



### **0.0.1 Sediments and catchment soils of a closed Mediterranean karstic lake as archives of land use change and atmospheric Pb deposition (Vransko jezero, Cres Island, Northern Adriatic)**

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Lake sediment cores and floodplain soils from closed karstic lake catchment of Vransko jezero (Cres Island, Northern Adriatic) were used to trace historic land-use change. Cores (1 m long) obtained from the lake floor at the depth of 50 m covered a time span of the last 5000 years and soil cores of 5.5 m the time span of the last 8500 years. Fluctuations in water levels of this closed karst lake catchment based on fossil pollen records were within the range of +/- 4 m of the average 20th century lake level (+12m). The deep core intervals from have Pb/Sc ratios of 2.4 which lie within crustal value ranges and have high radiogenic values ( $^{206}\text{Pb}/^{207}\text{Pb}$  ratio of 1.24). These values correspond to Pleistocene loess ratio, which ranges from 1.228 to 1.245 in. The Pb/Sc ratios gradually increase to > 3.5 with a peak value of 5.8 ( $^{206}\text{Pb}/^{207}\text{Pb}$  ratio 1.210) in the core interval which corresponds to the Roman Pb mining peak encountered in other parts of Europe as well as lead concentrations and the  $^{206}\text{Pb}/^{207}\text{Pb}$  ratios slightly higher indicating the post Roman Pb mining decline (400-900 AD). As a consequence of the arrival of Croat grazing farmers after 700 AD there is change in land use (increased erosion) during which the Pb/Sc ratios slightly drop (3.1) and  $^{206}\text{Pb}/^{207}\text{Pb}$  ratios increase but do not reach the paleosoil values. The influx of catchment soil material causes a gradual decline of  $\text{CaCO}_3$  from 65% to 25% in lake sediments. During the early period of the Little Ice Age (LIA) the Pb/Sc ratios range from 4 to 6. Due to the unfavourable climatic conditions and a thin soil cover on the carbonate bedrock, most of soil cover in the catchment was lost to erosion and deposited in the lake within approx. 200 years. The highest Pb/Sc ratios are found above 18 cm and range from 7

to 8 and the amount of calculated anthropogenic Pb reached 70% of the total Pb concentration. Although dramatic changes in lake sediment composition occurred due to deforestation during the MWP and soil erosion in the early stages of the LIA period, the sediments and soils nevertheless contain a continuous history both background anthropogenic inputs of Pb as observed in other more remote regions of Europe.