Geophysical Research Abstracts
Vol. 13, EGU2011-6145, 2011
EGU General Assembly 2011

Quantification of CO_2-formation pathways in the Martian Atmosphere

Joachim Stock (1), Christopher Boxe (2), Lee Grenfell (3), Ralph Lehmann (4), Beate Patzer (3), Heike Rauer (1,3), and Yuk Yung (5)

(1) DLR, Institut für Planetenforschung, Berlin, Germany (joachim.stock@dlr.de), (2) Earth and Space Science Division, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA, (3) Zentrum für Astronomie und Astrophysik, Technische Universität Berlin, Berlin, Germany, (4) Alfred-Wegener-Institut für Polar- und Meeresforschung, Potsdam, Germany, (5) Division of Geological and Planetary Science, California Institute of Technology, Pasadena, USA

The chemical composition of terrestrial planetary atmospheres can be critically influenced by the presence of trace species, which in turn, can act in catalytic cycles, affecting the concentrations of major atmospheric gases, by providing alternative chemical reaction routes (i.e., chemical pathways). Since the number of chemical species and reactions in such complex systems can be very large (and hence, also the number of chemical pathways), it is, generally, a challenging task to identify the important chemical pathways that determine the abundance of major species. Therefore, effective methods for the investigation of such reaction networks are required. In order to analyze the CO_2-dominated atmosphere of Mars, we use a new analysis tool (i.e., Pathway Analysis Program - PAP), which is capable of identifying and also quantifying all chemical reaction pathways in a reaction network. For this study, we apply PAP to the Caltech-JPL 1-D Mars photochemical model to identify and analyze the dominant chemical processes involved in CO_2-production in Mars' atmosphere. Results of our analysis with respect to the dominant catalytic chemical cycles, governing Martian atmospheric CO_2 will be discussed.