Can the history of lake records covering the glacial/interglacial cycles be reconstructed from downhole logging data and mineralogical composition? Investigating glacial/interglacial cyclicity from downhole logging data and mineralogical composition: an example from the ICDP driling project Lake Junín, Peru.

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Can the presence or absence of clay minerals high enough to recognize glacial/interglacial climate cyclicity? Selected sixty-eight samples were taken in order to compare and characterize the minerals in the lake sediments at different depths. The mineralogical analyses performed by x-ray diffraction of the selected samples. Linking the abundance and the lack of clay minerals in core samples with the downhole logging data, a relationship between geological history of the lake and climate change processes can be recognized. Consequently, the different mineralogical composition of the sediments, especially the presence or absence of smectite in the clay bulk, reflects a glacial/interglacial climate cyclicity.

Lake Junín is located at 4082 m above sea level in the Andes and is the largest lake (154 km²) entirely within Peruvian territory. Lake Junín is controlled by a thick sediment package (110 m) dominated by alternating packages of detrital and organic-rich mud layers. The lake probably the maximum extension of glaciation. and is a geomorphic record to reveal the waiting and warming of glaciers in the northern Cordillera. Bedrock consists mainly of Paleozoic-Neozoic marine carbonate with some exposure of pre-Cambrian crystalline sili- cate rocks along the eastern concord. The lake owes its origin to >250-ka-aged co- cordillera. The lake predates the maximum extent of glaciation and the glacial and interglacial cycles are marked by the lake's climate and an increase of clay minerals, chlorite and quartz.

Mineralogical composition

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Depth Site 1D (m)</th>
<th>Depth Site 2D (m)</th>
<th>Depth Site 3D (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smectite</td>
<td>6.611</td>
<td>3.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Illite</td>
<td>5.7</td>
<td>3.4</td>
<td>3.0</td>
</tr>
<tr>
<td>Chlorite</td>
<td>4.8</td>
<td>3.4</td>
<td>3.0</td>
</tr>
<tr>
<td>Kaolinite</td>
<td>4.8</td>
<td>3.4</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Cyclostratigraphic analysis

- The cluster analysis was carried out with the INCA software.
- The principal components are shown in the scatter plots and the composition of the clay fraction is illustrated in the ternary diagrams.
- The correlation of the mineralogical composition with the environmental parameters is shown in the scatter plots.

Core Clay Mineralogy

- The cluster analysis was carried out with the INCA software.
- The principal components are shown in the scatter plots and the composition of the clay fraction is illustrated in the ternary diagrams.
- The correlation of the mineralogical composition with the environmental parameters is shown in the scatter plots.

Bulk Rock Mineralogy

- The cluster analysis was carried out with the INCA software.
- The principal components are shown in the scatter plots and the composition of the clay fraction is illustrated in the ternary diagrams.
- The correlation of the mineralogical composition with the environmental parameters is shown in the scatter plots.

Cluster Analysis

- The cluster analysis was carried out with the INCA software.
- The principal components are shown in the scatter plots and the composition of the clay fraction is illustrated in the ternary diagrams.
- The correlation of the mineralogical composition with the environmental parameters is shown in the scatter plots.

The data were subjected to cluster analysis using the cluster analysis software. The results were compared with published data on the mineralogical composition of lake sediments.