Geophysical Research Abstracts
Vol. 21, EGU2019-17199, 2019
EGU General Assembly 2019

Hydrological changes of the central Atacama Desert since the Miocene as reconstructed from clay pan records of the Costal Cordillera/ N Chile

Volker Wennrich (1), Julia Diederich (1), Emma Fernandez Galego (1), Benedikt Ritter (1), Dominik Brill (2), Alicia Utande (2), Stefan Buske (3), Barbara Blanco Arrue (4), Pritam Yogeshwar (4), Christian Rolf (5), Stephanie Scheidt (1), Catalina Gebhardt (6), Roberto Bao (7), Eduardo Campos Sepúlveda (8), Tibor Dunai (1), and Martin Melles (1)

(1) University of Cologne, Institute of Geology and Mineralogy, Cologne, Germany (volker.wennrich@uni-koeln.de), (2) University of Cologne, Institute for Geography, Cologne Germany, (3) Institute of Geophysics and Geoinformatics, TU Bergakademie Freiberg, Freiberg, Germany, (4) Institute of Geophysics and Meteorology, Univ. Cologne, Cologne, Germany, (5) Leibniz Institute for Applied Geophysics, Stilleweg 2, 30655 Hannover, Germany, (6) Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany, (7) University of A Coruña, Faculty of Sciences, Spain, (8) Universidad Catolica del Norte, Departamento de Ciencias Geologicas, Antofagasta, Chile

Hyperaridity is a major limitation of Earth-surface processes and biological activity in the Atacama Desert of N Chile, one of the oldest and the driest deserts on Earth. But even the hyperarid core of the Atacama Desert of N Chile has experienced severe precipitation events, e.g., during the floods in 2015. On geological timescales, the overall aridity that is postulated to have lasted at least since the early Miocene was punctuated by distinct pluvial events. Such wetter conditions, e.g. during the Miocene, caused widespread lake-formation in the Central Depression and Coastal Cordillera, but also caused amplified surface processes, changes in vegetation dynamics, and enabled the dispersal of species. Unfortunately, due to the limited number and heterogeneous appearance of climate archives from the central Atacama, it's longer-scale precipitation history is still a matter of controversy.
This study aims to study continuous longterm (Miocene-Pleistocene) paleoclimatic/ environmental records from the hyperarid core of the Atacama Desert covering the last >10 Ma. Therefore we investigate endorheic clay pans in the Coastal Cordillera mostly formed by blocking of drainage by tectonic movement that host up to 150 m thick sediment records. The clay pans under study are located along a latitudinal transect across the hyperarid core of the Atacama, and thus, are assumed to have recorded local and regional precipitation variations on different timescales.
The investigated sequences exhibit significant changes in the sedimentological, geochemical, and mineralogical properties during the Pleistocene mainly triggered by precipitation changes. Diatom and phytolith remains preserved in these records clearly point to significant water bodies and a significant vegetation cover during some wet periods. Preliminary data of pre-Pleistocene sediments recovered from one of the sites, in contrast, imply permanent lacustrine conditions pointing to a major hydrological and/or climatic change in Coastal Cordillera. The results shed new light on the timing, frequency, and the driving mechanisms of the intervening pluvial phases.