Postglacial sea-level rise in south Portugal as recorded in Guadiana Estuary

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The Guadiana River Estuary is located in the terminal part of a deeply incised river valley, which accumulated several tens of meters of sediments during the Holocenic transgression. Five cored boreholes (see **Fig.1** for localisation) that reached the pre-Holocenic substratum were drilled recently in order to recognize the architecture of sedimentary facies and to quantify the accumulation of organic carbon trapped in sediments during the valley infilling by marine waters. It was assumed that due to structural constraints imposed by Palaeozoic and Mezozoic substratum, the main estuarine channel did not change its position significantly. Consequently borehole locations were chosen in order to represent different sedimentary environments in the estuary: proximity to the main channel (CM1 and CM3), external sea facing (CM4) and lagoonal (CM2 and CM5) environments. In all five boreholes the Holocene was found to overlay Pleistocene fluvial gravels at depth of 39.2m in CM1, 10m in CM2, 31m in CM3, 19.2m in CM4 and 50.8m in CM5. These depths reflect the pre-Holocenic topography of Guadiana Valley: the basal gravels correspond respectively to Pleistocene terrace levels, in boreholes CM1, CM3 and CM4, to shallow Jurassic platform in CM2 and to the bottom of Beliche River (Guadiana tributary) valley in CM5.

From **Table 1** which resumes results of datings so far done, it appears that the entire Holocenic sedimentary history is recorded within the deeper portions of Pleistocene river valleys (CM5 and CM1 boreholes), where the initial most rapid part of transgression, resulted in the deposition of monotonous clay sequence reported in the works of Dabrio *et al.* (1995) and Goy *et al*. (1996) from Tinto–Odiel Estuary in Spain. This type of sedimentation, i.e. from the upper intertidal regime, prevailed until present day in the confined areas of CM2 and CM5 boreholes. In the areas of CM1 and CM3 the basal clay portion is followed by the succession of meander bar sequences and on top by a lateral bar sequence.

In the area of CM4 which is the most sea exposed, the basal clay sequence is thin or almost lacking (yet to be checked by datings), due to the elevation of Pleistocene surface. The coarse/medium sand sequence represents depositional environment of coastal bars and in the top 3m, dunes.

The microfaunistic analyses of CM1 and CM3 yielded to the identification of two species associations, with a very distinct Shannon's index. This one abruptly changed from 0.03 to 2.28 at 8430 BP in CM1 and from 0.00 to 2.97 at 9470 BP in CM3. These associations testify the evolution from saltmarsh environment to a medium intertidal environment, between 8430±380 BP and 9470±250 BP.

The species association dominated by *A. beccarii* and *H. germanica*, did not undergo alteration along borehole CM2 sedimentary columm.

The major marine influence was recorded in CM4 through a high plancktonic/benthic foramineferous ratio, which begins to increase significantly around 6250±250 BP.

References

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Table 1 Summary of sediment datings from 4 boreholes in Guadiana estuary.

Borehole	Sample depth(cm)	Age BP(yr.)	$\delta^{13}C$(‰)	Material	Method
CM1	824	5020±310	1.1	shells	radiometric
CM1	1530	4600±40	-26.9	organic matter	AMS
CM1	1712	6210±220	-25.9	peat	radiometric
CM1	1860	6205±40	2.08	shells	AMS
CM1	2127	7590±100	20	shells	radiometric
CM1	2850	8430±380		shells	radiometric
CM2	200	3080±100	-27.3	organic matter	radiometric
CM2	715	5950±190	0.4	shells	radiometric
CM2	854	10130±200	-5.98	shells	radiometric
CM3	459	3300±160	-0.6	shells	radiometric
CM3	960	6710±120	1.6	shells	radiometric
CM3	1452	7080±200	0.7	shells	radiometric
CM3	2690	9470±250	-22.9	wood	radiometric
CM4	700	6200±340	1.6	shells	radiometric
CM4	975	5640±90	-0.31	shells	radiometric
CM4	1575	6250±250	1.4	shells	radiometric
CM4	2834	16980±100	-28.5	organic matter	AMS

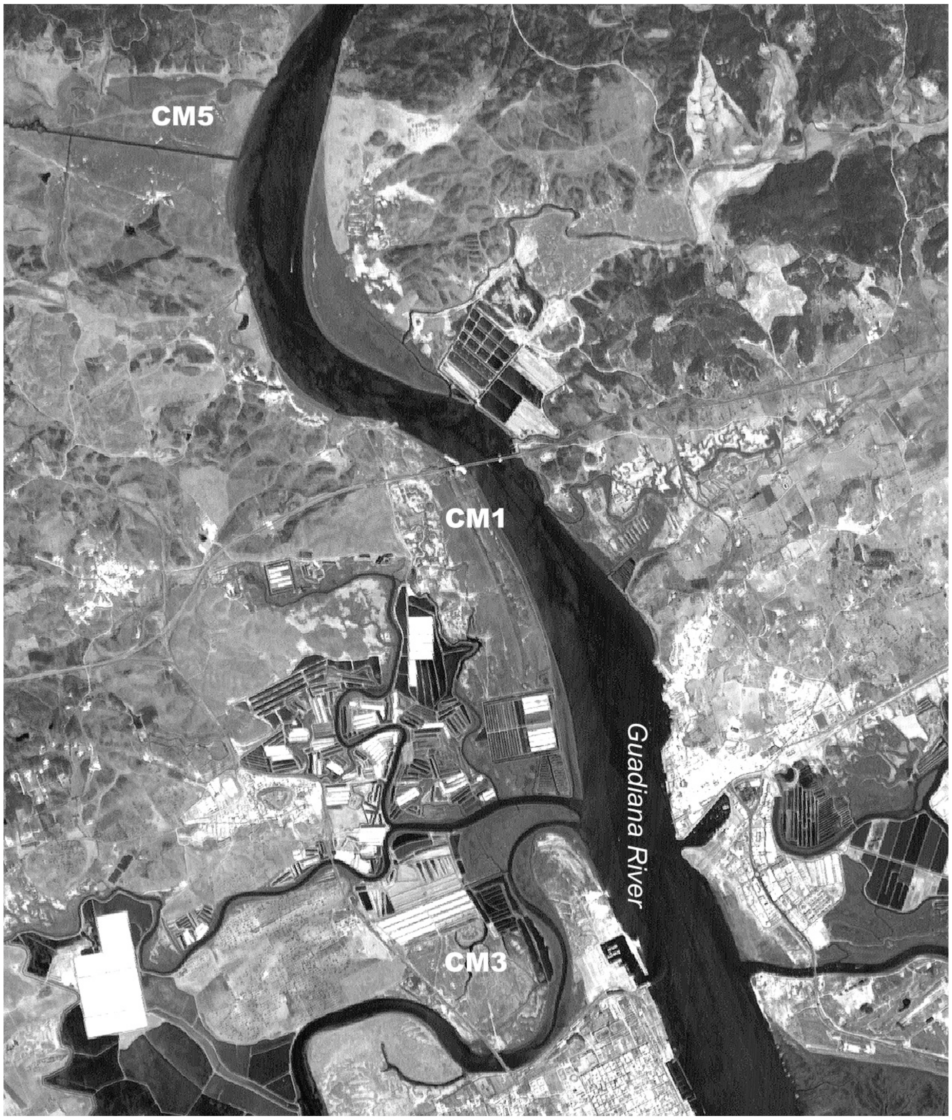

Fig. 1 Geographical localication of the five cored boreholes.