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Characterization of Massive vs. Laminated Texture of the Coconino Sandstone (Permian), Arizona from the Study of Thin Sections

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Characterization of Massive vs. Laminated Texture of the
Coconino Sandstone (Permian), Arizona from the Study of Thin Sections

This project seeks to contribute to the work of Dr. John Whitmore and Sarah Maithel on the Coconino Sandstone (Permian) of Arizona. More than one hundred thin sections are available for study from this sandstone. Each thin section was examined both macroscopically and microscopically to determine if the sample is "laminated" or "massive." The purpose of this project is to define what "laminae" are and then develop reliable quantitative criteria that can differentiate between the laminated and massive samples. These criteria might then be applied to distinguish patterns that occur across the deposit, which in turn may provide insight into the depositional conditions of the sandstone. The thin sections were visually examined to differentiate between compositional and textural lamination, as this study focused on textural characteristics. Dr. Whitmore provided data that was collected through the measurement of 400-600 randomly selected grains within each thin section. Statistical analysis of rounding, grain size, and sorting data suggested that sorting is the primary characteristic that causes lamination. While sorting data cannot provide a definitive classification of "massive" or "laminated" for individual thin sections, it can substantiate visual characterizations and support regional trends. For example, the outcrops in this study appear to be grouped into poorly sorted in the north and more moderately sorted further south. This indicates a change in the depositional environment which is probably related to a decrease in velocity. Collectively, sorting data along with visual inspection can be used to draw conclusions about the laminated or massive nature of an outcrop and can contribute to an understanding of depositional conditions.