

ELIZABETH COTTRELL

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EDUCATION

- 2004 Ph.D. Columbia University, at Lamont Doherty Earth Observatory
Department of Earth and Environmental Sciences
Dissertation: *Differentiation of the Earth from the Bottom Up: Core, Mantle and Crust*
Advisors: David Walker, Charles Langmuir, and Marc Spiegelman
- 1997 Sc.B. Brown University, Geological Sciences, Geochemistry with Honors
Thesis: *Petrologic and experimental evidence for the movement and heating of the pre-eruptive Minoan rhyodacite (Santorini, Greece)*; Advisor: Malcom Rutherford
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POSITIONS HELD

- 2016-present Curator-In-Charge of the National Rock and Ore Collections, *Department of Mineral Sciences, National Museum of Natural History, Smithsonian Institution, Washington, D.C.*
- 2010-2016 Director of the Global Volcanism Program, *Department of Mineral Sciences, National Museum of Natural History, Smithsonian Institution, Washington, D.C.*
- 2006-present Research Geologist, *Department of Mineral Sciences, National Museum of Natural History, Smithsonian Institution, Washington, D.C.*
- 2005-2006 Postdoctoral Fellow, *Carnegie Institution of Washington, Geophysical Lab*
- 2004-2005 Columbia Science Fellow, *Columbia University*
Designed and taught a new course, *Frontiers of Science*, in its inaugural year as part of the Columbia University Core Curriculum.
- 2004 AAUW Dissertation Fellow, American Association of University Women, *Columbia University, Lamont Doherty Earth Observatory*
- 1998-2003 NSF Graduate Research Fellow, *Columbia University, Lamont Doherty Earth Observatory*
- 1997-1998 Fulbright Scholar, *L'Institute du Physique du Globe, University of Paris VII*
Marginal Stability of Layered Miscible Fluids, Advisor: Claude Jaupart
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HONORS, AWARDS, & FELLOWSHIPS

- 2016 Elected Fellow of the Mineralogical Society of America
- 2014 Peer Recognition Award, *Smithsonian Institution*

2014 Science Achievement Award, *Smithsonian Institution*
2009 Science Achievement Award, *Smithsonian Institution*
2005 Carnegie Postdoctoral Fellowship, *Carnegie Institution of Washington, Geophysical Lab*
2004 Columbia Science Fellowship, *Columbia University*
2003 American Association of University Women Educational Foundation Dissertation Fellowship
1998-2002 National Science Foundation Graduate Research Fellowship
1997-1998 Fulbright Fellowship (Paris, France)
1997 Anna Crosby Emery Prize – (declined), *Brown University*
1997 Outstanding Student Award – Geological Sciences, *Brown University*
1997 Columbia University Fellowship (declined), *Columbia University*
1996-1997 NASA Rhode Island Space Grant Fellowship
1996 Society of Royce Fellows Research Fellowship, *Brown University*
1996 Research Experience for Undergraduates Fellowship, *Brown University*
1995 Undergraduate Research and Teaching Assistantship, *Brown University*
1993 Department of Energy Honors Program, Representative for the State of Vermont, National Synchrotron Light Source, Brookhaven National Laboratory, Brookhaven, NY.

SELECTED PROFESSIONAL SERVICE – LAST 6 YEARS ONLY

2016 Panelist, National Science Foundation
2016-present Member, Deep Carbon Observatory (DCO) Task Force 2020
2016-present Member, Consortium for Materials Properties Research in Earth Sciences (COMPRES) Nominating Committee
2014-2016 Distinguished Lecturer, NSF’s Geodynamics at Rifting and Subducting Margins (GeoPRISMS) program
2013-2014 Lecturer, US Science and Engineering Festival “Nifty 50”
2013-2015 Member, Consortium for Materials Properties Research in Earth Sciences (COMPRES) Infrastructure and Development Committee
2013 Chairperson and Lead Writer, NSF Earthcube End-Users Domain Workshop: Petrology, Geochemistry and Volcanology. National Museum of Natural History, March 6-7, 2013.
2013-2014 Member, 2013 American Geophysical Union’s Union Medal Selection Committee
2012-2013 Distinguished Lecturer, NSF’s Consortium for Materials Properties Research in Earth Sciences (COMPRES) program
2012-2013 Chair, Program Committee of the Geochemical Society
2011-present Member, Management Board and Scientific Steering Committee of the Global Volcano Model (GVM)
2011-present Member, Scientific Steering Committee of the Deep Carbon Observatory (DCO)
2011-present Engagement Liaison to the Reservoirs and Fluxes Directorate of the Deep Carbon Observatory (DCO) / Engagement Advisory Committee

2010-present	Director, Smithsonian's Global Volcanism Program. (Supervise two federal employees.)
2010-present	Director, NSF-REU Site: Natural History Research Experiences, EAR-1062692, OCE-1560088
2010-2011	Featured Scientist, Smithsonian-MIT "Vanished," an 8-week online/offline mystery game for middle-school children, meant to inspire engagement and problem solving through science.
2010-2011	Instructor in a four-part video series "Volcanoes with Liz" to teach geology to middle-school-aged children nationally in partnership with the National Science Resources Center (also available on iTunes University and YouTube)
2010-2011	Chair, Program Committee, Geological Society of Washington

FIELD EXPERIENCE

2015	Chief Scientist, NSF Shared Platform R/V Maritime Maid, Leg 3, Western Aleutians
2001	Shipboard Scientist, R/V Melville; Igneous Petrologist, COOK16MV, 12°-15°30'S Pacific. GLIMPSE (Gravity Lineations, Intraplate Melting Petrologic and Seismic Experiment.)

PROFESSIONAL SOCIETIES

American Geophysical Union ▪ Geochemical Society (Chair of the Program Committee 2012, 2013) ▪ American Association of University Women ▪ Society of Royce Fellows ▪ Geological Society of Washington (Council Member 2007-2008, Judging Committee 2006; Program Committee Chair 2010-2011) ▪ Mineralogical Society of America

REFEREED JOURNAL ARTICLES

(SPECIAL INDICATIONS: [†]STUDENT, [‡]POSTDOCTORAL ADVISEE OR *EMPLOYEE, [§]GROUP LEADER)

- [†]Ruth, D.C.S., **Cottrell, E.**, Cortes, J.A., Kelley, K.A., Calder, E.S. "Physical and chemical processes associated with passive degassing and the 2008 violent Strombolian eruption of Llaima volcano, Chile." *Journal of Petrology*, In Press.
- [†]Brounce, M.N., Kelley, K.A., Stern, R., Martinez, F., and **Cottrell, E.**, "The Fina Nagu Volcanic Complex: Unusual submarine arc volcanism in the rapidly deforming southern Mariana margin," *Geochemistry, Geophysics, Geosystems*, In Press.
- [‡]Davis, F.A., **Cottrell, E.**, [†]Birner, S.K., Warren, J.M., [†]Lopez, O.G., "Revisiting the electron microprobe method of spinel-olivine-orthopyroxene oxybarometry applied to spinel peridotites." *American Mineralogist*, In Press.
- Zellmer, G.F., Pistone, M., Iizuka, Y., Andrews, B.J., Gomez-Tuena, A., Straub, S.M., and [§]**Cottrell, E.**, "Petrogenesis of antecryst-bearing arc basalts from the Trans-Mexican Volcanic Belt: insights into along-arc variations in magma-mush ponding depths, H₂O contents, and surface heat flux." *American Mineralogist*, 10.2138/am-2016-5701. 2016.
- [†]Birner, S.K., Warren, J.M., **Cottrell, E.**, and [‡]Davis, F.A. "Hydrothermal alteration of seafloor peridotites does not influence oxygen fugacity recorded by spinel oxybarometry." *Geology*.

G38113-1. 2016.

- [†]Grocke, S.B., **Cottrell, E.**, de Silva, S., and Kelley, K.A. “The role of crustal and eruptive processes versus source variations in controlling the oxidation state of iron in Central Andean magmas.” *Earth and Planetary Science Letters*, 440, 92-104. 2016.
- [†]Zhang, H.L., Hirschmann, M.M., **Cottrell, E.**, Newville, M., and Lanzirotti, A. “Structural environment of iron and accurate determination of Fe³⁺/ΣFe ratios in andesitic glasses by XANES and Mossbauer spectroscopy.” *Chemical Geology*, 428, 48-58. 2016.
- [‡]McCormick, B., [‡]Popp, C., Andrews, B., & [§]**Cottrell, E.** “Ten years of satellite observations reveal highly variable sulphur dioxide emissions at Anatahan Volcano, Mariana Islands.” *Journal of Geophysical Research: Atmospheres*, 120(14), 7258-7282. 2015.
- [†]Brounce, M.N., Kelley, K.A., **Cottrell, E.**, Regan, M.K., “Temporal evolution of mantle wedge oxygen fugacity during subduction initiation,” *Geology*, v. 43, p 775-778, 2015. doi:10.1130/G36742.1
- [‡]Le Voyer, M., **Cottrell, E.**, Kelley, K.A., Brounce, M., and Hauri, E.H., “The effect of primary versus secondary processes on the volatile content of MORB glasses: an example from the equatorial Mid-Atlantic Ridge (5°N-3°S), *Journal of Geophysical Research, Solid Earth*. 120, p125-144, doi:[10.1002/2014JB011160](https://doi.org/10.1002/2014JB011160), 2015.
- Loughlin, S.C., Vye-Brown, C., Sparks, R.S.J., Brown, S.K., Barclay, J., Calder, E., **Cottrell, E.**, Jolly, G., Komorowski, J-C., Mandeville, C., Newhall, C., Palma, J., Potter, S., and Valentine, G. An introduction to global volcanic hazard and risk. In S.C. Loughlin et al. (Eds) *Global volcanic hazards and risk*, Cambridge University Press, Cambridge, p1-75, 2015.
- Brown, S.K., Loughlin, S.C., Sparks, R.S.J., Vye-Brown, C., Barclay, J., Calder, E., **Cottrell, E.**, Jolly, G., Komorowski, J-C., Mandeville, C., Newhall, C., Palma, J., Potter, S., and Valentine, G. *Global volcanic hazard and risk*. In S.C. Loughlin et al. (Eds) *Global volcanic hazards and risk*, Cambridge University Press, Cambridge. P76 – 167, 2015
- Siebert L., **Cottrell E.**, Venzke E., and Andrews B. “Earth volcanoes and their eruptions: an overview.” In: Sigurdsson H, Houghton B, McNutt S, Rymer R, Stix J, (eds) *Encyclopedia of Volcanoes*, 2nd ed. Academic Press, p.1426. ISBN-13: 978-0123859389. 2015.
- [†]Brounce, M., Kelley, K.A., **Cottrell, E.** “Variations in Fe³⁺/ΣFe of Mariana Arc basalts and mantle wedge fO₂,” *Journal of Petrology*, **55**, 2513-2536. doi:10.1093/petrology/egu065. 2014.
- Cottrell E.**, “Chapter 1: The Global Distribution of Active Volcanoes,” in *Volcanic Hazard, Risk & Disaster*. P. Papale, volume editor. Hazards and Disasters Series. Elsevier. 2015.
- S.K. Brown, Crosweller, S., Sparks, S., **Cottrell, E.**, Deligne, N. I., Guerrero, N. O., Hobbs, L., Kiyosugi, K., Loughlin, M., Siebert, L., and Takrada, S., “Characterisation of the Quaternary eruption record: analysis of the Large Magnitude Explosive Volcanic Eruptions (LaMEVE) database” *Journal of Applied Volcanology* **3**, 5. 2014.
- [‡]Grocholski, B., Shim, S.H-. **Cottrell, E.** and Prakapenka, V.B., “Crystal Structure and Compressibility of Lead Dioxide up to 140 GPa,” *American Mineralogist*, v. 99, 2014.
- [†]de Moor, J.M., Fischer, T.P., Sharp, Z.D., King, P.L., Wilke, M., Botcharnikov, R. E., **Cottrell, E.**, Zelenski, M., Marty, B., Klimm, K., Rivard, C., Ayalew, D., Ramirez, C., Sulfur degassing at Erta Ale (Ethiopia) and Masaya (Nicaragua): Implications for degassing processes and oxygen fugacities of basaltic systems. *Geochemistry, Geophysics, Geosystems* 14, doi:[10.1002/ggge.20255](https://doi.org/10.1002/ggge.20255). 2013.
- [‡]Seagle, C.T., **Cottrell E.**, Fei, Y., Hummer, D., and Prakapenka, V., “Electrical and Thermal Transport Properties of Iron and Iron-Silicon Alloy at High Pressure,” *Geophysical Research Letters*, doi: 10.1002/2013GL057930, 2013.
- Cottrell E.**, Kelley K.A. “Redox Heterogeneity in Mid-Ocean Ridge Basalts as a Function of Mantle Source.” *Science*, 340, pp. 1314-1317. doi: 10.1126/science.1233299. 2013.

- Walter, M.J. and **Cottrell, E.** “Assessing uncertainty in geochemical models for core formation in Earth.” *Earth and Planetary Science Letters*, 365, pp 165-176, 2013.
- Crossweller, S., Arora, B., S.K. Brown, **Cottrell, E.**, Deligne, N. I., Guerrero, N. O., Hobbs, L., Kiyosugi, K., Loughlin, S. C., Lowndes, J., Nayembil., M., Siebert, L., Sparks, S., Takrada, S., and *Venzke, E. “Global database on large magnitude explosive volcanic eruptions (LaMEVE).” *Journal of Applied Volcanology* **1**, 4. 2012.
- Kelley K.A. and **Cottrell E.** “The influence of magmatic differentiation on the oxidation state of Fe in a basaltic arc magma.” *Earth and Planetary Science Letters*, 329-330, p.109-121, 2012. 10.1016/j.epsl.2012.02.010
- Cottrell E.**, Kelley K.A. “The oxidation state of Fe in MORB glasses and the oxygen fugacity of the upper mantle.” *Earth and Planetary Science Letters* 305, pp 270-282, 2011.
- ‡Ricolleau, A; Fei, YW; **Cottrell, E**; Watson, H; Deng, LW; Zhang, L; Fiquet, G; Auzende, AL; Roskosz, M; Morard, G; Prakapenka, V, "Density profile of pyrolite under the lower mantle conditions", *Geophysical Research Letters*, vol. 36, 10.1029/2008GL03675, 2009.
- Castro, J.M., **Cottrell, E.**, Tuffen, H., Logan, A., and Kelley, K.A. “Spherulite crystallization buffers Fe-oxidation in silicic melt,” *Chemical Geology* 268, 272–280, 2009.
- Cottrell E.**, Kelley K.A., Lanzirotti A., Fischer R.A. “High-Precision Determination of Iron Oxidation State in Silicate Glasses Using XANES.” *Chemical Geology* 268, 167–179, 2009.
- Kelley, K.A. and **Cottrell E.**, “Water and the Oxidation State of Subduction Zone Magmas.” *Science*, vol 325 no 5940, pp. 605-607, 2009
- Cottrell E.** Walter, M.J., and Walker D., “Metal-silicate partitioning of tungsten at high pressure and temperature: implications for equilibrium core formation in Earth.” *Earth and Planetary Science Letters*. 281 (3-4), pp 275-287, 2009
- N. Chabot, A.J. Campbell, W.F. McDonough, D.S. Draper, C.B. Agee, M. Humayun, H.C. Watson, **E. Cottrell**, and S. Saslow. “The Fe-C system at Pressure and Implications for the Earth’s Core,” *Geochimica et Cosmochimica Acta*, 72, p. 4146-4158. DOI: 10.1016/j.gca.2008.06.006, 2008
- Jaupart C., Molnar P., and **Cottrell E.** “Instability of a chemically dense layer heated from below and overlain by a deep less viscous fluid,” *Journal of Fluid Mechanics*, Volume 572, Issue -1, Feb 2007, pp 433-469
- Cottrell E.** and Walker D., “Constraints on Core Formation from Pt partitioning in Mafic Silicate Liquids at High Temperatures.” *Geochimica et Cosmochimica Acta*, 70 (6), p. 1565-1580. 2006.
- Cottrell E.**, Jaupart, C., and Molnar P., “Marginal stability of thick continental lithosphere.” *Geophys. Res. Lett.*, 31, L18612, doi:10/1029/3004GL020332, 2004.
- Cottrell E.**, Spiegelman M., Langmuir CH., “Consequences of diffusive reequilibration for the interpretation of melt inclusions.” *Geochem Geophys Geosy* 3: art. no. 1026 May 3 2002.
- Cottrell E.**, Gardner J., and Rutherford M.J., “Petrologic and experimental evidence for the movement and heating of the pre-eruptive Minoan rhyodacite (Santorini, Greece).” *Contrib. Min. Petrol.* 135; 4, p.315-337. 1999

SELECTED ABSTRACTS & UNREFEREED PUBLICATIONS

(SPECIAL INDICATIONS: †STUDENT, ‡POSTDOCTORAL ADVISEE OR *EMPLOYEE)

- Cottrell, E.,** Kelley, K.A., [†]Grant, E.R., Coombs, M., and [‡]Pistone, M. “Generation of calc-alkaline volcanics in the Western Aleutians.” Fall Meeting of the American Geophysical Union. 2016. **INVITED.**
- [‡]Fischer, R.A., Nimmo, F., **Cottrell, E.,** and O’Brian, P., “Effects of core formation on the Hf-W system.” Fall Meeting of the American Geophysical Union. 2016.
- Kelley, K.A. and **Cottrell E.,** “Scales of Redox Heterogeneity in MORBs and the upper mantle.” Fall Meeting of the American Geophysical Union. 2016.
- Moore, G., Touran, J., Pu, X., Kelley, K.A., and **Cottrell E.,** “Measurements of the Activity of dissolved H₂O in an Andesite Melt.” Fall Meeting of the American Geophysical Union. 2016.
- Cottrell, E.,** Kelley, K.A., [‡]Pistone, M., Coombs, M., and [†]Grant, E.R., “The role of volatiles in generating continental crust.” International Goldschmidt Conference. 2016. **KEYNOTE.**
- Moore, G., Touran, J., Pu, X., Ghiorso, M., and **Cottrell E.,** “Determining the activity of H₂O in silicate melts at H₂O-undersaturated conditions.” International Goldschmidt Conference. 2016.
- Kelley, K.A., **Cottrell, E.,** Coombs, M., and [†]Grant, E.R., “Water, fO₂, and the creation of continental crust signatures in Aleutian arc magmas.” International Goldschmidt Conference. 2016.
- Cottrell, E.,** Lanzirotti, A., Kelley, K.A., Newville, M., [†]Birner, S., Davis, F.A., Mysen, B., Botcharnikov, R. “Radiation-induced oxidation of Fe in hydrous basalt glasses.” International Goldschmidt Conference. 2016.
- [†]Birner, S., **Cottrell, E.,** Warren, J.M., K.A. Kelley, and [‡]Davis, F.A. “Oxygen fugacity of the oceanic upper mantle as recorded by peridotites from the Southwest Indian Ridge.” International Goldschmidt Conference. 2016.
- [†]Birner, S., Warren, J.M., **Cottrell, E.,** and Davis, F.A. “Heterogeneous Oxidation in Supra-Subduction Settings: Evidence from Forearc Peridotites.” Fall Meeting of the American Geophysical Union, V11D-3086. 2015. **INVITED.**
- [†]Peterson, M., Kelley, K.A., **Cottrell, E.,** Saal, A., and Kurz, M. 2015. “The Oxidation State of Fe in Glasses from the Galapagos Archipelago: Variable Oxygen Fugacity as a Function of Mantle Source.” Fall Meeting of the American Geophysical Union, V22E-03. 2015.
- Hirschmann, M., [†]Zhang, H., **Cottrell, E.,** “Revised Mossbauer Calibration for Fe³⁺/Fe^T of XANES Basalt Standards: Implications for MORB” Fall Meeting of the American Geophysical Union, V31D-3049. 2015.
- [†]Said, M., [†]Birner, S.K., and **Cottrell, E.,** “Oxygen fugacity of abyssal peridotites along the Gakkle Ridge,” Fall Meeting of the American Geophysical Union, V21A-3006. 2015.
- [†]Said, M., [†]Birner, S.K., and **Cottrell, E.,** “Oxygen fugacity of abyssal peridotites along the Gakkle Ridge,” Geological Society of America *Abstracts with Programs*. Vol. 47, No. 7, p.767, paper number 302-5. 2015.
- [†]Brounce, M., Kelley, K.A., **Cottrell, E.,** Eiler, J., and Stolper, E. “Evidence for a role of slab fluids in the oxidized nature of arc basalts,” *Goldschmidt Abstracts*, p. 401. 2015.
- [‡]McCormick, B., [‡]Popp, C., Andrews, B., **Cottrell, E.** "A new SO₂ emissions budget for Anatahan volcano (Mariana Islands) based on ten years of satellite observations," EGU General Assembly Conference Abstracts 17, 6339. 2014.
- [‡]Popp, C., [‡]McCormick, B., Suleiman, R., Chance, K., Andrews, B., **Cottrell, E.** 2014. "Analysis of volcanic bromine monoxide emissions in the southwestern Pacific region in 2005 based on satellite observations from OMI," EGU General Assembly Conference Abstracts 17, 9837
- Cottrell, E.,** Lekic, V., Davis, F., and Kelley, K.A. 2014. “Insights Into Geodynamics from Mantle Redox,” Cooperative Institute for Deep Earth Research (CIDER) Annual Workshop. **KEYNOTE.**
- Cottrell, E.,** and Kelley, K.A. 2014. “Redox Heterogeneity of the Mantle Inferred from Hotspots,” Fall

Meeting of the American Geophysical Union, V23B-02.

- [†]Wall, K., Davis, F.A., **Cottrell, E.** 2014. "Oxygen fugacity recorded by xenoliths from Pacific oceanic islands." Fall Meeting of the American Geophysical Union, V52B-04. **Best Student Paper Prize.**
- Kelley, K.A. and **Cottrell, E.** 2014. "Roles of magmatic oxygen fugacity and water content in generating signatures of continental crust in the Alaska-Aleutian arc." Fall Meeting of the American Geophysical Union, T11A-4531.
- [†]Gentes, Z., Kelley, K.A., **Cottrell, E.** and Arculus, R. 2014. Near-Primary Oxidized Basalts from the Submarine Vanuatu Arc. Fall Meeting of the American Geophysical Union, V33B-4864.
- [†]*Birner, S.K., Warren, J.M., Cottrell, E., and Davis, F.* 2014. "Untangling the History of Oceanic Peridotites Using Spinel Oxybarometry. Fall Meeting of the American Geophysical Union, V53B-4863.
- [†]*Grocke, S.B., de Silva, S.L., Wallace, P., Kent, A.J.R., Hervig, R.L., Andrews, B.J., Cottrell, E.* 2014. "Storage Conditions of Large Silicic Magmatic Systems: Gauging Melt Evolution from Melt Inclusions Hosted in Different Phenocryst Phases." Fall Meeting of the American Geophysical Union, V51A-4721.
- [‡]Davis, F.A., **Cottrell, E.** 2014. "Oxygen fugacity profile of the oceanic upper mantle and the depth of redox melting beneath ridges." Fall Meeting of the American Geophysical Union, V51E-02. **INVITED.**
- [‡]Le Voyer, M. Kelley K.A., **Cottrell, E.,** and Hauri, E.H. 2014. "Undegassed carbon content from a highly depleted segment of the Mid-Atlantic Ridge (1-5°S): evidence from melt inclusions." Fall Meeting of the American Geophysical Union, V11C-4729. **INVITED.**
- [†]Brounce, M.N., **Cottrell, E.,** and Kelley, K.A. 2014. "The redox budget of the Mariana subduction zone." Fall Meeting of the American Geophysical Union, V31G-06.
- [†]*Wall, K., ‡Davis, F.A., and Cottrell, E.,* "Oxygen fugacity recorded by xenoliths from Pacific oceanic islands," Geological Society of America *Abstracts with Programs*. Vol. 46, No. 6, p.323, paper number 128-3, 2014
- Cottrell, E., ‡Davis, F., †Birner, S.K., Warren, J.M., and †Wall, K.,.** "Oxybarometry of peridotites from various tectonic settings," Geological Society of America *Abstracts with Programs*. Vol. 46, No. 6, p.414, paper number 164-7, 2014.
- [†]*Birner, S.K., Warren, J.M., Cottrell, E., Lopez, O.G., Davis, F.A., Falloon, T.J.,* "Oxygen Fugacity Variations Among Tonga Trench Forearc Peridotites," Goldschmidt Geochemical Conference, Sacramento, CA, USA. Abstract/Oral Presentation. 2014
- [‡]Popp, C., Andrews, B., Carn, S.A., Chance, K., **Cottrell, E.,** Schwandner, F.M., "Analysis of GOSAT XCO₂ in explosive volcanic plumes," EGU General Assembly Conference Abstracts 16, 14675, 2014
- [‡]Davis, F.A., McDonough, W.F., **Cottrell, E.,** Ash, R.D., "Hawaiian peridotite xenoliths and the use of Ni in olivine as a petrogenetic indicator for basalt." Goldschmidt Geochemical Conference, Sacramento, CA, USA. Abstract/Oral Presentation. **INVITED.** 2014
- [‡]Davis, F.A. and **Cottrell, E.,** "Parameters affecting the depth of redox melting beneath ridges." Goldschmidt Geochemical Conference, Sacramento, CA, USA. Abstract/Poster Presentation. 2014
- Helz, R., **Cottrell E.,** Kelley K.A., [†]*Brounce M.N.* "Redox history of the 1959 Kilauea eruption determined by XANES analysis of glassy scoria." Goldschmidt Abstracts, 2014
- Cottrell, E.,** Lekic V., Davis F., and Kelley K.A., "Redox Controls on the Asthenosphere," Fall Meeting of the American Geophysical Union, 2013. **INVITED**
- Kelley, K.A. and **Cottrell, E.** "Links between oxygen fugacity, slab fluids, and calc-alkaline differentiation of arc magmas," Fall Meeting of the American Geophysical Union, 2013.

INVITED

- [‡]Le Voyer, M. Hauri, E.H., **Cottrell, E.** and Kelley, K.A. "Mantle heterogeneities revealed by along-axis variations in MORB volatile contents" Fall Meeting of the American Geophysical Union, 2013
- [†]*Birner, S.K., Warren, J.M., Cottrell E., Lopez, O.G., Davis, F.A., Falloon, T.J., "Variations in Oxygen Fugacity among Forearc Peridotites from the Tonga Trench." Fall Meeting of the American Geophysical Union, 2013. **Best Student Paper Prize.***
- [‡]Popp, C., Andrews, B., Chance, K., **Cottrell, E.**, Buchwitz, M., Reuter, M., Schneising, O., and Burrows, J., "CO₂ release of the Kasatochi eruption in August 2008 as detected from space," Fall Meeting of the American Geophysical Union, 2013.
- [‡]McCormick, B.T., **Cottrell, E.**, Lopez, O.G., Mather, T.A., Pyle, D.M., and Venzke, E. "Towards improved volcanic emissions budgets: opportunities arising from a new global database of volcanic degassing data." Fall Meeting of the American Geophysical Union, 2013.
- [‡]Davis, F.A., **Cottrell, E.**, McDonough, W.F., Ash, R.D., "First-row transition elements (FRTE) in Hawaiian lherzolite xenoliths and their implications for lithologic heterogeneity in basalt source regions," Fall Meeting of the American Geophysical Union, 2013.
- [†]*Brounce, M., Kelley, K.A., and Cottrell, E., "Temporal evolution of oxygen fugacity in the Marianas mantle wedge." Fall Meeting of the American Geophysical Union, 2013*
- [†]*Grocke, S.B., de Silva, Shanaka, Cottrell, E., Andrews, B.J., Lindsay, J.M., "Timescales and storage conditions for the Tara supervolcanic magma system; insights from geotherobarometry and quartz chemistry." Fall Meeting of the American Geophysical Union, 2013*
- Cottrell, E.**, "Mantle redox heterogeneity," COMPRES Annual Meeting. Lake Geneva, WI., 2013.
- KEYNOTE**
- Cottrell, E.**, and Kelley, K.A., "Estimating system oxygen fugacity using micro-XANES spectroscopy," Geological Society of American Annual Meeting, 2013. **INVITED**
- [‡]McCormick, B.T., **Cottrell, E.**, Fischer, T., Chiodini, G., and Cardellini, C. "Transformational science with a new global volcanic gas emissions database", *Mineralogical Magazine*, **77(5)** 1720.
- [‡]McCormick, B.T., Clor, L.E., **Cottrell, E.**, Fischer, T., Hauri, E., Lehnert, K., and *Venzke, E. "A new global database of volcanic gas emissions", IAVCEI 2013 Scientific Assembly, 4A2_4H-O12.
- [‡]Popp, C., Andrews, B. J., Chance, K., **Cottrell, E.**, Buchwitz, M., Reuter, M., and Schneising, O. "Detection of volcanic CO₂ in the August 2008 Kasatochi eruption plume by SCIAMACHY measurements", IAVCEI Scientific Assembly, 2013.
- [†]*Grocke, S.B., E. Cottrell, S.L. de Silva, B.J. Andrews, and K.W. Kelley. Evaluating the role of crustal assimilation on the oxidation state of arc magmas. International Association of Volcanologists and Chemists of the Earth's Interior Meeting 2013, 1P1_1C-O13.*
- [†]*Grocke, S.B., Cottrell, E., de Silva, S.L., Andrews, B.J., Kelley, K.A. "The role of crustal assimilation on the oxidation state of arc magmas," Goldschmidt, 2013, Gold2013:abs2743. Oral Presentation.*
- [†]*Brounce M., Kelley, K.A., and Cottrell, E. "Evaluating proxies for fO₂ in the Marianas" Goldschmidt, 2013.*
- [‡]Le Voyer, M., Rose-Koga, E., **Cottrell, E.** Kelley, K. and Hauri, E. "Fluorine and Chlorine as tracers of magma-fluid and magma-crust interactions" 2013, IAVCEI OP2_1A-O14.
- [‡]Le Voyer, M., Hauri, E., **Cottrell, E.**, and Kelley, K. "Carbon inventory of oceanic basalts and the oceanic upper mantle" 2013, DCO International Science Meeting.
- Kelley, K.A., **Cottrell, E.** and [†]*Brounce, M.* "The relationship between fO₂ and calc-alkaline affinity of arc magmas," Goldschmidt, 2013.
- Cottrell E.** and Kelley K.A. "Redox Heterogeneity in MORB as a Function of Mantle Source."

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Cottrell, E., *Venzke, E., Siebert, L., and Andrews, B.J. Volcanoes of the World 4.0: The volcano and eruption database of Smithsonian's GlobalVolcanism Program. International Association of Volcanologists and Chemists of the Earth's Interior Meeting 2013, 4A2_4H-O9.

‡Grocholski, B. and **Cottrell, E.** "Water storage capacity of dense, lower mantle minerals." 44th Lunar and Planetary Science Conference, 1303, 2013.

‡Le Voyer, M., Hauri, E.H., Kelley, K.A., **Cottrell, E.** "Unraveling the effect of primary versus secondary processes on the volatile content of MORB glasses: an example from the equatorial Mid-Atlantic Ridge." Fall Meeting of the American Geophysical Union, 2012.

Cottrell E. and Kelley K.A. "Redox Heterogeneity in MORB." Fall Meeting of the American Geophysical Union, 2012. **INVITED.**

†Lopez, O.G., **Cottrell E.**, and Warren, J., "Upper mantle oxygen fugacity in ridge and subduction zone settings recorded by spinel peridotite." Fall Meeting of the American Geophysical Union, 2012.

†Brounce M.N., Kelley, K.A., and **Cottrell E.**, "Fe³⁺/ΣFe variation in Mariana arc and back-arc magmas and primary fO₂ of the mantle wedge." Fall Meeting of the American Geophysical Union, 2012.

Best Student Paper Prize.

Kelley, K.A., and Cottrell, E. "The oxidation state of Fe in subduction zone basalts and implications for mantle oxygen fugacity" European Geophysical Union, 2012, EGU2012-877. **INVITED.**

Kelley, K.A., and **Cottrell, E.**, "Importance of oxygen fugacity for temperatures and melting regimes beneath ridges, arcs, and hot spots." Fall Meeting of the American Geophysical Union, 2011. **INVITED.**

‡Seagle, C.T., **Cottrell, E.**, Fei, Y., Hummer, D., Prakenpenka V., "Electrical and Thermal Conductivity of Iron and Iron-Silicon Alloy at High Pressures." Fall Meeting of the American Geophysical Union, 2011. **INVITED.**

Cottrell, E., Andrews, B., Sorensen S.S., Hale, L.J., "Digital Management and Curation of the National Rock and Ore Collections at NMNH, Smithsonian." Fall Meeting of the American Geophysical Union, 2011. **INVITED.**

†Brounce M.N., Kelley K., and **Cottrell E** "Effect of differentiation on Fe oxidation in arc basalts." *Geochimica et Cosmochimica Acta Suppl. Goldschmidt Conference Abstracts.* 2011.

†Ruth, D. C. Sweeney, Cortes, J.A., **Cottrell, E.**, Calder, E.S., Valentine, G.A., "Geochemical and textural comparison of two different scoria erupted from Llaima volcano, Chile." Fall Meeting of the American Geophysical Union, 2010.

†Jackson, C.M., **Cottrell E.**, and Kelley, K.A., "Mineral-melt partitioning of V and Sc at arcs: implications for mantle wedge oxygen fugacity." Fall Meeting of the American Geophysical Union, V11F-01, 2010.

Cottrell, E., Siebert, L., Kimberly, P. "The Future of Smithsonian's Global Volcanism Program." Fall Meeting of the American Geophysical Union, V43E-04, 2010. **INVITED.**

Kelley, K.A. and **Cottrell, E.**, "Redox Conditions of Subduction Zone Magmas and Mantle," Fall Meeting of the American Geophysical Union, V11F-03, 2010. **INVITED.**

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‡Seagle, C. T., **Cottrell E.**, and Fei Y., "Equilibrium between solid and liquid iron: The Fe-Si-O system at high pressures," Fall Meeting of the American Geophysical Union, 2010.

‡Seagle, C. T., **Cottrell E.**, and Fei Y., "Experimental Investigation of the Fe-Si-O System at High Pressures," International Mineralogical Association Meeting 2010

‡Seagle, C. T., **Cottrell E.**, and Fei Y., "Experimental Investigation of the Fe-Si-O System at High

- Pressures,” COMPRES Annual Meeting 2010
- Cottrell E.** and Kelley K.A. “Basaltic glasses as records of mantle oxygen fugacity.” **KEYNOTE.** *Geochimica et Cosmochimica Acta Suppl. Goldschmidt Conference Abstracts.* 2010.
- Kelley K, **Cottrell E.**, [†]*Brounce M* & [†]*Parks B.*, “The Influence of Magmatic Differentiation on the Oxidation State of Fe in Arc Magmas.” **INVITED.** *Geochimica et Cosmochimica Acta Suppl. Goldschmidt Conference Abstracts.* 2010.
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- Cottrell E.** and Walter M.J. “Monte Carlo Error Analysis Applied to Core Formation: The Single-stage Model Revived.” *EOS Trans.* V13C-2046. 2009
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- Kelley, K.A. and **Cottrell, E.** “The Oxidation State of Global Subduction Zone Basalts and its Relationship to Volatiles, Magmatic Processes, and Source Composition.” **INVITED.** *EOS Trans.* V33E-01. 2008.
- Cottrell, E.**, and Kelley K.A. “Detecting and Correcting Melt Inclusion Modification.” **INVITED.** *EOS Trans.* V13F-02. 2008.
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- E. Cottrell**, M.J. Walter, and D. Walker, “W Partitioning Between Liquid Metal and Liquid Silicate as a Function of P, T, fO₂, X_{carbon}, and melt structure: Implications for the Earth, Moon, Mars, and Vesta.” *Proceedings of the 39th Annual LPSC.* Abs no.2238. 2008.
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- E. Cottrell** and D. Walker, “PtFe Nano and Micro-Nuggets in Experimental Silicate Glasses.”**INVITED.** *EOS Trans. AGU, Fall Meet. Suppl.*, 2007. Abstract V22B-01.
- E. Cottrell**, K. Kelley, and R. Fischer, “New micro-XANES determinations of Fe speciation as a proxy for oxidation state of global MORB and arc magmas.” *EOS Trans. AGU, Fall Meet. Suppl.*, 2007. Abstract DI43A-07.
- K. Kelley, **E. Cottrell**, and R. Fischer, “Water and the Oxidation State of Global Arc and MORB Magmas.” *EOS Trans. AGU, Fall Meet. Suppl.*, 2007. Abstract DI33A-1118.

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- Y. Fei, A. Ricolleau, E. Cottrell, L. Zhang, A. Corgne, Y. Wang, T. Komabayashi, N. Sata, V. Prakapenka, Y. Meng, “Spin transition and equation of state of ferroperricite at high temperature: Implications for density model of the lower mantle.” EOS Trans. AGU, Fall Meet. Suppl., 2007.
- J. Castro, P. Beck, E. Cottrell, and H. Tuffen, “Spherulites record crystallization, degassing, and oxidation-reduction mechanisms in obsidian flows.” **INVITED**. EOS Trans. AGU, Fall Meet. Suppl., 2007. Abstract V14A-07.
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- Cottrell E.**, Fei Y., Ricolleau A., Prakapenka V., “Experimental Petrology in the LHDAC.” COMPRES Annual Meeting, June 2007.
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- Cottrell E.** and Walker D., “The origin of PtFenano- and micro-nuggets in experimental silicate glasses and its constraint on planetary core formation.” Nanoscale Processes in Earth and Planetary Sciences, NNIN Workshop. No. 1722. January, 2006.
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- Cottrell E.** and Goldstein, S. “Glaciers in New York City: A Field Guide, Exercises & Instructor Manual.” www.gl.ciw.edu/cottrell, Columbia University, 2004.
- Cottrell E.**, Jaupart, C., and Molnar P., “Marginal Stability of Thick Continental Lithosphere.” EOS, Transactions, AGU, T31A-1264, Fall Meeting, 2004.
- Cottrell E.** and Walker D., “Ultra-High Temperature Effects in Earth’s Magma Ocean: Pt and W Partitioning.” Proceedings of the Oxygen in Terrestrial Planets Conference. 2004.
- Walker D., Kavner A., and **Cottrell E.**, “Core-Mantle Geochemical Interactions.” EOS, Transactions, AGU, U51A-03 **INVITED**, 2002.
- [†]Levine NM, “Trace Element Concentrations in Melt Inclusions within a Plagioclase Phenocryst Host,” Junior Paper, Geosciences Department Princeton University, 2001-2002
- Cottrell E.** and Walker D., “A New Look at Pt Solubility in Silicate Liquid.” Proceedings of the 33rd Annual Lunar and Planetary Science Conference. Abs no.1274. 2002.

Cottrell E., Spiegelman M., and Langmuir C.H., “A Numerical Model to Evaluate the Importance of Diffusive Exchange Between Melt Inclusions and Host Crystals.” EOS, Transactions, AGU, V71A-30, Fall Meeting, 2000.

Cottrell E., Rutherford M.J., Gardner J., “Conflicting Evidence for Pre-Eruptive Conditions and Processes in the Minoan Rhyodacite, Santorini, Greece.” EOS, Transactions, AGU, 77, 46, pp. F805, V22A-24 **INVITED**, 1996.

PUBLIC MEDIA AND ONLINE EDUCATIONAL PRODUCTS CREATED TO ADVANCE PUBLIC UNDERSTANDING OF SCIENCE

- 2016 Coverage of [Eruptions, Earthquakes, and Emissions](#) (E3) launch.
BBC News, “Volcano insight: Fifty years of eruptions revealed,” by V. Gill.
<http://www.bbc.com/news/science-environment-37569152>
Washington Post. “Watch Earth pulse with earthquakes and eruptions in this stunning visualization,” by S. Kaplan. <https://www.washingtonpost.com/news/speaking-of-science/wp/2016/10/10/watch-earthpulse-with-earthquakes-and-eruptions-in-this-stunning-visualization/>
New York Times, Science Times, October 11, 2016. “What 50 Years of Earthquakes and Volcanic Eruptions Look Like,” by N. St. Fleur.
http://www.nytimes.com/2016/10/11/science/earthquakes-volcanos.html?_r=0
- 2014 Featured guest on NPR’s nationally broadcast Science Friday, September 12, 2014:
<http://sciencefriday.com/segment/09/12/2014/keeping-an-eye-on-eruptions-around-the-world.html>
Featured guest on Smithsonian’s ScienceHow Live Webcast
<http://qrius.si.edu/watch/volcano-geochemistry-webcast-elizabeth-cottrell#.VBc73C5dVok>
- 2013 AAAS Podcast: Why mantle geochemistry matters: Elizabeth Cottrell connects mantle oxidation state to mid-ocean ridge basalts and the global carbon cycle.
<https://tinyurl.com/mebbyyo> [sciencemag.org]
Deep Carbon Observatory News: <https://tinyurl.com/ny4a3nk> [deepcarbon.net]
Brookhaven News Room: <http://www.bnl.gov/newsroom/news.php?a=24076>

- 2011 Q&A on the Virginia Earthquake with Smithsonian Scientist Elizabeth Cottrell.
<https://tinyurl.com/k9wtocm> [smithsonianmag.com]
 “Volcanoes with Liz” four-part video series for public audiences and for classroom use.
<https://tinyurl.com/kklqlgo> [itunes.apple.com]
 “Vanished,” An online game for middle-school aged children created by MIT’s Education Arcade and the Smithsonian Institution. <https://vanished.mit.edu/user/register>
 Videos produced for Vanished include:
 “Understanding the Deep Earth” <http://www.youtube.com/watch?v=5x9FS4XdrwM>
 “How to be a Scientist” <http://www.youtube.com/watch?v=ohf8-Mo8iyY>
 “All We Saw Was a Pile of Goop” <http://www.youtube.com/watch?v=tyF2Ar7H4-4>
 Understanding the Japan Earthquake. Smithsonian YouTube Channel.
<http://www.youtube.com/watch?v=fraPBV4kzvl>
- 2010 Smithsonian geologist puts Eyjafjallajökull eruption in perspective. Smithsonian YouTube Channel. <http://www.youtube.com/watch?v=U8965YViiPo>
 Recreating Volcanoes in a Lab. Smithsonian YouTube Channel.
http://www.youtube.com/watch?v=X2_bAUWmiW0
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<http://www.rsc.org/chemistryworld/News/2009/July/30070901.asp>
- 2004 Stoddard, J. “Simulating the Creation of the Earth's Core, With the Help of Great Gray.” *Earth Institute News*. <https://tinyurl.com/m8vzdyn> [columbia.edu]
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ACADEMIC COLLOQUIA AND MAJOR (> 100 ATTENDEES) PUBLIC LECTURES

- 2016 University of California at Davis, Earth and Planetary Sciences, January
 Vanderbilt University, Dept. of Earth and Environmental Science, March
 Northeastern Illinois University, Dept. of Earth Science, March
 Northeastern Illinois University, Presidential Lecture Series (Public), March
- 2015 Drexel University, Dept of Biodiversity, Earth and Environmental Science, January
 Florida State University, Dept of Earth, Ocean and Atmospheric Science, February
 Challenger IMAX Theater, Tallahassee, FL, February
 University of Vermont, Department of Geology, February
- 2014 Community College of Baltimore County, Physical Sciences, November
 Cooperative Institute for Dynamic Earth Research (CIDER) 2014 Summer Program,
 Santa Barbara, CA, July, 2014

- Oregon State University, Dept. of Geosciences, May
Lamont-Doherty Earth Observatory, Columbia University, April
Oxford University, Dept. of Earth Sciences, March
Bristol University, School of Earth Sciences, March
2013 Wellesley, Dept. of Geosciences, February
Lafayette College, Geology and Environmental Sciences, February
University of Minnesota, Dept. of Geology and Geophysics, April
COMPRES Annual Meeting, Lake Geneva, WI, June
Carnegie Institution of Washington, Department of Terrestrial Magnetism, September
Johns Hopkins University, Earth and Planetary Sciences, September
Lamont-Doherty Earth Observatory, Columbia University, Department of Earth and
Environmental Sciences, Colloquium, October.
University of Chicago, Dept. of Geophysical Sciences, November
Smithsonian Institution, National Museum of the American Indian, “The Future is Here,”
Conference, June
Brookhaven National Laboratory, March
2012 Lamont-Doherty Earth Observatory, Columbia University, Department of Earth and
Environmental Sciences, Geochemistry Seminar, April.
Concord University, Dept. of Physical Sciences, November
Smithsonian Institution, Castle Lecture Series, January
Smithsonian Institution, National Museum of Natural History, October
Smithsonian Institution, National Air and Space Museum, NASA STARS, February
2011 State University of New York at Buffalo, Dept. of Geology, March
2010 University of Michigan, Dept. of Geological Sciences, January
Rutgers University, Dept. of Earth and Planetary Sciences, Colloquium, February
University of Maryland, Dept. of Geological Sciences, March
2009 University of NY at Stony Brook, Dept. of Geosciences, November
American Museum of Natural History, New York, January
2008 The George Washington University, October
2007 University of Chicago, Dept. of Geophysical Sciences, June
University of Rhode Island, Graduate School of Oceanography, April
2006 University of Toronto, Department of Geology, November
SUNY Stony Brook, Department of Geosciences, September
University of Maryland, Department of Geological Sciences, May
Brown University, Department of Geological Sciences, March
Northwestern University, Department of Geological Sciences, February
Smithsonian, National Museum of Natural History, Mineral Sciences, February
2005 Geological Society of Washington, Public Lecture Series

2004 Columbia University, Department of Earth and Planetary Sciences
American Museum of Natural History
Brown University, Department of Geological Sciences
Carnegie Institution of Washington, Geophysical Laboratory
Bryn Mawr College, Department of Geology
North Shore, East Hampton, and New York, NY Branch Meetings of the AAUW

STUDENTS AND POSTDOCS ADVISED

Postdocs Advised at the Smithsonian | First position after departure from my lab

Rebecca Fischer (2015 to present) | Assistant Professor, Harvard University
Colin Jackson (2016 to present)
Mattia Pistone (2014 to 2016) | Ambizione Fellow of the Swiss National Science Foundation
Frederick Davis (2012 to 2015) | Assistant Professor, University of Minnesota, Duluth
Christoph Popp (2012 to 2015) | Staff Scientist, Federal Office of Meteorology and Climatology
MeteoSwiss
Marion Le Voyer (2012 to 2015) | non-tenure track lecturer, University of Maryland
Brendan McCormick (2012 to 2014) | Research Associate, Cambridge University, UK
Brent Grocholski (2011 to 2014) | Editor at AAAS, Science Magazine
Christopher Seagle (2009 to 2011) | Staff Scientist, Sandia National Laboratory

Graduate Students

Elizabeth R. Grant (2016 to present) – URI/GSO, advised collaboratively w/ K. Kelley | Graduation expected 2021
Suzanne K. Birner (2013 to present) –Stanford University, advised collaboratively w/ J. Warren | Graduation expected May, 2018
Maryjo Brounce (2009 – 2014) – URI/GSO, advised collaboratively w/ K. Kelley | Postdoctoral Fellowship at Caltech, now Assistant Professor at U. California Riverside
Dawn C. Sweeney Ruth (2010 – 2014) – State U. of NY at Buffalo, committee member | Postdoctoral Fellow at Earth Observatory of Singapore
Stephanie Grocke (2012 – 2014) – Oregon State University, committee member | Fulbright-NSF Fellow, Iceland

Undergraduate Interns

Meena Said (2015) – Lockhead University, PA.
Kellie Wall (2014) – Washington State University, WA.
Oscar Lopez (2012, 2013) – Northwestern University, IL.
Christa Jackson (2010 – 2011) – Humbolt State, CA.
Esther Posner (2009) – Grand Valley State University, MI.
Elizabeth Ruebush (2009) – Williams College, MA.
Rebecca Fischer (2007) – Northwestern University, IL.