Palaeoenvironmental analyses of the Pleistocene and Holocene deposits of the Peshawar Basin, Pakistan – in search for the early Anthropocene

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The recognition of the relationship between geosphere, biosphere and humans led to introduction of the Anthropocene as a potential new epoch of Earth history. Since the introduction of the term, hot debates on the Anthropocene from both natural and social sciences arise proving the vividness and broad impact of the subject. Interestingly, the Earth Science-based research in this regard still lacks data. Today, the most important questions are IF and WHEN anthropogenic influence on geological processes and the Earth System as a whole started to dominate. A thick succession of interbedded lacustrine, channel margin and floodplain deposits of Indus and Kabul rivers and the overlying loess deposits represent the late Pleistocene and Holocene sedimentary archives in the Peshawar Basin, northwest Pakistan. At places erratic boulders in the strata represent the latest Pleistocene glaciation (LGM) in the area. The youngest basin fill therefore preserves an excellent record of the climatic variation and environmental conditions during and after the latest deglaciation (LGM) in the area. Geochemical methods are applied to identify natural and anthropogenic contributions. The Chemical Index of Alteration (CIA) displays a decrease in the chemical weathering near the start of latest Pleistocene glaciation, overall low values coinciding with the glaciation phase and gradual recovery, and an increase in the CIA after the glaciation. The A-CN-K plots display similar weathering trend supporting the CIA in all the studied sections. Geochemical plots for Cu, Pb and Zn reveal increase in the input of these elements versus relatively stable background values of Sc in the youngest parts of the basin fill. The preliminary results therefore support the anthropogenic role in the distribution of these elements and correlates with the Gandahara time mining activities (at 5000–2000 BP) in different parts of the area.