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Characterization of Sedimentary Bedforms of Colorado Group Mudstones

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Introduction

In this study, the Second White Specks (2WS) Formation, part of the middle Cretaceous Colorado Group, is analyzed for sedimentary heterogeneity. These Cenomanian-Turonian samples are collected from West-central Alberta. The formation primarily consists of laminated calcareous mudstones with abundant fecal pellets composed of calcareous coccoliths debris representing the “white specs”. Integrating CT datasets from core and outcrop samples, 3D geometry of sedimentary bedforms existing in the 2WS Shales and Jumpingpound sandstone are determined.

Background Geology

In the Western Canada Foreland Basin, the Cretaceous Colorado Group contains several sandstone and conglomerate units. It is deposited in the warm Tethys Sea during global seal level highs and regional tectonic downflexing of the North American craton. This group is of particular interest as it displays considerable hydrocarbon potential. This light-oil bearing mudstone / marlstone “sequence is a recent addition to the global list of shale resource plays, and an active target of drilling programs” (Mainali et.al, 2014)

Within the Colorado group, the Cenomian-Turonian aged 2WS formation consists of two major members: Jumping Pound Sandstone and the Second White Speck Shales. Stratigraphically higher, the Jumping Pound is deposited in a high energy environment, consisting abundant sedimentary ripple bedforms. The 2WS Shale consists primarily of laminated calcareous mudstone with characteristic light colored “specks”. These specks are fecal pellets composed of calcareous coccolithic debris (Goodman, 1951) concentrated by currents. It also has foraminifera (dominantly planktonic), fish scales and bones, abundant Inoceramus prisms, and no or sparse bioturbation (Bloch et al., 1993, Schröder-Adams et al., 1996 and Tyagi et al., 2007).

Objectives

The objective of this study is to understand the three dimensional geometry of the bedforms existing in the Second White Specks formation.

Methodology

For this study, outcrop samples are collected from a region south of Calgary. These are cut into slices in order to analyze bedforms in three dimensions. Oriented thin sections of mudstone, cut in three planes, will be used to determine bed microstructure and palaeoflow directions.

CT data helps digitalize these slices which are further analyzed by undertaking computer modelling. This relates the geometry of cross bedding to the morphology and behaviors of bedforms.

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