Paleoclimate History of Tulare Lake, California

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General Overview

- History of Coring
- Tulare Lake Overview
- Age Hypothesis
- Lithologic Description
- Ostracodes
- TIC/TOC
- Magnetic Susceptibility
History of Coring

- The research of long sedimentary of the Quaternary period, and older sediments began in 1956 in North America.
- Analysis of a series of cores taken in the San Agustín playa of western New Mexico, United States of America.
- Early research in dry lake beds were poor due to dating methods, and sedimentation gaps.
- They still provided the potential for very long, detailed records in Western North America tectonic basins (Davis, 2004).
Tulare Lake Overview

• The height of the lake fluctuated due to glaciation.
• Indicators include lake salinity, diatoms, ostracodes, regional vegetation.
• Overflow, spillway height has routinely limited the maximum size of Tulare Lake.
• The cause of spillway heightening has been glacial outwash deposition on the alluvial fan of a Sierra Nevada stream (qtd. Atwater 1986).
Age Hypothesis

- Convert depth (ft) to cm by dividing by 0.032.
- Divide the converted cm by 0.04 (Negrini et. al. 2006) which gives the age estimate of the core, assuming a constant sedimentation rate.
- Example: 44.5(cm) /0.032=1390.625 (ybp)
- Approximate age range for TL-05 4A-10 is 33,662 to 36,412 ybp.
Lithologic Description

• Grain Size
  – 0 cm to 48 cm, clay
  – 49 cm to 116 cm, silty clay
  – 117 cm to 148 cm, silt

• Color
  – 0 cm to 48 cm, olive gray
  – 49 cm to 148 cm, olive gray with orange stain (indicates oxygen exposure).

• Remarks
  – 77 cm, Organic Material
  – 84 cm, Angular rock fragment
  – 99 cm, Organic Material, fizzes with HCL
Ostracodes are dependent on the physical and chemical limitations imposed by their environment, which in turn are controlled by geological, hydrological, botanical, and climatic factors.

Once the nature of these controls has been defined for a region, the ecological limitation of specific ostracodes can be determined.

Knowing the ostracode’s tolerance limits then allows one to reconstruct the environments of the past, through paleoclimatic, paleoecologic, paleogeologic, and paleohydrologic interpretations (qtd. Delorme, 1969).
## Ostracodes Found in Drive Ten

<table>
<thead>
<tr>
<th>Species</th>
<th>Temperature Range (°C)</th>
<th>Salinity Range (ppm)</th>
<th>Water Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprideis beaconensis</td>
<td>13 – 35</td>
<td>100 – 10000</td>
<td>I – III</td>
</tr>
<tr>
<td>Limnocythere ceriotuberosa</td>
<td>4 – 32</td>
<td>500 – 10000</td>
<td>I – II</td>
</tr>
<tr>
<td>Cyprinotus glaucus</td>
<td>18 – 32</td>
<td>100 – 10000</td>
<td>I – II</td>
</tr>
<tr>
<td>Candona patzcuaro</td>
<td>13 – 32</td>
<td>100 – 5000</td>
<td>I – III</td>
</tr>
</tbody>
</table>
Ostracode Analysis

- *Limnocythere ceriotuberosa*
- 4-32°C
- 500 – 10,000 ppm (salinity)
- Water types I – III
- Found 119 cm from top
TIC/TOC

• Total Inorganic Carbon (TIC)
  • The amount of inorganic carbon in the sample and is used to determine the amount of non-living matter.

• Total Organic Carbon (TOC)
  • The amount of organic carbon in the sample and is used to determine the amount of previous living matter.
  • High levels of TOC is usually an indicator of low lake levels.

• Drive 10 TIC/TOC was not completed.
TIC/TOC Predictions

- Based on our magnetic susceptibility graph and core descriptions, we expect that there will be a high amount of organic carbon in the following segment of the core: 1400 – 1494 cm
- There is low magnetic susceptibility in this segment, as well as root casts and ostracodes from 1415 – 1446 cm
Magnetic Susceptibility

Magnetic Susceptibility is the measurement of magnetite or other iron-rich minerals, which line up with the Earth's magnetic field. It is put under a magnet to get a specific number, which indicates the amount of magnetite and iron-rich minerals found in the sample.
Graphs and charts showing data trends.


• http://www.curtoons.com/clients/magnet/skater.jpg