Dr. Seán Blake

Space Weather Researcher

Mail
blakese@tcd.ie

Web & Git
seanblake.ie
github.com/terminusest

Programming
Python ★★★★★
Matlab ★★★☆☆

About

I am a motivated astro/geophysics researcher with 6 years of experience in data analysis and scientific research, currently working at NASA Goddard Space Flight Center. The focus of my research is **Space Weather**, or how the Sun causes geomagnetic storms that can damage grounded infrastructure. I am experienced with geophysical modeling, analysing large datasets, machine learning, data visualisation and historical research.

Work Experience

2018-now **Postdoctoral Researcher at NASA GSFC**
Based in the NASA Goddard Space Flight Center in Maryland, USA. Currently researching extreme geomagnetic storm dynamics, historical superstorms, the extent of the auroral oval and localized geoelectric field enhancements.

2017-2018 **Postdoctoral Researcher at Trinity College Dublin**
Gathered and processed magnetotelluric data around Ireland as part of SWEMDI: the Space Weather Electromagnetic Database for Ireland.

2016-2018 **Director of CodifyDublin.com**
Founded Codify Ltd. which provided data science and computer programming workshops in Dublin. Designed curriculum, organised classes and taught approximately 150 students.

2014-2016 **Workshop Leader with Student2Scientist.org**
Ran educational computer science and physics workshops for secondary level students and teachers. Produced Junior Cert Short Course.

2013 **Intern with DIAS Geophysics Section**
Surveyed various locations in Ireland and analysed geomagnetic data as part of the IRETHERM magnetotelluric geothermal energy project.

Education

2013-2017 **Ph.D. in Astrophysics.** **Trinity College Dublin, Ireland**
• Co-funded by EirGrid to research the effects of space weather on the Irish power network.
• Thesis entitled *Monitoring and Modelling Geomagnetic Storms and Their Effects in Ireland* was the first detailed study of the Irish power network and its vulnerability to space weather events.

2014-2015 **Postgraduate Certificate in Statistics** **Trinity College Dublin, Ireland**
35 ECTS course on frequentist statistics

2009-2013 **B.A. Mod. in Astrophysics, II.I** **Trinity College Dublin, Ireland**
Thesis entitled: *Simulating a Convective Cell in the Solar Interior*

Skills

Scientific Computing

- Extensive experience with **Python** both in developing code for scientific applications and teaching. Also familiar with **Matlab**.
- Experienced with analysing large datasets, **machine learning** and numerical physics simulations, such as the **Space Weather Modeling Framework** suite of geospace simulations.
- Developed software for magnetic observatories in Ireland which provides real-time analysis of geomagnetic data (e.g., **Magie.ie**).

Academic Research

- Experienced with space weather and geophysics research, including GICs, power network modelling and magnetotellurics.
- Experienced with analysing geomagnetic and geoelectric time series.
- Practical experience with installing and maintaining geomagnetic observatories, as well as undertaking magnetotelluric surveys around Ireland.

Communication

- Presented novel scientific research at a number of international conferences.
- Strong teaching experience with students of all levels. Designed and taught curriculum for CodifyDublin programming courses, as well as computing courses for students.

Publications

- **Blake, S.P.**, Pulkkinen, A., et al., (2021). *Recreating the Horizontal Magnetic Field at Colaba during the Carrington Event with Geospace Simulations*, Space Weather, 10.1029/2020SW002585
- **Blake, S.P.**, Pulkkinen, A., et al. (2020). *Estimating Maximum Extent of Auroral Equatorward Boundary using Historical and Simulated Surface Magnetic Field Data*, Journal of Geophysical Research: Space Physics, 10.1029/2020JA028284
- *Magnetohydrodynamic (MHD) Modeling for the Further Understanding of Geoelectric Field Enhancements and Auroral Behavior During Geomagnetic Disturbance Events*, (2020), report for the Electric Power Research Institute
- Hayakawa, H., **Blake, S.P.**, et al. (2020). *The Extreme Space Weather Event in February/March 1941*, The Astrophysical Journal, 10.3847/1538-4357/abb772
- Bhaskar, A., **Blake, S. P.**, et al. (2020). *An analysis of the Trouvelot's Auroral Drawing on 1/2 March 1872: Plausible Evidence for Recurrent Geomagnetic Storms*, Journal of Geophysical Research: Space Physics, 10.1029/2020JA028227
- Marsal, S., **Blake, S. P.**, et al. (2020). *Including the Temporal Dimension in the SECS Technique*, Space Weather 10.1029/2020SW002491
- **Blake, S. P.**, Pulkkinen, A., et al., (2020). *Magnetic Field Measurements from Rome during the August-September 1859 Storms*, Journal of Geophysical Research: Space Physics, 10.1029/2019ja027336

- Campanyà, J., **Blake, S. P.**, et al. (2019). *Modeling Geoelectric Fields in Ireland and the UK for Space Weather Applications.* Space Weather, 10.1029/2018SW001999

- **Blake, S. P.**, Gallagher, P.T., et al. (2018). *A Detailed Model of the Irish High Voltage Power Network for Simulating GICs.* Space Weather, 10.1029/2018SW001926

- **Blake, S. P.** (2017). *Modelling and Monitoring Geomagnetically Induced Currents in Ireland*, PhD Thesis, University of Dublin, Trinity College, link

- **Blake, S. P.**, Gallagher, P. T., et al. (2016). *Geomagnetically induced currents in the Irish power network during geomagnetic storms*, Space Weather, 10.1002/2016SW001534

Selected Presentations

- *Extreme Geomagnetic Field Variations: Historical Measurements, and Modern Simulations*, Invited Online Talk, AGU Fall Meeting 2020, SM050-06

- *Recreating the Horizontal Magnetic Field at Colaba during the Carrington Event with Geospace Simulations*, eLightning Online Talk, AGU Fall Meeting 2020, SM011-10

- *Recreating the Carrington Event Magnetic Field Measurements using Extremely High Pressure Solar Wind Scenarios and the Space Weather Modelling Framework*, Online Talk, EGU General Assembly 2020, EGU2020-22086

- *Magnetic field measurements from Rome during the 1859 Carrington event storm*, NASA Goddard Heliophysics Director's Seminar, 2020, NASA Goddard Space Flight Center

- *Latitudinal Extent of the Auroral Oval during the Carrington Event*, Talk, AGU Fall Meeting 2019, San Francisco IN41B-09

- *Using MHD Simulations to Investigate Extreme Geomagnetic Storms*, Talk, EPRI Sunburst Chicago Meeting, 2019

- *Magnetohydrodynamic Modeling of Geomagnetic Storm Events*, Talk, EPRI Sunburst Virtual Meeting, 2020

- *Quantifying the Latitudinal Extent of the Aurorae During Large Geomagnetic Storms*, Talk, IUGG General Assembly, 2019, Montreal,