Magnetic Fields in Earth-like Exoplanets and Implications for Habitability around M-dwarfs

Mercedes Lopez-Morales, Natalia Gomez-Perez, Thomas Ruedas

(Submitted on 14 Jul 2011)

We present estimations of dipolar magnetic moments for terrestrial exoplanets using the Olson & Christiansen (2006) scaling law and assuming their interior structure is similar to Earth. We find that the dipolar moment of fast rotating planets (where the Coriolis force dominates convection in the core), may amount up to ~80 times the magnetic moment of Earth, M_Earth, for at least part of the planets' lifetime. For very slow rotating planets (where the force of inertia dominates), the dipolar magnetic moment only reaches up to ~1.5 M_Earth. Applying our calculations to currently confirmed rocky exoplanets, we find that CoRoT-7b, Kepler-10b and 55 Cnc e can sustain dynamos up to ~ 18, 15 and 13 M_Earth, respectively. Our results also indicate that the magnetic moment of rocky exoplanets not only depends on their rotation rate, but also on their formation history, thermal state, age and composition, as well as the geometry of the field. These results apply to all rocky planets, but have important implications for the particular case of exoplanets in the Habitable Zone of M-dwarfs.

Comments:	4 pages, 1 figure, to appear in the Origins 2011 ISSOL & IAU Meeting Conference Proceedings, Montpellier, France, July 3-8 2011
Subjects:	**Earth and Planetary Astrophysics (astro-ph.EP)**
Cite as:	**arXiv:1107.2804 [astro-ph.EP]**
	(or **arXiv:1107.2804v1 [astro-ph.EP]** for this version)

Submission history

From: Mercedes Lopez-Morales [view email]
[v1] Thu, 14 Jul 2011 12:42:57 GMT (373kb)

Which authors of this paper are endorsers?