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Daytime and nighttime turbulence on Mars monitored by InSight

Aymeric Spiga^{1,2}, Naomi Murdoch³, Don Banfield⁴, Ralph Lorenz⁵, Claire Newman⁶, Jorge Pla-García^{7,8}, Raphael Garcia³, Philippe Lognonné⁹, Léo Martire³, Sara Navarro⁷, and the the InSight team*

¹Sorbonne Université - Campus Pierre et Marie Curie, Laboratoire de Météorologie Dynamique BC 99, Paris, France (spiga@lmd.jussieu.fr)

²Institut Universitaire de France, 1 rue Descartes, 75005 Paris, France

³Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SUPAERO), 10 Avenue Edouard Belin, 31400 Toulouse, France

⁴Cornell University, Cornell Center for Astrophysics and Planetary Science, Ithaca, NY, 14853, USA

⁵Johns Hopkins Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723, USA

⁶Aeolis Research, 333 N Dobson Road, Unit 5, Chandler AZ 85224-4412, USA

⁷Centro de Astrobiología (CSIC-INTA), 28850 Torrejón de Ardoz, Madrid, Spain

⁸Space Science Institute, 4765 Walnut Street, Suite B, Boulder, CO, 80301, USA

⁹Université de Paris, Institut de physique du globe de Paris, CNRS, F-75005 Paris, France

*A full list of authors appears at the end of the abstract

The InSight instrumentation for atmospheric science combines high frequency, high accuracy and continuity. This makes InSight a mission particularly suitable for studies of the variability in the Planetary Boundary Layer (PBL) of Mars -- all the more since this topic is of direct interest for quake detectability given that turbulence is the main contributor to atmosphere-induced seismic signal. For the strong daytime buoyancy-driven PBL convection, InSight significantly extends the statistics of dust-devil-like convective vortices and turbulent wind gustiness, both of which are of strong interest for aeolian science. For the moderate nighttime shear-induced PBL convection, InSight enables to explore phenomena and variability left unexplored by previous in-situ measurements on Mars. In both daytime and nighttime environments, how the gravity waves and infrasound signals discovered by InSight are being guided within the PBL is also a central topic to InSight's atmospheric investigations, with the tantalizing possibility to identify possible sources for those phenomena. InSight has been operating at the surface of Mars since 18 months, thus the seasonal evolution of the many phenomena occurring in the PBL will be an emphasis of this report. Comparisons with turbulence-resolving modeling such as Large-Eddy Simulations will be also discussed.

the InSight team: Atmospheres STG