Contrasting Facies in Slope and Basin-Floor Deposits That Correspond to Rising and Flat Shelf Edge Trajectories, Lewis Shale, Washakie Basin, Wyoming, USA

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Abstract

The Cretaceous Lewis Shale margin is a unique system. This margin is a high sediment supply system compared to the other margins. The study area is located in south-central along the eastern margins of the Washakie Basins, Wyoming, USA. A research done by Cavaraj and Steel suggests that Lewis Shale deep water fans were deposited both during rising relative sea level (rising shelf edge trajectory) and stable to falling relative sea level (flat shelf edge trajectory) because of high sediment supply.

The aim of this research is distinguish the slope and basin floor fan deposits that correspond to flat shelf edge trajectory and rising shelf edge trajectory with understanding the facies changes in slope and basin-floor deposits. Several methods are conducted to accomplish the study, which are core description and well log correlations. The recent hypothesis is the fans developed from rising shelf edge trajectories will result smaller and thinner fans while the bigger and thicker fans are produced by flat trajectories.

Tectonic and Stratigraphic setting

The Lewis Shale is located in eastern margin of Washakie basin (Fig 1). This formation is upper Cretaceous in age. The Lewis Shale was deposited on continental crust during the final major transgression and regression of Cretaceous Western Interior seaway during the Lower Maastrichtian.

This formations is divided into three members: the lower, Dan, and upper member. The lower member is composed of black and dark gray shale with no sandstone. The Dan member consists of interbedded sandstone and mudstone with ~65% sandstone. The upper member is dominantly dark gray to olive gray mudstone with 0 to 25% sandstone (Gill et al., 1970).

Data Used/Methodology

This study is based on Christian and Steel, 2006 research using well log correlation to identify the cliniforms. The shelf edge trajectories are counted by calculating the ratio between the average progradation and average aggradation of the shelf edge (Fig 1). In this system, the sediment deposits was dispersed to slope and basin floor during times when shelf edge was prograding (falling stage of lowstand) as well as during times when shelf edge was prograding with rising shelf-edge trajectory (highstand) with significant volume of sandstone.

One core description CSM Strat Test 61 was done in detailed in order to understand the main facies character of deposits from the fans and further study is on well log analysis.

Hypothesis

The aim of this research is distinguish the slope and basin floor fan deposits based on the main facies characteristics that correspond to flat shelf edge trajectory and rising shelf edge trajectory with understanding the facies changes in slope and basin-floor deposits.

The recent hypothesis is the fans developed from rising shelf edge trajectories will result smaller and thinner fans while the bigger and thicker fans are produced by flat trajectories.

Current Result

Table 1. Facies Table of CSM Strat Test #61

<table>
<thead>
<tr>
<th>Member</th>
<th>Subdivision</th>
<th>Subdivision</th>
<th>Interpretation</th>
<th>Subdivision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>Lower</td>
<td>Lower</td>
<td>Interbedded sandstone and mudstone</td>
<td>-</td>
</tr>
<tr>
<td>Lower</td>
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<td>Interbedded sandstone and mudstone</td>
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</tr>
</tbody>
</table>

There are seven general facies are identified at CSM Strat Test #61, however in order to understand more detail which facies is correspond to slope and basin floor fan deposits with rising or flatish shelf-edge trajectory, more cores data and well log analysis are needed for further study.