#### Sedimentology, Petrography, and Mineralogy of the Tallahatta Formation near the City of Meridian, Mississippi

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#### ABSTRACT

The Tallahatta Formation is a rock unit that was deposited in Mississippi during Eocene time. It is currently exposed along an arcuate outcrop belt extending from the north-central to the east-central part of the state. We investigated sedimentology, petrography, and mineralogy of an exposure of this formation in a road cut along the Interstate 20 Highway, west of the City of Meridian, Mississippi. The portion of the Tallahatta Formation that is exposed at this location displays a rhythmic sedimentation pattern consisting of the alternation of two lithofacies. Lithofacies 1 is the bioturbated and nodular mudstone which consists of centimeter-thick beds of unlithified argillaceous siltstone that alternates with thin layers of hard, lithified mudstone. Lithofacies 2 is composed of white, massive to thickly-bedded mudstone.

Petrographic studies of thin sections prepared from thirteen samples from this outcrop indicate that bioturbated and nodular siltstone beds of lithofacies 1 consist of a mixture of quartz silt and other very fine-grained particles. The lithified, hard beds are composed of volcanic ash and volcanic glass spherules. Lithofacies 2 consists of very finegrained amorphous grains, suggesting that beds of white, massive mudstone lithofacies are volcanic ash layers.

The absence of shallow water indicators such as cross beds, the dominance of fine grain lithology, and the abundance of bioturbation indicate that the Tallahatta Formation was deposited in low energy waters below wave base in the study area. The abundance of amorphous grains points to the presence of volcanic ash as a major sediment source.

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  - 2. Study Area
  - 3. Methods
  - 4. Geology of MS
  - 5. Outcrop
  - 6. Lithofacies One
  - 7. Petrology of Lithofacies One
  - 8. Lithofacies Two
  - 9. Petrology of Lithofacies Two
  - **10. Preliminary Conclusions**

#### Objective

- The goal of the study was to investigate the characteristics of the exposed part of the Tallahatta Formation in this outcrop.
- This study stemmed from a class project that related to my undergraduate coursework in Sedimentology.

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#### **Volcanic Glass**

1.0 mm

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**Conclusion 1: Depositional Environments** The following characteristics indicate that the Tallahatta Formation in this road cut was deposited in a low-energy, below wave base environment such as inner to midneritic settings:

- 1. Fine-grained lithologies dominated by siltstone and clay-size ash layers
- 2. The absence of shallow-water sedimentary structures such as cross bedding and ripple marks indicative of current

#### **Conclusion 1 (Continued):**

- **3. Lateral continuity of same lithologies for 10-30 miles along the Interstate Highway 20**
- 4. The absence of any feature suggestive of river channel
- 5. The dominance of bioturbation processes in both lithofacies

**Conclusion 2: Dominance of Volcanic Ash in the Tallahatta Formation** 

This indicates that the deposition of the Tallahatta Formation occurred during major episodes of volcanism in the USA.



#### **The Source of Volcanic Ash**

Most likely, volcanic ash of the Tallahatta Formation was sourced by major volcanic activity associated with the initiation of the Basin and Range Extension in the Western USA.



From Hopkins (2002)

#### **Conclusion 3: Rhythmic Sedimentation**

The alternation of silt and clay rich layers with ash rich beds suggests that deposition of the Tallahatta Formation was affected by changes in climate and/or regular volcanic activity.



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