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Julie Bryce, Associate Professor of Geochemistry, travels to Italy

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Associate Professor of Geochemistry - Italy

Professor Bryce traveled to Ferrara, Italy, this spring to conduct research on the links between carbon dioxide and volcanic activity.

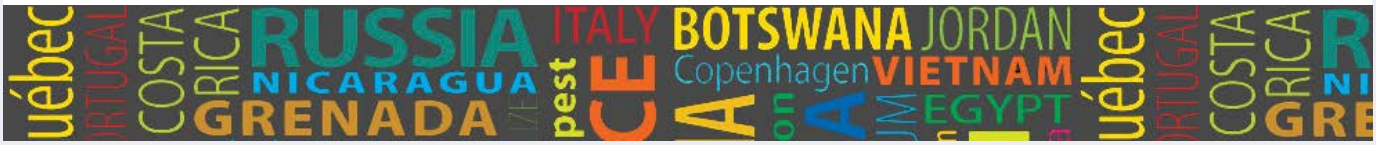
Bryce (r.), NRESS Ph.D. student Barkman (l.) and Italian colleagues from CNRS-Pisa/University of Ferrara and the Museo Tridentino di Scienza Naturali in Trento consult a geologic map to locate Veneto volcanic lavas in the mountains above Rovereto, Italy. Photo courtesy of A. Chouinard.

My motivation to visit Ferrara, Italy, could be put into one word: mantle. Earth's mantle is its large rocky layer that extends beneath the crust on which we stand down to Earth's metallic core. The group I visited in Ferrara are world experts in studying xenoliths, "strange rocks" brought up in lava flows, plucked from Earth's deep interior as the underground lava, so-called magma, rises to the surface. These samples provide some important information about the geological and chemical processes that long ago led to the formation of Earth's crust. They also bear testimony that can be used to reconstruct more recent processes that have led to volcanism in certain regions.

I first met the Ferrara-based scientists at a 2009 meeting of geochemists held in Switzerland and learned at that meeting of their extensive collection of mantle xenoliths from several volcanic provinces where I have worked for years. My hope was that the chemical composition of these xenoliths would shed some insight into how carbon dioxide (CO_2) bearing fluids transferred from Earth's mantle contribute to the volcanism driving the breakup of continents in East Africa as well as the development of a volcanic province in Sicily, along the northern margin of the African plate.

So far in 2010, I have traveled to Ferrara twice, from my home base in France, where I am spending my sabbatical working with a colleague at Ecole Normale Supérieure de Lyon (ENS-Lyon). My first trip to Ferrara in January was to give a seminar and exchange ideas and samples, thereby collectively developing an analytical strategy for these precious mantle samples that I could then pursue with my colleague in the ENS-Lyon laboratory. My January visit also enabled me to plan future collaborations, including laying the groundwork to investigate the role of CO_2-bearing fluids in driving Sicilian volcanism, a project Ms. Julie Barkman is developing as part of her Ph.D. thesis. Ms. Barkman, a NRESS Ph.D. student, shortly thereafter arrived at the ENS-Lyon geochemical laboratories, and was able to be extremely productive in her short visit to Lyon to work on samples from our Ferrara colleagues. Accordingly, she joined me on my return to Ferrara. The second venture in April provided us an opportunity to talk about the new data, begin to address their implications, and plan our continued collaboration. Our hosts also took Ms. Barkman and me out into the field to show us a volcanic field in Northern Italy, which was formed during the formation of the Alps. This area, the Veneto Volcanic Province (VVP), contained lava flows with a similar chemical history to the Sicilian volcanic province we had begun to investigate. The VVP also had lava flows that brought up mantle xenoliths. At our first stop, in a quarry on the backside of the mountains framing Lago di Garda, we struck gold and found a fantastic suite of xenoliths. We later drove through and stopped to study different pieces of the terrain emplaced as part of the VVP.

Thanks in part to the support of a CIE International Development award, both times I left Italy for France with many chunks of the mantle (as well as a kilogram of Ferrara's delectably famous cappellacci di zucca). Though the pasta is long gone, we are hard at work on unraveling the mysteries of the xenoliths. It will take us some time to finish our chemical analyses of the treasures from the deep Earth, but with a talented UNH Ph.D. student and the strong support of our Italian and French collaborators, we have a good team to pursue this puzzle.



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