

IAN J. ORLAND
Curriculum Vitae
(updated: 10/2019)

Geoscience Program Coordinator
Wisconsin Geological and Natural History Survey
University of Wisconsin-Madison
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EDUCATION

Ph.D., University of Wisconsin-Madison, Geoscience 2012
M.Sc., University of Wisconsin-Madison, Geology 2008
A.B., Washington University in St. Louis, Earth & Planetary Sci., *Summa Cum Laude* 2006

PROFESSIONAL TRAINING

- Geoscience Program Coordinator, Wisconsin Geological and Natural History Survey (WGNHS), Div. of Extension, Univ. of Wisconsin-Madison (UW) 2019-present
- Assistant Scientist, Dept. of Geoscience, UW 2016-2019
- Visiting Research Faculty, Earth & Atmospheric Sci., Georgia Inst. of Tech. 2016
Supervisor: KM Cobb
- Postdoctoral Research Associate, Dept. of Geoscience, UW 2014-2016
Advisors: JW Valley, SA Marcott
- NSF Postdoctoral Fellow, Dept. of Earth Sciences, Univ. of Minnesota (UM) 2013-2015
Advisor: RL Edwards
- Research Assistant, NSF P2C2, Dept. of Geoscience, UW 2010-2012
Advisor: JW Valley
- Weeks Research Assistant, Dept. of Geology & Geophysics, UW 2006-2010
Advisor: JW Valley
- USGS Summer Intern, PA Water Science Center, New Cumberland, PA 2006
Environmental Careers Org./ National Assoc. of Geoscience Teachers/ USGS
- Undergraduate Research Assistant, Earth & Planetary Sci., Washington University in St. Louis (Wash U) 2003-2006

HONORS & AWARDS

- NSF-AGS Postdoctoral Research Fellowship 2013
- NOAA Climate & Global Change Postdoctoral Research Fellowship, declined 2013
- Distinguished Graduate Student Award, UW Dept. of Geoscience 2012
- Outstanding Student Research Paper Award, UW Dept. of Geoscience '09, '13, '14
- Thomas E. Berg Award for Excellence in Teaching, UW Dept. of Geoscience 2008
- Courtney Werner Memorial Prize, academic achievement, Wash U Dept. EPS 2006
- Tyson Research Fellow, Wash U 2005
- Field Course Scholarship, National Association of Geoscience Teachers 2005
- Dieckmann Scholar, academic merit scholarship, Wash U 2002-2006

RESEARCH GRANTS

- NSF P2C2 (\$359,231) 2018-2021
"Speleothem Records of Permafrost and Climate from an Ice-Proximal, Mid-Continent Cave"
PI: SA Marcott, Co-PI: IJ Orland
- NSF P2C2, Collaborative Research (\$59,960) 2017-2021
"High resolution cave climate histories of east and central Asia: deeper in time, wider geographically, new analytical approaches, and new tests of climate interpretations,"

- UW PI: IJ Orland, UM PIs: RL Edwards, H Cheng
- NSF P2C2 (\$225,733) 2016-2018
 “Seasonal dynamics of the Indo-Asian Monsoon during deglaciations,” PI: IJ Orland, Co-PI: F He
 - UW CPEP – Reid Bryson Exploratory Research Grant (\$4,880) 2016-2018
 “Onset and retreat of glacial permafrost at Cave of the Mounds, WI,” PI: IJ Orland
 - NSF-AGS, Postdoctoral Research Fellowship (\$172,000) 2013-2015
 “Seasonal resolution examination of Asian Monsoon dynamics as recorded in Chinese speleothems,” PI: IJ Orland, Supervisor: RL Edwards
 - Binational Science Foundation (\$132,000; co-author on proposal) 2011-2015
 “Seasonality changes in the Eastern Mediterranean revealed by high resolution studies of Soreq Cave speleothems, Israel,” Co-PIs: M Bar-Matthews and JW Valley
 - NSF P2C2 (\$163,771; lead author on proposal) 2010-2012
 “Seasonality from speleothems: High resolution Ion Microprobe studies at Soreq Cave, Israel,” PI: JW Valley
 - AGU Chapman Conference on Abrupt Climate Change travel support (\$500) 2009
 - Comer Science & Education Foundation (\$28,000) 2008
 - AAPG Grant In Aid of Research (\$1,500) 2008
 - UW Dept. of Geoscience support for travel to GSA Conference (\$400) 2007
 - Sigma Xi Grant In Aid of Research (\$400) 2007
 - UW Dept. of Geoscience support for summer research (\$2,600) 2007

STUDENT MENTORSHIP

- Cameron Batchelor, (UW-Madison; MSc '18; PhD '22, anticipated) committee member
- Rui Tan, (UW-Madison; BSc '19) undergraduate thesis co-advisor

TEACHING EXPERIENCE

- Madison Area Technical College, Invited Lecturer Spring 2016
 Guest lecturer for the advanced analytical techniques course “Electron Microscopy.”
- UW Invited Lecturer, paleoclimate lecture, GEO 100 “General Geology” Fall 2012
 Guest lecturer for a large introductory course.
- UW Teaching Assistant, GEO 203 “Earth Materials” Spring 2007
 Mineralogy and Petrology for Geoscience majors.
- UW Teaching Assistant, GEO 110 “Evolution and Extinction” Fall 2006
 Introductory Geoscience course.

PEER-REVIEWED PUBLICATIONS

- (22) Turnier R. B., Katzir Y., Kitajima K., Orland I. J., Spicuzza M., Valley J. W. (*in press*) Calibration of oxygen isotope fractionation and calcite-corundum thermometry in emery at Naxos, Greece. *Journal of Metamorphic Petrology*.
- (21) Orland I. J., He F., Bar-Matthews M., Chen G., Ayalon A., and Kutzbach J. E. (*in press*) Resolving seasonal rainfall changes in the Middle East during the last interglacial period. *Proceedings of the National Academy of Sciences*.
- (20) Denny A., Orland I. J., and Valley J. W. (*in press*) Regionally correlated oxygen and carbon isotope zonation in diagenetic carbonates of the Bakken Formation. *Chemical Geology*.
- (19) Denny A. C., Fall A., Orland I. J., Valley J. W., Eichhubl P., and Laubach S. E. (*in press*) A history of pore water oxygen isotope evolution in the Cretaceous Travis Peak Formation in East Texas. *GSA Bulletin*.

- (18) Batchelor C. J.*, Orland I. J., Marcott S. A., Slaughter R., Edwards R. L., Zhang P., and Li X. (*in press*) Distinct permafrost conditions across the last two glacial periods in mid-latitude North America. *Geophysical Research Letters*.
- (17) Price T. D., Spicuzza M. J., Orland I. J., and Valley J. W. (2019) Instrumental investigation of oxygen isotopes in human dental enamel from the Bronze Age battlefield site at Tollense, Germany. *Journal of Archaeological Science* **105**, 70-80.
- (16) Wycech J. B., Kelly D. C., Kitajima K., Kozdon R., Orland I. J., and Valley J. W. (2018) Combined effects of gametogenic calcification and dissolution on $\delta^{18}\text{O}$ measurements of the planktic foraminifer *Trilobatus sacculifer*. *Geochemistry, Geophysics, Geosystems* **19**, 4487-4501.
- (15) Oye O. J., Aplin A. C., Jones S. J., Gluyas J. G., Bowen L., Orland I. J., and Valley J. W. (2018) Vertical effective stress as a control on quartz cementation in sandstones. *Marine and Petroleum Geology* **98**, 640-652.
- (14) Helser T., Kastle C., McKay J., Orland I. J., Kozdon R., and Valley J. W. (2018) Evaluation of micromilling/conventional isotope ratio mass spectrometry and secondary ion mass spectrometry of $\delta^{18}\text{O}$ in fish otoliths for sclerochronology. *Rapid Communications in Mass Spectrometry* **32**, 1781-1790.
- (13) Wycech J., Kelly D. C., Kozdon R., Orland I. J., Spero H. J., and Valley J. W. (2018) Direct comparison of $\delta^{18}\text{O}$ analyses on individual planktic foraminifer (*Orbulina universa*) shells by SIMS and gas-source mass spectrometry. *Chemical Geology* **483**, 119-130.
- (12) Sliwinski M. G., Kitajima K., Spicuzza M. J., Orland I. J., Ishida A., Fournelle J. H., and Valley J. W. (2018) SIMS bias on isotope ratios in Ca-Mg-Fe carbonates (Part III): $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ matrix effects along the magnesite-siderite solid-solution series. *Geostandards and Geoanalytical Research*, **42** (1), 49-76.
- (11) Brodie M. W., Aplin A. C., Hart B., Orland I. J., Valley J. W., and Boyce A. J. (2018) Oxygen Isotope Microanalysis by Secondary Ion Mass Spectrometry Suggests Continuous 300 Million Year History of Calcite Cementation and Dolomitization in the Devonian Bakken Formation. *Journal of Sedimentary Research* **88**, 91-104.
- (10) Cammack J. N., Spicuzza M. J., Cavosie A. J., Van Kranendonk M. J., Hickman A. H., Kozdon R., Orland I. J., Kitajima K., and Valley J. W. (2018) SIMS Microanalysis of the Strelley Pool Formation Cherts and the Implications for the Secular-Temporal Oxygen-isotope Trend of Cherts. *Precambrian Research* **304**, 125-139.
- (9) Helser T., Kastle C., Crowell A., Ushikubo T., Orland I. J., Kozdon R., and Valley J. W. (2017) A 200-year archaeozoological record of Pacific cod (*Gadus macrocephalus*) life history as revealed through ion microprobe oxygen isotope ratios in otoliths. *Journal of Archaeological Science: Reports*, doi: 10.1016/j.jasrep.2017.06.037.
- (8) Louyakis A.S., Mobberley J. M., Vitek B. E., Visscher P. T., Hagan P. D., Reid R. P., Kozdon R., Orland I. J., Valley J. W., Planavsky N. J., Casaburi G., and Foster J. S. (2017) A study of the microbial spatial heterogeneity of Bahamian thrombolites using molecular, biochemical, and stable isotope analyses. *Astrobiology* **17**(5) 413-430.
- (7) Oerter E. J., Sharp W. D., Oster J. L., Ebeling A., Valley J. W., Kozdon R., Orland I. J., Hellstrom J., Woodhead J. D., Hergt J. M., Chadwick O. A., and Amundson R. (2016) Pedothen carbonates reveal anomalous North American atmospheric circulation 70,000–55,000 years ago. *Proceedings of the National Academy of Sciences* **113**, 919-924.

- (6) Orland I. J., Valley J. W., and Kita N. K. (2015) High-resolution tools advance study of paleoclimate archives. *EOS* **96**, doi:10.1029/2015EO040911. American Geophysical Union, Washington DC, USA.
- (5) Orland I. J., Edwards R. L., Cheng H., Kozdon R., Cross M., and Valley J. W. (2015) Direct measurements of deglacial monsoon strength in a Chinese stalagmite. *Geology* **43**, 555-558.
- (4) Orland I. J., Burstyn Y., Bar-Matthews M., Kozdon R., Ayalon A., Matthews A., and Valley J. W. (2014) Seasonal climate signals (1990-2008) in a modern Soreq Cave stalagmite as revealed by high-resolution geochemical analysis. *Chemical Geology* **363**, 322-333.
- (3) Matta M. E., Orland I. J., Ushikubo T., Helser T. E., Black B. A., and Valley J. W. (2013) Otolith oxygen isotopes measured by high-precision secondary ion mass spectrometry reflect life history of a yellowfin sole (*Limanda aspera*). *Rapid Communications in Mass Spectrometry* **27**, 691-699.
- (2) Orland I. J., Bar-Matthews M., Ayalon A., Matthews A., Kozdon R., Ushikubo T., and Valley J. W. (2012) Seasonal resolution of Eastern Mediterranean climate change since 34 ka from a Soreq Cave speleothem. *Geochimica et Cosmochimica Acta* **89**, 240-255.
- (1) Orland I. J., Bar-Matthews M., Kita N. T., Ayalon A., Matthews A., and Valley J. W. (2009) Climate deterioration in the Eastern Mediterranean as revealed by ion microprobe analysis of a speleothem that grew from 2.2 to 0.9 ka in Soreq Cave, Israel. *Quaternary Research* **71**, 27-35.

OTHER PUBLICATIONS & THESES

- Fairchild I. J., Bar-Matthews M., Wynn P. M., and Orland I. J. (2014) Seasonality in speleothems. In *Annual Recorders of the Past* (eds B. Zolitschka, J. Pike, L. von Gunten, and T. Kiefer). Past Global Changes Magazine **22**, 24-25. PAGES International Project Office, Bern, Switzerland.
- Tan L., Orland I. J., and Cheng H. (2014) Annually laminated speleothems in paleoclimate studies. In *Annual Recorders of the Past* (eds B. Zolitschka, J. Pike, L. von Gunten, and T. Kiefer). Past Global Changes Magazine **22**, 22-23. PAGES International Project Office, Bern, Switzerland.
- Orland I. J. (2012) "Seasonality from speleothems: High-resolution ion microprobe studies at Soreq Cave, Israel" PhD thesis; UW-Madison.
Committee: M Bar-Matthews, AE Carlson, CM Johnson, SM Meyers, JW Valley (Chair), and JW Williams
Ph.D. minor: Distributed courses in Atmospheric and Oceanic Sciences, Geography and Water Chemistry
- Orland I. J. (2008) "Climate deterioration in the Eastern Mediterranean as revealed by ion microprobe analysis of a speleothem that grew from 2.2 to 0.9 ka in Soreq Cave, Israel" MS thesis; UW-Madison.
Advisor: JW Valley
- Orland I. J. (2006) "Characterizing the storm response of small watersheds in St. Louis County, MO" Undergrad thesis; Washington University in St. Louis.
Advisor: RE Criss

SELECTED CONFERENCE ABSTRACTS (65 total, * indicates advisee author):

- Tan R. Q.*, Orland I. J., Batchelor C. J., and Marcott S. A. (2019) Assessing the Crystal Fabrics and Mineralogy of Speleothems from Cave of the Mounds, WI. UW-Madison Undergraduate Research Symposium, Madison, WI.

- Orland I. J., He F., Bar-Matthews M., Chen G., Ayalon A., and Valley J. W. (2018) “Resolving paleorainfall proxies in the Eastern Mediterranean with seasonal-resolution model and proxy analyses” AGU Fall 2018 Meeting.
- Batchelor C. J.*, Orland I. J., Marcott S. A., Slaughter R., Edwards R. L., Zhang P., and Li X. (2018) “A U-Th chronology of late Pleistocene climate and permafrost conditions at Cave of the Mounds, Wisconsin” AGU Fall 2018 Meeting.
- Orland I. J., Cobb K. M., Carolin S. A., Linzmeier B. J., Valley J. W., and Adkins J. F. (2016) “Micro-scale $\delta^{18}\text{O}$ analyses of a Borneo stalagmite across the Toba super-eruption,” AGU Fall 2016 Meeting.
- Orland I. J., Kozdon R., Linzmeier B., Wycech J., Sliwinski M., Kitajima K., Kita N. T., and Valley J. W. (2015) “Enhancing the Accuracy of Carbonate $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ Measurements by SIMS,” AGU Fall 2015 Meeting.
- Orland I. J., Edwards R. L., Cheng H., Kozdon R., and Valley J. W. (2014) “Seasonal-Resolution $\delta^{18}\text{O}$ in Speleothems by Ion Microprobe: Revealing Asian Monsoon Dynamics,” AGU Fall 2014 Meeting.
- Orland I. J., Bar-Matthews M., Ayalon A., Kita N. T. and Valley J. W. (2010) “Ion microprobe analysis of $\delta^{18}\text{O}$ in speleothems as a source of sub-annual-resolution climate records,” 20th V. M. Goldschmidt Conference, *Geochimica et Cosmochimica Acta* **Suppl. 74**, A779.
- Orland I. J., Kita N. T., Bar-Matthews M., Ayalon A., Matthews A. and Valley J. W. (2007) $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ along the growth axis of a Soreq Cave (Israel) speleothem: sub-annual resolution by ion microprobe. *GSA Programs with Abstracts* **39**, no. 6.

INVITED SPEAKER PRESENTATIONS

- SoundWaves, The Wisconsin Institutes for Discovery, UW 2018
- Special Seminar (x2), Dept. of Geoscience, UW 2018
- Summer School on Speleothem Science, Burgos, Spain 2017
- Goldschmidt 2017, Session: “Improving our understanding of hydroclimate variability using paleoclimate records.” Paris, France 2017
- *Keynote talk*. Climate Change: The Karst Record VIII, University of Texas-Austin 2017
- NSF High-Resolution Proxies of Paleoclimate Workshop, UW 2017
- UW-Madison Climate Change Symposium, Nelson Inst. Cent. for Climatic Res., UW 2016
- NSF High-Resolution Proxies of Paleoclimate Workshop, UW 2015
- NSF Tibet Working Group, Annual Workshop, University of Colorado - Boulder 2014
- Weekly Seminar, Dept. of Earth & Env. Sciences, Rensselaer Polytechnic Institute 2014
- NSF High-Resolution Proxies of Paleoclimate Workshop, UW 2013
- Pre-College Enrichment Opportunity Program for Learning Excellence, UW 2013
- Colloquium, Dept. of Earth & Planetary Sciences, Wash U 2013
- Soft Rock Seminar, Dept. of Earth Sciences, UM 2012
- Wednesday Night at the Lab Seminar Series, Wisconsin Alumni Association, UW 2009
Televised by Wisconsin Public Television
- Climate People & Environment Program Seminar Series, UW 2008
- Seminar Series, Geological Survey of Israel, Jerusalem, Israel 2007

PROFESSIONAL SERVICE & SOCIETY MEMBERSHIPS

- Representative, District #531, UW-Madison Academic Staff Assembly (ASA) 2019-present
- Representative, District #140, UW-Madison ASA 2018-2019

- Peer-reviewer, *2010-present*
Journals: *Geochimica et Cosmochimica Acta*, *Geology*, *GSA Bulletin*,
J. Hydrology, *Nature Scientific Reports*, *Quaternary Science Reviews*,
J. Sedimentology, Sedimentary Geology
Grant proposals: NSF
Student presentation judge: AGU, CPEP at UW-Madison
- Organizing committee,
Wisconsin Geologic Mapping Advisory Committee, annual meeting, UW (2019)
NSF High-Resolution Proxies of Paleoclimate Workshop, UW (2013, '15, '17)
- Conference session convener,
Climate Change, The Karst Record IX (2019)
Goldschmidt (2017)

- Geological Society of America *2007-present*
- American Geophysical Union *2009-present*
- Geochemical Society *2010-present*

PRESS COVERAGE

- Instrument and Facilities Highlight: WiscSIMS. EAR to the Ground (NSF newsletter), 2012.
- Assisted with the UW press release about Orland et al. (2009). Subsequent interviews with Geotimes, ABC news, MSNBC.com, Discovery Channel Online, and local radio (WORT).