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Reading the geo-bioarchives of Ephesos: Human-environment interactions in Western Turkey during the last 8 millennia

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During Antiquity, Ephesos was an important harbour city. About 7 millennia ago the maximum Holocene transgression reached c. 20 km inland. Due to the progradation of the Küçük Menderes delta and its tributaries the coastline has continuously shifted westwards since then. Especially during Hellenistic time, the delta advanced for about 1.5 km, most probably because of human impact. Our interdisciplinary geoarchaeological research focuses on (i) the detection of spatial and temporal shifts of the coastline during the past millennia, together with estimations of sedimentation rates; (ii) the human impact on the landscape, especially in the environs of the Roman Harbour and canal which was constructed to maintain the connection to the sea; (iii) and the reconstruction of the vegetation history of the Ephesia. More than 30 core sequences were retrieved from geo-bioarchives. For a better understanding of the depositional environments, geochemical, sedimentological and palynological analyses, as well as the determination of the macro- and microfossils were carried out. Besides diagnostic ceramic finds, AMS-14C dating and tephrochronology was used for the chronological framework. Our drill cores enable us to reconstruct the coastline changes during the last millennia and to quantify sedimentation rates. Low sedimentation rates occurred from the 5th millennium BC to the 1st millennium BC; this fact contrasts with higher rates thereafter (most probably due to human activities as deforestation and agriculture). The second aim of the studies is to identify the anthropogenic influence in the sediments of the Roman Harbour. A stratified layer of 1.30 m thickness clearly proves the intensive harbour use between the 2nd cent. BC and the 5th cent. AD, the prosperity period of the city. The stratification probably results mainly from the discharge of sewage and waste of the city into the harbour. Heavy metal concentrations as copper also rise in this layer. In the harbour canal, we also assume strong human impact: an intestinal parasite (*Trichuris cf. trichiura*), fruit tree as well as sugar melon pollen were found in the cores. The third aim is to reconstruct the vegetation history during the last millennia with palynological tools. Three drill cores were analyzed for pollen remains dating back to the 6th millennium BC. The first results reveal the dominance of deciduous oak, in a landscape with human impact, already from the 6th millennium BC onwards. In one core, we detected a rapid decrease in pollen grains, coinciding with the appearance of a volcanic ash from the Minoan eruption of Thera volcano (Santorini) in 1630 BC. From Hellenistic and Roman times onwards, fruit trees (olive, chestnut, walnut) appear next to crop and pasture farming. After the destruction of the city by earthquakes in the 3rd cent. AD, pine trees became dominant, presumably on abandoned land.