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Stratigraphy of fluvial sediment sequences and their palaeoenvironmental information in the foreland of the Serra dos Órgãos, southeastern Brazil

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In the hinterland of Rio de Janeiro city the rivers Guapiaçu, Macacu and Iconha originate in the Serra dos Órgãos mountain range and drain into the Atlantic Ocean. Since their channelization in the 1950s, higher flow velocities caused an incision of the rivers into the valley fills. These circumstances provide the possibility to study the alluvial deposits along the streams during low water level and allow conclusions on palaeoenvironmental change and landscape history.
Sedimentological investigations of 13 exposures as well as AMS 14C measurements were carried out to investigate sediment properties and reconstruct the sedimentation history within the floodplains. These results enable to distinguish three different facies units.
A late Pleistocene Unit I can be detected at the base of the observed exposures and consists of clast-supported fine to coarse gravels. It can be assumed that the gravel bodies were formed by a climatically induced erosional-depositional cycle within a braided river system.
The gravels are overlaid by Unit II, a grayish to bluish loam mainly of mid-Holocene age. During generally drier climates these loams have been deposited during high water stages or flooding events as a splay facies proximal to the rivers. A reduced flow competence and relatively stable morphodynamic conditions are assumed for that period.
Unit III accumulated in the late Holocene typically consists of several meters of planar or cross bedded sands to fine gravels, interfingered by loamy inclusions, buried peat bogs and organic debris. Fining-upward sequences can be frequently studied within Unit III which were completed by loamy sediments in the uppermost parts of the exposures. The increased flow competence from Unit II to Unit III seems to be a fluvial response to the increased humidity of the late Holocene as well as the enhancement of El Niño-Southern Oscillation (ENSO). Heavy rainfall likely caused higher sediment supply from the steep slopes as well as a reworking of sediments followed by sedimentation in the floodplains. The development of the uppermost loams is attributed to deforestation and land use intensification in historical times which led to higher erosion rates and related sediment loads. An increased human impact can be postulated for the last 250 years.