

SEDIMENTARY PROCESSES AND PRODUCTS IN A CRETACEOUS DELTA DRIFT, MAIELLA MOUNTAINS, ITALY

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PROJECT OBJECTIVES

- To relate sedimentary structures and geobody architecture to the flow processes in the drift delta.
- Provide detailed facies and dimensions of all elements in the delta drift.
- Identify the sedimentary criteria for recognizing these coarse-grained drift deposits in cores and seismic data.

PROJECT RATIONALE

The bioclastic wedge of the Orfento Formation is a carbonate drift delta that in its geometry, size and composition is very similar to the Miocene delta drift cored in the Maldives during IODP Expedition 359 (Eberli et al., 2019). These similarities include: 1) a feeder channel opening into the basin, 2) an excavation moat at the exit of the channel, 3) an overall mounded geometry with an apex that is at a shallower water depth than the source channel, 4) progradation of stacked lobes 5) channels that pinch out in a basinward direction, 6) smaller channelized intervals arranged in a radial pattern (Fig. 1).

Carbonate drift deltas form when a sediment-laden current flows through a channel that opens to a basin across a knickpoint where current conditions can change from bedload to suspended flow and deposition. The largely mud-free Orfento delta drift contains sedimentary structures that are reminiscent of

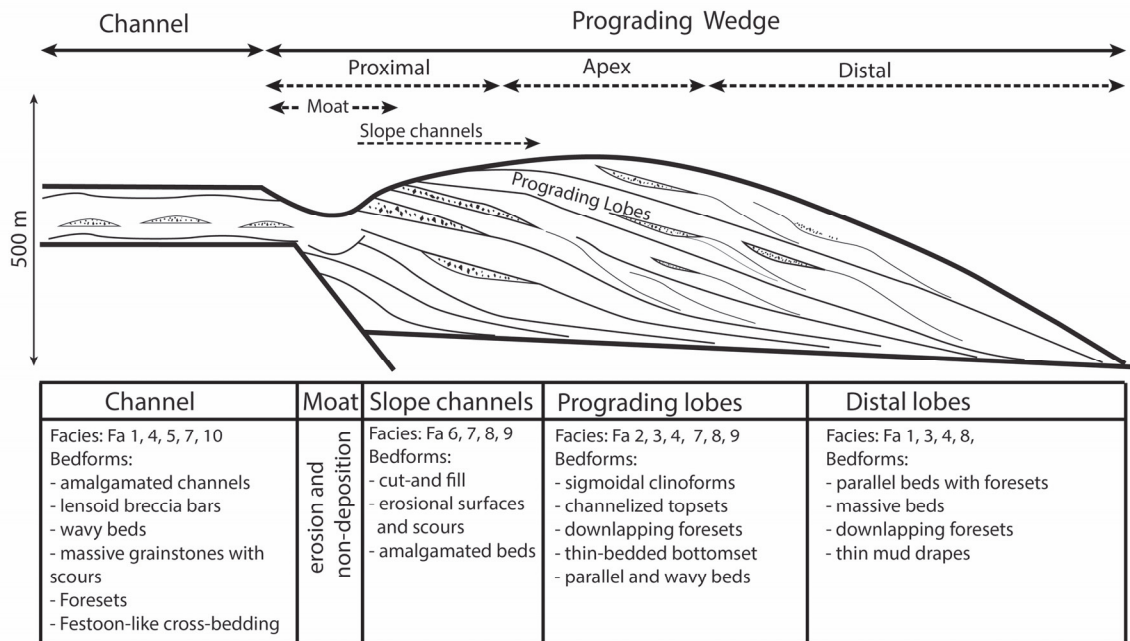


Figure 1: Schematic display of the bioclastic wedge of the Upper Cretaceous Orfento Formation with the different environments and their facies and bedforms that is interpreted as a delta drift.

high-density sediment flows. Other beds display structures that are commonly associated with hyperpycnal flow. These hyperpycnal flow characteristics are likely related to the semi-continuous current flowing through the feeder channel. Other common sedimentary features, such as scours filled with pebble- and gravel-sized bio- and lithoclasts, erosive surfaces, and top-cut-out foresets in clinof orm beds are found in cyclic steps and supercritical flow (Massari, 2017). A study is needed to decipher the flow conditions in the various elements of the delta drift.

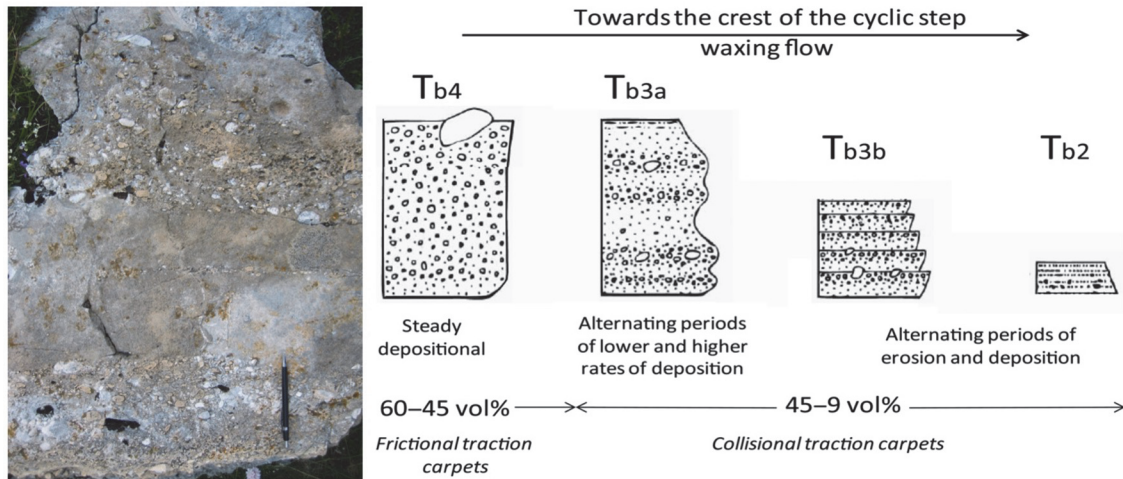


Figure 2: Left: Amalgamated coarsely graded bed with traction carpets. The components of the traction carpets are almost exclusively rounded lithoclasts of the Orfento Formation. This bed and others are similar to those described by Postma et al. (2014) in cyclic steps of gravelly turbidite sequences (to the right).

APPROACH AND DELIVERABLES

Outcrop work in the different facies belts of the delta drift, focusing on sedimentary structures in individual beds, the arrangements of bedsets and the large-scale geometry, will be used to reconstruct the flow conditions in each element. A particular interest will be to capture the transition from bedload to suspended flow and transitions from supercritical to subcritical flow.

The goal of this study is to produce a series of criteria of sedimentary structures and geometry that help identify such delta drift deposits in other outcrops and in subsurface data.

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