

An obliquity-study of the early Earth's atmosphere

Anke Hamann-Reinus (1), Markus Kunze (1), Mareike Godolt (2), Heike Rauer (2,3), and Ulrike Langematz (1)

(1) Institut für Meteorologie, Freie Universität Berlin, Berlin, (2) Zentrum für Astronomie und Astrophysik, Technische Universität Berlin, Berlin, (3) Institut für Planetenforschung, Deutsches Zentrum für Luft- und Raumfahrt, Berlin (anke.hamann-reinus@met.fu-berlin.de)

Abstract

Studying the evolution of early Earth's atmosphere is the major goal of our task 'Atmospheric Dynamics' embedded in the HGF-Alliance 'Planetary Evolution and Life'. We use the General Circulation model EMAC (ECHAM5/MESSy) for a parameter study of the Earth's obliquity. After Williams (1993) the Earth axis obliquity crosses values from 70° to about 23.5° at present. Especially the decrease to an obliquity below 54° caused an amelioration of the environment through the reduction in seasonal temperature stresses at about 550 Ma. Remarkably, this coincides with the time of the so called Cambrian explosion. As a start we change the Earth's obliquity to 26° and 45° corresponding with possible obliquities at 430 Ma and 550 Ma (referring to Williams, 1993). We present results concerning dynamics and circulation in troposphere and stratosphere.

References

- [1] Williams, G.E. (1993), *Earth Science Reviews*, 34, 1-45.