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# **Sedimentary characterization of a succession of aeolian sands in the Tejo River lower valley – a record of environmental changes of western Iberia during the Late Plistocene to Holocene**

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Aeolian sands have been recognized along the Tejo River valley in Portugal. Some of these sediments occur intercalated with fluvial deposits of the youngest terrace of the Lower Tejo (the Terrace T6 of a suite of six) but they constitute almost always a cover unit. This unit, named Carregueira Sands, is up to 15 m thick and covers the terrace staircase along the SE river valley margin at altitudes ranging from 30 m to 150 m. The Carregueira Sands were dated by Quartz OSL as 31 Ka (base) to 4 ka (top). The best exposures are located at sand pits near Carregueira village and were used for the sedimentological characterization here presented.

The unit is interpreted as recording climbing dunes, organized into a stacked succession of <3.5 m thick cross-bedded sub-units, corresponding to dune foresets, intercalated with palaeosoils. Palaeocurrents indicate sand transport towards SE, suggesting sand sourcing from the exposed alluvial plain. Eleven facies were recognized, including dominant aeolian deposits, intercalated with thin paleosoils, mud lenses (wet interdune) and minor fluvial deposits. Large scale tabular, tangential or slightly trough cross-bedded sets (0.5-3.5 m thick) consisting of medium-grained sands are the most expressive aeolian dune deposits. Aeolian deposits are also represented by decimetre to meter thick massive, low angle or horizontally stratified fine to medium grained sands (4 facies).

Fluvial facies are represented by small sized (up to 1 m thick, width/height ratios of 0.5-5) channel-shaped beds formed by well-rounded gravel in a moderately sorted sandy matrix (2 facies), horizontally laminated sand-mud beds (1 facies) and tabular laterally persistent faint laminated or massive fine to medium sands with floating rounded pebbles (2 facies). The wet interdune/paleosol facies are sub-horizontal decimetre thick sand beds with significant silt-clay fraction (up to 30 %). The grain-size distributions of aeolian and sandy fluvial sediments are similar, being dominated by medium sand particles (modal sizes of 0.25-0.5 mm). However, aeolian sediments are always

unimodal whilst sandy fluvial sediments usually integrate subsidiary populations of coarse silt and, occasionally, pebble. Thickness of the Aeolian sets tends to decrease upwards. The presence of micaceous lamina, moderate amounts of mud (up to 5 %), relatively coarsegrain-size, poor sorting and the dominant weak roundness of the quartz grains indicate short aeolian transport. The aeolian sands should be mainly derived from the Tejo alluvial plain during cold and dry periods, when the river undergone incision and the vegetation diminished. The dunes climbed the slopes of the left margin of the valley, forced by strong NW Atlantic winds. The aeolian sub-units record long periods of wind controlled sand accretion, punctuated by episodes of dune stabilization and vegetation development (interstadials).