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Multiproxy and multicore evidence of late Holocene monsoon reduction on the central Tibetan Plateau from Lake Taro Co

Falko Turner (1,2), Xinmiao Lu (1,3), Marieke Ahlborn (4,5), Anja Schwarz (2), Liping Zhu (1,3), Torsten Haberzettl (4), Junbo Wang (1,3), Yun Guo (1), Jianting Ju (1), Peter Frenzel (6), Yongbo Wang (7), Roland Mäusbacher (4), Mauro Alivernini (6), and Antje Schwalb (2)

(1) Key Laboratory of Tibetan Environment Changes and Land Surface Processes (TEL), Institute of Tibetan Plateau Research, Chinese Academy of Sciences, No. 16 Lincui Rd., Chaoyang District, Beijing, 100101, China, (2) Institute for Geosystems and Bioindication, Technische Universität Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany, (3) CAS Center for Excellence in Tibetan Plateau Earth System, Beijing 100101, China, (4) Physical Geography, Institute of Geography, Friedrich Schiller University Jena, Löbdergraben 32, 07743 Jena, Germany, (5) Helmholtz-Zentrum Potsdam, Deutsches GeoForschungsZentrum GFZ, Telegrafenberg, 14473 Potsdam, Germany, (6) Institute of Earth Sciences, Friedrich Schiller University of Jena, Burgweg 11, 07749 Jena, Germany, (7) College of Resource Environment and Tourism, Capital Normal University, West 3rd Ring North Road 105, 100048 Beijing, China

In lake ecosystems, climate change usually causes responses of multiple environmental factors. A reduction in the amount of precipitation for example may result in decreasing inflow, falling water level and rising ion concentration. While some of these factors as conductivity will influence biota in the entire lake, others will impact certain habitats more strongly. A drop in lake level for instance may severely change the extent and structure of littoral biota but might have only a minor impact on the deep profundal of large lakes.
Here we present geochemical (XRF-) and organismic (pollen, chironomid, diatom, Pediastrum algae, ostracod) data for the past 7.2 ka from Taro Co, a large and deep lake on the Tibetan Plateau (31°03'– 31°13' N, 83°55' – 84°20' E, 4,567 m a.s.l., maximum depth 132 m). In addition to this multiproxy approach, three cores from different settings (central basin / profundal, sublittoral and subaquatic prodelta) are analysed to infer complementary information on mid- to late Holocene limnological changes. Independent radiocarbon chronologies for the three cores are established and patterns of the geochemical records are used to evaluate age models against each other.
A pollen based quantitative reconstruction indicates a shift to increasingly arid conditions from 6 to 4 ka BP. Geochemical data and changes in species composition of diatom and Pediastrum assemblages in the profundal sediment core indicate increasing conductivity during the last 4 ka, while a chironomid-derived quantitative lake level record shows a 40 m lake level drop around 4.5 ka BP. In the prodelta sediment core, a strong lithological change from delta front to prodelta sediment and decreasing percentages of lotic chironomid taxa indicate a decreasing inflow around 4.5 ka BP. This approach to use several proxies in sediment cores from distinctive settings in one lake thus enables to infer a more complete and reliable picture of limnological changes associated with late Holocene monsoon reduction on the southeastern central Tibetan Plateau.