Daniel Blatter

Curriculum Vitae

Institute of Geophysics and Planetary Physics
Scripps Institution of Oceanography
University of California, San Diego
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RESEARCH INTERESTS

Investigating the impact of fluids on solid earth processes and dynamics, including the lithosphere-asthenosphere system, mid-ocean ridge melting, subduction zone seismicity and volcanism, plate tectonics, geothermal exploration, carbon capture and sequestration, freshwater exploration and characterization, and more. I also develop a range of computational algorithms to solve nonlinear inverse problems in geosciences, including uncertainty quantification via Bayesian sampling

ACADEMIC APPOINTMENTS

2020-2022 **SCRIPPS INSTITUTION OF OCEANOGRAPHY, UC SAN DIEGO** La Jolla, CA
John W Miles postdoctoral fellow in theoretical and computational geophysics
- Faculty mentors: Professor Matthias Morzfeld and Professor Steven Constable

EDUCATION

Jul 2020 **COLUMBIA UNIVERSITY** New York, NY
PhD, Geophysics, Lamont-Doherty Earth Observatory
- Dissertation: "Constraining fluids in the crust and upper mantle with Bayesian inversion of electromagnetic data."
- PhD advisor: Professor Kerry Key

June 2015 **STANFORD UNIVERSITY** Stanford, CA
Master of Science, Computational Science and Engineering
- Computational geoscience program
- Research group: Stanford Exploration Project (SEP); research focus: reflection seismic imaging

May 2013 **GEORGE WASHINGTON UNIVERSITY** Washington, DC
Master of Arts, Middle East Studies, emphasis: energy and technology
- Coursework focus: energy policy and international relations
- Capstone Project: field research in Tunisia on the impact of energy rents and subsidies on the politics and international relations of the Middle East

May 2011 **UNIVERSITY OF UTAH** Salt Lake City, UT
Bachelor of Science, Physics, minor in Mathematics: **GPA 3.92**
- Honors: Graduated Cum Laude (min GPA 3.9), Phi Beta Kappa, Sigma Pi Sigma
- Research: mathematical modeling of oxygenation in mammals and the denucleation of the mammalian erythrocyte.

PEER REVIEWED PUBLICATIONS

[a] Blatter, D., Morzfeld, M., Key, K., Constable, S. "Efficient Bayesian sampling using stochastic optimization. Part I: theory." Submitted to *Geophysical Journal International*

[b] Blatter, D., Morzfeld, M., Key, K., Constable, S. "Efficient Bayesian sampling using stochastic optimization. Part II: case studies in 1D and 2D electromagnetic inversion." Submitted to *Geophysical Journal International*.

[1] Blatter, D., Naif, S., Key, K., Ray, A. "A plume origin for hydrous melt at the lithosphere-asthenosphere boundary." In revision at *Nature*.

[2] Blatter, D., Ray, A., Key, K. (2021). Two-dimensional Bayesian inversion of magnetotelluric data using trans-dimensional Gaussian processes. *Geophysical Journal International*.

[3] Blatter, D., Key, K., Ray, A., Gustafson, C., & Evans, R. (2019). Bayesian joint inversion of controlled source electromagnetic and magnetotelluric data to image freshwater aquifer offshore New Jersey. *Geophysical Journal International*, *218*(3), 1822-1837.

[4] Blatter, D., Key, K., Ray, A., Foley, N., Tulaczyk, S., & Auken, E. (2018). Trans-dimensional Bayesian inversion of airborne transient EM data from Taylor Glacier, Antarctica. *Geophysical Journal International*, *214*(3), 1919-1936.

[5] Menke, William, and Daniel Blatter. (2019). Trade-off of resolution and variance computed from ensembles of solutions, with application to Markov Chain Monte Carlo methods. *Geophysical Journal International*, 218(3), 1522-1536.

FIELD WORK

Dec-Jan 2019 **HT RESIST MARINE MAGNETOTELLURIC AND CONTROLLED SOURCE ELECTROMAGNETIC DEPLOYMENT** Wellington, NZ

RV Roger Revelle, Hikurangi Margin, 29 days at sea

- 170 ocean bottom electromagnetic receiver deployments; 128 recoveries
- 500 line-km of controlled source electromagnetic data collected

Nov 2015 **LAND MT DEPLOYMENT** Pawnee, OK

- 16 land magnetotelluric sites deployed

Jun-Jul 2015 **OKMOK VOLCANO MARINE MT SURVEY** Dutch Harbor, AK

RV Roger Revelle, Aleutian subduction zone, 5 days at sea

- 54 ocean bottom electromagnetic receiver deployments

TEACHING

Fall 2019 **UNDERSTANDING CLIMATE SCIENCE** Columbia University

Lead instructor

- Designed and implemented course from scratch as part of Columbia's Science Honors Program
- 12-week course, 2.5 hours of instruction per week, 21 students
- Topics: Earth's oceans and atmosphere; climate communication; international climate policy

Fall 2018 **UN1201: ENVIRONMENTAL RISKS AND DISASTERS** Columbia University

Teaching assistant

- Taught 22 students; led two discussion sections; office hours

INVITED PRESENTATIONS

Jun 2021 **SIAM CONF. ON MATHEMATICAL AND COMPUTATIONAL ISSUES IN GEOSCIENCES** Milan, Italy

Optimization-based Bayesian inversion for electromagnetic geophysical data

- Part of "Advances in Bayesian inversion in the geosciences" minisymposium

Dec 2019 **AMERICAN GEOPHYSICAL UNION ANNUAL FALL MEETING** San Francisco, CA
Probabilistic characterization of a melt-rich channel at the base of the Cocos plate

Sept 2019 **SIAM NORTHERN STATES SECTION ANNUAL MEETING** Laramie, WY
Sparse Model Parametrization for 2D Bayesian Inversion Using Trans-D MCMC
- Part of "Statistical methods for geophysical inverse problems" minisymposium

SELECTED PRESENTATIONS

Sept 2020 **UNIVERSITY OF UTAH "SEISMO-TEA" SEMINAR** Salt Lake City, UT
Constraining melt fraction and volatile concentration at the LAB with Bayesian inversion of EM data

Dec 2019 **AMERICAN GEOPHYSICAL UNION ANNUAL FALL MEETING** San Francisco, CA
2D Bayesian inversion of MT data using parsimonious Gaussian Processs

June 2019 **NEW YORK SCIENTIFIC DATA SUMMIT** New York, NY
Extracting information from data using MCMC, poster presentation

Aug 2018 **THE 24TH ELECTROMAGNETIC INDUCTION WORKSHOP** Helsingor, Denmark
Bayesian Joint Inversion of Surface-towed CSEM and MT Data: Quantifying the Resolution Gain

Sept 2017 **SECOND EUROPEAN AIRBORNE ELECTROMAGNETICS CONFERENCE** Malmo, Sweden
Bayesian Inversion of Transient Airborne EM Data from the McMurdo Dry Valleys, Antarctica, poster presentation

Mar 2017 **SCRIPPS ELECTROMAGNETIC CONSORTIUM ANNUAL MEETING** La Jolla, CA
Uncertainty estimation in geophysical inversion---a Bayesian approach

Dec 2016 **AMERICAN GEOPHYSICAL UNION FALL MEETING** San Francisco, CA
Bayesian Inversion of 2D Models from Airborne Transient EM Data
- Awarded AGU's Outstanding Student Presentation Award

SERVICE

2020- **COMMUNITY ORGANIZED, PEER ASSISTED EXPERTISE EXCHANGE IN ELECTROMAGNETIC GEOPHYSICS (COOPERATE EM)** San Diego, CA
Organizer
- COOPERATE EM is an inclusive, cooperative community of EM geophysicists based in the US. Led by early career scientists and students, we are building a network to foster collaboration and the free exchange of skills, expertise, and know-how within the US EM geophysics community
- Wrote mission statement; building a community-wide skills repository; organizing workshops and seminars

2020- **UAW LOCAL 5810** San Diego, CA
Union steward, organizer
- Moderated and helped organize a panel discussion on obtaining funding as a postdoc or research scientist which over 270 postdocs and research scientists attended

2017-2020 **GRADUATE WORKERS OF COLUMBIA (UAW LOCAL 2110)** New York, NY

Graduate student worker organizer, bargaining committee member

- 10-15 hours per week organizing fellow graduate students to dismantle barriers to equity, diversity, and inclusion in graduate education: better pay, access to health care, protections against sexual harassment, fair treatment of international student workers
- Served on the union bargaining committee, participated in bargaining with CU representatives
- Organized a successful strike (April 2018); engaged local politicians; spoke at rallies

INTERNSHIPS

June-Aug 2014 **CONOCOPHILLIPS** Anchorage, AK

Summer 2014 Geoscience Intern, North Slope Development Business Unit

- Applied quantitative and qualitative seismic analysis to mature a hydrocarbon prospect
- Utilized elastic inversion attributes, near- and far-stack seismic reflectivity, well logs, and rock physics modeling to evaluate reservoir presence
- Impact: results of seismic analysis utilized directly in drilling decision-making (prospect drilled)

Jan-May 2012 **AMERICAN COUNCIL ON RENEWABLE ENERGY** Washington, DC

Research Analyst, Editor, Biomass Coordinating Council

- Conducted and analyzed research on issues critical to the biomass industries, including technology, government policy, finance, the environment, and national security
- Wrote and edited reports on key biomass issues

May-Jul 2011 **EUROPEAN PEOPLE'S PARTY** Brussels, Belgium

Political Analyst, EPP Working Group on Foreign Affairs

- Participated in hearings, debates, and resolutions on topics such as European neighborhood policy, energy security, democracy promotion, and the Arab Spring
- Used analytical and writing skills to produce weekly party briefs on the Arab Spring

SKILLS AND ACTIVITIES

- **Computer:** Julia, Fortran, MATLAB programming languages, regular user of Linux-based high performance computing clusters at Columbia University and UC San Diego
- **Foreign Languages:** French (fluent); Arabic (advanced); Tahitian (fluent)
- **International Experience:** lived in French Polynesia for two years; studied Arabic in Amman, Jordan, for two months; traveled extensively in Middle East, Europe and Asia