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<th><strong>DEPARTMENT:</strong></th>
<th>Physical and Environmental Sciences</th>
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<td><strong>PROJECT TITLE:</strong></td>
<td>Clay Mineralogy of the Molina Member of the Wasatch Formation: Recognition of the PETM</td>
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Clay Mineralogy of the Molina Member of the Wasatch Formation: Recognition of the PETM

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Abstract

During the Paleocene and Eocene epochs, we saw a thermal event occur which changed the environment. By studying the clay minerals that are within the Molina Member of the Wasatch Formation we will see how the change in environment affected the clay minerals. The study area is located between De Beque, Colorado and Molina, Colorado just off 45 ½ road in an area called Atwell Gulch. The unit that is involved in this study is the Wasatch Formation with its three members: Atwell Gulch, Molina, and Shire. The two main units that were focused on were Atwell Gulch and Molina with a total of 17 samples taken from the Atwell Gulch study area. Three samples were collected from the Shire member to establish an area of decrease in the mineral kaolinite. The samples were then taken back to the lab and were analyzed for minerals that may have been affected by the change in the environment. When looking for the change in the clays we saw an increase in the kaolinite starting at WP15_M10 to WP17_M12. The sudden increase shows that something dramatic occurred. We can see that the environmental change caused a subsequent change in the clay minerals and we can use this study as a basis for what the future environment may look like if we reach another thermal maximum time.

Purpose

The purpose of the project is to determine if the PETM interval (Zachos et al, 2008) can be found in the Molina member by comparing the clay mineralogy of the Molina member with the clay minerals within the Atwell Gulch and Shire members. We plan to find an increase in the amount of kaolinite from the Atwell Gulch through the Molina member and then a decrease in the Shire member. Theoretically, there should be an increase due to the PETM interval that was found within the Molina member from the previous work by Zachos.

Study Area

The methods that were used in the project are XRD and some XRF data analysis. To get the data though we had to grind the samples into fine material for the XRD to pick up some of the clay material. We then separated the clay using a mixture of Calgon and magnesium chloride. We let the samples dry and run them three different times through the XRD as a normal smear mount to a glycolate mount then finally to a furnace mount. We take the data and calculate the percent of kaolinite there is in each of the samples. The methods that were used to calculate the percent of kaolinite were using the data that was given by the XRD for each of the samples. I then took the integrated intensity numbers (Int. I) for the 14, 12.5, 10 and 7 angstrom peaks and added them together. I then divided the sum by the Int. I 7.2 angstrom peak, after the answer was calculated I then took that number and multiplied it by 100 to get a percentage.

Results

The results showed that the percent of kaolinite had an increase that started after the middle and into the end of the Molina Member. The spike then drastically drops at the beginning of the Shire member. Kaolinite is a mineral that is found in many wet environments. With the data that has been collected we can assume that the environment during the Molina was a wet and humid environment. This is also consistent with braided river channel system that is found within the lithology of the sandstone bodies of the Molina Members.

Conclusions

From the data that was collected form analyzing the samples we can confirm that there is a PETM value within the Molina Member. We can say that at this spot the environment changed so much so that it changed the chemistry of the clay minerals.

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