A 30ka hydroclimatic record from the Pamir

BERNHARD AICHNER[1*], STEFFEN MISCHKE[2], FRANCESCO S.R. PAUSATA[3], QIONG ZHANG[3], LIV HEINECKE[4], SARAH J. FEAKINS[5], DIRK SACHSE[1,6], ZAFAR MAHMOUDOV[7], ILHOMJON RAJABOV[7]

[1]University of Potsdam, Potsdam-Golm, Germany (*correspondence: baichner@uni-potsdam.de)
[2]University of Iceland, Reykjavik, Iceland
[3]Stockholm University, Stockholm, Sweden
[4]Alfred-Wegener-Institute, Potsdam, Germany
[5]University of Southern California, Los Angeles, USA
[6]GFZ, German Res. Center for Geosci., Potsdam, Germany
[7]Hydromet, Dushanbe, Tajikistan

The goal of this study is to deepen the understanding of past changes in the Pamir, a climate sensitive region located at the boundary of large scale atmospheric circulation systems. A 12.2 m sediment core with a basal age of ca. 30 ka BP was drilled at Lake Karakul (Tajikistan), a large closed brackish lake situated at 3,915 m altitude. The lake catchment is classified as alpine steppe to desert with MAT of -3.9 °C and MAP of 82 mm [1]. Sedimentary aliphatic biomarker distributions were mostly dominated by mid-chain compounds with average $\delta^{13}C$ values of ca. -14‰, revealing an aquatic macrophyte origin. However, three intervals (at ca. 30, 27 and 16-15 ka BP; possibly synchronous to Heinrich-events) were characterized by enhanced abundances of terrestrial long-chain *n*-alkanes as well as lower $\delta^{13}C$ values of aquatic compounds. Changes in hydrogen isotopic signatures reveal three major periods throughout the record with δD values during the Holocene < LGM < H-events. This general trend is confirmed by a set of experiments performed with an atmospheric model with an embedded isotope module (CAM3iso-model [2]). The model simulations show changes in precipitation seasonality during cold spells as a potential factor controlling annual precipitation δD values. The results indicate shifts in atmospheric circulation as well as changes of source water for lipid synthesis at the Late Glacial to Holocene transition and possibly during H-events, with the latter also showing significant ecological responses within the lake catchment. Thus we infer a close coupling between Northern Hemispheric and Central Asian climate dynamics throughout the last 30 ka.

[1] Mischke *et al*. (2010), *PPP* **289**, 10-24 [2] Pausata *et al*. (2011), *Nat. Geosci*. **4**, 474-480