New 40Ar/39Ar ages from the Cerocahui basin region of northern Sierra Madre Occidental, Chihuahua, Mexico: Implications for ignimbrite correlation and the timing of synextensional deposition

Bryan P. Murray1, Willis E. Hames2, Graham D.M. Andrews1, and Cathy J. Busby1

1Department of Geological Sciences, California State Polytechnic University, Pomona; 2Department of Geology and Geography, Auburn University; 2Department of Geology and Geography, Auburn University; 3Department of Earth and Planetary Sciences, University of California, Davis

Abstract

The Cerocahui basin is a half graben located adjacent to the Copper Canyon region of the northern Sierra Madre Occidental in the large igneous province. Previous studies in the area have identified two Oligocene-aged and middle to uppermost Miocene-aged basement deposits evident in several Oligocene alluvial fan deposits to the south of the basin (Chapopotillo Formation). Age control of the study area is limited, as only a few ages are available for the ages of the various deposits and the timing of extension.

The study area is located within the northern Sierra Madre Occidental (SMO) and extends northward into the Copper Canyon region. This study focuses on determining the geochronological framework of several Oligocene-aged and upper Miocene-aged deposits within the Cerocahui basin. A total of 10 samples were collected from the Cerocahui basin, representing four ignimbrites: Cerocahui, El Volcán, Bahuichivo, and Chichimeca. The samples were dated using the 40Ar/39Ar multigrain technique, and the ages were determined using the plateau technique. The results of this study suggest that the Cerocahui basin is composed of at least three distinct ignimbrites: the Cerocahui ignimbrite, the El Volcán ignimbrite, and the Bahuichivo–Bachamichi fault zone ignimbrites.

Geologic Maps

Figure 5A: Geologic maps and cross-sections of the Cerocahui basin region. (A) Cerocahui basin (BM010216-3) and (B) Cerocahui basin (BM010821-3) showing the location of the measured stratigraphic section. (C) Cerocahui basin (BM010823-6). (D) Irigoyen ignimbrite (BM010821-3) and (E) Cerocahui basin (BM010821-3) showing the location of the measured stratigraphic section. (F) Cerocahui basin (BM010823-6). (G) The measured stratigraphic section of the Cerocahui basin deposits in the Cerocahui basin (BM010823-6). (H) The measured stratigraphic section of the Cerocahui basin deposits in the Cerocahui basin (BM010823-6).

Igneous Correlation

Table 1: Summary of the age results.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Age (Ma)</th>
<th>Error (Ma)</th>
<th>Plateau age (Ma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM010216-3</td>
<td>23.59 ± 0.13</td>
<td>0.13</td>
<td>23.59 ± 0.13</td>
</tr>
<tr>
<td>BM010821-3</td>
<td>27.6 ± 0.3</td>
<td>0.3</td>
<td>27.6 ± 0.3</td>
</tr>
<tr>
<td>BM010823-6</td>
<td>27.46 ± 0.3</td>
<td>0.3</td>
<td>27.46 ± 0.3</td>
</tr>
</tbody>
</table>

Bachuichivo–Bachamichi fault zone ignimbrites

The Bahuichivo–Bachamichi fault zone ignimbrites are composed of at least two distinct units: the Cerocahui ignimbrite and the El Volcán ignimbrite. The Cerocahui ignimbrite is composed of at least three distinct units: the Cerocahui ignimbrite, the El Volcán ignimbrite, and the Bahuichivo–Bachamichi fault zone ignimbrites.

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