geophysical union, February 2016, New Orleans, Louisiana, USA.
17. **Garanaik, A**., Venayagamoorthy, S. K. and Stretch. D. D., "An analysis of diapycnal mixing efficiency in stably stratified turbulent flows", 68th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2015, Boston, Massachusetts, USA.
18. **Garanaik, A**., Karimpour, F. and Venayagamoorthy, S. K., "Evaluation of the standard closure scheme for modeling stably stratified wall-bounded turbulence", 67th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2014, San Francisco, California, USA.
19. **Garanaik, A**., Jena, J., "Roller compacted Concrete (RCC): A better alternative over conventional concrete for gravity dams", All-India Seminar on IE, January 2011 BBSR, India