Geophysical Research Abstracts
Vol. 20, EGU2018-13616, 2018
EGU General Assembly 2018

terraXcube: An emerging ecotrone to converge chamber experiments and environmental studies in alpine ecology

Georg Niedrist (1), Andrea Nollo (2), Hermann Brugger (2), Andrea Vilardi (2), Georg Leitinger (3), and Ulrike Tappeiner (1)

(1) Institute for Alpine Environment, Eurac research, Bozen, ITA , (2) Institute fof Mountain Emergency Medicine, Eurac research, Bozen, ITA, (3) Institute of Ecology, University of Innsbruck, AT

Experiments in controlled environments and field studies are both well established and effective methods to investigate the ecological impact of global change. However, especially for high mountains and polar regions several constraints limit the results from both approaches: Chamber experiments can reproduce well controllable and standardized environmental conditions, but they are limited in simulating complex combinations of environmental parameters such as atmospheric pressure, humidity, temperature and radiation simultaneously. On the other hand, field studies are carried out in real conditions, but the complexity of variables often hampers a clear view on the impact of the single driving factor. In addition, field experiments in mountains are often limited by logistical problems such as equipment functionality, transport, travel and accommodation.
In Bolzano/Bozen (IT) a new ecotrone is currently under construction that addresses exactly these limitations. The terraXcube will consist of five hypobaric chambers organized in two units. Four small chambers (LxWxH 3x3x3m each) are designed for ecological research with the following parameters that can be controlled individually or simultaneously: barometric pressure ($\geq$600 mbar), temperature (-20°C - +50°C), humidity (10 – 100%), solar radiation (280-1000nm), rain and concentration of several gases (CO_2, O_3 etc.). One large chamber (LxWxH, 12x6x 6m) is designed for mountain emergency medicine and industrial testing and extends the above mentioned variables to extreme ranges such as $\geq$ 300mbar atmospheric pressure, -40 to +60°C temperature range and wind ($\leq$ 25m/sec).
Through an automatic data acquisition system microclimatic parameters deriving from an ongoing drought experiment with Smart Field Lysimeters can be reproduced in real-time within the terraXcube. This combination of field-and chamber studies offers exciting new perspectives in mountain and extreme environmental research and might further reduce the gap between in vivo and in vitro experiments in alpine ecology.