Geophysical Research Abstracts
Vol. 20, EGU2018-3556, 2018
EGU General Assembly 2018

Comparison of oxygen isotope records from lakes and tree-rings in southern Patagonia (OXICLIM)

Christoph Mayr (1,2), Nathalie Dubois (3,4), Andreas Lücke (5), M. Lujan Garcia (6,7), Melina Mauad (8), Julieta Massaferro (9), Milagros Rodriguez-Catón (10), Rebecca Smith (11), Ana Srur (10), and Bernd Zolitschka (12)

(1) Friedrich-Alexander-Universität Erlangen-Nürnberg, Institut für Geographie, Wetterkreuz 15, 91058 Erlangen, Germany (christoph.mayr@fau.de), (2) Ludwig-Maximilians-Universität München, GeoBio-Center and Department für Geo-und Umweltwissenschaften, 80333 München, Germany, (3) ETHZ, Sonneggstrasse 5, 8092 Zürich, Switzerland , (4) EAWAG, Überlandstrasse 133, 8600 Dübendorf, Switzerland, (5) Forschungszentrum Jülich, Institut für Bio- und Geowissenschaften, IBG-3: Agrosphäre, 52425 Jülich, Germany, (6) Universidad de Buenos Aires, Facultad de Ciencias Exactas y Naturales, Dept. Biodiversidad y Biología Experimental, Ciudad Universitaria, C1428EHA, Buenos Aires, Argentina, (7) CONICET, Instituto de Biodiversidad y Biología Experimental Aplicada, Ciudad Universitaria, C1428EHA , Buenos Aires, Argentina, (8) Universidad Nacional de La Plata, ILPLA, Bv. 120 y 62 S/N, 1900 La Plata, Argentina, (9) CONICET, CENAC/APN, 8400 Bariloche, Argentina, (10) CONICET, IANIGLA, 5500 Mendoza, Argentina, (11) Research Laboratory for Archaeology and the History of Art, South Parks Road, Oxford, OX1 3UB, UK, (12) Universität Bremen, Institut für Geographie, GEOPOLAR, Celsiusstr. 2, 28359 Bremen, Germany

The recently launched Argentinean-German joint project “Synthesis of oxygen isotope proxies for climate reconstruction in southern Patagonia” (OXICLIM) is a scientific initiative intended to combine regional continental climate archives by means of oxygen isotope records. The long-term aim of our study is to provide the foundation for quantitative climate reconstructions using statistical methods and mechanistic models. The study area, close to Los Glaciares National Park in southern Patagonia, exhibits a distinct humidity gradient evident as a transition from humid Andean *Nothofagus* forest to Patagonian steppe. The ends of this gradient, humid and dry, are represented here by Laguna Verde (49.20˚S; 72.98˚W) and Laguna Las Gemelas Este (49.39˚S; 72.90˚W), respectively. For Laguna Verde we have found weak but significant negative correlations (r^2=-0.28 and r^2=-0.26) of tree-ring width with temperature variability and the Southern Annular Mode index, respectively. For both sites, we have extracted cellulose from multi-decadal tree-ring records from the lakes’ catchments and analysed the $^{18}O/^{16}O$ ratios of single years. Concurrently, chironomid head capsules and aquatic cellulose were extracted from the lake sediments and their oxygen isotope ratios were analysed. Radiometric dating (^{210}Pb, ^{137}Cs) and tephrochronology provide a robust chronology of the last century for the sediment cores, whereas tree-rings are annually dated from present-day backwards. The oxygen isotope composition of tree-ring cellulose from *Nothofagus pumilio* reflects the source water isotopic composition overprinted by plant physiology and air humidity changes. The lacustrine oxygen isotope records reflect the isotopic composition of lake water, which is determined by hydrological constraints such as the lake water balance and the history of air masses controlled by orography and moisture sources. Combining both oxygen isotope archives tree-ring cellulose and lake sediment - is a novel and challenging approach. The best way to test its applicability is possible in areas with a strong hydrological gradient, such as along the eastern flanks of the Patagonian Andes.