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Effects of mass waste events on thrust wedges: Analogue experiments and application to the Makran accretionary wedge

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Olistostromes cover large portions of active thrust wedges like Makran, Gulf of Cadiz and offshore Borneo. Olistostrome emplacement by submarine mass flow represents an instantaneous and massive mass redistribution that may influence thrust wedge mechanics. Different scenarios are experimentally tested. They show that the post-olistostrome wedge development depends on the thickness and extent of the added load.
These results are discussed after the example of the Iranian Makran wedge, between the Arabian and Eurasian plates. The Makran accretionary wedge offers exceptionally clear exposures where the size, the stratigraphy, the morphology and the primary structures of the wedge can be studied without conjecture. A huge olistostrome is intercalated in the Upper Miocene deposits. It is interpreted as a gigantic, catastrophic mass flow emplaced on the growing wedge.
Experimental results suggest that the mass-redistribution caused by large mass-flows can explain a change in deformation style from intense folding and thrusting to gentle folding and eventually a jump of thrust imbrication towards the frontal offshore part of this still active accretionary wedge.
Our interpretation illustrates the non-Coulomb rheology of large sedimentary masses in accretionary wedges and the mechanical imbalance that the rapid emplacement of large submarine mass-flows may introduce in their evolution.