A Tentative Estimate of Space Paleoclimate Relevant to the Geospace in an Astrobiological Framework

G. JERSE [1], M. MESSEROTTI [2,1] GREGORIO, A. AND J. CHELA-FLORES [3,4]
[1]Department of Physics, University of Trieste, Via A. Valerio 2, 34127, Trieste, Italia;
[2]INAF-Trieste Astronomical Observatory, Loc. Basovizza n. 302, 34012, Trieste, Italia.
[3] The Abdus Salam ICTP, Strada Costiera 11, 34014 Trieste, Italia, [4]Instituto de Estudios Avanzados, IDEA, Caracas 1015A, República Bolivariana de Venezuela

In this work, we give tentative estimates of the energy levels of the Earth's magnetosphere and atmosphere at different epochs and for different solar activity levels (space paleoclimate). In particular our derivation arises from available observations and models of the galactic and solar ambient. We consider these calculations a first step towards a comprehensive approach in an astrobiological framework. In fact, the emergence and evolution of life on Earth were strongly biased by the physical conditions of the galactic and of the planetary environments in the early Solar System. Observations of solar proxies at different epochs show that the young Sun was more active than the present Sun with a consequent enhanced particle and radiation emission. The young active Sun may have played an important role in the evolution of the Earth's atmosphere and most likely on the origin and the evolution of life itself. Despite the fact that physically consistent values were derived via observations and models, this work points out the highly fragmentary character of the available data and the constraints of the available models, both of which prevent a reliable derivation of estimates for past epochs. This work indicates that the approach of considering a comprehensive set of significant space weather sources is quite complex. Hence, it deserves a multi-disciplinary approach and expertise to cope with a variety of data and models in order to build a consistent and significant scenario.