Geophysical Research Abstracts
Vol. 21, EGU2019-14605, 2019
EGU General Assembly 2019

Sensibility analysis of of the InSight seismic data to the Martian structure: Application to the MSS blind test data

Salma Barkaoui (1), Philippe Lognonné (1), Mélanie Drilleau (1), Taichi Kawamura (1), Balthazar Kenda (1), Maria Saadé (1), Naomi Murdoch (2), and Martin van Driel (3)

(1) IPGP Institue de Physique de Globe de Paris, Planétologie, France , (2) Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SUPAERO), France, (3) ETH Zürich

Exploring the internal structure and the dynamics of our solar system is mandatory to understand the behavior of our universe and its origin. One of the tools chosen by NASA is seismology, particularly in order to constrain the deep interior structure of the red planet via the Insight (Interior Exploration using Seismic Investigations, Geodesy, and Heat Transport) mission that was successfully landed on November 26th, 2018 in Elysium Planitia.
However, planetary seismology is still far from providing models with high precision and calculation speed. Thus, this study is one of the first attempts to model the Martian interior structure using a seismic waveform inversion technique : the Machine Learning and the Pattern Search algorithm by resolving a nonlinear global optimization problem.
It's a new revolutionary mathematical tool for seismology and inverse problem in general as it gives a better understanding of blinded or burred problems like our case.
For that, before applying it to the incoming InSight data provided by the seismometer SEIS (the Seismic Experiment for Interior Structure), we need to ensure its efficiency through several tests.
Therefore, we will focus on the inversion sensibility error by comparing the resulting inverted crustal model obtained using this new method to the existing models provided by the SEIS team using other tools like Markov Chain Monte Carlo (McMC). This technique will be applied to the MSS blind test data computed by the InSight collaborators. The aim is to constrain the epicentral distance, the depth and origin time of the seismic event, as well as the seismic velocity profiles and the attenuation, and to compare it with existing methods developed by the InSight science team.