Grayson Boyer

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Postdoctoral Research Associate

EDUCATION

ARIZONA STATE UNIVERSITY
PhD in Biochemistry
May 2018 | Tempe, AZ
Cum. GPA: 4.0

WASHINGTON STATE UNIV.
BS in Biochemistry
May 2010 | Pullman, WA
Summa cum laude

LINKS

Home:// **gmboyer.github.io**
Github:// **gmboyer**
LinkedIn:// **grayson-boyer**
Twitter:// **@gmboyer**
Kaggle:// **gmboyer**

SKILLS

DATA
Confidence intervals • Decision trees • Detrended correspondence analysis • K-means and hierarchical clustering • Discriminant analysis • Machine learning • Monte Carlo simulations • Nonmetric multidimensional scaling • Principal component analysis • Random forest • Regex • Regression • Text mining • Visualization

MODULES AND PACKAGES
dplyr • ggplot2 • CHNOSZ • numpy • pandas • scikit-learn • plotly

LANGUAGES
R • Python • LaTeX • SQL

SOFTWARE
Agilent Masshunter • EQ3/6 • Jupyter Notebooks • Mathematica • Microsoft Excel • SUPCRT92 • Tableau

SELECTED COURSEWORK
Computational Chemistry
Theoretical Geochemistry
Quantitative Biochemistry

RESEARCH AND TEACHING

ENKI PROJECT | Postdoctoral Researcher and Developer
May 2018 - Present

- Developed three Python and R Jupyter notebooks to automate geochemical data cleanup, calculate properties of water samples with 50+ geochemical variables, and datamine scientifically valuable results from thousands of output files as a part of the NSF-funded **EN**abling **K**nowledge **I**ntegration (ENKI) initiative.
- Automated complex quality control calculations for environmental water samples, reducing task time from weeks to moments and allowing easy statistical post-analysis of results.
- Provided high-level tutorials in the use of free geochemical software tools available on the ENKI JupyterHub server.

ARIZONA STATE UNIVERSITY | Research & Teaching Asst.
Aug 2010 – May 2018 | Tempe, AZ

- Performed statistical analyses and visualization of environmental lipid abundance data across 30+ sample sites using a self-curated database of 3,500+ lipid structures.
- Compared observed environmental lipids and concurrent geochemical measurements to generate hypotheses regarding lipid energetic cost and function.
- Led workshops introducing R and the CHNOSZ thermodynamic package to students and faculty (2011-2017).
- Curated and ensured quality control of the SLOP16 open source database containing thermodynamic properties of 2,000+ chemical species.
- Mentored an undergraduate lab research assistant (2013-2014).
- Co-chaired the session "Reaction Kinetics, Thermodynamics, and Habitability" at the Astrobiology Science Conference in Mesa, AZ, on Apr 27, 2017.

GRANTS AND FELLOWSHIPS

- NASA Exobiology | Mar 2016 | $852,865
  "Geochemical and Biomolecular Changes at the Transition to Photosynthesis"
- NASA Astrobiology Institute Grant | Apr 2013 | $10,758
  "How do environmental C:N ratios influence C:N ratios of lipid biomarkers?"
- Arizona State Univ. Grad. Research Fellowship | Aug 2010 | $19,000

PUBLICATIONS

- **Boyer, GM**, Schubotz, F, Summons, R, Woods, J, Shock, EL (2018) Thermophile lipid oxidation state suggests bioenergetic favorability of alkyl chain modification along temperature and redox gradients. (Submitted, in review)
- **Boyer, GM**, and Shock, EL. Thermodynamic favorability of thermophile lipid chain modifications across a temperature and redox gradient. (Forthcoming)
- Shock, EL, Canovas, P, Yang, Z, **Boyer, GM**, Johnson, K, Robinson, K, Fecteau, K, Windman, T, Cox, A (2013) Thermodynamics of organic transformations in hydrothermal fluids. *Reviews in Mineralogy and Geochemistry*, 76(1): 311-350.
- Schulze-Makuch D, Méndez, A, Fairén, AG, von Paris, P, Turse, C, **Boyer, GM**, Davila AF, Resendes de Sousa António, M, Catling D, Irwin LN (2011) A two-tiered approach to assessing the habitability of exoplanets. *Astrobiology*, 11(10): 1041-1052.