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Lithology and Depositional Environments of a Portion of the Clays Ferry Formation (Middle and Upper Ordovician) Exposed at Silver Creek, Madison County, Kentucky

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Lithology and depositional environments of a portion of the Clays Ferry Formation (Middle and Upper Ordovician) exposed at Silver Creek, Madison County, Kentucky

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We measure, describe, and interpret a carbonate stratigraphic section within the Clays Ferry Formation (Middle and Upper Ordovician) cropping out in Madison County, Kentucky (USGS Kirksville 7.5" quadrangle). Outcrops are exposed within the bed of Silver Creek along Ky 876 (Barnes Mill Road) from ~100 m downstream of where a bridge crosses the stream, then upstream and upsection for a distance of ~300 m over several sets of falls until bedrock exposure becomes sporadic to absent. We sampled the stratigraphic section at approximately half-meter intervals, also taking samples at lithology changes. We collected a total 18 samples, all of which were slabbed, and then chose 12 samples for thin section analysis.

The total thickness of our measured section is 4.8 m. The rocks are dominantly limestones with some carbonate shales, deposited in shallow-water depositional environments that are generally open-marine subtidal with perhaps some intertidal units. We saw several lithologies representing discrete depositional environments. Burrowed mudstones and wackestones are more common lower in the stratigraphic section and perhaps represent the shallowest depositional environments. Upsection, laminated pelloidal packstones/grainstones occur and contain varying amounts of fragmented fossils. The next prominent unit is a 1.5-meter-thick interval, where shaly carbonate is interbedded with ~10-cm thick limestone beds containing a diverse fossil assemblage, indicating subtidal, open-marine conditions. Several 15- to 25-cm thick grainstone beds mostly comprised of nested, strophomenid brachiopods are prominent ledges and formed under turbulent conditions. Fossiliferous packstones and grainstones with brachiopods, bryozoans, and crinoids then dominate indicating open-marine, subtidal environments; one such horizon displays 10- to 15-cm-high dune bedforms. Upsection for the next ~1.5 meters these lithologies reoccur and are interbedded with one another representing migration of depositional environments over a shallow-marine platform.

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