Localization of MSL and MER: Methods and Data. R. G. Deen[1], F. J. Calef[2], T. J. Parker[3], and H. E. Gengl[4]; [1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Dr, Pasadena, CA 91109, Bob.Deen@jpl.nasa.gov, [2]same, Fred.Calef@jpl.nasa.gov, [3]same, Timothy.J.Parker@jpl.nasa.gov, [4]same, Hallie.E.Gengl@jpl.nasa.gov.

Introduction: Localization is a process by which landing sites and rover positions are accurately determined on a planetary surface. Accurate positions are necessary for navigating the rover (avoiding hazards and getting to interesting locations), and to provide the proper scientific context for observations (using orbital imagery).

MSL and MER both attempt to keep track of their location as they drive by combining wheel revolution counts, yaw, and visual odometry (VO) [1]. VO is quite accurate, but it consumes precious resources (time and power) so it is only done when precision is needed onboard. Counting wheel revolutions does not take into account wheel slippage and thus can be significantly off. Even VO is subject to accumulation of errors over long traverses. Therefore, localization must be done on the ground by comparing the rover's *in-situ* view to orbital views in order to get precise positions.

This talk will describe how localizations are done by the MER and MSL Localization Teams, how the resulting data are managed, and how to find and use this data in PDS.

Localizing the Rover: The rovers are localized by taking orthorectified navcam mosaics and comparing them to orbital imagery. This process will be described in detail.

Managing the Data: The localization results are stored in the PLACES (Position Localization and Attitude Correction Estimate Storage) database, a ReST-style database accessed via URL's. This database stores localization from any and all sources, letting the user determine which localizations they want to use. This database will be described, as well as current work towards a more user-friendly front end.

Finding and Using the Data: The PLACES data for MSL is now available in PDS [2]. This data will be described, as well as how to find it in PDS. Additionally, some examples of how PLACES data is used will be presented. MER localization data is not yet available in PDS, but we are working towards this as a goal.
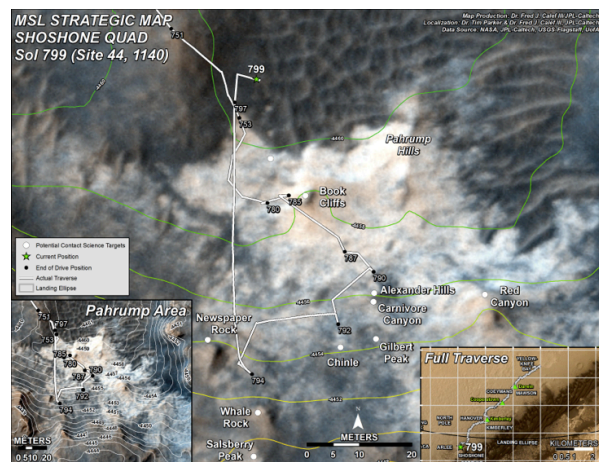
References:

[1] Maimone, M., Y. Cheng and L. Matthies, "Two Years of Visual Odometry on the Mars Exploration Rovers," Jour. Field Robotics: Special Issue on Space Robotics 24(3), pp. 169-186, March 2007

[2]
http://pds-imaging.jpl.nasa.gov/data/msl/MSLPLC_1XXX
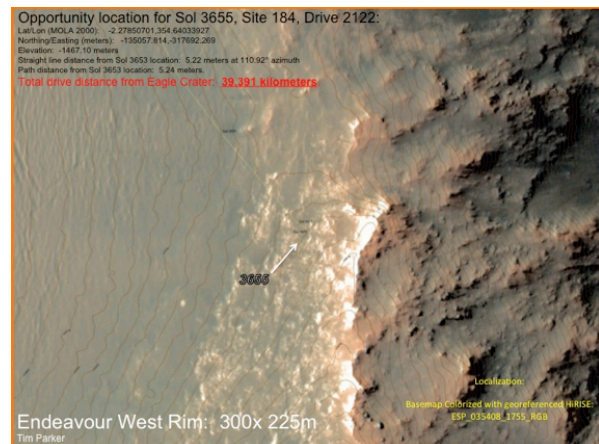
Sample localization report for Opportunity (Sol 3655).

Sample traverse map for Curiosity (Sol 799)