John A. Higgins

Date of Birth: May 22, 1980

Assistant Professor
Department of Geosciences
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Employment:

2012-present	Assistant Professor, Department of Geosciences, Princeton University
2011-2012	Canadian Institute for Advanced Research (CIfAR) Junior Fellow
2009-2011	Hess Postdoctoral Fellow, Department of Geosciences, Princeton University
2003-2009	Graduate Research Assistant, Department of Earth and Planetary Science, Harvard University

Education:

2003-2009	Graduate School of Arts and Sciences, Harvard University, Cambridge, MA Ph.D. in Earth and Planetary Sciences, June 2009. Ph.D. Dissertation Supervisor: Daniel P. Schrag
2002-2003	Department of Earth Sciences, University of Cambridge, Cambridge, UK M.Phil. in Earth Science, August 2003. M.Phil. Dissertation Supervisor: Harry Elderfield
1998-2002	Harvard College, Cambridge, MA A.B. in Earth and Planetary Sciences (Summa cum laude), June 2002.

Fellowships and Awards:

2011-2013	Canadian Institute for Advanced Research (CIfAR) Global Scholars Program
2009-2011	Hess Postdoctoral Fellow, Princeton University
2007-2009	National Science Foundation Graduate Research Fellowship
2004-2007	National Defense Science and Engineering Graduate (NDSEG) Fellowship
2002-2003	Henry Fellowship to the University of Cambridge
2002	Phi Beta Kappa, Harvard College

Research Interests:

- Measurements of isotopic systems of the alkali and alkali earth metals (Mg, Ca, K, Li) to reconstruct Earth's climate and the chemistry of seawater on geologic timescales.

- Interactions between surface reservoirs and the solid Earth with an emphasis on the evolution of climate, the global carbon cycle, seawater chemistry, and ocean-atmosphere redox over Earth history.

Publications:

1. **Higgins, J.A.** Kurbatov, A.V., Spaulding, N.E., Brook, E.J., Introne, D.S., Chimiak, L., Yan, Y., Mayewski, P.A. and M. Bender (2015) *Atmospheric composition at ~1 Ma from blue ice in the Allan Hills, Antarctica*, Proceedings of the National Academy of Science, 112 (22), 6887-6891.

2. Husson, J.M., **Higgins, J.A.**, Maloof, A.C., and B. Schoene (2015) *Ca and Mg isotope constraints on the origin of Earth's deepest $\delta^{13}C$ excursion*, Geochimica et Cosmochimica Acta, 160, 243-266.

3. Hain, M.P., Sigman, D.M., **Higgins, J.A.**, and G.H. Haug (2015) *The effects of secular calcium and magnesium concentration changes on the thermodynamics of seawater acid/base chemistry: Implications for Eocene and Cretaceous ocean carbon chemistry and buffering,* Global Biogeochemical Cycles, 29, doi:10.1002/2014GB004986.

4. Blättler, C. Miller, N.R., and **J.A. Higgins** (2015) *Mg and Ca isotope signatures of authigenic dolomite in silicious deep-sea sediment,* Earth and Planetary Science Letters, 419, 32-42.

5. **Higgins, J.A.** and D.P. Schrag (2015) *The Mg isotopic composition of Cenozoic seawater – evidence for a link between Mg-clays, seawater Mg/Ca, and climate*, Earth and Planetary Science Letters, 416, 73-81.

6. Husson, J.M., Maloof, A.C., Schoene, B. Chen, C.Y., and **J.A. Higgins** (2014) *Stratigraphic expression of Earth's deepest $\delta^{13}C$ excursion in the Wonoka Formation of South Australia,* American Journal of Science, *in press*.

7. Fantle, M. and **J.A. Higgins** (2014) *The effects of diagenesis and dolomitization on Ca and Mg isotopes in marine platform carbonates: Implication for the geochemical cycles of Ca and Mg,* Geochimica et Cosmochemica Acta, 42, 458-481

8. Blättler, C. and **J.A. Higgins** (2014) *Calcium isotopes in evaporates record variations in Phanerozoic seawater Ca and SO_4,* Geology, 42(8), 711-714, DOI: 10.1130/G35721.1.

9. Spaulding, N.E., Kurbatov, A.V., **Higgins, J.A.**, Bender, M.L., Arcone, S.A., Campbell, S., Dunbar, N.W., Introne, D.S., and P.A. Mayewski (2013) *Climate archives from 80-250 ka in horizontal and vertical ice cores from the Allan Hills Blue Ice Area, Antarctica,* Quaternary Science Reviews 80(3): 562-574.

10. Macdonald, F.A., Strauss, J.V., Sperling, E.A., Halverson, G.P., Narbonne, G.M., Johnston, D.T., Kunzmann, M., Schrag, D.P. and **J.A. Higgins** (2013) *The stratigraphic relationship between the Shuram carbon isotope excursion, the oxygenation of Neoproterozoic oceans, and the first appearance of the Ediacara biota and bilaterian trace fossils in northwestern Canada,* Chemical Geology, 362, 250-272.

11. Schrag, D.P*. , **Higgins, J.A.***, F.A. Macdonald, and D.T Johnston (2013) *Authigenic carbonate and the history of the global carbon cycle,* Science, 339(540), DOI: 10.1126/science.1229578.

12. **Higgins, J.A.** and D.P. Schrag (2012) *Records of Neogene seawater chemistry and diagenesis in deep-sea carbonate sediments and pore-fluids*, Earth and Planetary Science Letters, 357-358, 386-396.

13. Maloof, A., S.M. Porter, J.L. Moore, F.O. Dudas, S. Bowring, **J.A. Higgins**, D.A. Fike, and M.P. Eddy (2010) Earliest Cambrian record of animal and ocean geochemical change, *Geological Society of America Bulletin,* 122 (11/12), 1731-1774.

14. **Higgins, J.A.** and D.P. Schrag (2010) Constraining magnesium cycling in marine sediments: Insights from magnesium isotopes, *Geochimica et Cosmochimica Acta*, 74(17), 5039-5053.

15. **Higgins, J.A.**, W.W. Fischer, and D.P. Schrag (2009) Oxygenation of the ocean and sediments: Consequences for the seafloor carbonate factory. *Earth and Planetary Science Letters*, 284, 25-33.

16. P.F. Hoffman, G.P. Halverson, E.W. Domack, J.M. Husson, **J.A. Higgins**, and D.P. Schrag (2007) Are basal Ediacaran (635 Ma) post-glacial "cap dolostones" diachronous? *Earth and Planetary Science Letters*, 258, 114-131.

17. **Higgins, J.A.** and D.P. Schrag (2006) Beyond methane: Towards a theory for the Paleocene-Eocene Thermal Maximum. *Earth and Planetary Science Letters*, 245, 523-537.

18. S. Barker, **J.A. Higgins**, and H. Elderfield (2003) The future of the carbon cycle: review, calcification response, ballast and feedback on atmospheric CO_2. *Philosophical Transactions of the Royal Society of London Series A – Mathematical Physical and Engineering Sciences*, 361 (1810), 1977-1998.

19. **Higgins, J.A.** and D.P. Schrag (2003) Aftermath of a Snowball Earth. *Geochemistry, Geophysics, Geosystems*, 4 (3), 1028, doi:10.1029/2002GC000403.

Invited Talks:

11/2014 – University of Victoria, School of Earth and Ocean Sciences
11/2014 – University of Miami, Rosenstiel School of Marine and Atmospheric Science
10/2014 – Agouron Institute Geobiology Meeting on the Sulfur Cycle
10/2014 – Meeting of the Comer Family Foundation
6/2014 – Goldschmidt Geochemistry Conference
4/2014 – Rice University, Department of Earth Science
4/2014 – Stony Brook University, Department of Geosciences
3/2014 – Pennsylvania State University, Department of Geosciences
2/2014 – Yale University, Department of Geology and Geophysics
8/2013 – Goldschmidt Geochemistry Conference
5/2013 – Meeting of the Canadian Geological Society (symposium in honor of P.F. Hoffman)
12/2012 – Fall Meeting of the American Geophysical Union
10/2012 – Lamont-Doherty Earth Institute, Geochemistry Division
7/2012 – Goldschmidt Geochemistry Conference
3/2012 – Rutgers University, Department of Earth and Planetary Science
12/2011 – Fall Meeting of the American Geophysical Union
11/2011 – Cornell University, Department of Earth and Atmospheric Science
5/2011 – California Institute of Technology, Env. Science and Engineering Seminar
4/2011 – The University of Chicago, Department of Geophysical Sciences
4/2011 – UC Berkeley, Department of Earth and Planetary Science
5/2010 – Lamont-Doherty Earth Institute, Geochemistry Division

Funded Proposals:

1. Collaborative Research – Toward a global timeline of biological and ocean geochemical change during the early Cambrian. NSF Integrated Earth Systems Program #1410317. 2014-2017. $1,049,155.
2. Scott Vertebrate Paleontology Fund – Research into non-traditional metal isotope systems (Mg, Ca, and K) in modern and fossil vertebrate teeth and bones. 2014-2015. $106,572.
3. Magnesium isotopes and the origin of marine dolomite – new insights into an old problem. American Chemical Society Petroleum Research Fund #53802-DNI2. 2013-2014. $100,000.
4. Water-rock interactions and the global CO_2 thermostat. Princeton Grand Challenge Program. 2011-2013. $200,000.

Pending Proposals:

1. Reconstructing Seawater Chemistry to 220 Ma Using Fossil Corals and its Implications for the Chemical Mass Balance of Seawater. NSF OCE Division # 1459723. 2014. $489,509.
2. Collaborative Research: Window into the 40 kyr World from Climate Records in 1 Ma ice from the Allan Hills Blue Ice Area, NSF PLR Division, #1443263. 2014. $640,282.

Unfunded Proposals:

1. Development of Ca and Mg isotopes in shallow marine carbonates as tracers for authigenesis and diagenesis. NSF OCE Division #1434571. 2014. $499,953.
2. Reconstructing seawater chemistry to 220 Ma constrained by studying fossil corals and its implication for the chemical mass balance of seawater. NSF OCE Division #1356926. 2013. $483,566.
3. Collaborative Research – Climate Records in Archives of Old Ice from the Allan Hills Blue Ice Area. NSF PLR Division #1341417. 2013. $714,498.
4. Earth-Life Transitions Collaborative Research – Toward a global timeline of biological and ocean geochemical change during the early Cambrian. NSF EAR Division #1337655. 2013. $613,423.
5. Corals as Archives for Paleoseawater Chemistry and the Oceanic Mass Balance during the Cenozoic and Mesozoic. NSF OCE Division #1233156. 2012. $573,613

Advising (Princeton University):

1. Postdoctoral Scholars: Clara Blättler (2012 – present), Or Bialik (2013-2014).
2. Graduate Students: Danielle Santiago Ramos (2013 – present), Alliya Akhtar (2013 - present), Anne Gothmann (2010-present).
3. Graduate Advisory Committee: Jon Husson (2012-2014), Audrey Yau (2012-2014), Jessica Lueders-Dumont (2013 – present), Keiran Swart (2014 – present), Emma Kast (2014 – present)
4. Senior Theses: Robert Shepard (2013), Andrea Beale (2013).
5. Junior Research Projects: Atleigh Forden (2014), Aly Beveridge (2014), Joan Cannon (2013), Preston Kemeney (2013), Robert Shepard (2012).

Invited Talks by Advisees (Princeton University):

11/2014 – Harvard University, Department of Earth and Planetary Sciences – Dr. Clara Blättler
10/2014 – Rutgers University, Institute of Marine and Coastal Science – Dr. Clara Blättler
10/2014 – Meeting of the Comer Family Foundation – Anne Gothmann

6/2014 – Goldschmidt Geochemistry Conference – Anne Gothmann

Teaching (Princeton University):

1. GEO203 – Fundamentals of solid Earth science
2. GEO534 – Geological constraints on the global carbon cycle
3. GEO506 – Fundamentals of the Geosciences II

Academic Service:

Reviewer for Science, Nature, Geochimica et Cosmochimica Acta, Earth and Planetary Science Letters, Geology, Paleoceanography, and Geochemistry, Geophysics, Geosystems.

Grant reviewer for ACS-PRF, NASA.

University/Departmental Service:

Graduate Work Committee (2012 – present)

Committee on Classrooms (2014 - present)