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# Blind tests of methods for InSight Mars mission: Open scientific challenge

John Clinton (1), Savas Ceylan (2), Domenico Giardini (2), Amir Khan (2), Martin van Driel (2), Maren Böse (1,2), Fabian Euchner (1,2), Raphael F. Garcia (3), Mélanie Drilleau (4), Philippe Lognonné (4), Mark Panning (5), and Bruce Banerdt (6)

(1) Swiss Seismological Service (SED), ETH Zürich, Sonneggstrasse 5, 8092 Zürich, Switzerland, (2) Institute of Geophysics, Sonneggstrasse 5, 8092 Zürich, Switzerland (savas.ceylan@erdw.ethz.ch), (3) ISAE-SUPAERO, DEOS/SSPA, Toulouse, France, (4) Institut de Physique du Globe de Paris, Paris, France, (5) Department of Geological Sciences, University of Florida, Gainesville, FL, USA, (6) Jet Propulsion Laboratory, Pasadena, CA, USA

The Marsquake Service (MQS) will be the ground segment service within the InSight mission to Mars, which will deploy a single seismic station on Elysium Planitia in November 2018. The main tasks of the MQS are the identification and characterisation of seismicity, and managing the Martian seismic event catalogue. In advance of the mission, we have developed a series of single station event location methods that rely on a priori 1D and 3D structural models. In coordination with the Mars Structural Service, we expect to use iterative inversion techniques to revise these structural models and event locations.

In order to seek methodological advancements and test our current approaches, we have designed a blind test case using Martian synthetics combined with realistic noise models for the Martian surface. We invite all scientific parties that are interested in single station approaches and in exploring the Martian time-series to participate and contribute to our blind test. We anticipate the test will can improve currently developed location and structural inversion techniques, and also allow us explore new single station techniques for moment tensor and magnitude determination.

The waveforms for our test case are computed employing AxiSEM and Instaseis for a randomly selected 1D background model and event catalogue that is statistically consistent with our current expectation of Martian seismicity. Realistic seismic surface noise is superimposed to generate a continuous time-series spanning 6 months. The event catalog includes impacts as well as Martian quakes. The temporal distribution of the seismicity in the timeseries, as well as the true structural model, are not be known to any participating parties including MQS till the end of competition. We provide our internal tools such as event location codes, suite of background models, seismic phase travel times, in order to support researchers who are willing to use/improve our current methods. Following the deadline of our blind test in late 2017, we plan to combine all outcomes in an article with all participants as co-authors.