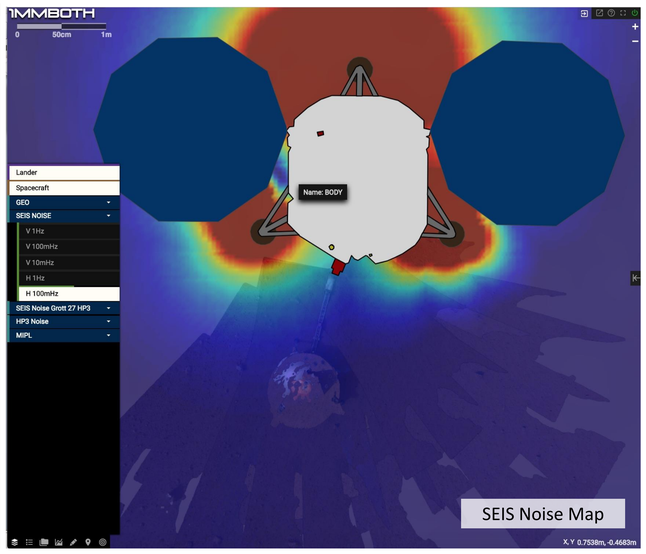
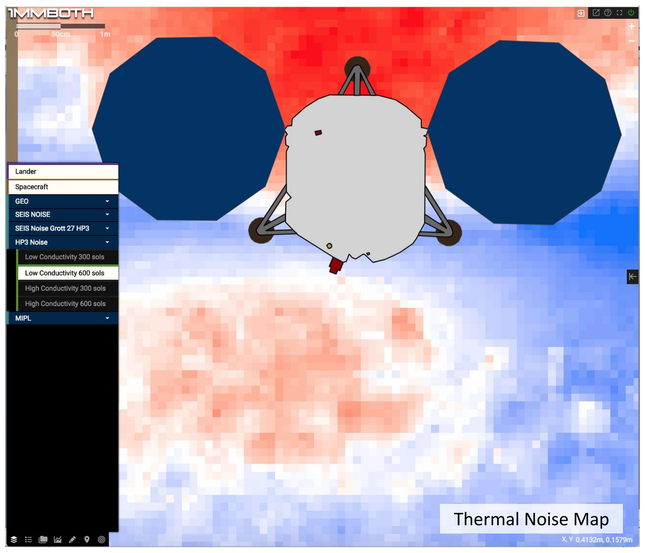
SCIENCE OPERATIONS WITH THE INSIGHT WEBGIS

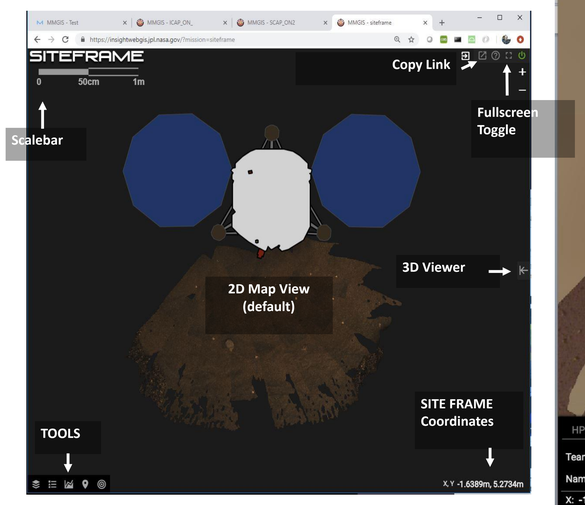
F. J. Calef III[1], T. Soliman[1], H. E. Abarca[1], R. Deen[1], N. Ruoff[1], N. Williams[1], L. Berger[1], H. Lethcoe[1], R. Hausmann[1], M. Golombek[1]
[1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Dr, Pasadena, CA 91109, Fred.Calef@jpl.nasa.gov

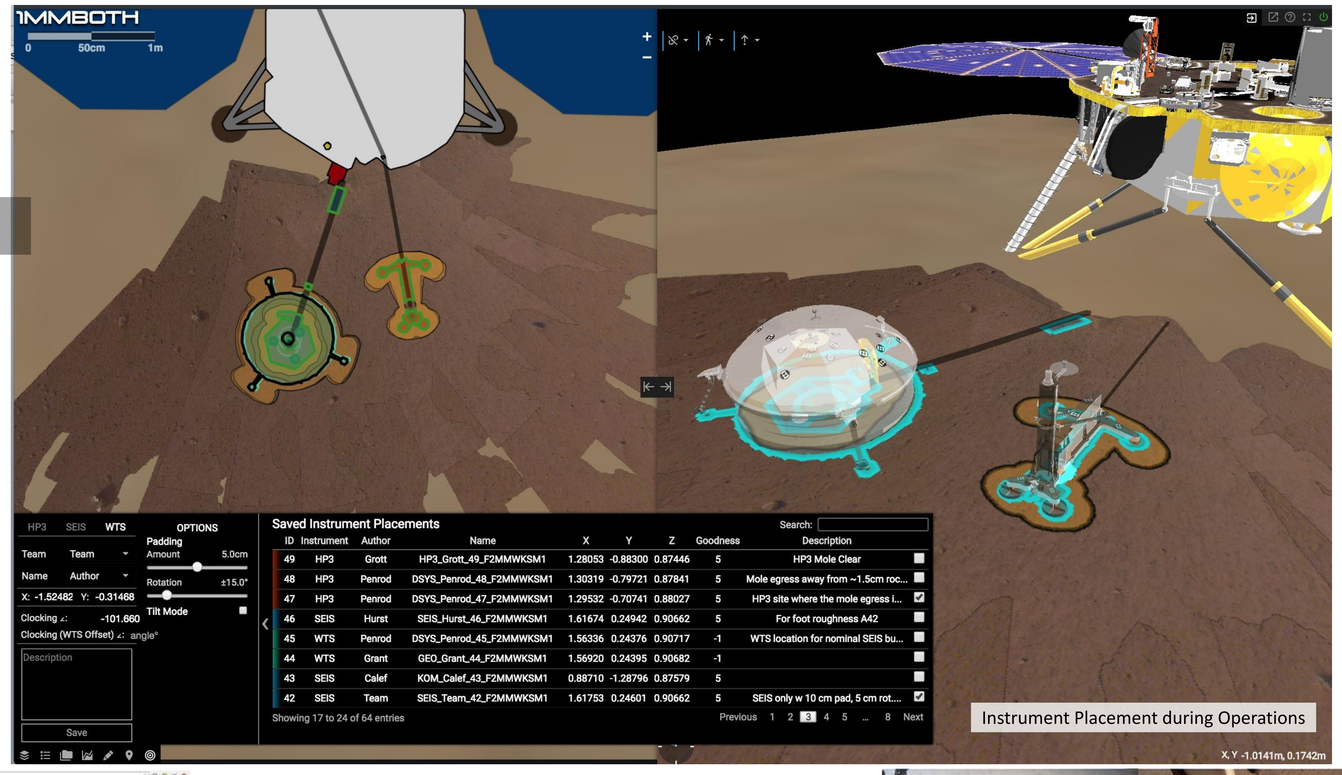
INTRODUCTION

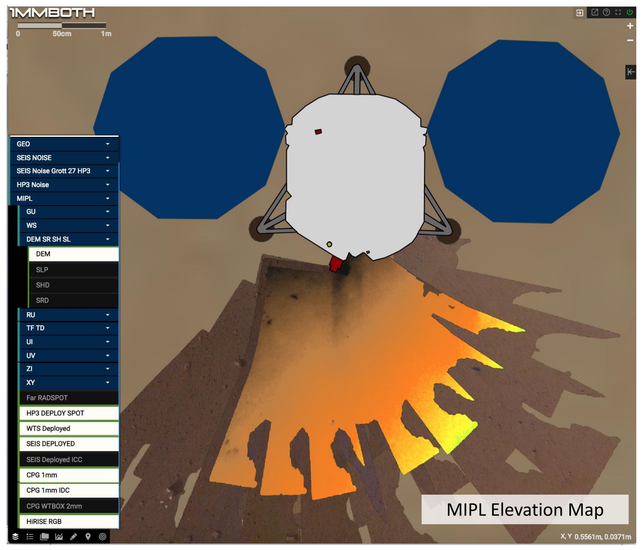
The InSight lander science mission goals are to investigate the formation of rocky planets and detect seismic activity on Mars [1]. Two scientific instruments were built and deployed to the surface to achieve these goals: a seismometer (SEIS) and a heat probe (HP3), as well as a wind and thermal shield (WTS) to cover SEIS. The Instrument Site Selection Working Group (ISSWG) was formed by the mission to quantify and qualify the instrument placements on the surface. Constraints on instrument tilt, rock size under the instruments, surface materials, distance from the lander, and noise characterization (both vibrational and thermal) were all taken into account to select the best location for these instruments to deploy to and meet their scientific objectives within the primary mission timeline of one Mars year. A web-based GIS tool was developed that incorporated multi-layered mosaics, measurement tools, and 2D/3D visualization to allow science team members to evaluate suggested placements against a known list of 'constraints' ("must meet") and 'desirements' ("would be nice").



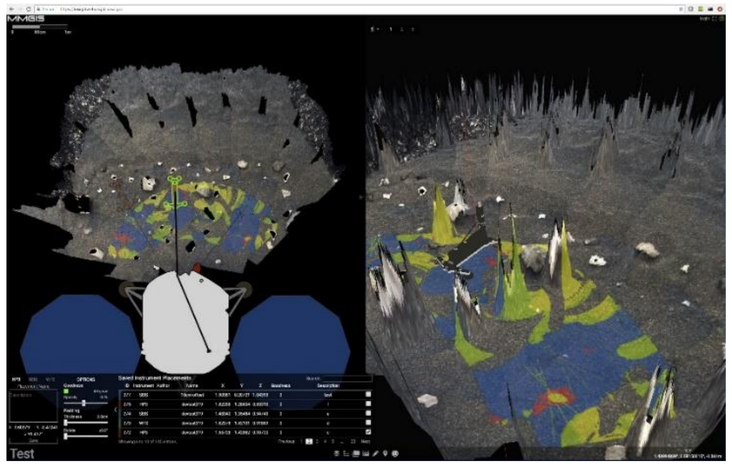




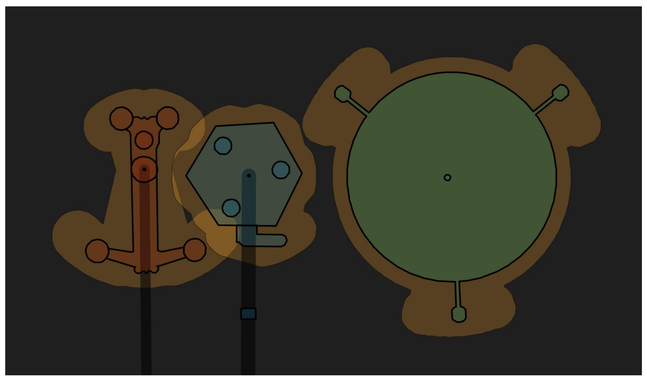




Figures represent the webGIS interface and various test and operations datasets during deployment.



Test datasets. Color overlay is a 'goodness' map.



Instrument Outlines for HP3, SEIS, and WTS, including tethers

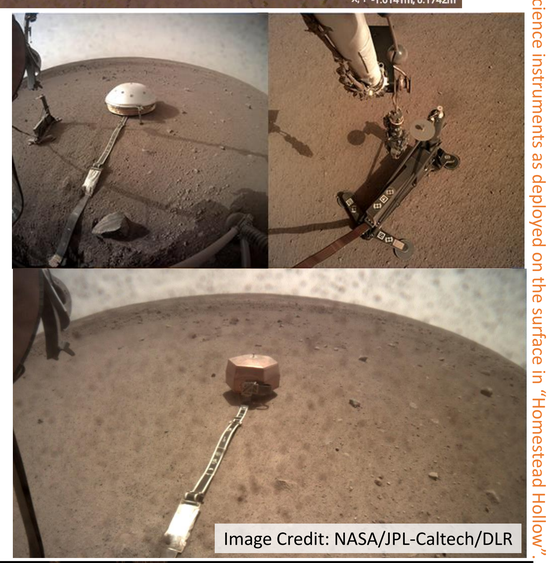
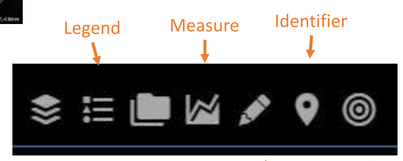
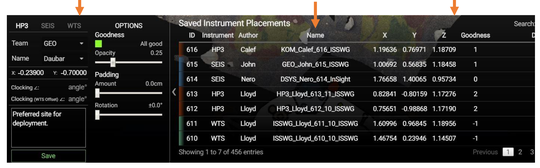
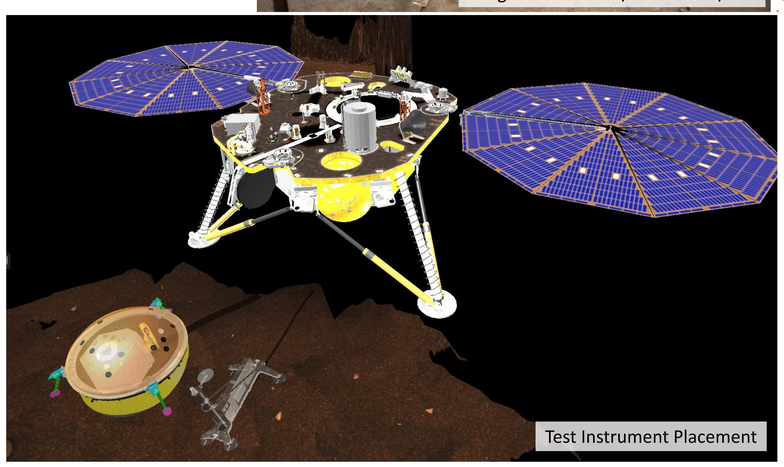


Image Credit: NASA/JPL-Caltech/DLR

Science instruments as deployed on the surface in "Homestead Hollow"







Test Instrument Placement

Operations: As data was processed and delivered from MIPL, we used the Geographic Data Abstraction Library (GDAL) tools to convert VICAR datasets into GeoTIFFs used by the ISSWG team, process them to 8-bit versions for visualization, tile datasets, upload them to the webserver, and enter their location into configuration files on the webserver. Once MIPL was finished processing, it took <1 hour to upload all MIPL dataset layers, <10 minutes for critical layers (visible, elevation model, goodness map) to begin site selection activities. Science and instrument team specific layers could be processed, in total, in ~30 minutes, but was dependent on the input product state upon delivery.

Conclusion: We successfully deployed a web-based GIS system for science operations for the ~20 member, InSight ISSWG group to select locations for the SEIS and HP3 instruments on the surface of Mars. The webGIS interface allowed interactive instrument placement and cross-team collaboration. Data was served rapidly and the tools performed nominally. The web-based interface provided a unified, operating system independent, mapping platform for science operations.

References: [1] Banerdt et al. LPSC2013 abstract 1719 [2] Calef et al. (2016) LPSC2017 abstract 2541.