

## **HGF-Alliance Planetary Evolution and Life**

The climate evolution of terrestrial planets is complex. However, within the HGF-Alliance Planetary Evolution and Life, we want to significantly improve our understanding of the atmospheric conditions supporting habitability by taking advantage of what we have learned from Earth and our sister planets in the solar system.

This knowledge will ultimately allow us to better understand also terrestrial planets outside our own planetary system, which are expected to be discovered in the very near future.

In our contribution to the HGF-Alliance we adapt our present day tuned Chemistry Climate Model ECHAM5/MESy Atmospheric Chemistry (EMAC) to the conditions of the early Earth during the late Archean at around 2.5 Ga (Ga:  $10^9$  years before present). The EMAC will be used to simulate the atmospheric state under selected scenarios representing different stages of the Earth's evolution. An important aim is to determine the essential physical processes required in such a model in order to reproduce the global dynamical features (meridional circulation, zonal-mean wind etc.) of these stages of the Earth's evolution. We also seek out potential coupling feedbacks between the dynamics and chemistry and will investigate which factors (atmospheric composition, radiation input etc.) control global transport features hence influence habitability.