Numerical modeling of Mars atmospheric waves trapped in the night side surface wave guide and predictions of measurements by pressure and seismic sensors of InSight Mars mission

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Previous investigations of acoustic and gravity wave propagation in Mars atmosphere suggest that these waves can be trapped close the surface during the night and propagate over long distances (Lognonné, 2017; Garcia et al., 2017; Spiga et al., 2018). This property is important for the capability of INSIGHT mission to detect infrasounds generated by meteor impacts and planetary normal modes excited by the atmosphere. These waves are expected to be recorded by both pressure and seismic sensors.

This study consider simulations of these phenomena by two different numerical wave propagation tools. The first tool (MINAT) allow the computation of atmospheric and solid vibrations on a global scale with windless atmospheric models. The second one (SPECFEM-DG) is performing similar computations but including wind effects and restricted to local simulations. The two simulation tools will use identical atmosphere models. The comparison of their outputs will allow to infer the influence of winds and local/global features.

The prediction of wave types and characteristics trapped close to the surface for various atmospheric conditions will be used to understand the night time observations of pressure and seismic sensors of INSIGHT mission.