JI-HYE SEO

BS in Environmental and Atmospheric Chemistry from Purdue University (2012); MS in Earth Sciences from Dartmouth College (2015); PhD in Earth Sciences from Dartmouth College (Present)

What have you been doing since the publication of your article in *JPUR*, volume 1?

I continued my undergraduate research with Dr. Greg Michalski looking at mineral composition of soils in the Atacama Desert, Chile, and graduated in 2012. After graduation, I took a year off and worked as an assistant lab technician in the Purdue Stable Isotope facility. I am currently attending graduate school at Dartmouth College, where I have obtained a master's degree in Earth Sciences and am pursuing a PhD. My research involves understanding past climate change forcing and the earth's response to these changes. This is accomplished by studying changes in platinum, iridium, and osmium concentrations, and osmium isotopes in ancient polar ice.

What are your career goals?

Using my isotope geochemistry background, my goal is to work as a glaciogeochemist in a polar research center (for example, the Cold Regions Research and Engineering Laboratory or Korea Polar Research Institute) and to communicate my research to the public.

How did the research you did as an undergraduate at Purdue impact your current endeavors? What is the value of undergraduate research?

My undergraduate research provided great opportunities for advanced laboratory and field work experiences. Most importantly, the research stimulated a desire for knowledge in the field of geochemistry through the use of inquiry, experimental, and data processes. My undergraduate research inspired me to further my education in chemistry and earth sciences.

SOLVING THE MYSTERY OF THE ATACAMA NITRATE DEPOSITS:

The Use of Stable Oxygen Isotope Analysis and Geochemistry

Ji-Hye Seo, Chemistry

INTRODUCTION

History of Atacama nitrate deposits

The Atacama Desert in northern Chile is known to contain the largest nitrate deposits in the world. The nitrates were extensively mined in the early 1800s, and nitrate ore was exported to Europe and the U.S. as agricultural fertilizer and to make gunpowder and explosives. Just like oil reserves in the modern era, the high demand for nitrate and the Atacama's nitrate monopoly fueled the region's economic and geopolitical development during the 1800s (McConnell, 1935). Bolivia, Peru, and Chile all once owned parts of the most valuable nitrate deposits, but disputes over their ownership led to hostilities and resulted in the War of the Pacific in late 1800s. The war lasted five years and ended with a decisive victory for Chile. Peace treaties were made between the three countries; however, there were still boundary disputes over the nitrate deposits after fighting ceased. Later, the Treaty of Peace and Friendship of 1904 between Peru and Chile was established and gave Chile control of the entire Atacama Desert (Bonilla, 1978). With the increasing global demand for nitrate, the Chilean nitrate mining industry flourished and was extremely profitable for many decades. During this period, most Chilean income came from the nitrate mining industry, making it the pillar of the Chilean economy.

Chile's nitrate mining boom came to an abruptly halt in the early 1900s (McConnell, 1935). Blockades prevented Germany from importing the Chilean nitrate needed for

Figure 1. Field photos of typical rugged surface in the Atacama (A) and ruins of old nitrate mining industries (B).

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How did the faculty mentor relationship impact you during your time at Purdue?

My faculty mentor, Dr. Michalski, was supportive of my undergraduate research. He helped me gain research, technical, and science communication skills. He also provided me with opportunities to gain field experience and attend a conference. When I needed help before graduation, he gave me advice on how to move forward with my career.

How did the experience of publishing an article in *JPUR* benefit you? What advice would you give to other undergraduates at Purdue who are interested in contributing to the journal?

The process of writing a *JPUR* article helped me become better acquainted with my research, to understand application of the research such as the big picture of where my research fits in, and to advance my writing skills, which is a crucial step toward sharing research data. It provided a unique addition for my CV/résumé, especially to faculty who are looking for a graduate student to work with. The writing process gave me an advantage in understanding what is expected when preparing a paper for submission to a scientific journal.

Writing a journal article may seem intimidating and time-consuming; however, it is the best way for undergraduates to gain professional writing and

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communication skills, and to gain perspective of the broader impact and intellectual merit of your research. Additionally, the process of writing can deliver an appreciation of the research results and complementary studies. Keeping these in mind, *JPUR* provides firsthand scientific writing with good guidance from the editors and better mentor relationships. I hope that undergraduates who are interested in writing a scientific article seize this opportunity to further their endeavors.

What advice would you give to other undergraduates at Purdue who are interested in doing research?

I would first see what interests you the most and see if your interest fits into a faculty member's research project. Take the initiative to get involved in the research of your interest. Look into research group websites to see different types of ongoing projects, contact faculty, and meet and show your interest in their research (your future research advisor). Maintaining interest in your research is what drives the self-motivation to move forward with your research. To do so, having a good relationship with your advisor is the key. Your advisor can help you improve your research skills and provide you with opportunities to share your research, such as attending conferences and writing short journal articles.

Seo, J. (2011). Solving the mystery of the Atacama nitrate deposits: The use of stable oxygen isotope analysis and geochemistry. *Journal of Purdue Undergraduate Research*, *1*, 38–45–113. http://dx.doi.org/10.5703/JPUR.01.1.6