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# A search for the effects exerted by a possible Martian intrinsic magnetic field on its SEP environment

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Present-day Mars does not have a significant global intrinsic magnetic field although it displays surface magnetic anomalies. In the past 'young Mars' may have had a strong intrinsic magnetic field. Induced Martian magnetic fields affect the properties of Solar Energetic Particles, (SEPs), near the planet. Recent Martian SEP environment studies, made using self-consistent global plasma simulations [McKenna-Lawlor et al. 2012; Kallio et al., 2012], have shown that piled up magnetic fields in the Martian magnetosheath/magnetosphere affect the behaviour of SEPs, resulting, for instance, in dramatic magnetic shadowing. In these studies when correlating the simulations with in situ measurements made by the SLED instrument aboard the Phobos spacecraft, Mars was not assumed to have an intrinsic magnetic field, which raises the question as to whether, and how, a residual Martian intrinsic magnetic field may have contributed to affecting the disturbed solar energetic particles (SEPs) recorded near the planet.

In the present work we have extended our hybrid modelling of SEPs by assuming that Mars has an intrinsic magnetic field. Then, we compare a non-magnetized Mars with a magnetized Mars in terms of SEP measurements. We also discuss the consequences of the results, keeping in mind the forthcoming in situ SEP instrument measurements which are scheduled to start near Mars at the end of 2014 on-board the MAVEN spacecraft.