

CURRICULUM VITAE

Attreyee Ghosh

Associate Professor
Indian Institute of Science

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Centre for Earth Sciences
Indian Institute of Science
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Education

Ph.D., May, 2008
Geophysics, Stony Brook University
Thesis: Elucidating lithosphere-mantle coupling by modeling the lithospheric stress field and predicting plate motions
Advisor: Dr. William E. Holt
M.A., May, 2003
Lamont-Doherty Earth Observatory of Columbia University, New York, USA
M.Sc., 2001
Indian Institute of Technology, Bombay, India

Professional Experience

Associate Professor, Indian Institute of Science, 2019-present
Assistant Professor, Indian Institute of Science, 2012-2019
Postdoctoral Associate, Stony Brook University, 2010-2012
Postdoctoral Research Associate, University of Southern California, 2008-2010
Research Assistant, Stony Brook University, 2004-2008
Teaching Assistant, Stony Brook University, 2003-2004

Award, Fellowship

Outstanding Student Paper, AGU Fall Meeting, San Francisco, 2007
Outstanding Student Paper, AGU Joint Assembly Meeting, Baltimore, 2006
Junior Research Fellowship, University Grants Commission, India, 2001
Faculty Fellowship, Lamont-Doherty Earth Observatory of Columbia University, 2001

Press Coverage

GeoSpace: The missing mass - what is causing a geoid low in the Indian Ocean?, October 16, 2017

The Telegraph: Peering into the Earth, September 28, 2015
ScienceDaily: Geoscientists Use Numerical Model to Better
Forecast Forces Behind Earthquakes, February 17, 2012
Our Amazing Planet: Plate Tectonics Becoming Clearer With
Computers, February 16, 2012
Times Beacon Record: Understanding the deep Earth to predict
earthquakes, May 15, 2012

Invited Talks

Workshop on Geodynamic Modelling, IISER Pune, 2021
Indian Geophysical Union Annual Convection, Virtual, 2021
AGU Fall meeting, Virtual, 2020
IUGG General Assembly, Montreal, Canada, 2019
Summer School for Women in Mathematics and Statistics,
Centre for Theoretical Sciences (ICTS), Bangalore, India, 2019
Indian Institute of Science and Educational Research (IISER),
Pune, India, 2019
Short course on *Challenges and Advances in Planetary Science*,
CEaS, IISc, Bangalore, India, 2017
Discussion meeting on *Dynamics of Complex Systems*, International
Centre for Theoretical Sciences (ICTS), Bangalore, India, 2016
Short course on *Geodynamic Processes*, CEaS, IISc, Bangalore,
India, 2016
Indian Institute of Science and Educational Research (IISER), Kolkata,
India, 2016
UNAVCO Science Workshop, Colorado, USA, 2014
Tata Institute of Fundamental Research (TIFR), Hyderabad, India, 2014
CSIR Center for Mathematical Modelling and Computer Simulation
(CMMACS), Bangalore, India, 2013
Mount Carmel College, Bangalore, India, *Women in Science*,
in association with Indian Academy of Sciences, 2013
NASA Jet Propulsion Laboratory, Pasadena, USA, 2011
Department of Geosciences, Princeton University, USA,
Solid Earth Brown Bag Seminar, 2010
Department of Geological Sciences, California State University,
Northridge, USA, 2009
Centre for Earth Sciences, Indian Institute of Science, Bangalore,
India, 2009
Department of Earth Sciences, Indian Institute of Technology,
Bombay, India, 2009
AGU Joint Assembly, Baltimore, USA, 2007

Synergistic Activities

Associate Editor: Geochemistry Geophysics Geosystems (2020-),
Frontiers in Earth Science (2021)
Session Convener: American Geophysical Union, 2014, 2019

Reviewer: Nature, Tectonophysics, Tectonics
Journal of Geophysical Research
Geochemistry Geophysics Geosystems
Earth and Planetary Science Letters
Geophysical Journal International
Pure and Applied Geophysics

Current/Past Projects Science & Engineering Research Board (SERB), 1/2021-1/2024
Ministry of Earth Sciences (MoES), 10/2018-03/2021
ISRO-IISc Space Technology Cell (STC), 04/2014-03/2017

Classes Taught Introduction to Earth and its Environment (2021)
Solid Earth Geophysics (2020, 2021)
Topics in Geophysics (2015-2020)
Mantle Convection (2014, 2015, 2018, 2019, 2021)
Lithosphere Dynamics (2014)
Plate Tectonics (2013)

Students Supervised **Phd:** Srishti Singh (2014-2020), Jyotirmoy Paul (2015-2021),
Debanjan Pal (2019-), Mainak Chakrabarty (2020-), Aashruti
(2020-)
MTech: Poulami Roy (2018), Viswanathan C (2019), Amarjyoti
Baruah (2021)

Publications

- A. Ghosh, D. Pal*, Do lower mantle slabs contribute in generating the Indian Ocean Geoid Low?, *Tectonophysics*, *Accepted*, 2021.
- J. Paul*, A. Ghosh, Could the Reunion plume have thinned the Indian craton?, *Geology*, doi: <https://doi.org/10.1130/G49492.1>, 2021.
- S. Singh*, A. Ghosh, The role of crustal models in the dynamics of the India-Eurasia collision zone, *Geophysical Journal International*, 223, p. 111-131, 2020.
- J. Paul*, A. Ghosh, Evolution of cratons through the ages: A time-dependent study, *Earth and Planetary Science Letters*, 531, <https://doi.org/10.1016/j.epsl.2019.115962>, 2020.
- S. Singh*, A. Ghosh, Surface motions and continental deformation in the Indian plate and the India-Eurasia collision zone, *Journal of Geophysical Research*, doi:10.1029/2018JB017289, 2019.
- J. Paul*, A. Ghosh, C. P. Conrad, Traction and strain-rate at the base of the lithosphere: An insight into cratonic survival, *Geophysical Journal International*, 217, p. 1024-1033, 2019.
- A. Ghosh, W. E. Holt, A. Bahadori, Role of large scale tectonic forces in intraplate earthquakes of Central and Eastern North America, *Geochemistry Geophysics Geosystems*, 20, doi:10.1029/2018GC008060, 2019.

- X. Wang, W. E. Holt, A. Ghosh, Joint Modeling of Lithosphere and Mantle Dynamics: Sensitivity to Viscosities Within the Lithosphere, Asthenosphere, Transition Zone, and D" Layers, *Physics of the Earth and Planetary Interiors*, 293, <https://doi.org/10.1016/j.pepi.2019.05.006>, 2019.
- A. Ghosh, G. Thyagarajulu*, B. Steinberger, The importance of upper mantle heterogeneity in generating the Indian Ocean geoid low, *Geophysical Research Letters*, 44, p. 9707-9715, 2017.
- S. Singh*, S. Agrawal*, A. Ghosh, Understanding deep earth dynamics: a numerical modelling approach, *Current Science (Invited Review)*, 112, p. 1463-1473, 2017.
- X. Wang, W. E. Holt, A. Ghosh, Joint Modeling of Lithosphere and Mantle Dynamics: Evaluation of Constraints from Global Tomography Models, *Journal of Geophysical Research*, 120, 8633-8655, 2015.
- E. S. Finzel, L. M. Flesch, K. D. Ridgway, W. E. Holt, A. Ghosh, Surface motions and intraplate continental deformation in Alaska driven by mantle flow, *Geophysical Research Letters*, 4350-4358, 2015.
- D. Sarah Stamps, L. M. Flesch, E. Calais, A. Ghosh, Current Kinematics and Dynamics of Africa and the East African Rift System, *Journal of Geophysical Research*, 119, p. 5161-5186, 2014.
- A. Ghosh, T. W. Becker, E. Humphreys, Dynamics of the North American continent, *Geophysical Journal International*, doi:10.1093/gji/ggt151, 2013.
- A. Ghosh, W. E. Holt, L. Wen, Predicting the Lithospheric Stress Field and Plate Motions by Joint Modeling of Lithosphere and Mantle Dynamics, *Journal of Geophysical Research*, 118, p. 346-368, 2013.
- A. Ghosh, W. E. Holt, Plate Motions and Stresses from Global Dynamic Models, *Science*, 335, p. 839-843, 2012.
- A. Ghosh, T. W. Becker, S. J. Zhong, Effect of lateral viscosity variations on mantle flow and the geoid, *Geophysical Research Letters*, 37, L01301, doi:10.1029/2009GL040426, 2010.
- A. Ghosh, W. E. Holt, L. M. Flesch, Contribution of gravitational potential energy differences to the global stress field, *Geophysical Journal International*, 179, p. 787-812, 2009.
- A. Ghosh, W. E. Holt, L. Wen, L. M. Flesch, A. J. Haines, Joint modeling of lithosphere and mantle dynamics elucidating lithosphere-mantle coupling, *Geophysical Research Letters*, 35, L16309, doi:10.1029/2008GL034365, 2008.

*Students supervised

A. Ghosh, W. E. Holt, L. M. Flesch, A. J. Haines, Gravitational potential energy of the Tibetan Plateau and the forces driving the Indian plate, *Geology*, 34, p. 321-324, 2006.

Conference Presentations

A. Ghosh*, W. E. Holt, A. Bahadori, Lateral viscosity variations within the lithosphere and their role in affecting the dynamics and seismicity of central and eastern North America, AGU Fall Meeting, Virtual, 2020.

J. Paul*, A. Ghosh, Understanding deformation of cratons in presence of mid-lithospheric discontinuity, EGU General Assembly, 2020.

A. Ghosh, **J. Paul***, Effect of Weak Mid-lithospheric Discontinuities on the Survival of Cratons, AGU Fall Meeting, San Francisco, 2019.

J. Paul*, A. Ghosh, Evolution of cratons in time-dependent mantle convection models, AGU Fall Meeting, San Francisco, 2019.

S. Singh*, A. Ghosh, Modeling the deformation in the Indian plate and the India-Eurasia collision zone, AGU Fall Meeting, San Francisco, 2019.

J. Paul*, **A. Ghosh**, Evolution and survival potential of cratons: A numerical study, IUGG19-0972, IUGG General Assembly, Montreal, 2019.

A. Ghosh, G. Thyagarajulu, B. Steinberger, Probing the Origin of the Indian Ocean Geoid Low, IUGG19-0648, IUGG General Assembly, Montreal, 2019.

S. Singh*, **A. Ghosh**, D. Coblenz, Supporting the Tibetan Plateau: Coupling of Surface Topography and Upper Mantle Dynamic Processes, AGU Fall Meeting, Washington DC, 2018.

J. Paul*, A. Ghosh, Stability of cratons since early Phanerozoic, AGU Fall Meeting, Washington DC, 2018.

A. Ghosh, **J. Paul***, C. Conrad, The Relation Between Traction and Strain Rate at the Base of the Lithosphere: Key to understanding cratonic stability, AGU Fall Meeting, Washington DC, 2018.

J. Paul*, A. Ghosh, Variation of traction and strain rate with lithospheric thickness: An insight into understanding cratonic stability, EGU General Assembly, Vienna, 2018.

S. Singh*, **A. Ghosh**, D. Coblenz, Role of dynamic topography in Himalaya-Tibetan plateau region, AGU Fall Meeting, New Orleans, 2017.

W. E. Holt, A. Ghosh, X. Wang, The Geodynamics of Intraplate Stresses within Central and Eastern North America, SSA Annual Meeting, Denver, 2017.

- A. Ghosh**, T. Gollapalli*, B. Steinberger, Investigating the Indian Ocean Geoid Low, AGU Fall Meeting, San Francisco, 2016.
- X. Wang, **W. E. Holt**, A. Ghosh, Importance of Lower Mantle Structures to Plate Stresses and Plate Motions, AGU Fall Meeting, San Francisco, 2016.
- X. Wang, **W. E. Holt**, A. Ghosh, A comparison of the dynamics of North America and the India-Eurasia collision, GSA Annual Meeting, Baltimore, 2015.
- A. Ghosh, **W. E. Holt**, A model for the intraplate dynamics of central and eastern North America, GSA Annual Meeting, Baltimore, 2015.
- A. Ghosh**, W. E. Holt, S. Stein, Seismicity in Eastern North America: What Is the Source of Intraplate Strain and Stress?, AGU Fall Meeting, San Francisco, 2014.
- X. Wang, **W. E. Holt**, A. Ghosh, The Driving Forces of the Large-Scale Deformation in the India-Eurasia Collision Region: Joint Modeling of Lithosphere and Mantle Dynamics, AGU Fall Meeting, San Francisco, 2014.
- A. Ghosh**, Numerical models of plate-mantle coupling: constraints from geodesy, UNAVCO Science Workshop, Colorado, USA, 2014.
- X. Wang**, W. E. Holt, A. Ghosh, The lithospheric stress field from joint modeling of lithosphere and mantle circulation using constraints from the latest global tomography models, AGU Fall Meeting, San Francisco, 2013.
- W. E. Holt**, A. Ghosh, X. Wang, The Role of Lithosphere Structure and Large-Scale Mantle Flow in the Forces that Affect North America, GSA Annual Meeting, Denver, 2013.
- A. Ghosh**, T. W. Becker, E. Humphreys, Effect of compositional anomalies beneath the western United States, IASPEI Joint Assembly, Gothenburg, Sweden, 2013.
- A. Ghosh**, W. E. Holt, S. Stein, The Dynamics of Eastern North America: Intraplate Strain and Stress, EOS Trans. AGU Fall Meet. Suppl., S54D-04, 2012.
- W. E. Holt**, A. Ghosh, Using GPS Derived Shear Strain Rates in Southern California to Constrain Fault Slip Rate, Locking Depth, and Residual Off-Fault Strain Rates, EOS Trans. AGU Fall Meet. Suppl., G22B-04, 2012.
- W. E. Holt, A. Ghosh, **S. Stein**, The Dynamics of Eastern North America Obtained from Coupled Global Models of Lithosphere Structure and Whole Mantle Convection, GSA Annual Meeting, Charlotte, 2012.
- W. E. Holt**, A. Ghosh, Y. Chen, Using GPS Derived Shear Strain Rates in Southern California to Constrain Fault Slip Rate, Locking Depth, and Residual Off-Fault Strain Rates, SCEC Annual Meeting, Palm Springs, 2012.

- A. Ghosh, **T. W. Becker**, E. Humphreys, Dynamics of the North American Continent, SCEC Annual Meeting, Palm Springs, 2012.
- A. Ghosh**, W. E. Holt, S. Stein, The Dynamics of Eastern North America: Intraplate Strain and Stress, CIG Workshop on Mantle Convection and Lithospheric Dynamics, Davis, 2012.
- A. Ghosh**, W. E. Holt, Prediction of Plate Motions and Stresses from Global Dynamic Models, EOS Trans. AGU, Fall Meet. Suppl., Abstract T13b-2370, 2011.
- A. Ghosh**, T. W. Becker, E. Humphreys, Understanding the deformation of the North American continent, Earthscope National Meeting, Austin, 2011.
- A. Ghosh**, T. W. Becker, E. Humphreys, Effect of shear tractions on deformation of western North America, T21E-2209, AGU Fall Meet. Suppl., 2010.
- A. Ghosh, **T. W. Becker**, E. Humphreys, B. Schmandt, Interaction of slabs, keels and mantle flow affecting deformation of western North America, The Meeting of the Americas, Foz do Iguassu, Brazil, 2010.
- A. Ghosh**, T. W. Becker, E. Humphreys, Geoid, dynamic topography, plate motion and stress field over North America, GLADE, San Diego, 2010.
- T. W. Becker, **A. Ghosh**, S. Zhong, Influence of lateral viscosity variations on the geoid and other surface observables, EOS Trans. AGU, 90(54), Fall Meet. Suppl., Abstract DI41A-1784, 2009.
- A. Ghosh**, T. W. Becker, E. Humphreys, M. Gerault, Western North America dynamics, EOS Trans. AGU, 90(54), Fall Meet. Suppl., Abstract U53B-0064, 2009.
- A. Ghosh**, T. W. Becker, S. Zhong, Effect of lateral viscosity variations on mantle flow and the geoid, 11th International Workshop on Modeling of Mantle Convection and Lithospheric Dynamics, Braunwald, 2009.
- L. A. Alpert**, A. Ghosh, T. W. Becker, I. Bailey, Coseismic subduction zone strain-release as a constraint for slab dynamics, 11th International Workshop on Modeling of Mantle Convection and Lithospheric Dynamics, Braunwald, 2009.
- W. E. Holt**, A. Ghosh, L. Wen, Constraints from Surface Geophysical and Geological Observations on the Role of Lithosphere-Mantle Coupling, EOS Trans. AGU, 90(22), Jt. Assem. Suppl., 2009.
- A. Ghosh**, T. W. Becker, S. Zhong, Effect of lateral viscosity variations on mantle flow and the geoid, EOS Trans. AGU, 89(53), Fall Meet. Suppl., Abstract DI53A-1687, 2008.
- M. Gerault, **A. Ghosh**, T. W. Becker, E. Humphreys, How lateral viscosity variations control the dynamics of western North America, EOS Trans. AGU, 89(53), Fall Meet. Suppl., Abstract U51B-0024, 2008.

- W. E. Holt, **A. Ghosh**, L. Wen, A. J. Haines, C. Kreemer, L. M. Flesch, Lithosphere-mantle coupling: constraints from the World Stress Map, EOS Trans. AGU, 89(53), Fall Meet. Suppl., Abstract T11C-1890, 2008.
- R. Arevalo**, A. Ghosh, V. Lekic, V. C. Tsai, A. M. Dziewonski, L. H. Kellogg, J. Matas, W. R. Panero, B. Romanowicz, Degree-2 in the Transition Zone and Near the CMB: Bottom up Tectonics?, EOS Trans. AGU, 89(53), Fall Meet. Suppl., Abstract DI21A-1744, 2008.
- L. A. Alpert**, A. Ghosh, T. W. Becker, I. Baliley, M. S. Miller, Coseismic subduction zone strain-release as a constraint for slab dynamics, EOS Trans. AGU, 89(53), Fall Meet. Suppl., Abstract DI53A-1674, 2008.
- A. Ghosh**, T. W. Becker, E. Humphreys, Effects of lateral viscosity variations on the dynamics of western North America, *SCEC Annual Meeting*, 2008.
- A. Ghosh**, L. Wen., W. E. Holt, A. J. Haines, L. M. Flesch, A Best-fit Lithosphere-Mantle Coupling Model Constrained by Plate Motions and the Velocity Gradient Tensor Field in the Plate Boundary Zones, CIG Workshop for Advancing Numerical Modeling of Mantle Convection and Lithospheric Dynamics, 2008.
- A. Ghosh**, L. Wen., W. E. Holt, A. J. Haines, L. M. Flesch, A Best-fit Lithosphere-Mantle Coupling Model Constrained by Plate Motions and the Velocity Gradient Tensor Field in the Plate Boundary Zones, EOS Trans. AGU, 88(52), Fall Meet. Suppl., Abstract T21B-0582, 2007.
- W. E. Holt**, A. Ghosh, L. Wen., A. J. Haines, L. M. Flesch, Integrating full three-dimensional mantle circulation models with lithospheric deformation models, EOS Trans. AGU, 88(23), Jt. Assem. Suppl., Abstract U42A-05, 2007.
- W. E. Holt**, A. Ghosh, L. Wen., A. J. Haines, L. M. Flesch, The role of density-buoyancy driven mantle flow in continental deformation: North America, Asia, and the rest of the world, Earthscope National Meeting, 2007.
- A. Ghosh**, W. E. Holt, L. Wen., L. M. Flesch, A. J. Haines, Plate motions, lithospheric stress field and lithosphere-mantle coupling, EOS Trans. AGU, 87(52), Fall Meet. Suppl., Abstract G41A-03, 2006.
- W. E. Holt, **A. Ghosh**, A. J. Haines, Effect of continental keels on the lithospheric deviatoric stress field, EOS Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T52D-03, 2006.
- A. Ghosh**, L. Wen, W. E. Holt, A. J. Haines, L. M. Flesch, Global lithospheric stress field and laterally varying lithosphere-mantle coupling, EOS Trans. AGU, 87(36), Jt. Assem. Suppl., Abstract T24A-05, 2006.
- W. E. Holt**, A. Ghosh, A. J. Haines, L. M. Flesch, L. Wen., A global inversion for the distribution of basal lithospheric tractions associated with the coupling of mantle circulation, VI Hotine-Marussi Symposium of Theoretical and Computational Geodesy, 2006.

- A. Ghosh**, L. Wen, W. E. Holt, A. J. Haines, L. M. Flesch, Three dimensional modeling of lithosphere and mantle dynamics elucidating lithosphere-mantle coupling, EOS Trans. AGU, 86(52), Fall Meet. Suppl., Abstract U53A-02, 2005.
- A. Ghosh**, W. E. Holt, L. M. Flesch, A. J. Haines, Gravitational potential energy of the Tibetan Plateau and the role of mantle circulation in driving the Indian plate, EOS Trans. AGU, 85(47), Fall Meet. Suppl., Abstract T31A-1276, 2004.