

## CONTACT INFORMATION

Department of Geological Sciences  
University of Colorado Boulder  
2200 Colorado Ave, Boulder, CO 80309

Email: [md.hossen@colorado.edu](mailto:md.hossen@colorado.edu)  
Phone: (720)361-8268

## SCHOLAR ID

- ❑ Google Scholar: <https://scholar.google.com/citations?user=EUVdjg8AAAAJ&hl=en>
- ❑ ORCID ID: <http://orcid.org/0000-0002-4641-2858>

## SUMMARY OF QUALIFICATIONS

Experienced professional with a solid academic background and a demonstrated commitment to carry out high quality research on Geophysical Science, Environmental Science and Numerical Weather Prediction; Described as a "numerical modeler" with exceptional ability to use numerical analysis techniques and numerical optimization routines; Strong mathematical background builds upon several years of teaching at university and undergraduate & graduate course work; Proficient in the use of programming languages (Python, MATLAB, FORTRAN, C/C++, R) with extensive knowledge of inverse theory, data assimilation, signal processing and remote sensing.

## EDUCATION

- ❑ **Ph.D in Earth Sciences**, Australian National University, Canberra, Australia, Nov 2015
- ❑ **MS in Computational Science**, Florida State University (FSU), Dec 2008, GPA: 3.67/4.0
- ❑ **M.Sc, Applied Mathematics**, University of Dhaka, Bangladesh, Sep 2001, First class (Grade A)
- ❑ **B.Sc in Mathematics**, University of Dhaka, Bangladesh, June 1999, First class (Grade A)  
(Minor in Physics and Statistics)

## COMPUTER SKILLS

- Operating systems: Linux, Windows and Mac OS
- Programming Language: Python, FORTRAN, C/C++, Matlab, R, Shell scripting
- Atmospheric Modeling: Lin-Rood shallow water finite volume model,  
Tangent linear model, Adjoint model
- Tsunami Modeling: JAGURS (parallelized), GeoClaw, ANUGA (parallelized)
- Others: PyTorch, GMT, GrADS, MPI, OpenMP, NetCDF, HDF5,  
awk, sed, Git, ObsPy, SAC

## HONORS AND AWARDS

- CIRES visiting fellowship, University of Colorado Boulder 2018–2020
- Travel award to attend PNW Earthquake Science Workshop, Seattle, Washington 2019
- Travel grant to attend MCS RCN Megathrust Modeling Workshop, Eugene, Oregon 2019
- Travel scholarship, 2019 SAGE/GAGE workshop organized by IRIS and UNAVCO 2019
- Scholarship, Australian National University (ANU) 2011–2015
  - ANU PhD Scholarship
  - RSES Supplementary Scholarship
  - ANU HDR Merit Scholarship
- President's list, Florida State University 2007

## PROFESSIONAL EXPERIENCE

- **Postdoctoral Associate**, University of Colorado Boulder 2018-present
  - Developing a methodology for a guidance to build an optimal sea-floor observation network in the Cascadia subduction zone
  - Implementing data assimilation method with ship-borne GPS data in Ocean science
  - Supervisor: Professor Anne F. Sheehan
- **Project Researcher**, Earthquake Research Institute, University of Tokyo, Japan 2017-2018
  - Developed an adjoint sensitivity approach for tsunami source inversion
  - Supervisor: Professor Kenji Satake
- **Assistant professor in Mathematics**, BRAC University, Dhaka, Bangladesh 2015–2018
  - My responsibilities were to prepare and deliver lectures in the class, make questions and grade exam scripts, and advise students on academic matters
  - Performed duties as a Convenor of scrutinizing committee; course Coordinator; member of course curriculum committee and moderation committee
- **PhD Research**, Australian National University, Australia 2011-2015
  - Developed the first time reverse imaging method for tsunami source inversion
  - Investigated the importance of model parameterization, including dispersion, source kinematics, and source discretization, in tsunami source study
  - Advisor: Professor Phil R. Cummins
- **Senior Lecturer in Mathematics**, BRAC University, Dhaka, Bangladesh 2009–2011
- **Research Assistant**, Florida State University 2006 - 2008
  - Worked to develop a methodology for identifying adaptive observation location
  - Acquired knowledge on numerical linear algebra, numerical optimization, data assimilation and numerical weather prediction
  - Improved computational skills by utilizing numerical techniques and optimization
  - Advisor: Professor Ionel M. Navon
- **Lecturer in Mathematics**, BRAC University, Dhaka, Bangladesh 2002–2006

## COURSES I TAUGHT AT BRAC UNIVERSITY

- |  |   |
|--|---|
| <input type="checkbox"/> Fundamentals of Mathematics                   | <input type="checkbox"/> Calculus                       |
| <input type="checkbox"/> Fortran Programming                           | <input type="checkbox"/> Real Analysis I                |
| <input type="checkbox"/> Differential Calculus and Coordinate Geometry | <input type="checkbox"/> Vector Mechanics               |
| <input type="checkbox"/> Integral Calculus and Differential Equations  | <input type="checkbox"/> Discrete Mathematics           |
| <input type="checkbox"/> Complex Variable and Laplace Transformations  | <input type="checkbox"/> Mathematical Methods           |
| <input type="checkbox"/> Differential Geometry                         | <input type="checkbox"/> Mathematics Lab (using Python) |

## GRADUATE COURSE-WORK AT FSU

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|--|--|
| ✧ Introduction to Scientific Programming     | ✧ Numerical Optimization                     |
| ✧ Foundations of Computational Mathematics I | ✧ Applied Computational Science I            |
| ✧ Advanced Dynamic Meteorology I             | ✧ Applied Computational Science II           |
| ✧ Survey of Numerical PDEs                   | ✧ Computational Aspects of Data Assimilation |

## PROFESSIONAL DEVELOPMENT

- ✧ Deep Learning with Python and PyTorch offered by IBM (completed with 91% mark)
- ✧ Machine Learning with Python: A practical introduction (ongoing)
- ✧ 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**, 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.
- **M. J. Hossen**, I. M. Navon and Dacian N. Daescu. “Effect of random perturbations on adaptive observation techniques.” *International Journal for Numerical Methods in Fluids*, 69(1):110–123, 2012.
- **M. J. Hossen**, P. R. Cummins, J. Dettmer, and T. Baba (2015), Time reverse imaging for far-field tsunami forecasting: 2011 Tohoku earthquake case study, *Geophys. Res. Lett.*, 42, 9906-9915.
- **M. J. Hossen**, P. R. Cummins, J. Dettmer, and T. Baba (2015), Tsunami waveform inversion for sea surface displacement following the 2011 Tohoku earthquake: Importance of dispersion and source kinematics, *J. Geophys. Res. Solid Earth*, 120, 6452-6473.
- 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.
- T. Baba, S. Allgeyer, **M. J. Hossen**, P. R. Cummins, H. Tsushima, K. Imai, K. Yamashita, T. 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 Modelling*, Volume 111, Pages 46-54, ISSN 1463-5003.
- **Hossen, M. J.**, Gusman, A. R., Satake, K., & Cummins, P. R. (2018). An adjoint sensitivity method applied to time reverse imaging of tsunami source for the 2009 Samoa earthquake. *Geophysical Research Letters*, 45, 627-636.
- **M. J. Hossen**, Iyan E. Mulia, David Mencin and Anne F. Sheehan. “Data assimilation with ship-borne GPS data in the Cascadia subduction zone” (To be submitted soon).

#### 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.
- ✧ Our work is published in many media including sciencedaily.com, newswise.com, natureworld-news.com, phys.org.

#### CONFERENCE TALKS

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

## REFERENCES

**Professor Anne F. Sheehan**, Department of Geological Sciences, University of Colorado Boulder,  
Phone: +1 (303)-492-4597, Email: [anne.sheehan@colorado.edu](mailto:anne.sheehan@colorado.edu)

**Professor Phil R. Cummins**, Research School of Earth Sciences, Australian National University,  
Phone: (+61) (2) 6125 1217 Email: [phil.cummins@anu.edu.au](mailto:phil.cummins@anu.edu.au)

**Professor Kenji Satake**, Earthquake Research Institute, The University of Tokyo, Japan,  
Phone: +81-3-5841-0219 Email: [satake@eri.u-tokyo.ac.jp](mailto:satake@eri.u-tokyo.ac.jp)