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How to detect the onset of the pastoral Anthropocene in the Tibetan Highlands?

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Origins of pastoral societies and their impact on the environment in the Tibetan Highlands are poorly known. The age and intensity of the human impact on Tibetan ecosystems is debated, and estimates based on evidence from various disciplines diverge by more than 20,000 years. The focus of this contribution is on grazing lawns of the eastern Tibetan highlands, covering in total approx.. 450.000 km^2 between 3000 and nearly 6000 m a.s.l. receive between 300 and 800 mm summer rainfall with less than 30% of interannual variation. The main constituent is Kobresia pygmaea, a sedge of 2 to 4 cm in height, forming durable root mats and golf-course like carpets. These “alpine meadows” are perceived as natural.
This mainstream belief is challenged here: The susceptibility against fire and grazing are the main drivers of the making of a synanthropic ecosystem.
Hypothesis: Not the number of humans determines the impact on the environment, but the tool they use for the making of a pastoral landscape. As humans are defined as the fire species, the Anthropocene starts with humans using fire that changes vegetation structures and shapes their environment. Fire-shaped vegetation structures and fire-driven ecosystem’s dynamics depend on the fuel-load to be burnt. During the Mid Holocene Climatic Optimum, hunters and pastoralists burnt forests and grasslands during the dry cold winter.
Results: Macroscopic determined and 14C-dated charcoal of tree species, survey of forest relics in “alpine meadows”, results of grazing exclosure experiments including the identification of grazing indicators, and palynological records of first grazing indicators support our view that the “alpine meadows” of the eastern Tibetan highlands are a human made environment since the onset of pastoralism starting around 8.5 ka cal.BP, maintained through fire and selective grazing of livestock.
The age of the present grazing lawns, however, is not yet known. The presence of hunters using fire and replacing forests by grassland may date back as far as the LGM, while archaeological evidence for the onset of pastoralism is missing. A multi-proxy approach, however, suggests a mid-Holocene Climatic Optimum age.