



The new magnetic figure of Mars

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Mars is the only planet (besides Earth) which has been orbited more than once by spacecrafts providing globally distributed and high resolution vector magnetic field measurements, with Mars Global Surveyor (MGS, 1996-2006) and Mars Atmosphere and Volatile Evolution (MAVEN, 2014-). MGS returned repetitive coverage of the Martian surface at 2:00 am and a constant 400 km altitude, allowing an easy and straightforward separation of static (internal) and time-varying (external) magnetic sources. It also provided indirect estimates of the total field intensity, and sparse, mostly day side, vector measurement below 200 km during the early phases. MAVEN however, is on an elliptical orbit, with varying local time, latitude and altitude. These two complementary missions allow us to update existing magnetic field models of Mars and to greatly improve both their accuracy and spatial resolution. The new model we present is based on Equivalent Source Dipoles, an approach in which magnetic sources are homogeneously located below the surface. The model is constructed with carefully selected measurements, using local and extrapolated proxies to estimate the level of external field activity. Orbital segments are individually checked to remove spurious or noisy measurements. The final model has a global horizontal resolution close to 100 km. It is converted to a spherical harmonic model up to degree and order 140, to allow a downward continuation to the surface of Mars. At a local scale, anomalies are better defined, which eases their interpretation in terms of magnetization properties and processes. Several examples will be presented and discussed.