



SCIENCE • STEWARDSHIP • SERVICE

Paper #164127

HEAVY MINERAL ASSEMBLAGES IN VOLCANIC ASHES FROM THE MONO BASIN, CALIFORNIA

[COX, Stephen E.](#)¹, HEMMING, Sidney R.¹, and STEPONAITIS, Elena A.², (1) Department of Earth and Environmental Sciences and Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964, cox@ldeo.columbia.edu, (2) Department of Environmental Science, Barnard College, 404 Altschul Hall, 3009 Broadway, New York, NY 10027

Mono Lake is a closed-basin lake in the Western Great Basin. High lake levels during glacial times resulted in outcropping lake sediments (Wilson Creek Formation) ranging in age from approximately 12,000 to 70,000 years b.p. These sediments are punctuated by one basaltic and at least eighteen distinct rhyolitic volcanic ashes, all of which are compound and probably represent multiple eruptive events. These ashes and the corresponding lake sediments can be correlated on the basis of stratigraphic order and outcrop appearance throughout the basin.

As a result, basinwide sedimentological evidence for climate change can be tied precisely to a relative timescale throughout much of Wilson Creek time. However, the absolute timescale of the Wilson Creek Formation demands further refinement. Direct dating using the $^{40}\text{Ar}/^{39}\text{Ar}$ system has yielded mixed results, and carbonate ^{14}C dating has also proved difficult. Correlation of ashes outside the basin will allow refinement of the ages using ^{14}C dating of plant macrofossils. The major element chemistry and overall appearances of the rhyolitic ashes in the Wilson Creek sequence (all but the basaltic ash 2) are very similar, so we are testing whether using geochronology and the mineralogy of trace mineral phases will distinguish the ashes.

The motivation for studying the mineralogy of the ashes is fourfold: first, more robust geochemical and petrologic methods for distinguishing ashes will allow for greater clarity in several outcrops that contain unconformities, disturbances or repetitions that make positively identifying ashes by stratigraphic order impossible; second, distinguishing among the Wilson Creek ashes and potentially tying the ashes into a regional tephrochronological regime will allow for verification and expansion of the efforts of to correlate certain Wilson Creek ashes to deposits outside the Mono Basin; third, correlation to cinder cones will allow the application of the petrologic and chemical methods to categorize the Mono Craters, which will permit the use of lava flows that are often more easily dated due to larger grain sizes, more easily distinguished xenocrysts, and distinctive mineralogies; and fourth, characterizing the trace mineral assemblages of each ash will identify minerals for further geochronology.

Abstract ID#: 164127

Password: 364332

Meeting: 2009 Portland GSA Annual Meeting (18-21 October 2009)

Session Type: Topical/Theme

Selection: T125. Geochemical Approaches to Sedimentary Provenance Studies I

Title: HEAVY MINERAL ASSEMBLAGES IN VOLCANIC ASHES FROM THE MONO BASIN, CALIFORNIA

Key Words: Mono, allanite, ash, sediment, lake

Presentation Format: Either oral or poster

Discipline Categories: Geochemistry, Limnogeology (Ungraded), Quaternary Geology (Ungraded)

Scheduled For:

Presentation Date: Tuesday, 20 October 2009

Presentation Time: 10:30 AM

Abstract Submission Fee: Paid (gsa-2009AM-2712-5170-9136-9318)

First Author

Presenting

Stephen E. Cox

Department of Earth and Environmental Sciences and Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964

Office Phone: 845-365-8844

Fax Number: 845-365-8155

Email: cox@ldeo.columbia.edu

Confirmation Email: cox@ldeo.columbia.edu

Abstract book page: 428

Second Author

Sidney R. Hemming

Department of Earth and Environmental Sciences and Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964

Office Phone: 845-365-8417

Email: sidney@ldeo.columbia.edu

Abstract book page: 428

Third Author

Elena A. Steponaitis

(Undergraduate student)

Department of Environmental Science, Barnard College

404 Altschul Hall

3009 Broadway

New York, NY 10027

Office Phone: (845) 365-8844

Fax Number: (845) 365-8155

Email: es2596@barnard.edu

Abstract book page: 428