

SEEBANY DATTA-BARUA
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Education

Ph.D. in Aeronautics and Astronautics, Stanford University, 2008
M.S. in Aeronautics and Astronautics, Stanford University, 2002
B.S. with Honors in Physics, Stanford University, 2000
Minor in Mathematics

Academic Appointments

Assistant Professor, 2012–present	Illinois Institute of Technology
Mechanical, Materials and Aerospace Engineering	Armour College of Engineering
Assistant Professor, 2010–2012	San Jose State University
Department of Aviation and Technology	College of Engineering

Grants and Awards

Principal Investigator (PI), “CAREER: Coherent Structures in Ionospheric-Thermospheric Flows,” National Science Foundation, 5/15/14 – 5/14/19.

Co-Investigator, Illinois Space Grant Consortium, NASA, 10/1/13 – 9/30/14.

PI, “Ionospheric Storm Transition Region Properties,” National Science Foundation, AGS-1114424, 9/1/10 – 8/31/13.

Project Director, “Reid-Hillview Airport Time-in-Mode Survey,” ICF International contract, 2011.

Institutional PI, “Collaborative Research: CEDAR – The Space-time Properties of High Latitude Ionospheric Irregularities by a Two-dimensional Array of GPS Scintillation Receivers,” National Science Foundation, AGS-1139121, 2/1/12 – 1/31/15.

Dissertation

Ionospheric Threats to the Integrity of Airborne GPS Users

Dissertation Readers: Todd Walter, Per Enge, Umran Inan

Abstract: This work characterizes the spatial variation of ranging errors due to the ionosphere during geomagnetically active periods for GPS-based aircraft landing systems, which rely on differential positioning.

Dissertations and Theses Supervised

J. Xing Zhang, “Measurement Model of Ionospheric Electron Content with CYGNSS,” M.S. Thesis, Illinois Institute of Technology, December 2013.

Peer-Reviewed Journal Papers**Published**

S. Datta-Barua, T. Walter, G. S. Bust, and W. Wanner (2014), “Effects of solar cycle 24 activity on WAAS navigation,” *Space Weather*, 12, 4663, doi:10.1002/2013SW000982.

S. Datta-Barua, G. S. Bust and G. Crowley (2013), “First storm time plasma velocity estimates from high-resolution ionospheric data assimilation,” *J. Geophys. Res. Space Physics*, 118, doi:10.1002/2013JA019153.

M. Joerger, J. Neale, **S. Datta-Barua**, and B. Pervan (2013), “Ionospheric Error Modeling for Carrier Phase-Based Multi-Constellation Navigation Systems,” *IEEE Transactions on Aerospace and Electronic Systems*, vol. 49, no. 1, pp. 451–467, doi:10.1109/TAES.2013.6404114.

J. Lee, **S. Datta-Barua**, G. Zhang, S. Pullen, and P. Enge (2011), “Observations of low-elevation ionospheric anomalies for ground-based augmentation of GNSS,” *Radio Sci.*, 46, RS6005, doi:10.1029/2011RS004776.

S. Datta-Barua, G. S. Bust, and G. Crowley (2011), “Deducing storm-time F region ionospheric dynamics from 3-D time-varying imaging,” *Journal of Geophysical Research*, 116, A05324, doi:10.1029/2010JA016304.

S. Datta-Barua, J. Lee, S. Pullen, M. Luo, A. Ene, D. Qiu, G. Zhang, and P. Enge (2010), “Ionospheric Threat Parameterization for Local Area GPS-Based Aircraft Landing Systems,” *Journal of Aircraft*, 0021-8669 vol.47 no.4 (1141-1151), doi: 10.2514/1.46719.

S. Datta-Barua, G. S. Bust, G. Crowley, and N. Curtis (2009), “Neutral wind estimation from 4-D ionospheric electron density images,” *Journal of Geophysical Research*, 114, A6, doi:10.1029/2008JA014004.

S. Datta-Barua, A. J. Mannucci, T. Walter, and P. Enge (2008), “Altitudinal variation of midlatitude localized TEC enhancement from ground- and space-based measurements,” *Space Weather*, 6, S10D06, doi:10.1029/2008SW000396.

S. Datta-Barua, T. Walter, J. Blanch, and P. Enge (2008), “Bounding higher-order ionosphere errors for the dual-frequency GPS user,” *Radio Science*, 43, RS5010, doi:10.1029/2007RS003772.

J. Lee, S. Pullen, **S. Datta-Barua**, and P. Enge (2007), “Assessment of Ionosphere Spatial Decorrelation for Global Positioning System-Based Aircraft Landing Systems,” *Journal of Aircraft*, vol. 44, no. 5, pp. 1662–1669.

In Press

G. S. Bust and **S. Datta-Barua**, “Scientific Investigations using IDA4D and EMPIRE,” *J. Geophys. Res.*, 30 June 2013.

Peer-Reviewed Journal Papers, continued

In Preparation

S. Datta-Barua, G. S. Bust, D. S. Miladinovich, and G. Crowley, “Ionospheric Drivers and Plasma Density Variations from Data Assimilative Imaging,” in preparation 11 Mar 2014.

Conference Papers

J. Lee, J. Lee, S. Pullen, and **S. Datta-Barua**, “Conceptual Study of Real-time Ionospheric Threat Adaptation Using Space Weather Forecasting for GNSS Augmentation Systems,” Proceedings of the 2014 International Technical Meeting of the Institute of Navigation (ION ITM 2014), San Diego, CA, January 2014, in press.

G. S. Bust, **S. Datta-Barua**, K. Deshpande, S. Bourand, S. Skone, and Y. Su, “Correlation Properties of a 2-D Array of High-Latitude Scintillation Receivers,” Proceedings of the 26th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS 2013), Nashville, TN, September 2013, in press.

S. Datta-Barua, G. S. Bust, T. Walter and G. Crowley, “Preliminary Investigation of Solar Cycle 24 Storms and their Effects on SBAS Navigation,” Proceedings of the 25th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS 2012), Nashville, TN, September 2012, pp. 2731-2741.

S. Datta-Barua and G. Bust, “GNSS Imaging-derived Dynamics of Ionospheric Storm Transition Regions,” Proceedings of the 24th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS 2011), Portland, OR, September 2011, pp. 2532-2541. *Recipient, Best Presentation of Session Award.*

S. Datta-Barua, G. Bust, and G. Crowley, “Error Propagation in Ionospheric Image-based Parameter Estimation,” Proceedings of the 23rd International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS 2010), Portland, OR, September 2010, pp. 1039-1048.

M. Joerger, J. Neale, B. Pervan, **S. Datta-Barua**, “Measurement Error Models and Fault-Detection Algorithms for Multi-Constellation Navigation Systems,” Proceedings of IEEE/ION PLANS 2010, Indian Wells, CA, May 2010, pp. 927-946.

S. Datta-Barua, T. Walter, S. Pullen, and P. Enge, “Modeling the 20 November 2003 Ionosphere Storm with GRACE,” Proceedings of the Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS) 2007, Fort Worth, TX, September 2007, pp. 2840–2848.

Conference Papers, continued

S. Datta-Barua, T. Walter, S. Pullen, and P. Enge, “Modeling the 31 October 2003 Localized Enhancement with Space- and Ground-Based Data,” Proceedings of the International Beacon Satellite Symposium 2007, Chestnut Hill, MA, June 2007.

G. X. Gao, **S. Datta-Barua**, T. Walter, and P. Enge, “Ionosphere Effects for Wideband GNSS Signals,” Proceedings of ION Annual Meeting 2007, Cambridge, MA, April 2007, pp. 147–155.

S. Datta-Barua, T. Walter, J. Blanch, and P. Enge, “Bounding Higher Order Ionosphere Errors for the Dual Frequency GPS User,” Proceedings of Institute of Navigation (ION) Global Navigation Satellite Systems (GNSS) 2006, Fort Worth, TX, September 2006, pp. 1377–1392.

J. Lee, S. Pullen, **S. Datta-Barua**, and P. Enge, “Assessment of Nominal Ionosphere Spatial Decorrelation for Local Area Augmentation System (LAAS),” Proceedings of IEEE/ION Position Location and Navigation Symposium 2006, San Diego, CA, April 2006, pp. 506–514.

S. Datta-Barua, T. Walter, E. Altshuler, J. Blanch, and P. Enge, “Dst as an Indicator of Potential Threats to Wide Area Augmentation System (WAAS) Integrity and Availability,” Proceedings of ION GNSS 2005, Long Beach, CA, September 2005, pp. 2365–2373.

M. Luo, S. Pullen, **S. Datta-Barua**, G. Zhang, T. Walter, and P. Enge, “LAAS Study of Slow-Moving Ionosphere Anomalies and Their Potential Impacts,” Proceedings of ION GNSS 2005, Long Beach, CA, September 2005, pp. 2337–2349.

S. Datta-Barua, T. Walter, H. Konno, J. Blanch, P. Enge, and A. Komjathy, “Verification of Low Latitude Ionosphere Effects on WAAS During October 2003 Geomagnetic Storm,” Proceedings of ION Annual Meeting, Cambridge, MA, June 2005, pp. 429–439.

S. Datta-Barua, T. Walter, J. Blanch, and P. Enge, “Towards WAAS Availability Forecasting: Analysis of Geomagnetic Data,” Proceedings of the Ionospheric Effects Symposium (IES) 2005, Alexandria, VA, May 2005.

T. Walter, S. Rajagopal, **S. Datta-Barua**, and J. Blanch, “Protecting Against Unsourced Ionospheric Threats,” Proceedings of Beacon Satellite Symposium, Trieste, Italy, October 2004.

Conference Papers, continued

S. Datta-Barua, “Ionospheric Threats to Space-Based Augmentation System Development,” Proceedings of ION GNSS 2004, Long Beach, CA, September 2004, pp. 1308–1317. *Recipient, Institute of Navigation Student Paper Award.*

T. Walter, **S. Datta-Barua**, J. Blanch, and P. Enge, “The Effects of Large Ionospheric Gradients on Single Frequency Airborne Smoothing Filters for WAAS and LAAS,” Proceedings of ION NTM 2004, San Diego, CA, January 2004, pp. 103–109.

S. Rajagopal, T. Walter, **S. Datta-Barua**, J. Blanch, and T. Sakai, “Correlation Structure of the Equatorial Ionosphere,” Proceedings of ION NTM 2004, San Diego, CA, January 2004, pp. 542–550.

S. Datta-Barua, P. H. Doherty, S. H. Delay, T. Dehel, and J. A. Klobuchar, “Ionospheric Scintillation Effects on Single and Dual Frequency GPS Positioning,” Proceedings of ION GPS/GNSS 2003, Portland, OR, September 2003, pp. 336–346.

M. Luo, S. Pullen, J. Dennis, H. Konno, G. Xie, T. Walter, P. Enge, **S. Datta-Barua**, and T. Dehel, “LAAS Ionosphere Spatial Gradient Threat Model and Impact of LGF and Airborne Monitoring,” Proceedings of ION GPS/GNSS 2003, Portland, OR, September 2003, pp. 2255–2274.

P. H. Doherty, T. Dehel, J. A. Klobuchar, S. H. Delay, **S. Datta-Barua**, E. R. de Paula, and F. S. Rodrigues, “Ionospheric Effects on Low-Latitude Space Based Augmentation Systems,” Proceedings of ION GPS 2002, Portland, OR, September 2002, pp. 1321–1329.

S. Datta-Barua, T. Walter, S. Pullen, M. Luo, J. Blanch, and P. Enge, “Using WAAS Ionospheric Data to Estimate LAAS Short-Baseline Gradients,” Proceedings of ION National Technical Meeting (NTM) 2002, Anaheim, CA, January 2002, pp. 523–530.

Conference Presentations

G. S. Bust, **S. Datta-Barua**, S. Skone, and K. Deshpande, “High Latitude GPS Scintillation Arrays,” presented at the International Beacon Satellite Symposium, Bath, United Kingdom, July 2013.

S. Datta-Barua, G. S. Bust, and G. Crowley, “Ionospheric Drivers and Plasma Density Variations from Data Assimilative Imaging,” presented at the International Beacon Satellite Symposium, Bath, United Kingdom, July 2013.

Conference Presentations, continued

D. S. Miladinovich, **S. Datta-Barua**, G. S. Bust and G. Crowley, “Indirect Estimates of High-Resolution Ionospheric-Thermospheric States During Stormtime,” student poster in poster competition presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Boulder, CO, June 2013.

J. Xing, **S. Datta-Barua**, B. Pervan, and A. Ridley, “Measurement Model of Ionospheric Electron Content with CYGNSS,” student poster in poster competition presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Boulder, CO, June 2013.

S. Datta-Barua, G. Bust, and G. Crowley, “Mid-latitude Ionospheric Storm Density Gradients and Drifts Estimated from TEC Imaging,” presented at the American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 3 – 7, 2012.

S. Datta-Barua and G. S. Bust, “ExB Dynamics of Ionospheric Storm Transition Regions,” presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Santa Fe, NM, June 25 – 29, 2012.

S. Datta-Barua and G. Bust, “Ionospheric Storm Dynamics from Assimilative Imaging,” presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Santa Fe, NM, June 27 – July 1, 2011.

S. Datta-Barua, G. Bust, and G. Crowley, “Using Beacon Satellites to Estimate Ionospheric Drivers During Stormy Periods,” presented at Beacon Satellite Symposium, Barcelona, Spain, June 7–11, 2010.

S. Datta-Barua, G. Bust, and G. Crowley, “Estimating Density Gradients and Drivers from 3D Ionospheric Imaging,” presented at the American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 14–18, 2009.

S. Datta-Barua, G. Bust, and G. Crowley, “Estimating Model Parameters from Ionospheric Reverse Engineering,” presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Santa Fe, NM, June 28– July 2, 2009.

S. Datta-Barua, G. Bust, G. Crowley, N. Curtis, and A. Reynolds, “ Estimating Model Parameters from Ionospheric Reverse Engineering (EMPIRE) of the November 2004 Geomagnetic Storm,” presented at the AGU Fall Meeting, San Francisco, CA, December 15–19, 2008.

G. Bust, **S. Datta-Barua**, G. Crowley, and N. Curtis, “Estimation of Neutral Winds from 4D Ionospheric Imaging,” presented at International Union of Radio Scientists (URSI) General Assembly, Chicago, IL, August 14, 2008.

S. Datta-Barua, G. Bust, G. Crowley, and N. Curtis, “Deriving Neutral Winds from Global 4-D Electron Density Fields,” presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Midway, UT, June 16–21, 2008.

A. J. Mannucci, **S. Datta-Barua**, T. Walter, A. Komjathy, L. Sparks, B. T. Tsurutani, “Anomalous Nighttime Plasma Structure in the Recovery Phase of a Superstorm,” *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract SA21A-0275, 2005.

Invited Talks

S. Datta-Barua et al, “Inferring 2D spatio-temporal properties of irregularities from a closely spaced sub-auroral scintillation array,” International Union of Radio Scientists (URSI) National Radio Science Meeting, Boulder, CO, January 2014.

S. Datta-Barua, “Greening the Blue Skies: Reducing the Environmental Impacts of Aviation,” E-Green Seminar Series, partnership between San Jose State University and Chungbuk National University, Korea, September 27, 2011.

S. Datta-Barua, “Global Navigation Satellite Systems and the Environment,” Green Talk Speaker Series, College of Engineering, San Jose State University, April 6, 2011.

S. Datta-Barua, “Safety and Security in Aviation: Topics, Tools, Tradeoffs,” Institute of Navigation, Northern California Section Meeting, April 9, 2010.

S. Datta-Barua, G. Bust, and G. Crowley, “Estimating Model Parameters from Ionospheric Reverse Engineering (EMPIRE),” presented at the Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) workshop session “Estimating Physical Drivers from Ionospheric Imaging and Data Assimilation,” Santa Fe, NM, July 1, 2009.

S. Datta-Barua, G. Bust, G. Crowley, and N. Curtis, “Estimation of Neutral Winds from 4D Ionospheric Imaging,” presented at CEDAR workshop session “Measurement and Modeling of Neutral Winds in the MLT and IT Regions,” Santa Fe, NM, June 30, 2009.

S. Datta-Barua, T. Walter, S. Pullen, and P. Enge, “Modeling Ionospheric Storms Using Ground- and Space-Based GPS Data: A Case Study for Aviation Integrity,” Institute of Navigation, Dayton, Ohio, Section Meeting, November 8, 2007.

Professional and Academic Service

Track Chair, ION GNSS+ 2013, Nashville, TN, September 2013.

Workshop Chair, Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Boulder, CO, June 2013.

Session Chair, ION International Technical Meeting 2013, San Diego, CA, January 2013.

Judge, Student Poster Award Competition, American Geophysical Union Fall Meeting, San Francisco, CA, December 3 – 7, 2012.

Session Chair, 25nd International Technical Meeting of the Satellite Division of the Institute of Navigation ION GNSS 2012, Nashville, TN, September 2012.

Judge, Annual Student Poster Competition, Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Santa Fe, NM, 27 June – 1 July 2011.

Workshop Chair, Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Workshop, Santa Fe, NM, 27 June – 1 July 2011.

Session Chair, 22nd International Technical Meeting of the Satellite Division of the Institute of Navigation ION GNSS 2009, Savannah, GA, September 2009.

Session Chair, Institute of Navigation (ION) 63rd Annual Meeting, April 2007.

Event Organizer – Guidance, Navigation, and Control Seminar: Invited and hosted NASA astronaut Col. Michael Fincke to speak about his experiences during International Space Station Expedition 9, April 2005.

Event Organizer – Women in Engineering Seminar special event: Invited and hosted US Representative Zoe Lofgren to speak about her policy work promoting science and technology as representative for Silicon Valley, May 2007.

Member, Aeronautics/Astronautics Women's Group, 2003–2007.

Member, Graduate Student Council Transportation Board, 2006–2007.

Professional Affiliations

Member, American Geophysical Union.

Member, American Institute of Aeronautics and Astronautics.

Member, Institute of Electrical and Electronics Engineers.

Member, Institute of Navigation.

Editorship Service

Associate Editor, Radio Science, 2013 – present.

Reviewer Service

National Science Foundation, Atmospheric and Geospace Sciences (AGS) Division

Journal of Navigation, ION

Radio Science, AGU

Transactions on Geoscience and Remote Sensing, IEEE

Journal of Aircraft, AIAA

Transactions on Aerospace and Electronic Systems, IEEE

Advances in Space Research, Committee on Space Research (COSPAR)

Geophysical Research Letters, AGU