

## DEREK J WELLER

Earthquake Research Institute, University of Tokyo  
1-1 Yayoi 1, Bunkyo-ku, Tokyo 113-0032, Japan  
1-970-319-5789, Derek.j.weller@gmail.com

### EDUCATION

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**University of Colorado at Boulder**, Boulder, CO 2013-2017

PhD, Geological Sciences, GPA: 3.912

Thesis: *Eruption Record and Aspects of Magma Genesis and Evolution from Volcanoes of the Southernmost Andean Southern Volcanic Zone, Chile*

Advisor: Charles Stern

- Identified and reconstructed late-Pleistocene to Holocene eruption histories for the four southernmost volcanoes of the Andean Southern Volcanic Zone
- Linked lacustrine and outcrop tephra records and constructed the tephro-chrono-stratigraphic framework for north-central Patagonia
- Investigated processes controlling petrogenetic variability for the four southernmost volcanoes of the Andean Southern Volcanic Zone

**University of Colorado at Boulder**, Boulder, CO 2011-2013

MSc, Geological Sciences, GPA: 3.824

Thesis: *A Large Late-glacial Ho Eruption of the Hudson Volcano, Southern Chile*

Advisor: Charles Stern

- Created the lithostratigraphic description, geochemical characterization, and geochemical modeling of a newly discovered late-Pleistocene large explosive eruption of Hudson volcano from southern Chile

**University of Colorado at Boulder**, Boulder, CO 2006-2010

BA, Geological Sciences and Environmental Studies, GPA: 3.695

Dean's List Fall 2009

**Colorado Mountain College**, Glenwood Springs, CO 2004-2006

AS, General Science

Dean's List Fall 2005

### EXPERIENCE

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#### *Work Experience*

Visiting Researcher at the Earthquake Research Institute of the University of Tokyo, Tokyo, Japan (2018- Present) Designs and conducts research on topics in igneous petrology and volcanology. Utilizes and integrates geochemical data gathered using an electron microprobe, X-ray fluorescence, Laser Ablation Inductively-coupled Plasma Mass Spectrometer, and Fourier Transform Infrared Spectrometer. Integrated these data to understand magma chamber processes and to constrain the location and conditions of magma storage regions, the processes influencing magma genesis and magmatic evolution, and the influence of magma degassing in controlling magma rheology and the style of eruptive behavior. Prepares research results for publication in scientific journals and for presentation at invited seminars, domestic and international conferences.

Research Associate at the University of Colorado at Boulder, Boulder, Colorado, USA (CU)

(2017-Present) Independently designs and conducts original research on topics including igneous petrology, volcanology, and tephrochronology; utilizes and integrates geochemical data gathered using an electron microprobe, inductively coupled plasma mass spectrometer, and thermal ionization mass spectrometer. Uses the geochemical information to create geochemical models to constrain processes of magma generation and magmatic evolution to better understand magmatic systems and rates of magmatic processes, and to reconstruct eruptive histories for volcanic hazard assessment. Prepares research results for publication in scientific journals.

Graduate Laboratory Assistant at the Institute of Arctic and Alpine Research of CU (2008-2017)

Overseen the general management of lab operations including the repair and maintenance of a Thermo Finnigan Element2 sector field inductively-coupled plasma mass spectrometer and other laboratory instruments. Prepared biogenic calcium carbonate samples in a class 1000 cleanroom for trace element chemical analysis and the daily operation (instrument tuning, sample and acid blank testing) of ICP-MS instrument. Implemented a method for open-container HF-HClO<sub>4</sub> assisted whole rock and microsample digestion of geologic samples for simultaneous analysis of 36 trace elements using ICP-MS techniques at this facility. Mentored and trained undergraduate student employees.

Geoscience Intern at Encana Oil and Gas, Denver, Colorado (Summer 2015)

Identified potential recompletion targets for recovery enhancement as part of the Development team. Used petrophysical software and developed resistivity-based model to highlight recompletion targets while working with a multi-disciplinary team to evaluate economic viability to re-enter preexisting boreholes and recomplete sandstone units in the Upper Williams Fork member of the Mesaverde Formation in the Piceance Basin, Western Colorado.

Geoscience Intern at Enerplus, Denver, Colorado (Summer 2014)

Worked on outcrop examination, facies description, and high-resolution sampling for in-situ gamma ray and total organic carbon (TOC) measurements of the basal unit of the Mancos Shale from western and central Colorado to assess for source rock potential and to better constrain outcrop to wellbore measurements and to highlight potential horizontal targets in the Piceance Basin, Colorado. Performed sedimentary core lithofacies description and analysis. Examined well logs and wellbore cuttings to determine formation tops (Mowry Formation) from the Powder River Basin, Wyoming.

Grader and Test Question Writer at CU (periodically 2009-2016)

*Natural Catastrophes and Geologic Hazards*, Introductory upper division course designed for non-majors. (Supervisor: Dr. Charles Stern) Graded the course exams and final exam and served as tutor for course (~125 students/semester).

*Introduction to Oceanography*, Introductory upper division course designed for non-majors. (Supervisor: Dr. Thomas Marchitto) Created test and homework questions from the course readings, integrated homework questions into the online-based course management system, administered of exams, compiled semester exit survey for assessment of the students' science background after taking the course (~125 students/semester).

*Geology of Colorado*, Introductory level Geology of Colorado course designed for majors and non-majors (Supervisor: Dr. Paul Weimer) Graded and prepared homework and exam materials (~125 students/semester).

### ***Teaching Experience***

#### **Instructor of Record at CU (Spring 2018)**

*Introduction to Igneous and Metamorphic Petrology, GEOL-3020*. Taught the biweekly lecture component of the introduction to igneous and metamorphic petrology to upper division geology students; directed the weekly laboratory activities; mentored and advised Teaching Assistants on the weekly laboratory components.

#### **Teaching Assistant at CU**

*Introduction to Mineralogy, GEOL-3010*. (Fall 2012, 2013, 2014, 2015, 2016) Taught the weekly laboratory component emphasizing on the fundamentals of mineralogy: crystal symmetry, crystal systems and bravais lattices, point groups, space groups, X-ray powder diffraction, theory of optical microscopy, optical properties and theory of isotropic and anisotropic minerals, optical theory of pleochroism, birefringence, optical relief, optical indicatrix, interference figures, optic sign, optical characteristics of the common rock forming silicate minerals. Restructured the course laboratory assignments and exams to create new laboratory assignments, emphasizing optical microscopy and optical mineralogy.

*Introduction to Igneous and Metamorphic Petrology, GEOL-3020*. (Spring 2011, 2012, 2013, 2014, 2015, 2016, 2017) Conducted lectures and taught the weekly laboratory component emphasizing theory and fundamentals of optical microscopy, optical properties of rock forming silicate minerals, igneous rock mineralogy, petrochemistry, phase relations and associations, tectonic environments where magmas form, melt generation controls, interpretation of igneous rock and mineral textures (intrusive vs extrusive) and geochemistry, trace-element geochemistry, features and cause of different volcanic eruptions and their associated hazards; as well as metamorphic rock mineralogy, pressure-temperature pathways, mineral stability, metamorphic reactions, metamorphic protolithologies, metamorphic grade and facies, interpretation of metamorphic rock and mineral textures and mineral relations.

*Field Methods in Active Tectonics, GEOL-4721*. (Spring 2013) Introduced concepts in active tectonics, structural geology, earthquake geology and the measurement techniques, data analysis and interpretation using high-resolution digital topography (LiDAR) data. Conducted significant portion of the course in field -based activities introducing tectonic geomorphology, geology of earthquakes, paleoseismology, and structural geology of fault systems to students, teaching students the skills to recognize, measure, and interpret the surface strain produced by faulting and folding.

#### **Assistant Instructor at Colorado Mountain College**

*Southwestern Utah Field Geology, GEY-175*. (Spring 2009, 2018) / *Grand Staircase and Grand Canyon Field Geology, GEY-208*. (Fall 2008, 2009, 2018; Spring 2010) As this is an introductory field courses emphasizing fundamentals and principle of geology such as superposition, principle of original horizontality, uniformitarianism, taught students' methods to identify different rock types with an emphasis on igneous and sedimentary

rocks. Taught students the basic principles of sedimentology, stratigraphy, and techniques for the characterization of sedimentary rock (grain size, degree of sorting, compositional maturity, sedimentary structures) to interpret likely depositional environments and to reconstruct geologic histories; to recognize and map faults in the field; and to read and interpret geologic maps.

### ***Laboratory Experience***

#### Electron Microprobe Laboratory at ERI (2018-2020)

Sample preparation (mineral separation, mounting in epoxy, grinding and polishing, carbon coating) of volcanic material for EPMA analyses

Geochemical characterization volcanic material (volcanic glasses and mineral phenocryst) and elemental mapping of mineral phenocrysts

#### LA-ICP-MS Facilities at Earth Observatory of Singapore (2019-2020)

Sample preparation and quantitative measurement of trace and minor elements using Laser Ablation ICP-MS techniques and data reduction.

#### ICP-MS Trace Element Laboratory at CU (2008-2017)

Overseen the operation and maintenance of the measurement of trace element using a Thermo Finnigan Element2 sector field inductively coupled plasma mass spectrometer; prepared the oxidation and reductive cleaning in a class 1000 clean room facility.

#### Electron Microprobe Laboratory at CU (2011-2017)

Prepared and analyzed volcanic material (volcanic glasses, mineral phenocryst) for chemical characterization

#### Thermal Ionization Mass Spectrometry Facility at CU (2015-2017)

Prepared (sample digestion, cation-exchange chromatography, etc.) and analyzed volcanic material for Sr, Nd, Pb isotope ratios measured on 6-collector Thermal Ionization Mass Spectrometer

#### Thermochronology Facilities at CU (2015-2017)

Prepared the mineral separation (rock crusher, water table, magnetic separator, heavy liquids)

### ***Field Experience***

Miyakejima Volcano, Izu-Bonin Volcanic Arc, Japan (2019) Designed and conducted the sampling, description, and mapping of material derived from effusive fissure and more explosive central vent eruptions derived from Miyakejima volcano.

Mt. Fuji Volcano, Izu-Bonin Volcanic Arc, Japan (2019) Assisted in the installation of an infrasound array and temperature sensors to better understand avalanche hazards on Mt. Fuji.

Andean Southern Volcanic Zone, Chile (Austral Summer 2011) Selected the site and conducted sampling of pyroclastic eruptive products from outcrops and from lacustrine sediment cores for geochemical characterization (trace and major element analysis element analysis using ICP-MS and EMP technique; Rb-Sr isotopic measurements) (MSc and PhD work)

- Niobrara Formation and age equivalent strata of western Colorado, USA (Summer 2014-2016).  
Sampled altered bentonitic tephra deposits in the late Cretaceous Niobrara Formation and the age equivalent strata of western Colorado: (Ph.D. project and internship)
- Sunlight Creek, Wyoming, USA (Summer 2010) Worked as a field assistant measuring sediment transport and discharge and surveying the morphological characteristics on upper reaches of Sunlight Creek and surrounding drainages of the Absaroka Range, northwestern Wyoming.

### **PEER REVIEWED PUBLICATIONS**

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- Weller, D.J.**, de Porras, M.E., Maldonado, A., and Stern, C.R., (2019) Petrology, geochemistry, and correlation of tephra deposits from a large early-Holocene eruption of Mentolat volcano, southern Chile. *Journal of South American Earth Sciences*. 90: 282-295.  
doi.org/10.1016/j.jsames.2018.12.020.
- Weller, D.J.**, de Porras, M.E., Maldonado, A., and Stern, C.R., (2018) New age constraints on the Tephrochronology of the southernmost Andean Southern Volcanic Zone, Chile. *Quaternary Research*. 1-15. doi:10.1017/qua.2018.81.
- Weller, D.J.**, Stern, C.R., (2018) Along-strike variability in primitive magmas (major and volatile elements) inferred from olivine-hosted melt inclusions from volcanoes of the southernmost Andean Southern Volcanic Zone, Chile. *Lithos*. 296-299: 233-244.  
doi.org/10.1016/j.lithos.2017.11.009.
- Weller, D.J.**, de Porras, M.E., Maldonado, A., Méndez, C., Stern, C.R., (2017) Holocene tephrochronology of lower Río Cisnes valley, southern Chile. *Andean Geology*. 44(3): 229-248.
- Weller, D.J.**, Miranda, C.G., Moreno, P.I., Villa-Martinez, R., Stern, C.R. (2015) Tephrochronology of the southernmost Andean Southern Volcanic Zone, Chile. *Bulletin of Volcanology*. 77:107. doi: 10.1007/s00445-015-0991-2.
- Weller, D.J.**, Miranda, C.G., Moreno, P.I., Villa-Martinez, R., Stern, C.R. (2014) A large late-glacial Ho eruption of the Hudson volcano, southern Chile. *Bulletin of Volcanology*. 76: 831.  
doi: 10.1007/s00445-014-0831-9.
- Weller, D.J.**, Stern, C.R., Miranda, C.G., Moreno, P.I., Villa-Martinez, R., (2013) A very large (>20km<sup>3</sup>) late-glacial eruption (Ho) of the Hudson volcano, Southern Chile. *Bollettino di Geofisica Teorica ed Applicata*. v. 54. p. 203-206.

### **ABSTRACTS**

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- Weller, D.J.**, Stern, C.R. (2019) Along-strike variability in primitive magmas (major and volatile elements) inferred from olivine-hosted melt inclusions from volcanoes of the southernmost Andean Southern Volcanic Zone, Chile. American Geoscience Union. San Francisco, California. December 2019.
- Weller, D.J.**, Stern, C.R. (2019) Tephrochronology of the southernmost sector of the Andean Southern Volcanic Zone (SVZ), Chile. 1er Congreso de la Asociación Latinoamericana de Volcanología. Universidad Católica del Norte. Antofagasta, Chile. November 2019.
- Weller, D.J.**, Stern, C.R. (2019) Along-strike variability in primitive magmas (major and volatile elements) inferred from olivine-hosted melt inclusions from volcanoes of the southernmost Andean Southern Volcanic Zone, Chile. Japan Geoscience Union. Chiba, Japan. May 2019.

- Weller, D.J.**, de Porras, M.E., Maldonado, A., and Stern, C.R., (2018) New age constraints on the Tephrochronology of the southernmost Andean Southern Volcanic Zone, Chile. XV Chilean Geologic Congress, La Concepcion, Chile, November 2018.
- Weller, D.J.** (2017) Bentonite tephrochronology of the basal Mancos Shale and Niobrara Formation, Colorado. Rocky Mountain Rendezvous. Laramie, Wyoming.
- Weller, D.J.**, Stern, C.R. (2016) Tephrochronology in the area east of Puerto Cisnes and Coyhaique, Chile: Implication for volcanic hazards. Abstracts, Cities on Volcanoes 9, Puerto Varas, Chile, November 2016.
- Weller, D.** C Miranda, R Moreno, R Villa-Martinez and CR Stern (2015). Tephrochronology of the southernmost Andean Southern Volcanic Zone. Abstracts, 14th Chilean Geologic Congress, La Serena, Chile, October 2015.
- Stern, C.R., **Weller, D.J.**, (2012) A Revised Age of  $7430 \pm 250$  14C yrs BP for the very large mid-Holocene explosive H1 eruption of the Hudson Volcano, Southern Chile. XIII Congreso Geológico Chileno Congress, Antofagasta, Chile, August 2012.

## **THESES**

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- Weller, D.J.**, 2017. Eruption record and aspects of magma genesis and evolution for the volcanoes of the southernmost Andean Southern Volcanic Zone, Chile. PhD Thesis, University of Colorado.
- Weller, D.J.**, 2015. A large late-glacial eruption of Hudson volcano, southern Chile. MSc Thesis, University of Colorado.

## **AWARDS**

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- 2017 Beverly Sears Graduate Student Award  
2015 Rocky Mountain Association of Geologist Dudley & Marion Bolyard Award  
2015 CU Geological Sciences Undergraduate Mentorship Grant  
2015 Patterson Research Grant  
2015 CU Graduate School International Travel Grant  
2014 CU Geological Sciences Award Competition  
2013 CU Geological Sciences Award Competition  
2013 CU Department of Geological Sciences Travel Grant  
2012 CU Geological Sciences Award Competition  
2012 CU Department of Geological Sciences Travel Grant  
2011 CU Geological Sciences Award Competition

## **OTHER ACTIVITIES**

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### ***Teacher Training***

Graduate Teacher Program at CU (2014-2017). Completion of 50 course hours required for GTP certificate. Teaching portfolio in progress

### ***Mentorship Activities***

Research Experience in Solid Earth Sciences for Students (RECESS) Communication Mentor at CU (Spring 2018). Mentoring undergraduate interns and helping them refine their technical writing and presentation skill for summer internship projects in the Earth sciences.

Undergraduate Research Mentor at CU (2015-2016). Research mentor to Paulo Countino in his study to understand the contribution of continental crust to the geochemical evolution of magmas from Mentolat Volcano, southern Chile.

***Volunteer Activities***

Humane Society, Dog Walker (2017, 2018)

University of Colorado Annual Department Picnic and BBQ committee (2018)

American Association of Petroleum Geologist (AAPG)

Student Chapter Secretary (2016)

Outreach Coordinator (2017)

***Non-academic Activities***

Colorado Mountain College Men's Soccer Club (2004-2006)

Mountaineering, hiking, and camping

**PROFESSIONAL ORGANIZATIONS**

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American Geophysical Union (AGU)

International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

Geological Society of America (GSA)

American Association of Petroleum Geologist (AAPG)

Society of Exploration Geophysicist (SEG)

Rocky Mountain Association of Geologists (RMAG)