



The buried dune-fields of the Río Paraná, Argentina: an extreme in sedimentary preservation?

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Extremes in dune preservation can be used to constrain and extend our understanding of sedimentary preservation. Ground Penetrating Radar surveys reveal that fully-preserved dune fields exist in bar deposits in the Río Paraná, Argentina. These observations contradict the notion that the tops of dunes are always eroded by recurrence of scour, and provide a unique opportunity to investigate the completeness of the fluvial deposits.

These intact dune fields i) are found in >5% of the mid-channel bar deposits ii) exist only in the upper 5 m of the channel deposits, iii) are restricted to unit-bar troughs, iv) are up to 300 m in length, v) occur in multiple levels, vi) show signs of reactivation, and vii) match the size of average-flow dunes rather than those that form in extreme floods. These observations suggest that the development, abandonment, and burial of dune-fields is a common process that is linked to the distinct changes in flow and sediment transport that occur in the lee of bars in response to changes in discharge, especially in large seasonal rivers. Further analysis shows that changes in flow conditions caused by bar-scale morphology affect dune heights, lengths, bedform shapes and scour, the flux of sediment to the bed, and bedform migration rates: all the basic parameters known to control dune preservation. Thus, bar-scale variation in flow and sediment transport can be expected to cause differences in preservation potential between the thalweg, and the flanks, tops, lee- and stoss slopes of larger bar forms. This highlights that the physical boundary conditions that control sedimentary preservation do not necessarily coincide with an easily classified environment such as a river channel, and provides a conceptual basis for improvements in the interpretation, discrimination, and characterisation of river channel deposits.