Post-doctoral position

Mars' atmospheric science using InSight data and atmospheric modeling

Laboratoire de Météorologie Dynamique, Sorbonne Université, Paris, France

A 15-month post-doctoral position in planetary atmospheric science is opened at Laboratoire de Météorologie Dynamique (LMD), starting mid 2020. An extent towards a total two-year duration is possible. The position is funded by the Agence Nationale de la Recherche (ANR) grant MAGIS and opened at Sorbonne Université on the Pierre and Marie Curie campus in the heart of Paris, France.

The InSight mission's goal is the exploration of the interior of telluric planets; yet InSight's atmospheric measurements are unprecedented in frequency, continuity and accuracy, which gives a new impulse to studies of the martian atmosphere by in-situ exploration. Furthermore, combining seismic measurements with pressure, wind and temperature measurements, as well as imaging and surface temperature monitoring will be a never attempted way to monitor the atmosphere. In turn, the understanding of the atmosphere-related seismic noise will improve the quality of interior-related seismic signal to noise. Those questions relate to the atmospheric circulations at all scales, from baroclinic waves to gravity waves and turbulence and infrasound.

The successful applicant will carry out research aiming at characterizing the meteorological signals at all spatial and temporal scales, should those be directly measured by InSight's weather station or seismometers. A combination of data analysis and atmospheric modeling will be employed to that end. For the local turbulent scale, Large Eddy Simulations (LES) will be used in order to approach the upper frequency of both SEIS and APSS InSight measurements. This will support the first exploratory studies of the complete turbulent spectrum on Mars. For the global scale and the mesoscale, the search and expected analysis of global weather, slope winds, gravity waves, bores will push the LMD Mars Global Climate Model (GCM) toward unprecedented horizontal (<15 km) and vertical resolution, achieved only by the use of a new-generation "dynamical core" (Dubos et al. 2015) and design of simplified and accelerated physical code. In complement to that high-resolution GCM approach, the LMD Mars Mesoscale Model will be employed to analyze mesoscale atmospheric signatures in the specific region of the InSight landing site.

This position holds a strong collaborative component with the national and international InSight collaborators responsible for the analysis of seismic signals. The successful applicant will both join the InSight science team, and the InSight France team gathered under the ANR MAGIS project. In particular, a dedicated collaborative link is envisioned with the ISAE team (Toulouse) working on modeling acoustic, gravity and seismic waves in the coupled atmosphere/solid system. From low to high frequencies, the atmospheric and seismic signals unveils an entirely new vision of the Martian atmosphere and of planetary atmospheres in general.

A PhD in planetary science, atmospheric science, or geophysical fluid dynamics is required by the time of starting the position. The following skills will be considered in the evaluation process:

- working knowledge in planetary science (especially Mars' atmosphere)
- expertise in atmospheric dynamical modelling (including model development) from turbulence-resolving to global climate modeling
- experience of exploring datasets acquired by space missions
- ability to work in a team and to stimulate research as a community process

The successful applicant will join a team dedicated to Mars' atmospheric modelling and data analysis comprising Dr Aymeric Spiga (position advisor, senior Lecturer at Sorbonne Université, InSight participating scientist), Dr Ehouarn Millour (research engineer at CNRS) and Dr François Forget (research director at LMD). The successful applicant will benefit from a dynamic and stimulating research environment, with the possibility to interact with scientists in the LMD team involved with atmospheric modeling and observations of terrestrial and planetary atmospheres, as well as French collaborators at ISAE, at IPGP and in other French teams involved in the ANR MAGIS. Funding has been secured for travel to attend international conferences (at least 2 per year). Benefits include complete health insurance coverage and social security, as required by French law. Salary level as a function of post-PhD experience follows the rules and amounts set on a national basic by the French law.

Applicants should submit in a single PDF document a curriculum vitae with a list of publications, a short review of previous works, and statement of research interest and contribution to the project. Applicants should arrange for either two reference letters to be sent independently or include two contacts that can be contacted for reference.

Applications and information requests should be sent via email to Dr Aymeric SPIGA (aymeric.spiga@sorbonne-universite.fr). The closing date is May 4th, 2020. Late applications might be considered, until the position is filled.