Geophysical Research Abstracts
Vol. 21, EGU2019-4121, 2019
EGU General Assembly 2019

Earth – Evolution at the dry limit

Tibor J. Dunai and the SFB 1211 project leaders
University of Cologne, Geology and Mineralogy, Geosciences, Köln, Germany (tdunai@uni-koeln.de)

Water is the defining feature of the habitable Earth; it is essential for all life as we know it. Evolution of life in extremely water limited environments, which cover significant portions on of the Earth, is not well understood. Akin to life, water-driven processes leave unique marks on the Earth's surface. Mars is the only other planet known to bear the marks of water-driven surface processes, albeit fossil and of great age. The slow surface processes that may operate even in the virtual absence of liquid water are essentially unknown. What is evident is that transient episodes of increased water availability leave long lasting traces in extremely water limited environments. Intriguingly those traces of bursts in Earth surface evolution have rarely been related to bursts in biological colonization/evolution, and vice versa, although both relate to the same trigger: water.
The objective of the presented Coordinated Research Centre (CRC 1211; http://sfb1211.uni-koeln.de/), involving twenty projects conducted at the Universities of Cologne, Bonn and Aachen, the Research Centre Jülich, and partner institutions in Chile (UCN Antofagasta; Univ. Antofagasta; CEAZA, La Serena; PUC Santiago), is to investigate the mutual evolutionary relationships between Earth surface processes and biota. The target areas are arid to hyper-arid systems, where both biota and Earth surface process are severely and predominantly limited by the availability of water. The initial target is the Atacama Desert (7/2016- 6/2020), in a possible second phase (7/2020 – 6/2024) research in the Atacama would be joined by comparative research the Namib Desert.
Primary research aims are to isolate the key fingerprints of biological activity at the (water) limit of the habitable Earth, and to characterize the Earth surface processes operating in the (virtual) absence of liquid water. We aim to characterize thresholds for biological colonization and concurrent fluvial transformation of landscapes, the tipping point(s) of biotically and abiotically controlled Earth surface systems, and establish detailed long-term terrestrial climatic records of the oldest and most arid zones on Earth. Chronometric and spatial information on the colonization and radiation of biota will be related to the landscape evolution and their common driver; climate.