

Jakir Hossen, PhD

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SUMMARY

- Numerical modeling and data assimilation expert with 10+ years of experience in Atmospheric and Ocean sciences demonstrated by 13 publications in peer-reviewed journals including 9 first-author papers.
- Project management and time management skills leading to successful completion of four complex projects.
- Strong ability to collaborate and work in a team environment on multi-disciplinary projects.
- Legally authorized to work in the United States (**Green Card holder**).

EDUCATION

- **Australian National University, Canberra, Australia**
Ph.D in Earth Sciences, Research School of Earth Sciences Dec 2015
- **Florida State University, Tallahassee, FL**
MS in Computational Science, Department of Scientific Computing Dec 2008
- **University of Dhaka, Bangladesh**
M.Sc in Applied Mathematics, Department of Mathematics Sep 2001
B.Sc in Mathematics (Minor in Physics and Statistics), Department of Mathematics Nov 1999

RESEARCH AND PROJECT MANAGEMENT EXPERIENCE

- **Lynker/NOAA, Physical Scientist III (Ocean Data Assimilation)** Feb 2022–present
 - Evaluating the impact of observation systems on analyses and forecasts of the ocean.
 - Carrying out experiments on NG-GODAS UFS S2S marine initialization.
 - Conducting observing system experiments using remote sensing and insitu observations.
 - Working with SOCA group at NCEP to develop a coupled data assimilation capabilities within JEDI.
- **Colorado State University, Postdoctoral Research Fellow** Jun 2021–Feb 2022
 - Apply machine learning techniques with data assimilation method.
 - Introduce non-Gaussian component of atmospheric dynamics in the hybrid version of WRF-GSI model.
- **The University of Colorado Boulder, Postdoctoral Research Associate** Dec 2018–May 2021
 - Developing a methodology for guidance to build an optimal ocean observation network.
 - Led team project that implemented a data assimilation method with ship-borne GPS data.
 - Collaborated with scientists in NOAA and UNAVCO.
 - Drafted grant proposals on machine learning for rapid tsunami forecast.
- **The University of Tokyo, Japan, Project Researcher** Apr 2017–Mar 2018
 - Developed an adjoint sensitivity method to identify optimal stations that reduce the model error.
 - Presented the results in seminars and conferences.
- **Australian National University, Canberra, Doctoral Researcher** Apr 2011–Nov 2015
 - Led a team project to apply time reverse imaging method to tsunami source inversion.
 - Investigated the importance of model parameterization in source study.
 - Collaborated with researchers to study the effect of onshore digital elevation model on tsunami inundation.
- **Florida State University, Tallahassee, Florida, Research Assistant** Aug 2006–Dec 2008
 - Developing an algorithm based on 4D variational data assimilation method.

SKILLS

- **COMPUTER:** **Programming Language:** Python, Fortran, C/C++, Matlab, R, Shell scripting; **HPC Platforms:** MPI, OpenMP, Slurm, Torque; **Others:** PyTorch, GMT, QGIS, GDAL, NCI, GrADS, NetCDF, HDF5, awk, Git, ObsPy; **Atmospheric Modeling:** UFS Weather Model, WRF, GSI, Lin-Rood shallow water finite volume model, Adjoint and Tangent linear model; **Hydrodynamic Modeling:** JAGURS (parallelized), GeoClaw, ANUGA (parallelized), Geowave.
- **ANALYTICAL:** Machine learning, data assimilation, numerical weather prediction, numerical optimization, numerical linear algebra, GIS application, signal processing, etc.

LEADERSHIP EXPERIENCE

Assistant Professor in Mathematics, BRAC University, Bangladesh

Dec 2015–Nov 2018

- Formulated the syllabus and developed the course content for undergraduate mathematics courses, for example, numerical analysis, Fortran programming etc. Prepared and presented lectures in a class of 40 students. Led and trained teaching assistants in conducting lab and tutorials for 200 undergraduate students.
- Convenor of Examination scrutinizing committee (led a staff of 35 faculty); Course coordinator (to maintain quality and consistency of instruction in multiple-section courses).

HONORS AND AWARDS

- **CIRES Visiting Postdoctoral Fellowship**, University of Colorado Boulder 2018–2020
- **ANU PhD Scholarship** (HDR Merit & RSES Supplementary) 2011–2015
- **President's list** (2007), Florida State University (The award is given to students who got A's in all courses in a semester); **Travel award** (PNW Earthquake Science Workshop, Seattle, 2019; MCS RCN Modeling Workshop, Eugene, Oregon, 2019; 2019 SAGE/GAGE Workshop by IRIS and UNAVCO)

PROFESSIONAL DEVELOPMENT

- Summer 2021 WRF tutorial (virtual) organized by NCAR, July 19–23, 2021
- Deep Learning with Python and PyTorch offered by IBM (completed)
- Machine Learning with Python: A practical introduction offered by IBM (completed)
- Artificial Intelligence for Earth System Science (AI4ESS) Summer School, 2020
- 2020 InSAR Processing and Theory with GMTSAR (online short courses)

SELECTED PUBLICATIONS

- **M. J. Hossen**, Iyan E. Mulia, David Mencin and Anne F. Sheehan (2020). “Data assimilation with ship-borne GPS data in the Cascadia subduction zone”, *Earth and Space Science*, 8, e2020EA001390.
- **M. J. Hossen**, A. R. Gusman, K. Satake, & P. R. Cummins (2018). An adjoint sensitivity method applied to time reverse imaging of tsunami source for the 2009 Samoa earthquake. *Geophysical Research Letters*, 45, 627–636.
- Toshitaka Baba, Sebastien Allgeyer, **M. J. Hossen**, Phil R. Cummins, Hiroaki Tsushima, Kentaro Imai, Kei Yamashita, Toshihiro Kato (2017), Accurate numerical simulation of the far-field tsunami caused by the 2011 Tohoku earthquake, including the effects of Boussinesq dispersion, seawater density stratification, elastic loading, and gravitational potential change, In *Ocean Modeling*, Volume 111, Pages 46–54, ISSN 1463-5003.
- Dettmer J., R. Hawkins, P. R. Cummins, **M. J. Hossen**, M. Sambridge, D. Inazu, and R. Hino (2016), Tsunami source uncertainty estimation: The 2011 Japan tsunami, *J. Geophys. Res. Solid Earth*, 121, 4483–4505.
- **M. J. Hossen**, I. M. Navon and F. Fang, “A penalized four-dimensional variational data assimilation method for reducing forecast error related to adaptive observations.” *International Journal for Numerical Methods in Fluids*, 70(10):1207–1220, 2012.

CONFERENCE TALKS

- American Geophysical Union (AGU) Fall Meeting: Washington DC (2018, Oral), San Francisco (2013 & 2019 Poster), AGU virtual (2020, Oral); University of Washington (2021, invited)
- Asian Oceanic Geoscience Society (AOGS) Annual Meeting: Singapore (2017, Oral), Beijing, China (2016, Oral), Sapporo Japan (2014, Oral), Brisbane, Australia (2013, Oral).
- Seismological Society of America meeting 2019, Seattle, Washington, USA (Oral).
- JpGU-AGU joint meeting 2017, Chiba, Japan (Oral).

PRESS CONFERENCE

- Time Reverse Imaging of Tsunami Waveforms. M. J. Hossen, P. R. Cummins, and J. Dettmer. Salt Lake City, UT: Spring meeting Acoust. Soc. Am., 2016. This work included a scientific talk and a contribution to the press conference for the meeting. The work is published in many media including sciencedaily.com, phys.org.
- An article titled “How Cargo Ships Could Help Detect Tsunamis” on our data assimilation work using ship-borne GPS data has been published by WIRED magazine .

