Teaching Portfolio: Sophia Wensman

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Section I: Teaching Responsibilities

My teaching responsibilities as a graduate student teaching assistant in the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University (OSU) have been varied across subjects of Geography, Oceanography, and Geology. Courses I have taught as well as a representation of course type and student numbers can be found in Table 1.

Table 1. Courses taught as a Graduate Student at Oregon State University.

Course/ Quarter	Course Type	Students	Undergraduate vs. Graduate	Credit Hours	Avg. Enrollment
GEOG 323: Climatology					
Spring 2020 Winter 2019 Sprint 2019	Online; Writing intensive course	Majors, required	Undergraduate	4	28
OEAS 500: Cascadia Field Trip					
Fall 2019 Fall 2018 Fall 2017	Field Course	Majors, required	Graduate	3	20
GEOG 203: Human Environment Geography					
Winter 2019	Lecture, Difference, power, and discrimination	Majors, required	Undergraduate	3	70
OC 103: Exploring the Deep/Geography of the World's Oceans					
Winter 2019 Fall 2018 Winter 2018	Online	Non-majors, elective	Undergraduate	4	50
GEO 431/531: Environmental Geochemistry					
Sprint 2018	Lecture	Majors, elective	Both	3	15
GEOG 102: Physical Geography					
Winter 2018	Laboratory	Majors, required	Undergraduate	4	41
GEO 430/530: Geochemistry					
Winter 2017	Laboratory	Undergraduate Majors, required; Graduate Majors, elective	Both	4	27

Brief Description of Courses:

GEOG 323: Climatology:
This course discusses the physical principles of climate, climate classifications, and distribution and characteristics of climate regimes to create a systematic analysis of global and regional climates. As a Writing Intensive Course (WIC), this course fulfills requirements that introduce students to the conventions of writing in their major. As such, students in GEOG 323 construct a scientific term paper on the climatology of a region of their choosing.

OEAS 500: Cascadia Field Trip:
Course is an intensive 6.5-day field course within Cascadia (i.e., the Cascades Coast Range & coast of Oregon/Washington). Course introduces a range of geological, physical, ecological, and biogeochemical topics that exist within Cascadia and the linkages between these topics, and their interaction with society. In addition, this course provides an opportunity for new graduate students to help build a strong cohort to carry them through their graduate career.

GEOG 203: Human Environment Geography:
Course examines biological, physical, and human processes that affect the distribution of resources, and how differences in power create differences in exposure and vulnerability to poverty, malnutrition, and disease, as well as to injury, death, or loss of property as a result of geographic hazards. Issues of race, gender, ethnicity, social class, age, sexual orientation, and disability are explored through geographic concepts of scale and place to examine differences in access to resources. As a Difference, Power, and Discrimination (DPD) course, this class fulfills OSU requirements for students to engage in the intellectual examination of the complexity of the structures, systems and ideologies that sustain discrimination and the unequal distribution of power and resources in society.

OC 103: Exploring the Deep/Geography of the World's Oceans
Introduces oceanography including the geography, geology, chemistry, physics, and biology of the world's oceans. Topics include formation of Earth and its oceans, erosion, major earthquakes, and tsunamis along the Oregon coast; volcanic activity along a major underwater volcanic chain off the Oregon coast; cause and effects of El Nino; chemistry of seawater; biology of the oceans, from one-celled organisms to whales.

GEO 431/531: Environmental Geochemistry
This course includes an introduction to natural processes at and near the Earth's surface, as well as an examination of the impact of human activities on the natural environment. Study includes discussion of sources, transformations, transport, and fate of contaminants.

GEOG 102: Physical Geography:
This course covers the processes that shape the earth's surface including weathering, mass movement, landforms, river systems, groundwater, biogeography and human effects on landscape.

GEO 430/530: Geochemistry:
Applies principles of geochemistry to problems of earth science. Students examine how chemical elements and their isotopes are distributed through the Earth and Solar System, why terrestrial and extraterrestrial materials have their observed compositions, what chemical reactions occur on the surface of the Earth, in its interior, and in the Solar System around us? Students also examine how elements cycle between geochemical reservoirs, how have these cycles operated in the geological past and how they may be altered in the future.

Section II. Teaching Philosophy

Earth Science education gives students the opportunity to learn about the natural world. It also provides a means of developing a deep understanding of some of the most important global issues of today – climate change, air and water pollution, ocean acidification, and sea level rise to name a few. While topics I teach may vary with the course – climatology vs. environmental geochemistry, physical geography vs. oceanography, etc. – my role as an educator is to ensure that whether or not students in my classroom will go on to a career in the Earth Sciences, they will be able to act as well-informed citizens and think critically and scientifically about the processes that shape our planet.

I have sought training to improve my teaching abilities both at the higher education level and at the secondary education level. During both programs, I interacted with educational theory, learned practical methods for effective teaching, and taught in the classroom. While teaching in higher education is very different than teaching in a middle or high school setting, both experiences demonstrated the need for carefully considered curriculum that centers around facilitation of student learning rather than the transfer of knowledge from teacher to student.

In order to develop a student-centered teaching practice, my goals as an educator are to:

1. Create an inclusive classroom environment.
2. Use active learning and critical thinking strategies to engage students in the learning process.
3. Take steps to continue revising and improving my teaching practice.

1. Creating an inclusive classroom environment:

Unless students feel they have a place and voice in the classroom, achieving an equitable learning environment in my classroom is impossible. Implicit biases, microaggressions, and issues of accessibility are among the myriad of issues that reduce students' sense of belonging and undermine the teaching process.

In order to create a classroom that allows students to feel safe and foster a constructive learning environment I must first acknowledge my own privilege. I must recognize the privileges that come with being a white woman in STEM. It is my responsibility to use those privileges to work against the factors that lead students to feel like they don't have a place in science. To this end, I have sought to improve my ability to foster an inclusive classroom through active engagement in professional development workshops and seminars (Section VII) designed to foster discussion and improve knowledge on topics related to social justice, diversity, and inclusivity. Through these programs, I have gained practical skills for engaging in culturally relevant teaching, student-centered approaches to teaching, navigating through cultural difference, and active discussion of the cultural biases that operate in sciences.

Towards the application of what I have learned, I acted as a mentor and teacher in the Oregon State University (OSU), College of Engineering, Leading and Enabling Adolescent Futures in STEM (LEAFS) program. The goal of LEAFS is to increase inclusivity and diversity of STEM fields through the engagement of Oregon youths with disabilities. Acting as the facilitator for the Ocean Acidification group, I mentored three undergraduate engineering students in the creation of a half-day lesson designed to introduce K-12 students to the science of ocean acidification as well as the implications it has for organisms such as oysters, which are critically important to the health of Oregon's economy and coasts (Section IV). Designing the curriculum, of the top importance was

ensuring each activity planned was well thought out and provided scaffolding and options for interacting to allow students to access the information in a variety of ways and ensure students were able to actively engage with the material. Hands-on activities and the use of the scientific method gave students an opportunity to see themselves as scientists and engage with some of the most important issues facing our globe.

In part, creating an inclusive classroom is identifying inequalities and addressing controversial and challenging topics. Use of critical theory and active engagement with topics that reveal, and challenge power structures are crucial to creating social change as well as informed and well-rounded learner and scientist.

To supplement to the course work required of the GCCUT program, I elected to enroll in GRAD 542: The Inclusive Classroom: Difference, Power, and Discrimination (DPD). As part of this course I worked to in part develop a DPD class: Natural Resources, Economics and Environmental Justice. The course is designed to examine the interplay between natural resource extraction and use within the context of economic, political, and societal factors that control access to these resources. As part of the course I developed a syllabus for the course as well as a lesson plan focused on the Flint Water crisis and the unequal exposure to environmental hazards that developed (Section IV). While I have not yet been able to enact this course, I hope to fully develop and enact the course in my future position.

2. Engaging students in active learning and critical thinking:

While the teacher plays a key role in facilitating student learning, acting as the expert and provider of knowledge allows students to engage less with the content and become passive receivers of knowledge. Use of active learning strategies allows students to interact with material and create a deeper understanding of course content.

At times lecture formatting may be conducive to illustrating course material, however, even when lectures are used, I incorporate small group discussions or activities to help highlight key points. While I was the teaching assistant for GEO 431/531: Advanced Environmental Geochemistry, I created lesson examining ice cores as environmental archives of lead pollution. During this lesson, I incorporated two small group activities in which students examined figures from a peer reviewed paper and worked together to and draw conclusions (Section IV). When students had finished, each group acted as teachers to the rest of the class, explaining their answers. Other groups were then encouraged to walk through if and why they had a different answer. Through this mechanism I was able to see where students were struggling with the material and was able to address these issues before continuing with the lesson. Engagement with these activities during the class later helped during students' midterm exam when students were asked to again examine similar figures to those they had discussed during the class and draw conclusions.

When possible using experiential learning, such as engagement in laboratory exercises, field trips and field courses provides students an opportunity to gain first-hand experience with course content. Helping students begin to think like a scientist and engage in the scientific method creates a sense of ownership over the knowledge they've gathered and helps students practice making evidence-based deductions. As a teacher I have facilitated laboratory experiments, lead field trips, and helped students learn scientific techniques including mud core sampling, collecting stream flow, Secchi disk, and CTD measurements. Learning these skills helps students engage more personally with the data from these experiences, and helps students learn the scientific practices that scientists use when conducting experiments.

In conjunction with active learning, critical thinking plays a key role in helping students take ownership of their learning. Student engagement with primary literature, observational practice and interpretation of findings is necessary for students to leave the classroom with a better understanding and ability to engage thoughtfully with the outside world.

As the teaching assistant for the online writing intensive course GEOG 323: Climatology, I work with students through the development of a scientific research paper on the climatology of a region of their choice (Section V). Over the course of a term students submit a proposal and three drafts of their paper, with each edition asking students to add additional components. In my role as editor of their papers, my focus is on drawing their own critical thinking out. Thus, my comments focus on helping students with methods of using data to interpret results and making conclusions that support a thesis statement they've crafted. Over the course of the term I am able to 1) determine areas where the whole class is struggling and areas where a particular student needs more guidance, 2) help students develop their scientific voice, and 3) see student improvement with course material and the writing process over the course of the term.

3. Steps to improve teaching practices:

As an educator I am continually working to improve my teaching. Critical examination and reflection of our own process is the only way to improve as teachers. Towards this goal I have sought out professional development opportunities to learn about best practices and strategies for teaching online and in large classroom environments (Section VI). I have also worked to incorporate student feedback into my teaching through examination of student teaching evaluations (Section VII).

As a graduate teaching assistant for GEOG 323: Climatology, I have worked to improve the quality of feedback I have given to students on their term papers. Over the three terms I have taught this course I have transitioned my feedback strategy from predominantly in-line edits, towards a focus on larger areas of the paper that needed the greatest focus (e.g. abstract, discussion, use of figures, missing content, etc.). During my most recent term teaching the course I've also begun color coding in-line edits to improve recognition of errors. This technique helps students to more easily identify issues when sifting through the feedback provide on their papers. Since employing these changes, I have noted an improvement in quality of students' term papers in student evaluations of my interest in their learning as well as in my evaluation of their performance (Section VIII). I have also noticed increased improvement in areas where students often struggle – abstracts, introductions, discussions, and conclusions (Section VI).

My goals as an Earth Science educator are to create an environment that is student-centered, where students actively engage with and inform the course content and build confidence and skills in making evidence-based conclusions. Introducing students to Earth Science in a deep, meaningful way, creates opportunities for students to understand the world around them. These connections and the understanding of what influences and shapes our world creates scientists and citizens who are well informed and prepared to discuss, and search for solutions to some of the biggest issues facing our society.

Section III. CV

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RESEARCH INTERESTS

• Isotope Geochemistry • Analytical Chemistry • Environmental Chemistry • Trace Metal Geochemistry

EDUCATION

Ph.D., Ocean, Earth and Atmospheric Sciences: Ocean Ecology and Biogeochemistry 2016-Present
Oregon State University, Corvallis, OR
Dissertation (working): "Reconstruction of Human Impacts on the Environment: Insights from Uranium and Lead"
Advisor: Dr. Alyssa Shiel
GPA 3.93/4.00

Graduate Certificate in College and University Teaching 2020
Oregon State University, Corvallis, OR

B.S.Ed., Chemistry and Earth & Space Science, 2015
University of Michigan, Ann Arbor, MI

PROFESSIONAL CERTIFICATIONS

Provisional Teaching Certificate, State of Michigan 2015

WORK AND RESEARCH EXPERIENCE

Geochemistry Graduate Research Assistant 2016-Present
College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, OR

- Calibrating U/Ca Proxy in *Crassostrea gigas* (Oregon Sea Grant: R/SAQ-21-Shiel):
    - Oyster research seeks to improve understanding of oysters as bio-monitors of ocean carbonate chemistry and develop mitigation strategies for culturing oysters in the Pacific Northwest's increasingly corrosive waters.
    - Method development and analysis of trace metals in *Crassostrea* gigas shells via LA-ICP-MS (iCAP and Thermo). Including tuning, operating, and troubleshooting.
- Source identification of lead pollution in ice cores:
    - Pb isotope research seeks to develop new applications of high resolution ICP-MS to trace sources natural and anthropogenic sources of lead recorded in ice cores from antiquity through modern day.
    - Method development and analysis for analyzing ultra-trace lead isotopes (ppt level) from ice core meltwater using Attom HR-ICP-MS and Nu 3D MC-ICP-MS. Including tuning, operating, and troubleshooting for over 400 samples.
    - Preparation of ultra-trace lead isotopes in a class 1000 clean room environment.
    - Clean lab techniques including ultra-pure acid distillation, contamination control, and prevention at the ultra-trace level.
- Other projects:
    - Analyses of trace metal isotopes across multiple media (lichen, mushrooms, soils) using Nu Plasma 2 and Nu Plasma 3D MC-ICP-MS. Including tuning, operating, troubleshooting, and mentoring of instrument users.
    - Separation of trace metals via column chromatography for isotope analyses in a class 1000 clean room environment

Biogeochemistry Research Assistant 2014-2016

Biogeochemistry & Environmental Isotope Geochemistry Lab University of Michigan, Ann Arbor, MI

- Assisted with research projects focusing on utilizing mercury stable isotope techniques to trace sources, transport, and fate of mercury through the environment.
- Analyzed trace mercury concentrations in liquid and solid phase using AAS and AFS. Including tuning, operating, and troubleshooting.
- Prepared mercury samples for analysis via Nu Plasma MC-ICP-MS.
- Trained and mentored undergraduate employees in the laboratory.

Ocean Tracer Scientist, CLIVAR/GO-SHIP P16N 2015

Scripps Institution of Oceanography, University of California San Diego, San Diego, CA

- Collected water samples using a CTD/Rosette at 95 stations along the P16N line between Honolulu and Alaska.
- Analyzed water samples to determine concentrations of trichlorofluoromethane, dichlorofluoromethane, sulfur hexafluoride, and nitrous oxide using an on-board Gas Chromatography and Electron Capture Detection system. Including operating and troubleshooting

Ocean Tracer Intern 2014

Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, Seattle, WA

- Investigated the source and magnitude of nitrous oxide production from Hood Canal in Washington using nutrient, oxygen and CTD data gathered from a 4-day research cruise to the Canal.
- Analyzed CFC and N_2O samples using custom built on-board Gas Chromatography and Electron Capture Detection system. Including operating and troubleshooting

Analytical Chemistry Intern 2013

Dow Corning Hyde Corporation, Midland MI

- Tested the comparability of nuclear magnetic resonance spectroscopy, infrared spectroscopy, and gas chromatography functionality in measuring silicon-vinyl and silicon-hydrogen levels in Dow Corning products.
- Analyzed silica samples with GC, IR, and NMR techniques.

FIELD EXPERIENCE

Fieldwork and in situ experiments on Pacific Oysters, Netarts Bay (2 years) 2016-2020

- Experimental design and setup organized and implemented Aug 2016.
- Bi-monthly to monthly staining of Pacific Oysters with manganese and calcein until Aug 2018.
- Quarterly collection of oysters between Aug 2016 and Aug 2018 (>500 individuals collected).
- Subsequent staining experiments to determine optimal timeframe for staining oysters between August 2019 and February 2020

Research Cruises

Cruise	Position	Vessel	Year	Days at Sea
JISAO REU Cruise	Scientist	R/V Clifford A. Barnes	2014	4
CLIVAR/GO-SHIP P16N – Leg 2	Scientist	R/V Ronald H. Brown	2015	34
Graduate Teaching Cruise	Scientist	R/V Elakha	2017	1
Undergraduate Teaching Cruise	Scientist	R/V Pacific Storm	2017	1
OC523, Student Research Cruise	Chief Scientist	R/V Pacific Storm	2017	2
Graduate Teaching Cruise	Scientist	R/V Elakha	2018	1
Undergraduate Teaching Cruise	Scientist	R/V Oceanus	2018	1
Graduate Teaching Cruise	Scientist	R/V Elakha	2019	1
			Total	**45**

TEACHING & ADVISING EXPERIENCE

Graduate Teaching Assistant 2015-Present

College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, OR

Instructor Duty Descriptions:

GEOG 323: Climatology (online, writing intensive course) Spring 2019, Winter 2020, Spring 2020

- Credit Hours: 4, Average Number of Students: 28
- Edited and provided feedback on topic proposals, first, second and final drafts of student scientific research papers.
- Developed lessons in written and video formats to allow students to access guidance on laboratory concepts in multiple ways.
- Aided students through participation in discussion board Q&As and through direct communication with students via email.
- Graded laboratory, quiz, essay, and research papers.

OEAS 500: Cascadia Field Trip (in-person, field course) Fall 2017, Fall 2018, Fall 2019

- Credit Hours: 3; Average Number of Students: 20
- Worked in conjunction with instructors to teach students about hydrology, ecology and geology around the state of Oregon as well presented about interpersonal relations and course contracts.
- Organized and planned day-to-day operations including assembling, distributing, and packing course and research cruise materials, purchasing of supplies prior to and during trip, ensuring students were able to obtain appropriate gear, and organizing sleeping arrangements for students during the course. Additional course organizational development (F2018) to facilitate planning and execution of course in future years.
- Taught procedures for obtaining accurate Secchi disk readings as well as how to take hand-held CTD measurements and nutrient samples.

GEOG 203: Human Environmental Geography (in-person, DPD) Winter 2019

- Credit Hours: 3; Number of Students: 70
- Graded and provided feedback for students on assignments related to environmental justice case studies and an analysis of the social and ecological footprint resulting from production of assigned products. The goals of the assignments were to highlight interactions among different social categories and their relationship to difference, power and discrimination in the US and abroad, with an emphasis on resource access, political ecology, environmental justice, and the population-consumption-technology nexus.
- Created an analytical rubric to help students understand the expectations for their assignments.

eOC 103: Exploring the Deep/Geography of World Oceans (online) Winter 2018, Fall 2018, Winter 2019

- Credit Hours: 4; Average Number of Students: 50
- Graded labs, quizzes, homework and exams related to the ocean including marine geology and chemistry, ocean currents, and coastal and biological process.
- Provided help to students through communications via email.

GEO 431/531: Environmental Geochemistry (in-person) Spring 2018

- Credit Hours: 3; Number of Students: 15
- Worked with students to design, carry out and analyze samples from an experiment developed during the course regarding the determination of hotspots of metal contamination around the Oregon State University campus.
- Designed and implemented an interactive lecture and in class activity on lead isotopes and ice core geochemistry.
- Developed and graded a portion of students' final exam based on this lesson, while also incorporating information from other geochemical knowledge from the course.

GEOG 102: Physical Geography (in-person, laboratory course) Winter 2018

- Credit Hours: 4; Number of Students: 41
- Responsible for grading student assignments, labs and exams related to weathering, mass movement, landforms, river systems, groundwater, biogeography, and human effects on the landscape.
- Developed introductory lessons for students to introduce concepts and work to be performed during lab.
- Held weekly office hours to assist students with the course material.

GEO 430/530: Geochemistry (in-person, laboratory course) Winter 2017

- Credit Hours: 4; Number of Students: 27
- Assisted undergraduate and graduate students during the course with completing laboratories related to principles of geochemistry as they applied to problems of earth science.
- Graded laboratory assignments.

Field and Laboratory Advising 2016-Present

- U/Ca Project: (2016-2018)
    - Provided field experience for 10 undergraduate and 21 graduate students. Students assisted in staining and collection of over 500 oysters throughout the two-year project.
    - Mentored and trained an undergraduate chemistry student at Oregon State University, in proper laboratory safety and methods of oyster analysis.
- Other Laboratory Advising (2016-Present)
    - Mentored and trained 2 graduate students in operation of MC-ICP-MS.

Ocean Acidification Undergraduate Mentor and Facilitator 2019-2020

Leading and Enabling Adolescent Futures in STEM (LEAFS), College of Engineering, Oregon State University, Corvallis, OR

- Mentored 3 undergraduate engineering students over the course of 6 months in the creation of camp curriculum for K-12 students with disabilities focusing on the topic of ocean acidification. The mission of LEAFS is to "Inspire youths with disabilities to find their passion by interacting with several STEM based activities. We aim to promote a more inclusive environment and develop diversity in through for future engineers, as they tackle tomorrow's most challenging technological problems." accessibility.
- Co-taught 5 students between grades 9 and 11 during the camp session in January 2020. Activities included understanding pH and the difference between acids and basis, dissecting oysters and examining human CO_2 production.

Undergraduate Teaching Assistant 2013-2014

Instructor Duty Descriptions:

Earth Science (6th Grade): Slauson Middle School, Ann Arbor MI Winter 2014

- Total number of students: 125
- Used physics and engineering principles to create and implement a 4-week unit on the solar system including teaching students about gravity and gravitation, seasonal temperature variation, lunar phases, planetary motion, the properties of a habitable planet, properties of the Sun and sunspots, the Earth's magnetosphere, and space weather.

Life Science (7th Grade): Saline Middle School, Saline, MI Fall 2013

- Total number of students: 90
- Developed a two-week unit plan on energy, of which I taught two days, during which students constructed model buildings capable of withstanding simulated earthquakes.

- Taught an introductory lesson on waves in which students learned new vocabulary and physically manipulate waves to determine some of their characteristic properties, lead a laboratory focused on improving students' understanding of kinetic and potential energy transfer, and lead a demonstration examining how changing physical properties affect the overall molecular arrangement of molecules.

Chemistry (11th Grade): Canton High School, Canton, MI Winter 2013

- Developed and taught an "Ideal Gas Law" lesson and practiced classroom management and literacy strategies to study their effectiveness in the classroom
- Worked with students in small groups or individually to improve their understanding of chemistry.
- Studied student and school culture through observation and student surveys.

OUTREACH & ENGAGEMENT

CEOAS Academic Mentoring Program – Mentor 2017-Present

- Mentored 5 undergraduate students in Environmental Science (2), Geology (1), Ecological Engineering (1) and Ocean Sciences (1). Focus of mentoring was on giving undergraduate students the opportunity to learn about graduate school and explore academic and career paths.
- During mentorship I helped one student apply for an internship outside of the college, worked with a first generation student to navigate their early college career and helped them gain skills in finding the hidden curriculum in high education, worked with two students struggling with career choices, and facilitated connection with a fifth mentee to connect with professors within the college to find an internship.

Inspiration Dissemination – Radio Interview 2018

- Interview: "Sophie Wensman how can humans help oysters adapt to stresses from Ocean Acidification?"
- Discussed oyster proxy development research as well as what lead to the mass die-offs of larval oysters at Whiskey Creek Hatchery in 2007, how oyster research seeks to improve oyster aquaculture, as well as how using U/Ca ratios in oysters can help re-create ocean chemistry conditions.

Da Vinci Days Festival, Taste the Ocean Exhibit – Volunteer 2017, 2018

- Lead the Taste the Ocean Booth, designed to help the community learn about salinity in different bodies of water.

Salmon Bowl, National Oceanic Sciences Bowl – Volunteer 2017, 2018

- Volunteered as a runner during the Oregon State University meeting of the National Oceanic Sciences Bowl (NOSB) marine sciences competition.

Oregon Sea Grant outreach video "Using Oysters to Decrease Acidic Seawater" – Scientist 2017

- Interviewed by Oregon Sea Grant about oyster research project on the Oregon Coast. Focus of the video is on improving public knowledge of ocean acidification as well as the research being done to improve oyster aquaculture (https://youtu.be/dN3CymMlXvI).

PRESENTATIONS

Wensman, S., 2020. History recorded in ice: Tracing war, plague, and fingerprinting sources of lead pollution. GEO 431/531. Environmental Geochemistry, Oregon State University, Corvallis, OR. Two-day guest lecture.

Wensman, S., Shiel, A., Waldbusser, G., 2019. Efficacy of utilizing shell plantings to mitigate ocean acidification impacts on oyster (*Crassostrea gigas*) health. Coastal and Estuarine Research Federation, Mobile, AL. Poster presentation.

Wensman, S., 2019. Achievement Rewards for College Scientists Orientation. Corvallis, OR. Invited talk.

Wensman, S., 2019. Achievement Rewards for College Scientists Scholar Award Luncheon. Portland, OR. Poster Presentation.

Wensman, S., 2018. Tracing lead pollution in time and space. GEO 431/531. Environmental Geochemistry, Corvallis, OR. Guest lecture.

Wensman, S., 2018. Imitating nature: Improving oyster health utilizing "artificial oyster reefs". CEOAS Seminar Series, Corvallis OR. Oral presentation.

Wensman, S., 2014. Production of nitrous oxide in Hood Canal, Washington. REU Intern Presentation. Joint Institute for the Study of the Atmosphere and Ocean. University of Washington, Seattle, WA. Poster presentation.

Wensman, S., 2013. Comparison of NMR, IR, and GC functionality for measuring SiVi and SiH Levels in Dow Corning Products. Dow Corning Analytical Chemistry Department, Midland, MI. Oral presentation.

ORGANIZATIONS & COMMITTEES

CEOAS Unpacking Diversity – Member 2019-Present

- Helped organize and attended seminars and workshops on topics related to social justice and equity in sciences in higher education with the aim of creating a more inclusive environment in higher education.

Coalition of Graduate Students – Professional Development Chair 2019-2020

- Organized and hosted 3 workshops related to goals for professional development, application for jobs in the private, government, and academic sectors, and CV/Resume improvement.

Ocean Ecology and Biogeochemistry Graduate Student Night – Organizer 2017-2020

- Organized and hosted a weekly graduate student meeting with aims of improving graduate student connections, collaborations, and science communication skills. Student presentations ranged in topic from defense practice, poster presentations, discussion of optimal figure formatting, tools for productive writing, how to choose a journal to submit to, resources at and outside of Oregon State University, to presentations on science communication tools.

CEOAS Science Communications Group – Member 2017-2019

- Helped organize and attended workshops aimed to improve science communications within and outside of the College of Earth, Ocean, and Atmospheric Sciences. Topics included COMPASS Message Boxes, and effective professional website design and social media use.

CEOAS Promotion & Tenure Student Evaluation – Committee Member 2018

- Reviewed candidate's teaching abilities.
- Wrote evaluations summarizing input from student referee letters for each candidate.
- Participated in discussions of the Teaching Reviews at Promotion and Tenure committee meetings.

CONFERENCES

Goldschmidt 2020 Conference – Oral Presentation 2020

Abstract: Application of HR-ICP-MS Techniques to Constrain Modern Lead Pollution Sources in Greenland Ice

Coastal and Estuarine Research Federation (CERF) – Poster Presentation 2019

Abstract: Efficacy of utilizing shell plantings to mitigate ocean acidification impacts on oyster (*Crassostrea gigas*) health.

Oregon Women in Higher Education (OWHE) - Attendee 2018

HONORS & AWARDS

CEOAS Association of Graduate Students Travel Reimbursement Award 2019

- Award Amount: $300
- Need based travel award given to graduate students for the purpose of attending conferences.

Geology and Geophysics Travel Award 2019

- Award Amount: $500
- Need and merit-based award for the purpose of travelling to a conference or field work.

GSA Graduate Student Research Grant 2018

- Award Amount: $1,960
- Awarded grant based on merit of proposed research as well as ability for the applicant to achieve the goals of the project.
- Project: "Historical record of atmospheric emissions of heavy metals from ice cores in Alaska and Greenland"

Achievement Rewards for College Scientists (ARCS) scholar award recipient 2016-2018

- Award Amount: $18,000
- Awarded to first year Ph.D. students on the basis of academic merit and potential for exceptional research.

Dow Corning Hyde Scholarship & Internship recipient 2013-2014

- Award Amount: $20,000
- Awarded to a School of Education student studying Chemistry based on academic merit.

University of Michigan Honors 2010, 2011, 2013

COMPUTER SKILLS

Expertise in: R, Fiji (ImageJ), Ocean Data Viewer, OSX, Adobe Illustrator, Dragonfly, Windows, Microsoft Office

Skills in: MATLAB, ArcGIS

PROFESSIONAL MEMBERSHIPS

Geochemical Society 2020-Present

Coastal and Estuarine Research Federation 2019-Present

Geological Society of America 2018-Present

Northwest Scientific Association 2018

Section IV. Objectives and Methodologies

i. Objective: Improve accessibility of Earth Science education

Accessibility is a key issue in creating a more equitable learning environment. Creating student-centered courses that consider student needs and knowledge is necessary to improve issues of accessibility. Providing *scaffolding* and using *multiple approaches* to the same content can help students connect with course material.

Methods:
During creation of the lesson plan (Appendix I) for LEAFS (Leading and Enabling Adolescent Futures in STEM), a primary objective was to make sure there was scaffolding and alternative means of accessing the activities and materials. During one portion of the lesson, students conducted a dissection of a Pacific Oyster. During the activity (Appendix II), students were asked to find and identify parts of an oyster's anatomy as well as define the function of each body part. Scaffolding of this activity occurred in two ways: 1) students could have student helpers provided by LEAFS manipulate the oyster, or 2) students could use the activity handout to examine the oyster without needing to physically manipulate it. In this way, the lesson provided scaffolding for students with limited motor function as well as provided a means of engaging with the material without needing to touch the oyster if students were unable or unwilling to themselves. Additionally, all handouts used for the activity used fonts, that have been shown to improve readability for students with dyslexia.

In my teaching I try to provide multiple approaches through which students can engage with course content. In Climatology (GEOG 323), I have created laboratory overviews (available upon request) that students can access either through engaging with a written overview, or by watching a lab video. These overviews contain the same information, detailing the objectives of the labs, due dates, policies as well as insights into questions students have struggled with in the past, but by including both a written and video version, students can engage with the content in multiple ways.

ii. Objective: Create an inclusive classroom environment

Developing an inclusive classroom is a constant, ever evolving process which takes continual reflection and engagement. Creating an environment where students feel supported intellectually and academically and feel a sense of belonging in the classroom is not universally applicable. Understanding who our students are, the context of the curricula we teach, and what institutions and program we are in is necessary to ensure our students get the education they deserve.

Methods:
In part creating an inclusive classroom means engaging with critical pedagogy to utilize science and technology to address gender issues, present science through the lens of context within a multicultural world and help students engage in sociopolitical actions.

As part of the course I proposed during The Inclusive Classroom: Difference, Power, and Discrimination (GRAD 542), I created an example syllabus (Appendix III) and sample lesson plan

examining the Flint Water Crisis through a social justice lens (Appendix IV). The course provides an opportunity to scaffold difficult topics by slowly increasing the complexity of questions towards more difficult and controversial ones. By beginning with opinion and low stakes questioning techniques and building to higher level questions, students learn how to appropriately and constructively engage with complex and difficult content. As part of the lesson, I utilize small group and large group discussion of literature the students were to engage with prior to the lesson. Using small group discussion provides an opportunity for lower-stakes engagement with the content, such that students can begin to solidify and practice their viewpoints prior to discussing with the whole group. Using contemporary examples such as the Flint Water Crisis provides students with an opportunity to engage with the unequal distribution of power across economic, social, and political institutions and demonstrate how those unequal distributions result in discrimination.

In the classroom, students can feel a sense of isolation and disconnect from their peers and professor. Reaching out for help especially can seem daunting. To create more of a connection with students and show I am there to provide help, during my second year as a teaching assistant, I began making it a practice to include an announcement introducing myself at the beginning of the course. Especially in online classrooms, I have noticed a significant increase in the number of questions I receive when I include this announcement. In addition to telling students a little about myself, I also include methods of contacting me and a statement regarding my goals as the teaching assistant for the course. Most recently my announcement read in part: "My goal as your TA is to help you succeed in this course and help you improve your scientific writing. I encourage all of you to reach out to me if you need any assistance". While I hope these goals are known to all of my students even without an announcement, letting them know that I want them to ask me questions and reach out if they are struggling can help students feel more confident to do so.

iii. Objective: Use active learning practices

Whether in an online or in person course setting, student engagement with course material is critical to form a deeper understanding and connection to course concepts. My role in these situations is to act as a facilitator of student learning rather than the provider of knowledge.

Methods

I use *teamwork* to help students cultivate their knowledge. *Small group work* provides a support system for students and provides a lower stakes environment where students can feel more confident sharing their knowledge. For example, during my time as the graduate teaching assistant in Environmental Geochemistry (GEO 431/531), and subsequently as a guest lecturer in the class, students worked in groups during an activity (Appendix V) I created examining the lead record in Law Dome. Working in small groups allowed students to tackle interpreting the data from peer-reviewed literature to create a meaningful understanding of ice cores as recorders of environmental pollution. Walking around during these small groups, it was interesting to see the students who didn't often speak up in whole-class discussions contributing and discussing the questions with their groups. Listening to the thought process of students within the class while working through the activity, I was able to learn where the class was struggling and examine student thought processes. *Whole class discussions*, as were used following the small group activity in

Environmental Geochemistry following small group discussion creates a more collective knowledge base and brings discussion to a broader context. Listening to people from other groups share their answers or thoughts on content allows students to consider other viewpoints

Even when utilizing lectures to convey content, I incorporate student participation by asking questions and conducting demonstrations using student volunteers. For example, during laboratory introduction lectures in Physical Geography (GEOG 102), students worked with me to demonstrate the influence of angle of insolation on temperature, as well as collectively calculate a water budget.

Experiential learning through *laboratories*, *field trips*, and *field courses* helps students learn by "doing" science. For example, during Physical Geography (GEOG 102), I facilitated the collection of river hydrology data from a river located close to the Oregon State University campus. During the laboratory, students measured stream velocity using an orange and a known length of the river, determined stream discharge from measuring steam width, depth and flow. Students then used these values to answer deeper questions about stream discharge, compare their measured and calculated values to other rivers, hypothesize how landscape changes might change annual stream discharge, and reflect on accuracy of measurements.

Other field related experiences such as ship-board data collection, can provide real-world connections to students interested in careers in the earth science and make deeper connections when later engaging with the data resulting from such experiences. During my time at Oregon State University, I have facilitated 5 (2 undergraduate, 3 graduate) ship-board field experiences, and 3 (graduate) marsh coring experiences. In all of these field experiences, students have used the samples and data collected in future assignments or projects. Outside of the courses I've taught, I have also worked with a total of 31 students (10 undergraduates, and 21 graduate) through opportunities to participate in field work in connection with my research on the coast of Oregon. Teaching students how to collect samples or measurements using tools earth scientists frequently use, gives students the opportunity to gain valuable skills and examine potential career options.

iv. Objective: Facilitate critical thinking

Taking the initiative within one's own learning, identifying areas of confusion and determining ideal ways to correct these areas and pursue new knowledge are the hallmarks of self-directed learning. In order to foster students' process of becoming self-directed learners, I need to provide space to think critically and deeply about a subject.

Methods:

For students who are new to higher education or new to critical thinking practices, this process can be challenging especially since critical think often leads to students producing wrong answers or simply existing for a period in a state of frustration and confusion. When teaching courses where students may be new to critical thinking practices, I use small steps to work up to higher level critical thinking by using techniques such as:

- Asking open ended questions
- Asking students to explain their reasoning
- Providing time for students to think about answers to questions

- Using students answers when later discussing a concept or topic
- Not providing the correct answer for every question, but instead allowing students to search for their answer.
- Small group work

In addition to these practices I try to *shift attention from getting the correct answer to creating evidence-based conclusions*. While I was the teaching assistant for the laboratory sections of Physical Geography (GEOG 102), students were asked to solve a mystery about a geological phenomenon in the Pacific Northwest. During the lab students examined evidence and clues containing geologic information to observe, formulate a hypothesis about, and interpret. Prior to beginning the lab, I discussed the scientific method with students as well as how science is by nature, messy. The focus of the lab from the beginning of the class was not to get the right answer but to use the evidence from the lab to craft an interpretation. During the lab period I was often asked "Is this right?". In response, rather than saying yes or no, I asked them to explain their reasoning. Grading of the assignments as well was based on students' level of interpretation rather than whether they were correct. While frustration was expressed by several students through the course of the lab, these kinds of experiences are important to improve students' comfort with not knowing the correct answer as well as using evidence to craft their understanding.

Even when students are more experienced with critical thinking practices, I use the same techniques to engage students. However, I also work to *increase independence of student learning*. While editing student papers in Climatology (GEOG 323), I use in-line edits for smaller comments, but the focus of my editing is to provide overarching areas where students can improve. Rather than giving pointed advice on improvements in these final comments I provide 3 areas of the paper that need more work. This gives students an idea of where they should focus their efforts for the next iteration but requires them to put in the time to make the improvements. Examples of comments given below are taken from the second drafts of student research papers.

Student 1:

Nice work shifting the focus of your paper. It's definitely a climatology paper now! You've also done a good job using your figures for this draft. As with the previous draft you'll find comments both in your rubric and on the paper itself.

In response to your informal writing, I recommend using the library resources to help you find sources on wind patterns. If you're struggling to find search terms let us know once you've done a little digging on your own. You'll find more specific comments on the new section on the paper itself.

For the last draft I want you to focus on:

1) DEPTH: Some of your new sections are largely lacking in detail. Your major circulation modes section is starting to develop, however you're missing discussion of how NAO impacts the Nile. In your old sections as well there are areas that need development. We really want to see more than just bare-bones descriptions. See comments on the paper for how to improve some of these. You'll want to think about this when developing for your final sections of the paper.

2) DISCUSSION: Your discussion is largely unchanged from the last draft. This is the area we want you to interpret the facts you previously presented in your paper to prove your thesis statement.

3) CONCLUSION: Similarly to the discussion, this section is largely unchanged. Since you've added new information to your paper we want to see it evolve a bit to reflect that.

Please reach out to me or Dr. Allan if you have any questions. We are happy to help.

Best,

Sophie (Mar 4 at 4:40pm)

Student 2:

As with the last draft, you'll find comments in the rubric as well as on the paper itself. Reminder, each draft must show that edits from the previous draft have been addressed. You've lost considerable points here because the first draft content was largely unedited. You mentioned you were struggling with your abstract and discussion. This is completely normal. These are arguably the hardest sections of a paper to write. Your abstract is already quite well done. I suggest adding a bit more on your relevant findings from your paper.

For your final draft I'd like you to focus on:
1) CONTENT: Go back through and update your first draft sections using the comments from draft 1. In addition, go through the comments on this draft for information on what is missing from your new sections.

2) DISCUSSION: In your discussion, we want to see you interpreting your results to support your thesis statement. Think about how the results you've included demonstrate that your thesis statement is correct.

If you have any questions please reach out to me or Dr. Allan. We are happy to help.

Sophie (Mar 4 at 2:51pm)

In addition to my feedback and questioning, I employ scientific literature to help students improve their ability to interpret data. The activity created for Environmental Geochemistry (GEO 431/531) used figures from a paper by Vallelonga et al. (2002) to engage students in interpreting the lead record from Law Dome, Antarctica (Appendix V). Students used the figures, their previous knowledge from the course as well as the interactive lecture (available upon request) to answer questions about natural and anthropogenic sources as well as engaged with thinking about the issues and errors potentially associated with the results of the paper. In this way students were able to both interpret and engage with the data and think critically about the study. Asking students to specifically think about errors encourages students to not simply take these papers as facts, but to examine the assumptions and methods in a critical way. I also give students a chance to *reflect on their learning*.

9. Reflection: Please describe:
    a. What questions, ideas, or skills do you feel more confident in after completing the activity?

    b. What still feels confusing?

    c. What feels more confusing now that you've completed the activity?

The activity for Environmental Geochemistry (GEO 431/531) incorporated questions to complete after the activity was completed. These questions in conjunction with discussing the activity with their peers helped ensure students were thinking about their learning and allowed me to see where students were struggling with the content and examine how the activity could be improved to reduce confusion for future students.

Section V. Description of Course Materials

i. Accessibility of STEM – LEAFS Lesson Plan & Activity

Context:
In the Winter of 2019, I was asked to be a graduate student mentor for one of four groups apart of Leading and Enabling Adolescent Futures in STEM (LEAFS). The goal of the program is to "help inspire youths with disabilities to find their passion by interacting with several STEM based activities. We aim to promote a more inclusive environment and develop diversity in thought for future engineers, as they tackle tomorrow's most challenging technological problems." While the program had previously included only engineering based education, the group wanted to expand its network into the natural sciences. Over the course of three months, I taught three undergraduate engineering students about concepts related to ocean acidification, the carbon cycle, and oyster ecology, and facilitated the creation of a four-hour camp program for students with mental and physical disabilities in grades 6-12. In January 2020 the team implemented the lesson plan for a group of 8 students from around the state of Oregon.

Description of course content created:
The goal of the lesson (Appendix I) was to get students thinking about the issues of climate change, both on a large and small scale. Specifically, the goals were to engage students with the issue of ocean acidification and the ways in which humans have driven changes in ocean chemistry. Learning objectives of the lesson were to:

1. Define chemistry terms including pH, acidic, basic and buffer.
2. Describe how pH relates to ocean acidification and why it negatively impacts some organisms.
3. Explain why seawater resists changes in pH more than freshwater.
4. Communicate why oysters are important organisms in the state of Oregon.

As part of the lesson students engaged with hands-on activities including examining and dissecting a Pacific Oyster (Appendix II). The purpose of this activity was to engage students with a real organism and discuss the impact of ocean acidification on the Pacific Northwest and the organisms that live there.

ii. Engaging with Critical Pedagogy – Proposed Course Syllabus & Lesson Plan

Context:
As part of the Graduate Certificate in College and University Teaching (GCCUT) program, I elected to take GRAD 542: The Inclusive Classroom: Difference, Power, and Discrimination (DPD). The course examines research and strategies for creating an inclusive classroom. Throughout the course discussion of theory and research were used in concert with hands-on opportunities to cultivate and hone teaching and course development skills. Through the course I developed a proposed course: GEO 4XX: Natural Resources, Economics, and Environmental Justice.

Description of course content created:

This course deals with the geology of energy and mineral resources on which society depends, and the engineering, environmental and economic factors that control access to them. It examines how race, class, and gender interact to produce and sustain inequalities, the role of politics (local, state, national, & international) in shaping regulation and commerce, and the environmental footprint of resource extraction.

Course learning objectives are for students to be able to:

1. Describe the processes that concentrate natural resources
2. Examine historical environmental justice issues associated with natural resource extraction.
3. Examine the spatial inequities that arise from the siting of hazardous facilities in minority and low-income urban and rural communities
4. Analyze how structural factors and community characteristics influence environmental outcomes.
5. Gain familiarity with the discussion of natural resources in the media.
6. Communicate the connections between social, environmental, political, and economic factors governing extraction and use of natural resources.

As part of the course I developed a syllabus (Appendix III) as well as a sample lesson plan on the Flint Water Crisis (Appendix IV). In addition to the course syllabus I also developed a detailed lesson plan on the Flint Water Crisis, which would be enacted during the course. The example lesson plan would take place roughly half-way through the course. Students utilize the knowledge they've gained through discussion of sources, transportation, and effects of toxic heavy metals to contextualize the discussion of unequal burdens of toxic metal contamination. Students will be using the Flint Water Crisis as a case study for toxic heavy metal contamination and examine the factors that allowed the crisis to occur. This lesson alights with course learning objectives 3-4 and 6. Specific learning outcomes for this lesson are for students to:

1. Identify and discuss the role that racial and economic segregation in Flint, MI played in exposing predominantly low income, and majority black communities to toxic lead poisoning.
2. Analyze how the history of Flint as well as government politics and unequal distribution of power lead to the crisis.

Takeaways:
Although this course is only in the development stage and I have not been able to teach this course, it demonstrates many of the In part, taking this course provided the opportunity to examine leading research on critical theory, and methods of reflecting on, and engaging with the ways power structures influence both our classrooms and our course content.

iii. Using Active Learning & Critical Thinking in the Classroom – GEO 431/531: Environmental Geochemistry Activity

Context:
In spring 2018 I created an interactive lecture (slides available upon request) and activity (Appendix V) for undergraduate and graduate students in GEO 431/531: Environmental Geochemistry. The subject of the lecture was on ice cores as environmental archives of lead

pollution. This lecture took place mid-way through the quarter, after students had been briefly introduced to Pb pollution and lead isotopes. The next time this course was taught, in spring 2020, I was asked to guest lecture and present this lesson for a second time.

Description of course content created:

A brief description of the course (GEO 431/531) can be found in Section I of this portfolio. The learning objectives for the course as a whole were for students to be able to:

1) Explain the fundamental geological, chemical, physical, and biological processes that impact contaminant speciation and distribution in natural and disturbed systems
2) Understand the relationship between the demand for energy and natural resources and the environmental impacts
3) Identify appropriate geochemical techniques for identifying contaminant sources, pathways, and fate
4) Discuss techniques for the management of environmental pollution.

Addressing the first learning objective of this course, this activity (Appendix V) provided an opportunity for students to examine the lead pollution record as well as speciation from ice cores. The goal of this activity was for students to examine and interpret several figures from a paper from Vallelonga et al. (2002). Using their previous introduction to lead pollution and lead isotopes, I created an activity that required students to create evidence-based conclusions from the data and evaluate the quality and accuracy of the data.

The learning objectives of this activity were for students to be able to:

1) Identify anthropogenic influences in the lead isotope record.
2) Explain the reasons why lead concentration and lead isotope ratios vary both prior to and after anthropogenic influences are seen.
3) Interpret a three-isotope plot diagram to determine sources of lead pollution at Law Dome.
4) Determine sources of error associated with the results of the paper.

In addition to interpreting and examining the lead pollution record, I also included a reflection portion of the assignment, for students to determine what areas of the content were most challenging, and where they felt their knowledge improved.

Section VI. Evidence of Student Learning

GEOG 323: Climatology - Successive student papers:

1. Highlight segments of successive student papers from WIC course.
2. Use student feedback from throughout the term to showcase student learning and where they felt they improved as well as impact of instructor comments on quality of writing.

Section VII: Steps to Improve Teaching

In order to improve my teaching practice, I completed the Graduate Certificate in College and University Teaching (GCCUT) at Oregon State University. Through this program I learned theories of teaching and learning in higher education as well as research and research-based practices related to teaching and learning in higher education. On top of coursework taken through the GCCUT program, I also sought out professional development to augment and improve my practice. Through both my coursework and professional development I have focused when possible on creating an inclusive classroom as well as effective practices of teaching in online and large enrollment courses.

Table 2. Courses taken as part of the GCCUT program.

Course	Required vs. Elective	Credits	Course Description
GRAD 560: Theories of Teaching and Learning in Higher Education	Required	3	Examines theory and research related to teaching and learning in higher education.
GRAD 561: Course Design and Methods for College and University Teaching	Required	3	Explores research and research-based practices related to teaching and learning in higher education contexts, emphasizing course design, facilitation, and other instructional techniques
GRAD 610: Internship in College and University Teaching	Required	3	Uses student's real-time graduate student teaching as scaffolding to reflect on and improve teaching through collaboration with peers and instructors.
GRAD 607: Capstone Seminar in College and University Teaching	Required	3	Provides structure and evidence for crafting a well-made and cohesive teaching portfolio.
GRAD 542: Inclusive College Classroom: Difference Power and Discrimination	Elective	3	Examines research and strategies for creating an inclusive classroom. Discusses theory and research in concert with hands-on opportunities to develop and hone teaching and course development skills.
GRAD 513: Professional Development in College and University Teaching	Elective	3	Offers a self-directed learning experience through which students seek out professional development opportunities aligned with chosen goals in order to improve teaching practice. Programming chosen for this course focused on created an inclusive classroom environment, teaching in an online setting, and teaching in a large classroom setting.

Table 3. Professional development workshops and seminars attended.

Date (& Time Commitment)	Workshop/Seminar Name	Location	Presenter	Brief Description
2/25/20 (1.5 h)	CEOAS Unpacking Diversity Series: Growing a culture of dialogue	OSU Campus	Jeff Kenney	Discussed practical tools for discussing and changing the climate in higher education through dialogue and communication.
1/15/20 (1 h)	CEOAS Unpacking Diversity Series: Disability, ableism, and languages	OSU Campus	Gabe Merrell	Discussed barriers to involvement and learning in the geosciences experienced by individuals with disabilities. Discussed strategies for accommodating learning curricula and geosciences to be more inclusive.

10/22/19 (1 h)	CEOAS Unpacking Diversity Series: Cultural Appropriation: what's behind what you see	OSU Campus	Jane Waite	Examined how the need to represent, mimic or "honor" cultures other than our own, and other actions related to colonial power structures impact college climate.
6/28/19 (2 h)	CEOAS Science Communication Brown Bag Seminar: SciComm Using Twitter and professional websites	OSU Campus	Sarah Seabrook	Discussed tools for designing an effective website as well as cultivating a professional science Twitter.
6/14/19 (1.5 h)	CEOAS Unpacking Diversity Series: Supporting Graduate Student Mental Health: What faculty, friends, and family can do	OSU Campus	Julie Posselt	Examined results of Dr. Posselt's work on depression and anxiety among US graduate and professional students as well as the forms and sources of support that women and underrepresented minority students in high-diversity STEM PhD programs reported as salient to their persistence and well-being.
5/2/19 (1 h)	CEOAS Unpacking Diversity Series: Whiteness in higher education	OSU Campus	Erich Pitcher	Explored the different manifestations of white supremacy in the context of higher education, and the systems that make them invisible. Identified the impacts it has on student life and experiences.
2/15/19 (1.5 h)	CEOAS Science Communication: Interview Master Class	OSU Campus	Jane Greenhalgh & Alice Winkler	Explored tools and strategies for giving compelling interviews about science and communicating science effectively.
11/27/18 (1 h)	CEOAS Unpacking Diversity Series: Microaggressions, macro aggressions and racial fatigue on campus	OSU Campus	Marta Moldonado	Discussed conscious and subconscious, verbal and nonverbal, and environmental microaggressions towards minority groups. Explored common and less common microaggressions in the graduate student environment. Examined how microaggressions impact graduate student identity and mental health.
11/6/18 (2 h)	CTL Tuesday Teaching Talks: "Class Time" lectures & active learning	OSU Campus	Devon Quick	Considered approaches to combining student-centered activities and presentation-style instruction in one class time session.
10/29/18 (1 h)	CIRTLCast: How can we interrupt and mitigate implicit bias when we witness it?	Online – CIRTL	Eva Pietri	Discussed recommendations for interrupting and mitigating implicit bias including concrete tips and strategies.
10/23/18 (2 h)	CTL Tuesday Teaching Talks: Student feedback & responsive teaching	OSU Campus	Katy Williams	Learned strategies for collecting, analyzing, and responding to mid-course student feedback.

10/22/18 (1 h)	SERC, InTeGrate, Webinar: Beyond Teaching: Using context diversity to help students thrive while broadening diversity in the geosciences	Online – SERC	Gary Weissman & Roberto Ibarra	Learned about multicontext theory and context diversity. Examined how context diversity may influence my teaching, research, and academic careers. Discussed concrete examples and strategies for activating context diversity in the classroom.
10/22/18 (1 h)	CIRTLCast: How can we minimize implicit bias in our academic communities?	Online - CIRTL	Wayne Hilson, Jr.	Discussed recommendations for minimizing implicit bias in STEM classrooms, higher education institutions, and beyond.
10/12/18 (1 h)	CEOAS Unpacking Diversity Series: Intersectionality: more than a buzzword	OSU Campus	Luhui Whitebear	Discussed with intersectionality means and how the term has been co-opted for higher education. Compared student and faculty perspectives on intersectionality.
10/9/18 (2 h)	CTL Tuesday Teaching Talks: Supporting diverse learners through culturally responsive teaching	OSU Campus	Jeff Kenney	Explored the theory and practice of culturally responsive teaching.
10/8/18 (1 h)	CIRTLCast: How can we identify implicit biases in ourselves and others?	Online – CIRTL	Sarah Eddy	Discussed reactions to implicit bias in STEM as well as reflected on my own beliefs.
10/2/18 (2 h)	CTL Tuesday Teaching Talks: Creating equitable & culturally inclusive environments	OSU Campus	Jane Waite	Explored the questions: - Why do students experience the same class differently? - How does who we are impact the ways we teach and learn? - What constitutes an equitable environment?
10/1/18 (1 h)	CIRTLCast: How pervasive is implicit bias in STEM?	Online – CIRTL	Leslie Ashburn-Nardo	Discussed the prevalence of implicit bias in STEM, specifically: - The impact of diversity on student learning, on how diversity can enhance learning, and how inequities can negatively impact learning if not addressed. - How an instructor's beliefs and biases can influence student learning.
9/20/18 (8 h)	Ecampus Online Teaching Workshops: Teaching an online course	Online – Canvas	Self-paced course	Learned practical tools and strategies for teaching an online course using Canvas.
9/25/18 (2 h)	CTL Tuesday Teaching Talks: Teaching philosophies and portfolios	OSU Campus	Brooke Howland & Tasha Biesinger	Discussed how to use teaching philosophies and portfolios to capture the evolution of your teaching, ideology, and accomplishment.
5/17/18 (4 h)	Social Justice Education Initiative Workshop: Session 2	OSU Campus	Jane Waite	Built on learning from Session 1 (4/17/18) to explore important structures and tools to help apply equity and social justice principles.

4/27/18 (4 h)	CEOAS Science Communication Workshop: Distilling research into a story	OSU Campus	Abby Metzger, Nancy Steinberg, & Jennessa Duncombe	Learned practical skills for identifying and distilling science stories. Practiced translating research into a hook, elevator pitch, headline, or pithy summary.
4/17/18, (4 h)	Social Justice Education Initiative Workshop: Session 1	OSU Campus	Jane Waite	Engaged with questions related to: - What is the story of the current context in Oregon – how did we get here? - How do you locate yourself in this story? - Why does social justice matter?
4/16/18 (2 h)	Social Justice Education Initiative Workshop: Creating equitable teaching & learning environments	OSU Campus	Jane Waite	Discussed questions related to: - What constitutes an equitable teaching and learning environment, and why are they so critical to student success? - Why do various students experience the same class so differently? - How does who we are impact the ways we teach and learn?
4/4/18 (1.25 h)	Unpacking Diversity Series: Institutional and systematic discrimination in higher education	OSU Campus	Dwaine Plaza	Discussed systemic and institutionalized discrimination, issues graduate students of color face on the Oregon State University campus, how pipelines of privilege keep women out of STEM, as well as administrators and faculty role in helping to make OSU a better place for students of color and women overall.
2/22/18 (4 h)	Women in Marine Science: Sexual Misconduct Awareness and Response Training	OSU Campus	Aili Johnston	Developed practical skills in recognizing and addressing sexual misconduct in academic settings, both on and off campus with a focus on awareness, prevention and response.
1/26/18 (8 h)	2018 Oregon Women in Higher Education Annual Conference	Sunriver, OR	OWHE, various	Networked with women leaders in higher education in the state of Oregon. Participated in professional development and advancement activities. Examined methods of building a meaningful community and personal growth. Discussed systemic change and empowerment in higher education.

I. Creating an inclusive classroom

One theme of my programming is designing a culturally inclusive classroom guided by culturally mediated instruction. The focus of this programming was on learning practices for developing equitable learning environments.

During Session 1 and 2 of the Social Justice Education Initiative Workshop, Jane Waite stressed the hidden side of our classrooms. Power dynamics can play a role in reducing sense of belonging in the classroom. The dominant culture is the group with social, economic, and political power. Those who do not fit the description of the dominant culture can experience alienated and excluded from the learning environment. Understanding the perceptions and context of students and instructors in the classroom is critical to beginning to create equitable teaching and learning environments. We, as teachers must recognize that social constructs will persist in the classroom unless we actively work against them. Providing a diversity statement on a syllabus or making a set of agreements and rules for the class to follow is not enough, as these will mean different things to different people. Jane also described how instructors can allow alienation can continue when they don't address inequalities, disrespectful or ignorant comments regarding student identities, etc. Teachers need to be prepared to step in, but they need to be thoughtful and cognizant of their message prior to doing so. If needed, Jane suggested telling students that there's something that needs to be addressed here and that it will be soon. In this way, it allows the teacher to address issues of inequality in the classroom in a thoughtful way, and give themselves time to consider their words, but doesn't allow alienation to worsen.

During the Tuesday Teaching Talk (TTT), "Supporting Diverse Learners Through Culturally Responsive Teaching", Jeff Kenney described that creating an environment where students feel supported intellectually and academically and are extended a sense of belonging in the classroom regardless of identity, learning preferences, or education is not universally applicable. Our classroom needs to be contextualized with understanding of who is in our classes, who we are, what curricula we are teaching and what institution or program we are in. Teaching in the context of culture and using culturally responsive pedagogy allows instructors to engage students with the socially, economic and political influences that shape our knowledge and influence our environment.

Apart from seeking professional development on teaching techniques, I have sought programming that helps me learn about a range of social justice topics. The Unpacking Diversity Series has provided deeper knowledge and context related to topics including institutional and systemic discrimination present in higher education settings, microaggressions, white supremacy in higher education, and topics related to disability, ableism, and language. Seeking out knowledge on issues facing students in higher education can help me improve my contextual understanding of my classroom and students and address issues of inequality.

II. Teaching online and in large classroom settings

A second theme of my professional development is teaching in online and large classroom settings.

To gain knowledge about teaching in an online setting, I utilized Oregon State University's ECampus Online Teaching Workshop: Teaching an Online Course. The course stresses the

importance of obtaining timely and useful feedback from the instructor in order to improve student engagement with course content. Assessments including quizzes, discussions, polls etc. Methods of assessing students through quizzes using multiple question types including true/false, multiple choice, short answer, and fill in the blank were included. In addition, the course suggested using discussion starters for engaging students in discussion boards. These starters suggest that teachers utilize discussion boards by posing a question that has more than a single answer. Then as the week progresses and students are engaging in the discussion, the teacher may move to other questions throughout the week. These questions are therefore guided by the discussion and do not seem unrelated to the work that students have been doing thus far.

During the TTT "Class Time" Lectures & Active Learning., Devon Quick discussed methods of promoting productive classroom discussions both as a large group and in small groups. Small group discussion was highlighted as a tool to improve student learning. Facilitated small group work provides a means of making a large classroom feel smaller and can help promote student growth. Thus, there is a need to develop an environment where students feel comfortable sharing their knowledge and thoughts with the group when the instructor is not immediately present or available to listen to everything said. Devon Quick suggested varying groups during the course but allowing enough time within each group for students to build relationships with their class members. Other techniques suggested during the workshop included "Think-Pair-Share", reframing questions, scaffolding questions, using "muddiest points" to delve into student questions, and allowing enough wait time during questioning.

Section VIII. Student Evaluation of Teaching

As I work to improve my teaching practice, recognizing and being informed by student feedback is a helpful indicator of development and success. As a graduate student, my duties have mostly been focused on effectively working within a course that is already created. As such I have not yet been a part of developing the full course content. Thus, I have selected student feedback that most reflects the position I fill as a graduate student and link to my goals as an educator, namely, to create an inclusive classroom environment and engage students in the learning process. Table 4 therefore, shows a reflection of my ability to create a welcoming classroom environment, my evaluation of student performance, interest in student learning, and availability for extra help.

Table 4. Summary of student evaluations of teaching. Response rate represents the percent of the total students in the course who completed the teaching evaluation. Scores on selected student responses represent a scale of 1 = Very Poor; 2 = Poor; 3 = Fair; 4 = Good; 5 = Very good; 6 = Excellent. Scores that were not applicable are omitted (-).

Course	Total # Students	Response Rate	Ability to develop a welcoming classroom environment	Interest in my learning	Availability of Extra Help	Evaluation of student performance
GEOG 323: Climatology (online)						
Winter 2019	25	24%	5.1	4.9	5.3	5.1
Spring 2019	29	30%	5.3	4.6	5.3	4.8
OEAS 500: Cascadia Field Trip						
Fall 2019	20	50%	5.8	5.7	5.8	-
Fall 2018	14	50%	5.7	5.7	5.7	-
Fall 2017	24	41%	5.7	5.9	5.8	-
GEOG 203: Human Environmental Geography						
Winter 2019	70	34%	4.7	4.7	4.8	5.0
OC 103: Exploring the Deep/Geography of the World's Oceans (online)						
Winter 2019	52	59%	4.6	4.3	4.3	4.5
Fall 2018	45	51%	4.8	4.6	4.4	4.6
Winter 2018	55	49%	5.3	5.0	5.1	5.1
GEO 431/531: Environmental Geochemistry						
Spring 2018	15	20%	5.0	5.0	5.0	5.0
GEOG 102: Physical Geography						
Winter 2018	41	20%	4.5	4.5	4.8	4.5
GEO 430/530: Geochemistry						
Winter 2017	27	62%	4.4	4.2	4.5	4.4

Takeaways from Student Evaluations:

From my student evaluations of teaching I find that my lowest scores came from courses where I am mostly responsible for grading rather than working with students directly (GEO 430/530: Geochemistry and OC 103: Exploring the Deep/Geography of the World's Oceans). While OC 103 showed lower than average scores, I believe it reflects the level of engagement students I have with students during the course as opposed to it being an online forum. As I was mostly grading in this course, students did not have a significant amount of time to interact with me outside of seeing their grades and comments on their work. In another online course, GEOG 323: Climatology, students work with me directly during the term while working on their term papers.

Selected student comments:

GEOG 323: Climatology

Winter 2020

- "Sophie was an excellent TA! She was prompt to respond to questions. She returned assignments very quickly. She was overall incredibly helpful with this course. I cannot think of any ways to improve this course."

Spring 2019

- "I appreciated the weekly updates and info for the labs, and feedback on the drafts. I think having more communication from topics students expressed confusion on in the discussion boards would be helpful."
- "The labs feel disconnected from the course. I expand on this in the Allan review. Sophia had excellent communication and was clearly diligent in her duties."
- "Videos were mostly useless reading off of the PowerPoint, reiterating facts that were in the syllabus. Waste of time. Labs were not written to meet the level of detail in the provided lectures and reading materials."
- "I'm pretty satisfied with my grading on the labs."
- "You are a great professor, Sophia. Thanks for the help this term."

OEAS 500: Cascadia Field Trip

Fall 2019

- "Sophie was the tape that held us together, this course would never have worked without her."
- "You're a rad TA and super cool human being. Thank you for all you did for this field course - organization, keeping all the humans together, setting up and taking down, meals, driving, etc. etc. I hope they pay you well to TA this course because you did a ton of work, and you were smiling almost the whole time (even when I'm sure we were very annoying). THANK YOU!!"
- "Sophie puts 110% in organizing and making sure this course runs smoothly. She is caring, welcoming and supportive and definitely a person you can feel comfortable walking up with a need."
- "Thanks for helping make Cascadia a great experience!"

Fall 2018

- "Sophie's attitude and intelligence contributed greatly to the success of the Cascadia trip. She worked tirelessly and always without complaint. Her ability to organize, troubleshoot, and educate will carry her far into her professional career. She is top notch."

- "Sophie was awesome- so organized and on top of details required for the course to go smoothly."

Fall 2017

- "Sophie was a great TA! I really enjoyed her help and getting to know her."
- "Cascadia was so much fun! This was the perfect way to start my graduate education. I loved the trips to Mt. St. Helen and Cape Lookout especially. Having this experience helped me better understand some of the concepts I was learning in other courses this term because I could apply the information to a real-world situation (ie talking about coastal hazards is a lot easier when I can think about them in the context of the Oregon coast). Sophie was really helpful and was a great resource for questions about graduate student life from a graduate student perspective. The ONLY edit I would make to this course is to make the trip like a day or two shorter (which is probably not possible I understand). I was just a bit burned out from the group togetherness by that point :) Otherwise, so awesome!"
- "Sophia was a bit intimidating at first, but once we talked with her more she's great! Really helpful on the trip and was glad to have her around!"

GEOG 203: Human Environmental Geography

Winter 2019

- "I think this evaluation is for the TA that graded the midterm papers. If so, thank you for that. You got them done very quickly."
- "I never met Sophia. My suggestion would be to come to class at least once to introduce yourself. It'd hard to trust that your papers are being graded right when you don't even know who's doing it. Personally I didn't even see the purpose of having a grading TA for only two assignments."
- "Sophia graded two of our assignments and we never met her. She gave pretty good feedback on the assignments though."
- "While I am not that familiar with this instructor I found her grading to be fair and timely."

eOC 103 – Exploring the Deep/Geography of the World's Oceans

Winter 2019

- "Great class!"
- "Give more feedback on assignments and what was wrong and where to find the correct answer if there was a wrong answer"
- "I truly enjoyed this course. Thank you for helping make this a wonderful experience."
- "Grading has been very strict and too many questions to answer in soo little time on exams. Replace exams with a project and paper format for student to gain better learning outcome."
- "Easier on grading."
- "Not many comments on how to improve. The class was recommended to me by my academic advisor, and it should not have been. I am a "A/B" student and this class has been near impossible, for me. I think this class should be reserved for individuals with a background or a special interest in geology, geography, or environmental science. The information was so specific and so foreign to me that I just couldn't grasp it. As a very capable student, I can confidently say that I haven't learned anything thus far. Everything I learned has been simply to pass a test or finish a lab and once I memorize it, it disappears because it's so foreign to me (and probably many others?). Maybe additional modes of

learning would be helpful? Sometimes movies and or simulators can be helpful for people who are absolutely unaware of the simple concepts of a topic."

- "As I said before, I am an auditory learner and would benefit from online lectures in addition to reading the PowerPoint slides."

Fall 2018

- "This was a great class with lots of good info. Wish I could've done a lot better."
- "She left helpful comments when I got questions on the quizzes or labs wrong. Nothing to improve!"
- "Instructor Sophia Wensman, did a good job grading assignments the fair way. However, I believe the professor who organized and teaches a class should be the one grading our assignments. It would make more sense that whoever created the assignment is the one evaluating."

Winter 2018

- "Very helpful to the course"
- "On some of the labs, I was docked -5 points for a "copied answer". I simply took notes while doing the assigned readings and going over the lectures so I fail to see how this is a copied answer, but rather just referencing course material that has been provided to us and I was diligent in utilizing said material."
- "Very positive experience on a subject that originally didn't appeal so much for myself."
- "Sometimes there wasn't enough information on the labs to answer them."

GEOG 102: Physical Geography

Winter 2018

- "Awesome job! I had so much fun in this class and lab was my favorite part. Keep doing what you're doing, because its pretty awesome!"
- "Felt very fast paced."
- "Sophie did a great job with explaining concepts and holding frequent office hours to help with understanding the concepts."
- "Felt like she really wanted us to do well on the labs"

GEO 430: Geochemistry

Winter 2017

- "I know it's not Sophia's fault but recitation should really be held in a computer lab. Many of the labs were very excel intensive and if you did don't have a laptop there isn't much incentive to hang around"
- "Office hours were not available."
- "As the lab/recitation time was mostly devoted towards individual work on labs, this feedback is largely related to grading. It would be helpful for students to receive clearer expectations of what they will be graded on. There were a lot of points taken off on assignments for formatting, when it wasn't made clear to students that was going to be graded. It's fine to grade based on formatting, just helpful to know it's going to happen!"
- "I think introducing labs and going over what is involved in each one at the beginning of lab classes would be a useful way to help students understand what is expected for each lab, as well as show that you are more available for help if needed."

Section IX. Appendix

Appendix I. Lesson Plan for LEAFS Program

LEAFS Lesson Plan - Ocean Acidification

Learning Objectives:
The purpose of this day is to get students thinking about the issues of climate change, both on a small and large scale. It is important to get these young minds thinking about the problems the future will face, and climate change is a huge issue.
At the end of this lesson, Students will be able to:

5. Define chemistry terms including pH, acidic, basic and buffer.
6. Describe how pH relates to ocean acidification and why it negatively impacts some organisms.
7. Explain why seawater resists changes in pH more than freshwater.
8. Communicate why oysters are important organisms in Oregon.

Outline:

1. Introductions (5 min)
2. Introduction to Chemistry
    a. Elements and Atoms - what they are
    b. Introduction to molecules
3. Overview/introduction to acids and bases through a PowerPoint (10 minutes)
    a. Have students recognize acids and bases from their experiences- have them taste lemon juice and baking soda, have them think about what similar substances they're familiar with
    b. Activity - Testing the pH level of different liquids with bromothymol blue dye (5-10 min)
    c. Teach the students about acid base reactions - why do they react so well, what kinds of reactions are there, what is the general formula for these reactions (baking soda vinegar volcano?)
    d. Introduce the concepts of alkalinity and buffering
4. Introduce the carbon cycle: what chemicals are involved, how the reaction works, how it happens in our ocean. (5-10 min)
    a. Activity - Creating and testing buffering capacity of different water types (freshwater, estuary, and seawater). (10+ min) More information on the activity can be found here:
        i. If a student has low lung capacity or for some other reason may not be able to blow into the straw, an alternative activity would have to be done, involving a pump instead of blowing.

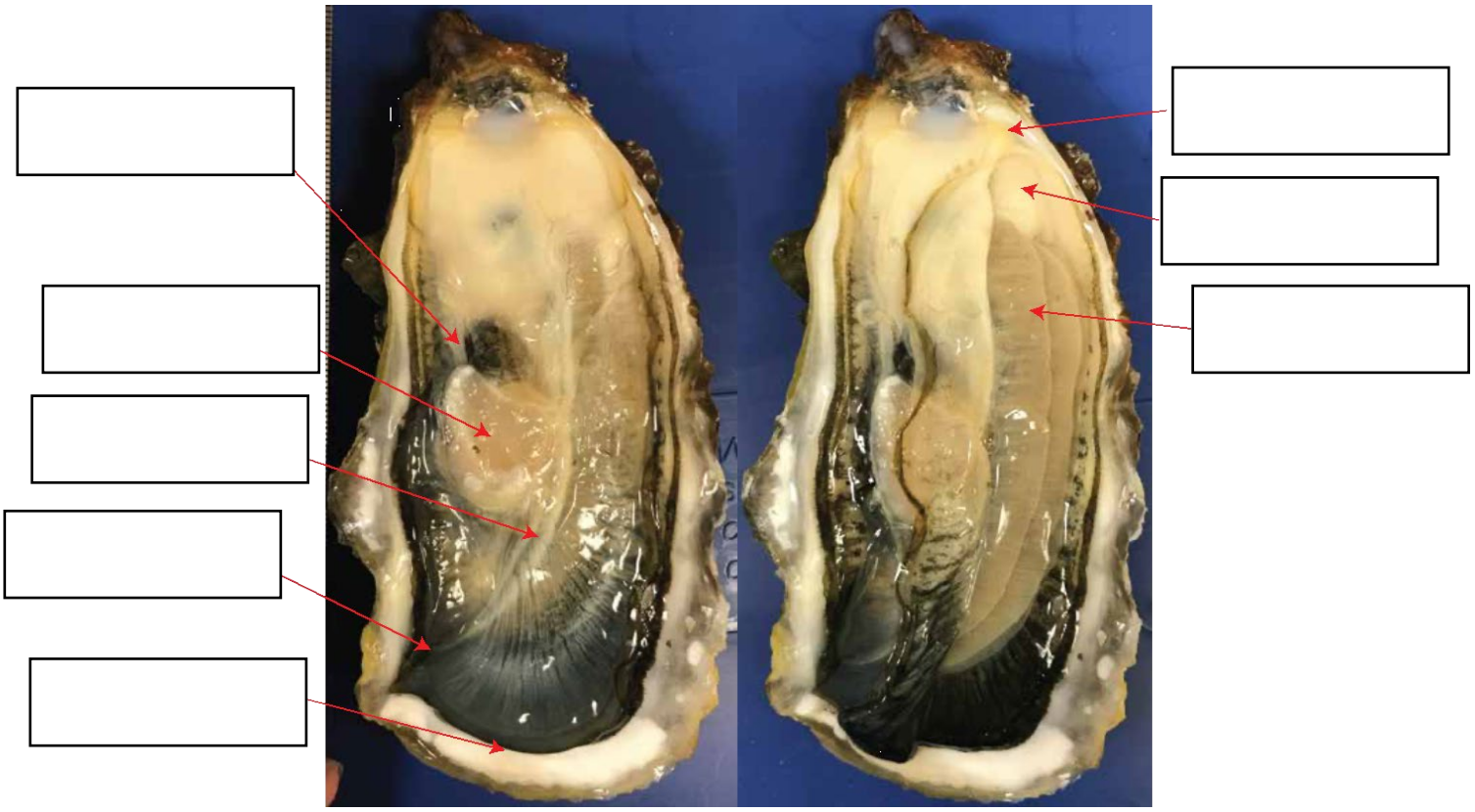
5. Discussions on oysters - where they live, how they live, why they're important (10 min) Talk specifically about oysters in the northwest, and how the oysters live here.
    a. Activity - Oyster dissection. (5-10 min)
    b. Dissection involves motor skills. Oysters will have to be opened beforehand; tweezers will be used for dissection. Depending on a student's motor capability, assistance may be required.
6. Bringing it all together - How does ocean acidification and carbonic acid affect oysters, and the ecosystem in general? Talk about what happens to the oysters - especially young oysters which are unable to create a shell. Get student's thoughts on how the acid might affect oysters before explaining the whole thing in more detail. (10-20 min)
    a. Ask students what else might the acid be affecting? What other organisms will feel harmful effects from the pH change? Do they know any, and if they don't show them some more examples.
7. Discussion on what is being done today - How scientists are currently looking into the issue, what instruments they use, and what solutions they are coming up with. Open up discussion to the students - what ideas do they have? (10+ minutes)
    a. Introduce Sophia's research - bring back alkalinity and buffering - how does nature try to resist these changes? Her research looks at taking dead oyster shells and placing them under the live oysters to dissolve first and raise the alkalinity, slowing the pH change and decay of the young oyster shells.
    b. Tie everything into the general concept of climate change - often climate change is thought of only as greenhouse gases, but there are other effects from the increase of co2, such as the increase in carbonic acid. Get the students thinking about the bigger picture.
8. Wrap Up

Appendix II. Oyster Dissection Activity for LEAFS Program

Oyster Dissection Match Game

Procedure:

Once you receive an oyster, use your tweezers, or have a buddy help you find each of the following parts of the oyster. Then match each term to its function.



a. Adductor Muscle
b. Mantle Edge
c. Mouth
d. Gills
e. Heart
f. Stomach
g. Intestine
h. Anus

__ . Takes in food and other small particles for digestion
__ . Absorbs nutrients digested in the stomach.
__ . Area where oysters grow their shell.
__ . Allows the oyster to breath. Takes oxygen out of the water.
__ . Location where solid waste leaves the body.
__ . Responsible for closing the oyster shell. Keeps the shell tightly closed when tides are low, or predators are near.
__. Circulates blood through the body.
__ . Digests food.

Appendix III. Syllabus for Proposed DPD Course

NATURAL RESOURCES, ECONOMICS, AND ENVIRONMENTAL JUSTICE

GEO 4XX **4 credits**

Course Description

This course deals with the geology of energy and mineral resources on which society depends, and the engineering, environmental and economic factors that control our access to them. It examines: how race, class, and gender interact to produce and sustain inequalities, the role of politics (local, state, national, & international) in shaping regulation and commerce will be examined, and the environmental footprint of resource extraction.

Prerequisites: GEO 101: The Solid Earth, GEO 221: Environmental Geology

Course Credits

This course combines approximately 120 hours of instruction, online activities, and assignments for 4 credits.

Instructor Information:

Sophia Wensman
Contact: wensmans@oregonstate.edu

Communication Policy:
Please post all course-related questions in the Q&A Discussion Forum so that the whole class may benefit from our conversation. Please contact me privately for matters of a personal nature. I will reply to course-related questions within 24 hours. I will strive to return your assignments and grades for course activities to you within 7 days of the due date.

Course Design

This class is designed to combine geologic principles within the context of environmental justice. Each week will be divided into three class periods consisting of 1 lecture, and 2 discussion sessions:

- **Lecture:** Will explore the geology of energy and mineral resources.
- **Discussion 1:** Will explore the relationship between the processes being discussed in Lecture 1 are shaped through the lens of environmental and social inequality
- **Discussion 2:** Will allow students the opportunity to practice scientific writing and build upon their connections between the lecture and discussion.

Learning Resources

Required readings:

- Journal articles and other materials as assigned by the instructor.

*Note there is no assigned textbook for this course. Material for the course (schedule, exercises, assignments,) should be downloaded from the course web site.

Difference, Power, and Discrimination Courses

Baccalaureate Core Requirements

Mineral Resources, Economics, and the Environment fulfills the Difference, Power, and Discrimination (DPD) requirement in the Baccalaureate Core. The DPD requirement engages students in the intellectual examination of the complexity of the structures, systems, and ideologies that sustain discrimination and the unequal distribution of power and resources in society. The unequal distribution of social, economic, and political power in the United States and in other countries is sustained through a variety of individual beliefs and institutional practices. These beliefs and practices have tended to obscure the origins and operations of social discrimination such that this unequal power distribution is often viewed as the natural order. Examination of DPD course material will enhance meaningful democratic participation in our diverse university community and our increasingly multicultural U.S. society.

Course Learning Outcomes

1. Describe the processes that concentrate natural resources.
2. Examine historical environmental justice issues associated with natural resource extraction
3. Examine the spatial inequities that arise from the siting of hazardous facilities in minority and low-income urban and rural communities
4. Analyze how structural factors and community characteristics influence environmental outcomes.
5. Gain familiarity with the discussion of natural resources in the media
6. Communicate the connections between social, environmental, political and economic factors governing extraction and use of natural resources.

Difference, Power, and Discrimination Learning Outcomes

1. Explain how difference is socially constructed,
2. Using historical and contemporary examples, describe how perceived differences, combined with unequal distribution of power across economic, social, and political institutions, result in discrimination,
3. Analyze ways in which the interactions of social categories, such as race, ethnicity, social class, gender, religion, sexual orientation, disability, and age, are related to difference, power, and discrimination in the United States.

Writing-Related Learning Outcomes

This course fulfills the Writing Intensive Course (WIC) Baccalaureate Core requirement. It does this by assessing students on the aforementioned learning outcomes using a combination of informal and formal writing assignments, a term research paper, laboratory exercises, and short essay quizzes.

Students should demonstrate an acceptable level of writing skills such as basic sentence structure, spelling, and elements of grammar.

Students should demonstrate critical thinking skills by composing a scientific essay that uses description, cause and effect, and results of analysis.

Students will demonstrate competency in the acquisition, use and referencing of climate data and information, and in the drafting, editing, and revision of essays dealing with laboratory observations related to specific climate concepts.

- **WIC1**: Develop and articulate content knowledge and critical thinking in the discipline through frequent practice of informal and formal writing.
- **WIC2**: Demonstrate knowledge/understanding of audience expectations, genres, and conventions appropriate to communicating in the discipline.
- **WIC3**: Demonstrate the ability to compose a document of at least 2000 words through multiple aspects of writing, including brainstorming, drafting, using sources appropriately, and revising comprehensively after receiving feedback on a draft.

Alignment of Learning Outcomes with Course Assignments

Learning Outcomes	How this outcome will be demonstrated in this course	How this outcome will be assessed in this course
Develop and articulate content knowledge and critical thinking in the discipline through frequent practice of informal and formal writing.	**Informal writing** Weekly and assigned discussion board, in-class discussion exercises, peer reviews. **Formal writing** Quizzes, research paper sequence.	**Informal writing** Assigned discussion board, in-class discussion exercises, peer reviews. **Formal writing** Quizzes, research paper sequence.
Demonstrate knowledge/ understanding of audience expectations, genres, and conventions appropriate to communicating in the discipline.	Discussion board posts, quizzes, in-class discussion exercises, research paper sequence, and peer reviews.	Quizzes, in-class discussion exercises, and research paper sequence.
Demonstrate the ability to compose a document of at least 2,000 words through multiple aspects of writing, including brainstorming, drafting, using sources appropriately, and revising comprehensively after receiving feedback on a draft.	Research paper sequence, which includes a paper topic proposal, a first draft, and a final polished paper based on feedback on the draft from the instructor and two peer reviewers.	Research paper topic proposal, first draft, and final paper

Scientific Writing Style and Audience

Students will utilize the scientific writing style in all aspects of this course. Students will gain practice and familiarity with this style through assigned readings, lectures, and specific research using scientific journal articles. Formal writing assignments will be assessed for the use of correct conventions. All writing should assume an informed audience, such that basic material from lectures and text is considered “common knowledge”.

Course Requirements & Grading Criteria

Assignment	Percent of Grade	Description
Participation	**10**	Students are expected to read all assigned readings, come to class prepared to contribute actively and intelligently to class discussions and exercises, and be present and engaged during class time.
Discussion Exercises	**20**	Students will complete 4 in-class writing exercises during discussion sessions. These exercises are designed to improve scientific writing skills and engage students in critical thinking.
Online Quizzes/ Activities	**20**	Students will complete quizzes and activities periodically throughout the term. These will specifically relate to scientific content related to geologic resources.
Informal Writing Exercises	**10**	Students will be asked to write frequently via low-stakes assignments that include writing samples that reflect key concepts, discussions about the weekly course content. Informal writing implies that students are not graded on content or correctness, but rather on completion. **DUE: Weekly by Sunday @ 11:59 PM**
Term Paper	**40**	Students will compose a 15-page term paper on a product of their choice and develop a term paper that explores the required resource extraction, production and consumption of that product as well as the relationship to difference, power, and discrimination in the US and abroad, with an emphasis on access and exploitation of natural resources, political ecology and environmental justice. **DUE:** • **Topic Proposal: Week 2 (6% of Grade)** • **1st Draft: Week 5 (8% of grade)** • **2nd Draft: Week 8 (10% of grade)** • **Final Paper: Finals Week (16% of grade)**

Grading Scale

A: 93-100%	B+: 87-90%	B-: 80-83%	C: 74-77% D+: 67-70%	D-: 61-64%
A-: 90-93%	B: 83-87%	C+: 77-80%	C-: 70-74% D: 64-67%	F: <61%

LATE POLICY:

A 10% reduction in grade will be assessed for each day that an assignment is overdue.

Course Schedule

Week	Class	Topic	Due
1	Lec	Course overview, Review: Element Abundances, Rock & Minerals, Plate tectonics	• Week 1 Readings, • Week 1 Quiz due Sunday by 11:59 PM • Informal writing prompt due Sunday by 11:59 PM
	Disc	Poverty, public health and environmental reform (historical context)	
	Disc	Science Writing - Overview In-class exercise	
2	Lec	Origin of mineral deposits	• Week 2 Readings, • Informal writing prompt due Sunday by 11:59 PM • **Proposal due to Canvas by 11:59 PM the night BEFORE your discussion**
	Disc	Environmental justice movements (case studies)	
	Disc	Peer editing of topic proposal. Bring 1 copy of proposal to discussion Start writing 1st draft of paper	
3	Lec	Soil & Water Resources	• Week 3 Readings • Week 3 Activity due Sunday by 11:59 PM • Informal writing prompt due Sunday by 11:59 PM
	Disc	Land & Water rights	
	Disc	Work on 1st draft of paper	
4	Lec	Mineral Exploration & Processing	• Week 4 Readings • Week 4 Quiz due Sunday by 11:59 PM • Informal writing prompt due Sunday by 11:59 PM
	Disc	Occupational hazards - race, gender, and class and workplace hazards	
	Disc	In-class writing exercise	
5	Lec	Mineral Land Access	• Week 5 Readings • Informal writing prompt due Sunday by 11:59 PM • **1st draft must be uploaded to Canvas by 11:59 PM the night BEFORE your discussion**
	Disc	Land ownership	
	Disc	Peer editing of 1st draft of paper	
6	Lec	Metals in the Environment	• Week 6 Readings • Week 6 Activity due Sunday by 11:59 PM • Informal writing prompt due Sunday by 11:59 PM
	Disc	Environmental Protection & Equity	
	Disc	Working on 2nd draft of paper	
7	Lec	Toxic heavy metals	• Week 7 Readings • Week 7 Quiz due Sunday by 11:59 PM • Informal writing prompt due Sunday by 11:59 PM
	Disc	Poverty & health - exposure to environmental hazards	
	Disc	In-class exercise	

Course Schedule Continued

Week	Class	Topic	Due
8	Lec	Energy Resources - Fossil Fuel Geology	• Week 8 Readings • Informal writing prompt due Sunday by 11:59 PM • **2nd draft must be uploaded to Canvas by 11:59 PM the night BEFORE your discussion**
	Disc	Market forces, politics and environmental regulation	
	Disc	Peer editing of 2nd draft of paper	
9	Lec	Energy Resources - Nuclear & Renewables	• Week 9 Readings • Week 9 Activity due Sunday by 11:59 PM • Informal writing prompt due Sunday by 11:59 PM
	Disc	Climate vulnerability	
	Disc	Working on final draft of paper	
10	Lec	Global Mineral Reserves	• Week 10 Readings • **Final draft must be uploaded to Canvas by 11:59 PM by Monday of Finals week**
	Disc	Global context of environmental justice	
	Disc	In-class exercise	

Expectations for Student Conduct

Student conduct is governed by the university's policies, as explained in the Student Conduct Code. Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility.

Statement of Accessibility

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Academic Dishonesty

You are expected to conduct yourself in a professional manner according to your enrollment at this university. Academic dishonesty such as plagiarism and cheating will not be tolerated. Students are expected to be honest and ethical in their academic work. Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.

We have no tolerance for academic dishonesty in any of its forms.

According to the Oregon State University's Student Conduct Code, academic dishonesty includes:

- Cheating - use or attempted use of unauthorized materials, information or study aids
- Fabrication - falsification or invention of any information
- Assisting - helping another commit an act of academic dishonesty
- Tampering - altering or interfering with evaluation instruments and documents
- Plagiarism - representing the words or ideas of another person as one's own

Penalties for academic dishonesty range from a zero on the assignment/assessment to an F in the course and referral for academic sanction or suspension, depending on the severity and/or frequency of the offense.

Religious Holidays Statement

Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

Student Evaluation of Courses

The online Student Evaluation of Teaching system opens to students the Wednesday of Week 8 and closes the Sunday before Finals Week. Students will receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to “sign” their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.

Appendix IV. Lesson Plan for Proposed DPD Course

Lesson Plan: Wednesday Week 6

Name: Sophia Wensman
Course: GEO 4XX. Natural Resources, Economics, and Environmental Justice
Course type: DPD, WIC
Number of Students: 25
Lesson Title: Poverty and health – exposure to environmental hazards
Credits: 4

1. **Purpose of Lesson:**
   This lesson will utilize student understanding of sources, transportation, and effects of toxic heavy metals to contextualize the discussion of unequal burdens of toxic metal contamination. Students will be using the Flint Water Crisis as a case study for toxic heavy metal contamination and examine the factors that allowed the crisis to occur.

2. **Alignment to Curriculum/Context within Course:**
   Lesson applies to course learning objectives:
   - (3) Examine the spatial inequalities that arise from the siting of hazardous facilities in minority and low-income urban and rural communities
   - (4) Analyze how structural factors and community characteristics influence environmental outcomes
   - (6) Communicate the connections between social, environmental, political, and economic factors governing extraction and use of natural resources

   Lesson applies to DPD Learning Outcomes:
   - Using historical and contemporary examples, describe how perceived differences, combined with unequal distribution of power across economic, social, and political institutions, result in discrimination.

   Prior lesson: Students will have had a Monday lecture discussing the science behind toxic heavy metal pollution. This will include a discussion of the metals themselves (including lead, mercury, cadmium and arsenic) as well as discussion of sources and transportation of these metals, normal and toxic levels, health effects, and clean-up options.

3. **Objectives for the Lesson:**
   - Students will identify and discuss the roll that racial and economic segregation in Flint played in exposing predominantly low income, and majority black communities to toxic lead poisoning.
   - Students will analyze how the history of Flint as well as government politics and unequal distribution of power led to the crisis.

4. **Sequence of Activities:**
   1. Warm-up activity (5 minutes)
   2. Brief review of salient points from readings – timeline & history of Flint (7 minutes)
   3. Small group discussion (12 minutes)
   4. Large group discussion (23 minutes)
   5. Class wrap-up – broadening the context (3 minutes)

5. **Assessment/Comprehension Checks: Performance Expectations & Tasks:**
    - Warm-up activity will allow students to access their prior knowledge from the previous class as well as start them thinking about the case study they will be examining in class.
    - During discussions I will move about the room listening to discussions. I expect students to be discussing in a way that promotes discussion of difficult topics as outlined in the guiding principles I provide students at the beginning of the course and remind students of during the class PowerPoint. If students are using the data from the articles they read and applying the DPD concepts we've discussed in previous classes it will show me they're engaging with the material.
    - Prior knowledge is anticipated from the water access class in week 3. Students will likely draw on some of these concepts during the class.

6. **Materials:**

Reading List Prior to Class (expectation is that students will come to class having read the following):

- https://www.metrotimes.com/detroit/a-deep-dive-into-the-source-of-flints-water-crisis/Content?oid=3399011
- Sadler, R. C., LaChance, J., & Hanna-Attisha, M. (2017). Social and Built Environmental Correlates of Predicted Blood Lead Levels in the Flint Water Crisis. *American Journal of Public Health*, *107*(5), 763–769. http://doi.org/10.2105/AJPH.2017.303692
- Butler, L. J., Scammell, M. K., & Benson, E. B. (2016). The Flint, Michigan, Water Crisis: A Case Study in Regulatory Failure and Environmental Injustice. *Environmental Justice*, *9*(4), 93–97. http://doi.org/10.1089/env.2016.0014
- Sadler, R. C., & Highsmith, A. R. (2016). Rethinking Tiebout: The Contribution of Political Fragmentation and Racial/Economic Segregation to the Flint Water Crisis. *Environmental Justice*, *9*(5), 143–151. http://doi.org/10.1089/env.2016.0015

Using during class:

- Brief PowerPoint to guide discussion

Appendix V. GEO 431/531: Environmental Geochemistry Activity

GEO 431/531: Examining the Law Dome Record

We'll be looking at the isotopic results from a 2002 paper:

> Vallelonga, P. et al., 2002. The lead pollution history of Law Dome, Antarctica, from isotopic measurements on ice cores: 1500 AD to 1989 AD. *Earth and Planetary Science Letters*, 204(1–2), pp.291–306.

Vallelonga et al. (2002) uses ice cores collected at Law Dome (Fig. 1) in Antarctica. The ice core was dated and analyzed for lead concentrations and isotopes. The goal of this work was to determine when an anthropogenic signature can be detected and discover the sources of these anthropogenic signatures.

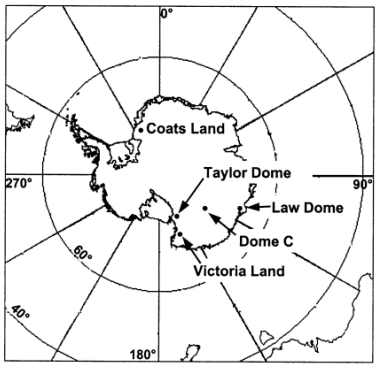


Fig. 1. Location of Law Dome and other Antarctic sites for which Pb isotopes and Pb concentration data are available. Map supplied by the Australian Antarctic Division, Data Centre.

Below is a figure from Vallelonga et al. (2002), in which they plot lead concentrations and the isotopic ratios of $^{206}Pb/^{207}Pb$ found within the ice core.

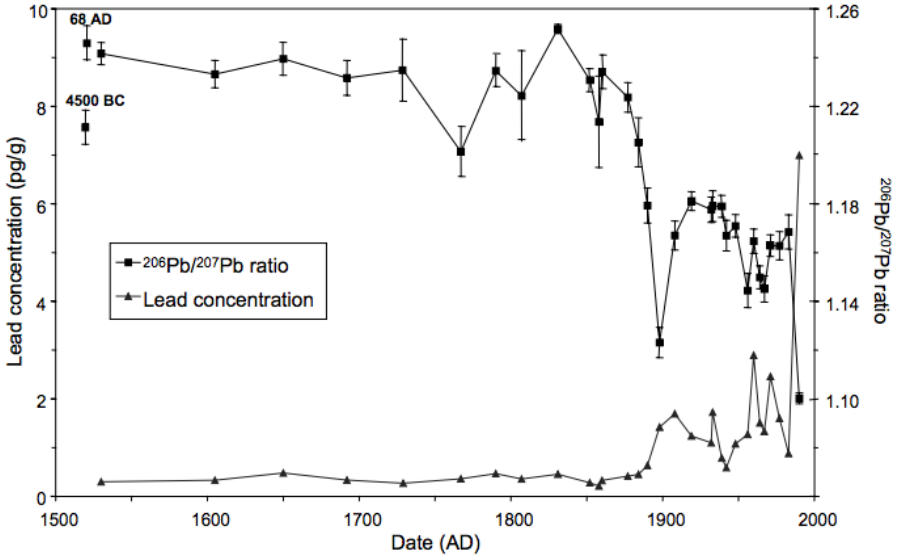


Fig. 2. The $^{206}Pb/^{207}Pb$ ratio and Pb concentration at Law Dome over the past 6500 years. Uncertainties shown for $^{206}Pb/^{207}Pb$ ratios are 95% confidence intervals.

10. Why do you think the authors plot the data this way? What is the purpose of plotting both lead concentration and $^{206}Pb/^{207}Pb$?

11. When do we begin seeing anthropogenic influences on the ice core?

12. **Prior to the date** you described above, why does the isotopic ratio of $^{206/207}Pb$ vary while the concentration remains low?

13. **After anthropogenic influences are seen**, why does the lead concentration vary? Why does the isotope ratio vary?

The authors developed a three-isotope plot diagram involving three sources: Australian, Canadian type Pb ores, Peru & Mexico Pb ores, and Mississippi valley Pb ores.

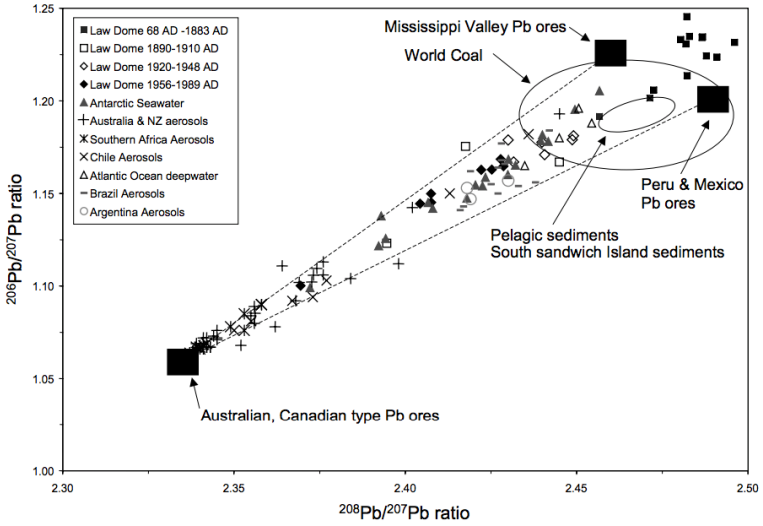


Fig. 5. Lead isotopic compositions at Law Dome from 68 to 1989 AD. Also included are Pb isotopic compositions of Antarctic seawater [20], various aerosols and Pb ores [17], Atlantic Ocean deepwater [55], Pelagic sediments [39] and South Sandwich Island sediments [40].

14. Look at the legend in the upper left along with the figure shown. Identify which samples from **Law Dome** you would consider to be from natural sources based on the information you gathered in previous questions.

15. A significant pollution event occurred in 1898, which lowered the $^{206}Pb/^{207}Pb$ ratio to ~1.12 and increased the Pb concentration four-fold (See previous figure). At this time, mining and smelting in Australia, as well as coal burning in Peru & Mexico were both increasing. Based on the data in the 3-isotope plot diagram, which source (Australian Pb ores, or Peru & Mexico Pb ores) do you think is the primary cause of this pollution event? Why?

16. Low $^{206}Pb/^{207}Pb$ ratios are observed between 1950 and 1970, while higher ratios are observed in the late 1970s and 1980s. During this period, anthropogenic Pb emissions in the Southern Hemisphere were dominated by combustion of leaded gasoline. Most Pb in leaded gasoline in the Southern Hemisphere consisted of a combination of Australian and Canadian type Pb and US Mississippi Valley type Pb.

    Based on the three-isotope plot diagram, were Mississippi Valley Pb ores a significant source of Pb pollution in Antarctica? How do you know?

17. What sources of error might be associated with the results of this paper? Do you think we might see something different if we repeated these measurements today? Why?

18. Reflection: Please describe:
    a. What questions, ideas, or skills do you feel more confident in after completing the activity?

    b. What still feels confusing?

    c. What feels more confusing now that you've completed the activity?