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# Analysis of the influence of higher atmospheric pressure levels on the Martian radiation environment - implications for Martian habitability in the Noachian era

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Due to the absence of a global magnetic field and low atmospheric pressure, high-energetic galactic protons can propagate all the way through the Martian atmosphere to the ground and interact with the soil. The resulting radiation environment on the Martian surface is much more hazardous for life than the one on Earth.
Looking at the possibility of an emergence of life on Mars, the Noachian epoch (4.6 - 3.5 Ga BP) proves to be a most interesting time span. It is assumed that Mars possessed a significantly higher atmospheric pressure level and possibly still had a global magnetic field, both serving as a shield against cosmic radiation. These conditions would in all likelihood have yielded a less hostile radiation environment for a possible emergence and evolution of life. Furthermore, it is widely agreed upon that liquid water existed at least sporadically on the surface during this time, which serves as a further prerequisite for an emergence of life as we know it.
Using the Planetocosmics- and GEANT4-simulation codes, we calculate the particle radiation on the Martian surface for different atmospheric conditions, as well as the resulting radiation exposure. Here, we present radiation environments for different atmospheric pressure levels and resulting equivalent dose rates.