Channel belt planform (low vs. high sinuosity) and behaviour (aggradational vs. laterally migrating) of turbidite channel-levee deposits: insights from the spectacularly exposed Tachrift Turbidite System (Taza-Guercif Basin, Late Tortonian, NE Morocco)

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Turbidite channels are important sediment transfer conduits from shallow-marine environments to deep-water basin floor. They have been the focus of extensive research from a number of modern and ancient deep-water turbidite systems over more than fifty years. Although flow-monitoring at a wide range of locations and high-resolution 3D-seismic studies have recently yielded new insights, their evolution and depositional features are challenging to be deciphered, as they are often characterised by complex three-dimensional facies heterogeneity and depositional geometries at sub-seismic scale. Well-exposed outcrops are crucial in bridging this gap, as they offer insight into small-scale heterogeneities.
This contribution aims to explore from the small-scale facies heterogeneity to the large-scale stacking pattern of superbly exposed leveed-channel complexes which represent part of the clastic infill of the Taza-Guercif Basin (Late-Miocene; NE Morocco). They are up to few tens of metres-thick and intercalated with hemipelagic marlstones, totalling a stratigraphic thickness of ~800m. The project's objectives include the reconstruction of the depositional architecture of deep-water channel-levee complexes, presenting a comprehensive evolution of these complexes from inception to deactivation, and establishing a model for stratigraphic geometries and facies relationships that may improve existing deep-water channel-levee models to be used for modeling seismic analogues.
Preliminary results (based on 1:5000-scale geological mapping and ~250 closely spaced detailed sedimentological logs, physical-correlated) provide valuable insights into facies and geometry of channel-fills and correlative levees over a ~150 m-thick and ~4 km wide transect largely oblique to the main palaeoflow. The study suggests the existence of dominant types of channel belt planform (low vs. high sinuosity) and behaviour (aggradational vs. laterally migrating), which result in two-end member patterns of channel-fill stacking, namely: (a) lateral-migration pattern formed by high-sinuosity leveed channel belts, which shift laterally with minor vertical aggradational, and (b) vertically stacked pattern reflecting the vertical aggradation of low-sinuosity leveed channels.