

# CURRICULUM VITAE: KYLE GWIRTZ

Assistant Research Scientist UMBC/NASA GSFC  
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## EXPERIENCE

Research experience in data assimilation, machine learning and inverse problems. Specific focus on developing models and methods for geomagnetic data assimilation, forecasting and the investigation of geomagnetic reversals and excursions.

## EDUCATION

Scripps Institution of Oceanography	Earth Sciences	Ph.D.	2021
University of Arizona	Applied Mathematics	M.S.	2019
University of Kansas	Mathematics	M.A.	2012
University of Kansas	Mathematics	B.Sc.	2009

## POSITIONS

Assistant Research Scientist, UMBC/NASA GSFC	2024-present
Postdoctoral Researcher, NASA Goddard Space Flight Center	2022-2024
Graduate Research Assistant, Scripps Institution of Oceanography	2020-2021
Graduate Research Assistant, University of Arizona	2018-2020
Graduate Intern, NASA Goddard Space Flight Center	Summer 2018
Graduate Teaching Assistant, University of Arizona	2016-2018

## AWARDS

NASA ROSES ESI Grant 2023 (Science PI)	2024-present
NASA Postdoctoral Fellowship (NPP)	2022-2024
Student Author Award, Geophysical Journal International	2021
NASA Earth and Space Science Fellowship (NESSF)	2018-2021

## PROFESSIONAL ACTIVITIES

Session Co-Chair: SWARM 10th anniversary (Core Dynamics)	Spring 2024
Session organizer: SIAM-Mathematics of Planet Earth	Summer 2020
Reviewer: Physics of the Earth and Planetary Interiors, IUGG special publications, Springer Nature, Geophysical Research Letters, Journal of Geophysical Research, Earth, Planets and Space	

## PUBLICATIONS

K. Gwartz, W. Kuang, C. Yi, A. Tangborn, *Impact of localization and inflation on geomagnetic data assimilation*, Physics of the Earth and Planetary Interiors, 355, (2024)

W. Kuang, K. Gwartz, A. Tangborn, M. Morzfeld *Understanding and predicting geomagnetic*

*secular variation via data assimilation*, IUGG special publication series, “Applications of data assimilation and inverse problems in the Earth Sciences”, chap 4.1, editors A. Ismail-Zadeh, F. Castelli, D. Jones, S. Sanchez, (2023)

K. Gwartz, T. Davis, M. Morzfeld, C. Constable, A. Fournier, G. Hulot, *Can machine learning reveal precursors of reversals of the geomagnetic axial dipole field?*, *Geophysical Journal International*, 231(1), 520-535 (2022).

K. Gwartz, M. Morzfeld, W. Kuang, A. Tangborn, *A testbed for geomagnetic data assimilation*, *Geophysical Journal International*, 227(3), 2180-2203 (2021).

K. Gwartz, M. Morzfeld, A. Fournier, G. Hulot, *Can one use Earth’s magnetic axial dipole field intensity to predict reversals?*, *Geophysical Journal International*, 225(1), 277-297 (2021).

M. Brio, J.G. Caputo, K. Gwartz, J. Liu and A. Maimistov, *Scattering of a short electromagnetic pulse from a Lorentz-Duffing film: theoretical and numerical analysis*, *Wave Motion*, 89, 43-56 (2019).

## SELECTED PRESENTATIONS

European Geosciences Union General Assembly Title of Poster: Estimating core dynamics via the assimilation of magnetic field models into numerical dynamos	Spring 2024
SWARM 10th Anniversary Meeting Title of Poster: Estimating core dynamics via the assimilation of magnetic field models into numerical dynamos	Spring 2024
American Geophysical Union Fall Meeting Title of Poster: Studying the Earth’s core via the assimilation of geomagnetic observations into numerical dynamo models	Fall 2023
International Union of Geodesy and Geophysics General Assembly Title of Talk: Localization and inflation in geomagnetic data assimilation: estimating the dynamic state of the Earth’s outer core	Summer 2023
NASA Solid-Earth Team Meeting Title of Poster: Geomagnetic data assimilation	Fall 2022
NASA GSFC 61A seminar Title of Talk: Data assimilation and machine learning in the Earth Sciences: lessons from applications to geomagnetism	Fall 2022
SEDI Symposium Title of Poster: Searching for precursors of geomagnetic reversals with machine learning	Summer 2022
American Geophysical Union Fall 2021 Meeting Title of Poster: Predicting Geomagnetic Reversals with Machine Learning Title of Poster: A testbed for geomagnetic data assimilation	Fall 2021
Joint ICTP-IUGG Workshop on Data Assimilation and Inverse Problems Title of Talk: Understanding and predicting geomagnetic secular variation via data assimilation	Fall 2021
SIAM-Computational Science and Engineering Title of Talk: Geomagnetic data assimilation for decadal scale forecasts: lessons from a new	Spring 2021

simplified model	
Data Driven Discovery Showcase, University of Arizona Title of Talk: Investigating the predictability of Earth's magnetic field	Spring 2021
American Geophysical Union Fall 2020 Meeting Title of Poster: Intensity based predictions of the dipole field and their value in characterizing the Earth-like nature of models	Fall 2020
SEDI Symposium Title of Poster: Can one use Earth's magnetic axial dipole field intensity to predict reversals?	Fall 2020
SIAM-Mathematics of Planet Earth Title of Talk: Data assimilation experiments with a reduced-order model of the geodynamo	Summer 2020
Scripps Institution of Oceanography, Paleomagnetism Seminar Title of Talk: Can one use Earth's magnetic axial dipole field intensity to predict reversals?	Summer 2020
American Geophysical Union Fall 2019 Meeting Title of Poster: A reduced-scale model for understanding the numerics of geomagnetic data assimilation	Fall 2019
NASA Solid-Earth Team Meeting Title of Poster: Geomagnetic data assimilation: numerical experiments with a reduced-scale model	Fall 2019
International Union of Geodesy and Geophysics General Assembly Title of Poster: Geomagnetic data assimilation: numerical experiments with a reduced-scale model	Summer 2019
American Geophysical Union Fall 2018 Meeting Title of Poster: Localization and bias correction in geomagnetic data assimilation: systematic numerical experiments with reduced-scale models	Fall 2018
U2 can UQ, University of Arizona Title of Talk: Geomagnetic data assimilation	Spring 2018

## SELECTED TEACHING

Graduate Teaching Assistant, Department of Mathematics, University of Arizona

<i>Semester</i>	<i>Course</i>
Spring 2018	Math 120: Precalculus
Fall 2017	Math 263: Introduction to Statistics and Biostatistics
Spring 2017	Math 112: College Algebra
Fall 2016	Math 112: College Algebra

Graduate Teaching Assistant, Department of Mathematics, University of Kansas

<i>Semester</i>	<i>Course</i>
Spring 2012	Math 115: Calculus I
Fall 2011	Math 116: Calculus II
Summer 2011	Math 115: Calculus I
Spring 2011	Math 104: Precalculus
Fall 2010	Math 104: Precalculus
Spring 2010	Math 101: College Algebra
Fall 2009	Math 115: Calculus I