



Constructing Martian seismicity catalog: Marsquake service and probabilistic event location algorithms

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The InSight (Interior exploration using Seismic Investigations, Geodesy and Heat Transport) lander will deploy a single seismic station within Elysium Planitia in November 2018. In support of the mission, the InSight team formed two ground-based support groups, the Mars Structure Service (MSS) and the Marsquake Service (MQS) to provide models of the Martian structure and a seismicity catalogue during the mission, respectively.

The MQS targets tectonic and impact events. Its duties within the InSight mission include identifying and characterising events, and managing the catalog for the entire planet. MQS currently employs 4 probabilistic single-station approaches to compute event distances using (1) multi orbit Rayleigh waves, (2) combination of body and direct surface wave arrivals, and event back-azimuth using (3) P-wave polarization, and (4) surface wave polarization measured from correlation of vertical and horizontal components. The resulting Martian catalogue will be made available to scientific community using standard web services.

Here, we summarise the probabilistic approaches and show event location examples using Martian synthetics. We also describe the procedure that MQS will follow for distributing event and station information in practice.