Anatomy of Late Quaternary Adriatic Clinoforms: Mechanisms of Sediment Transport and Mud Accumulation on the Continental Shelf

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On the land-locked Adriatic shelf (Central Mediterranean) shore-parallel muddy clinoforms develop both during highstand and falling sea-level conditions, representing the dominant building blocks of a stack of 100-kyr depositional sequences. Within each sequence, these clinoforms are tens of meters thick and rest on regional downlap surfaces traceable over hundreds of km parallel to the modern coast. The analysis of the most recent clinoform deposited during modern (highstand) conditions shows that transport is along the strike of the clinoform and the thinning of the deposit through the bottomset reflects the energetic impact of bottom water flowing along the contour. Bottom currents induce lateral advection, hinder sediment transport basinward and form elongated clinoform bodies characterized by a distinctive shore-parallel offlap break (typically in 25-30 m water depth). The modern HST Adriatic clinoform has a volume of 180 km^3 with a depocenter within less than 20 km from the coast, and reaches its maximum thickness (35 m) down-current with respect to the location of its deltaic entry points. Interestingly, these clinoforms register also very-short-term supply fluctuations like those reflecting abrupt climate change and human impact on the catchment during the last 500 years (Little Ice Age).

Borehole PRAD1.2 allowed to point out that the bulk of Pleistocene clinoforms within 100-kyr sequences record almost exclusively interglacial stages (Stages 5, 7 and 9, in particular) suggesting that shore-parallel advection is most efficient during sea-level highstands. As sea-level fall proceeds, the semi-enclosed Adriatic basin shrinks to about $1/8^{th}$ of its HST extent and circulation becomes sluggish allowing sediment deposition beyond the shelf edge: LST deposits onlap the upper slope, are rich in organic matter, and appear characterised by thin-bedded (cm-scale) turbidity-current deposits. Also in the case of these older deposits, two main factors determine the thinning of clinoforms through the bottomset. Beside the gradual decrease of sediment received basinward, a key control is the energy impact of the West Adriatic bottom current flowing along the contour, impinging the seafloor and limiting the basinward growth of the clinoforms. In this view, bottom currents induce lateral (shore-parallel) rather than basinward transport of sediment with the formation of elongated clinoform bodies characterized by a shore-parallel strike of the foreset.