Md Jakir Hossen, PhD

1300 30th St, Boulder, CO 80303 • Email: mjhossen55@gmail.com • Phone: 720-361-8268

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

- **The University of Colorado Boulder, Postdoctoral Research Associate** 2018-present
  - Developing a methodology for guidance to build an optimal 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** 2017–2018
  - 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** 2011–2015
  - 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 (national and international) to study the effect of onshore digital elevation model on tsunami inundation modeling.
  - Presented the findings of the research in several international conferences.
- **Florida State University, Tallahassee, Florida, Research Assistant** 2006–2008
  - Developing an algorithm based on 4D variational data assimilation method.

Leadership experience

Assistant Professor in Mathematics, BRAC University, Bangladesh 2015 – 2018

- Formulated the syllabus and developed the course content for undergraduate mathematics courses, for example, numerical analysis, linear algebra, Fortran programming etc. Prepared and presented lectures in a class of 40 students, helped students with course materials. 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).

Skills

- Computer: **Programming Language**: Python, Fortran, Matlab, R, C/C++, Shell scripting; **HPC Platforms**: MPI, OpenMP, Slurm, Torque; **Others**: PyTorch, GMT, QGIS, GDAL, ENVI, GrADS, NetCDF, HDF5, awk, Git, ObsPy, SAC; **Atmospheric Modeling**: Lin-Rood shallow water finite volume model, Adjoint and Tangent linear model; **Hydrodynamic Modeling**: JAGURS (parallelized), GeoClaw, ANUGA (parallelized).
- Analytical: Data assimilation, numerical weather prediction, numerical methods, numerical analysis, numerical optimization, numerical linear algebra, remote sensing, machine learning, GIS application, signal processing, image processing.

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

- 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)
- Crustal Deformation Modeling Workshop, June 10-14, 2019, Golden, Colorado

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, Accepted).
- **Hossen, M. J.**, Sheehan, A.F. and Satake, K. (2020). A Multi-fault Model Estimation from Tsunami Data: An Application to the 2018 M7.9 Kodiak Earthquake. Pure and Applied Geophysics, pp.1-12.
- **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

- University of Washington (2021, invited)
- American Geophysical Union (AGU) Fall Meeting: Washington DC (2018, Oral), San Francisco (2013 & 2019 Poster), AGU virtual (2020, Oral).
- 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).
- Seismological Society of Japan (SSJ) Fall Meeting, 2017, Kagoshima, Japan (Oral)
- JpGU-AGU joint meeting 2017, Chiba, Japan (Oral).
- DANWAKAI (monthly colloquium), the University of Tokyo, Japan (May 19, 2017) (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, newswise.com, natureworldnews.com, phys.org.