TOWARDS A DEPOSITIONAL MODEL OF COARSE-GRAINED DELTA DRIFT DEPOSITS, MAIELLA, ITALY - YEAR 2

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PROJECT OBJECTIVES

- Test the hypothesis that stratal succession of the delta drift in the Maiella is the combined product of hyperpycnal flow of a sediment-laden semi-continuous current flowing through the feeder channel and supercritical flow in the adjacent basin.
- Document the proximal to distal facies trends within the delta drift of the Maiella and assess the flow conditions necessary for producing the observed facies distribution.

PREFACE

This project was planned for last year with an approach that combined outcrop work and visualization of the clast distribution in a 3D GPR data set acquired in the quarry of Madonna della Mazza. This visualization portion of the project was completed (Grasmueck et al., 2020) but travel restrictions prevented us from doing the fieldwork, which we plan to complete this year.

PROJECT RATIONALE

The Upper Cretaceous Orfento Formation in the Maiella Mountains (Italy) is a largely mud-free coarse-grained succession of redeposited carbonates with sedimentary structures that are indicative for deposition of subaqueous high-density sediment flows. Yet, the succession does not fit in any of the existing turbidite fan models and recently these deposits have been recognized as a delta drift (Eberli et al., 2019). This carbonate delta drift succession in the Maiella displays characteristics of highly-concentrated turbidity current deposits (Fig. 1). Other elements, like scours filled with pebble- and gravel-sized clasts, and erosive surfaces are typical expressions of transitions from supercritical to subcritical flow (Postma and Cartigny, 2014). Other beds display structures that are associated with hyperpycnal flow. Hyperpycnal flow is commonly associated with sediment laden river water. Yet, isolated carbonate

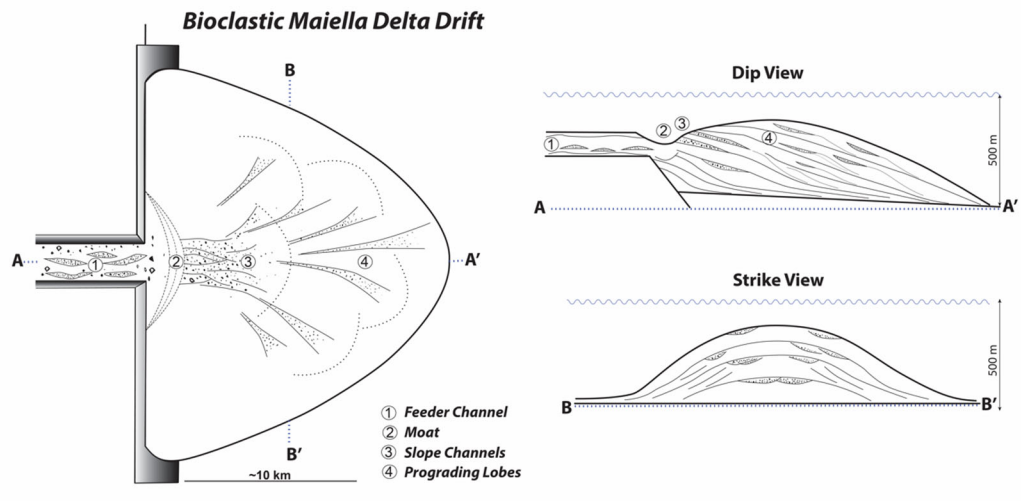

Figure 1: Schematic display of the Maiella drift delta as plan view and dip and strike cross-sections (from Eberli et al., 2019).

platforms do not have fluvial transport and thus, the hyperpycnal flow is likely generated by the ocean current flowing through a feeder channel where it entraps sediment. The large-scale geometry of coarse downlapping lobes in the Maiella delta drift are reminiscent of homopycnal jet outflow typical in Gilbert-type deltas. Thus, it is likely that, depending on the sediment load, both flow mechanisms occur in the delta drift.

PROJECT OBJECTIVES

This project aims to test the hypothesis that a sediment laden ocean current can yield flow conditions to a long-lived homopycnal and hyperpycnal flow, producing the observed bedload transport by the shear provided by the overpassing hyperpycnal sediment laden ocean current (Fig. 2). In addition, hydraulic jumps caused by the topography are thought to produce transitions from subcritical to supercritical flow and several of the observed sedimentary features.

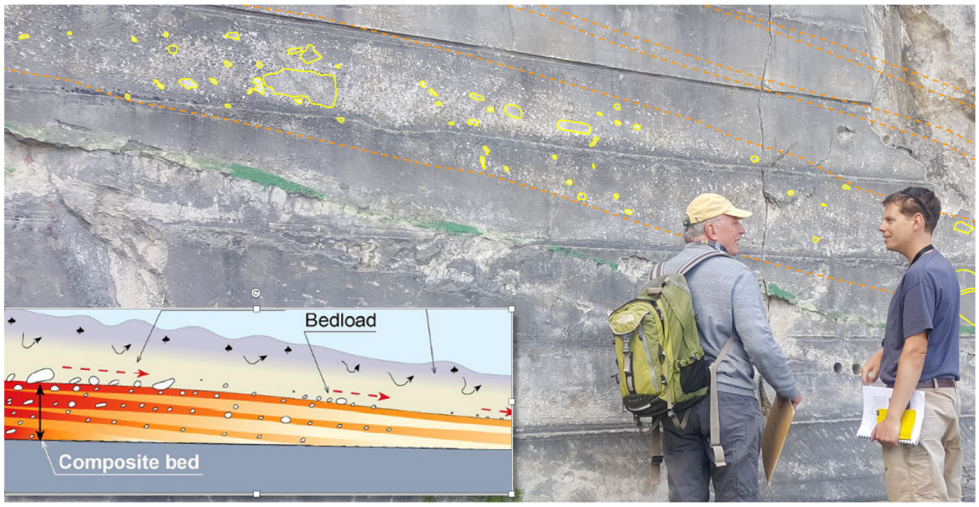

Figure 2: Clast distribution in the Madonna dell Mazza quarry. Clasts appear as white specks in the quarry floor and walls; larger clasts are outlined in yellow. Inset is schematic display of the clasts deposited by hyperpycnal flow (Zavala et al., 2011).

SIGNIFICANCE

This study will provide an assessment of the sedimentologic processes of jet flow generated by ocean currents in feeder channels and their depositional products. The results will identify criteria to distinguish coarse-grained contourite drifts from carbonate turbidite successions.

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