

The Evolving Sun and its influence on Planetary Environments

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Studies of young solar proxies (G0-G5 V stars), as part of the "Sun in Time" program, show that the young Sun was rotating over 10× faster than today. As a consequence, these young solar type stars (including the young Sun) had vigorous magnetic dynamos and correspondingly strong coronal X-ray and EUV emissions and chromospheric FUV and UV emissions - up to a thousand times stronger than that observed for the present Sun. Also, observations of the youngest solar proxies indicate that the young Sun had frequent and powerful flares and most likely strong winds. The results of the "Sun in Time" program will be discussed that show the decline of solar coronal and chromospheric activity with slower rotation and increasing age. Also discussed are some of the major effects that the young Sun's strong magnetic activity may have had on the photoionization, photochemistry, and erosion of paleo-planetary atmospheres. Some examples that will be briefly discussed include: the possible erosion of Mercury's mantle, loss of water on Mars and the oxidation of its surface, hydrodynamic mass loss from paleo planetary atmospheres, and the evolution of the Earth's atmosphere and the origin and evolution of life