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Paleoclimate, Environmental Sustainability and our Future

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is not synchronous in South Asia and in North Africa, showing an earlier and, hence, a more rapid decrease in vegetation cover in North Africa from 9 to 6 kyr BP while it has almost no influence on that in south Asia until 5 kyr BP. The simulation results suggest that the snow and glacier environment over the Tibetan Plateau is an important factor for Holocene climate variability in North Africa, South Asia and Southeast Asia.

HOLOCENE CLIMATE CHANGE, TIBETAN PLATEAU COOLING, MODELING EXPERIMENT

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Last millennium glacier variations and four centuries of climate change in the Elbrus area, Caucasus, Russian Federation

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Tree-ring analysis and a new lichenometric approach based on a combination of extreme value and Bayesian theories were used to re-estimate moraines ages of Elbrus area. 55 surfaces ranging from 3 to 700 years old were used to construct a new growth curve valid for the central Caucasus. Six new control points for Rhizocarpon section Rhizocarpon agree with the data reported previously by Serebryanny et al. (1984) and Seinova & Zolotarev (2001). Minimum tree-ring dates were obtained for several moraines of Bolshoy Azau, Terskol and Schkhelda glaciers. The tree-ring dates of moraines of Terskol glacier (1800s, 1850s and 1880s) are in a good agreement with the lichenometric and historical data. The age of the oldest trees growing on an end moraine of Bolshoy Azau glacier (AD 1614) brings evidence that the older lateral moraine, which terminates at the lower elevation and was previously dated as 17th century is in fact older than 13th century, judging by the lichenometric age of the end moraine mentioned above. Temperature sensitive, well-replicated ring width pine chronology (1614-2004) was constructed using the trees growing on the floor of Bolshoy Azau valley in the vicinity of the glacier in order to estimate climatic changes in the area during the last four centuries. The project (#16356) was supported by the PICS (France) and RAS (Russia) cooperation program.

LAST MILLENNIUM, GLACIER VARIATIONS, LICHENOMETRY, DENDROCLIMATOLOGY, CAUCASUS

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Possible solar control of centennial-scale cycles in the Early Holocene climate of NW Europe

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Hawes Water is a small (8 ha) carbonate lake located in NW England. Sediment cores from the lake have been used to reconstruct variations in climate since the Last-glaciation. A 9 m core, composed of relatively pure, shell-rich, micrite (>96% $CaCO_3$) was recovered spanning the Early-Mid Holocene. Contiguous 1 cm isotopic ($\delta^{18}O$, $\delta^{13}C$) analyses were carried out and used to monitor the impact and response of the local lake-catchment system to climatic change. The $\delta^{18}O$ record reveals substantial climatic instability. There are two periods of marked climatic deterioration, dated to approx. 9.4 ka BP and 8.2 ka BP based on U-series chronology. Even the times of relatively stable climate show significant changes. Spectral analysis and filtering of the $\delta^{18}O$ data reveal persistent regular cyclicity with a period of around 500 years. Interestingly, the two episodes of most marked climatic deterioration, recorded elsewhere in Europe, have been correlated with periods of decline in the North Atlantic circulation, and they correspond to amplified peaks within the centennial-scale cycles. Cross spectra of $\delta^{18}O$ with $\Delta^{14}C$ (taken as an indicator solar activity) for 8000 to 11,300 calendar years before present show significant coherency and common spectral peaks at periods of around 550 years. These variables are also in phase - lower $\delta^{18}O$ or colder temperatures correspond to negative $\Delta^{14}C$ or less solar activity. This implies that the centennial-scale periodicity may in part be due to indirect climate-forcing via subtle changes in solar activity.

OXYGEN ISOTOPES, SOLAR FORCING, HOLOCENE, CYCLICITY, CARBONATE LAKES

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