^{10}Be and climate variability during 1900-2006 AD reflected in varved lake sediments

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We present new data about ^{10}Be distribution in varved lake sediments extending for about one century. The sediment was cored in a lake located in eastern Finland (63°37′N, 29°06′E, 95.8 m a.s.l.), which has a surface and drainage areas of about 0.15 km^2 and 1 km^2 respectively. The sediment core was sliced at varve boundaries under a microscope and the varve material varied between 20 and 180 mg dry weight. ^{10}Be was extracted from the samples through total dissolution followed by ion exchange column separation and a final BeO. The ^{10}Be was measured at the AMS facility at Uppsala University. ^{10}Be concentrations range from 2.3-6.9×10^8 atoms g^{-1}, with an average of 3.3×10^8 atoms g^{-1}. The years 1894, 1921, 1930 and 1977-1978 AD have relatively high ^{10}Be concentration (>4.5×10^8 atoms g^{-1}). The years with lowest concentration are 1904 AD (2.3×10^8 atoms g^{-1}) and 1916 AD (2.4×10^8 atoms g^{-1}). ^{10}Be concentration was converted to flux in order to account for the effect of variable sediment composition (organic and mineralogical parts) and accumulation rate. Years with relatively high precipitation are correlated with high ^{10}Be suggesting that most of the isotope flux is strongly linked to wet fallout. The higher flux of ^{10}Be to the lake during cold years possibly reflects extensive supply upon melting of snow and ice cover which was associated with less retention within the drainage area. Data treatment reveals a clear negative correlation of ^{10}Be to individual solar cycles during the 20th century.

Holocene climate variability in Southwestern Mexico from speleothem δ^{18}O and Mg/Ca

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In spite of many marine records identifying rapid climate fluctuations in tropical and subtropical North and Central America, there are few high-resolutions records from continental environments revealing the consequences of climate variability in continental settings.

Here we present a Holocene paleoclimate reconstruction based on multiproxy analysis (δ^{18}O and Mg/Ca) of a stalagmite from southwestern Mexico that grew between 11.2 and 1.7 ka. The δ^{18}O and Mg/Ca records reveal a complex interplay between Caribbean and Pacific moisture sources, modulated by the north Atlantic SST, the ITCZ position and trade winds strength.

Climate anomalies from the Holocene (10.3, 8.2 and 4,2 ka) are characterized, in our record, by severe disruption to the total arrival of moisture in southwestern Mexico. However, associated disruption to local precipitation was more significant during the early Holocene than the late Holocene.