

**Título/Title:**

Gravity waves: a key process in Mars middle/upper atmosphere?

**Orientador/Supervisor:**

Gabriella Gilli ([ggilli@oal.ul.pt](mailto:ggilli@oal.ul.pt))

Pedro Machado ([machado@oal.ul.pt](mailto:machado@oal.ul.pt))

**Local do Estágio/Host Place:**

IA-Lisbon (Observatório Astronómico de Lisboa, Tapada da Ajuda)

**Descrição/Description:**

Gravity waves (GWs) are frequently observed in planetary atmospheres and they are considered essential to explain the atmospheric circulation. Several studies of Venus atmosphere reported large density and temperature fluctuation in form of wave-like structure, supposed to be produced by gravity waves. Those waves, also very frequently detected on other terrestrial planets, play a crucial role in the atmosphere but they are still poorly constrained in terms of their basic parameters: their spectral distribution, sources of excitation, vertical levels of dissipation, or their geographical distributions are far beyond our knowledge. An alternative approach to study atmospheric GWs and their induced temporal and spatial variations is possible with the use of sophisticated 3D models, to investigate the impact of GW on the global circulation.

The student will be involved in the work of the team, focused to better characterize GWs, as well as to identify their possible sources by combining models and observations. In particular, he/she will learn how to use 3D simulations by a General Circulation Model (GCM), and quantify the impact of GW drag in the middle/upper atmosphere using different set of parameters. In addition the student will support the on-going work of our group in characterization of GW characteristics using several dataset, from Venus Express and AKATSUKI missions

**Requisitos/Requirements:**

The project is based on the use of python scripts and FORTRAN routines. Therefore, the candidate should be able and willing to program in python and possibly have a basic knowledge of FORTRAN.