known pedigree, which greatly reduces duplication of effort and the potential for error. The use of the software spans all phases of the space system lifecycle, from the study of future concepts to operations and anomaly analysis. It allows SOAP software to correctly position and orient all of the principal bodies of the Solar System within a single simulation session along with multiple spacecraft trajectories and the orientation of mission payloads. In addition to the 3D visualization, the user can define numeric variables and *x*-*y* plots to quantitatively assess metrics of interest.

This work was done by Robert Carnright

and Claude Hildebrand of Caltech and David Stodden and John Coggi of The Aerospace Corporation for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45057.

Facilitating Analysis of Multiple Partial Data Streams

NASA's Jet Propulsion Laboratory, Pasadena, California

Robotic Operations Automation: Mechanisms, Imaging, Navigation report Generation (ROAMING) is a set of computer programs that facilitates and accelerates both tactical and strategic analysis of time-sampled data - especially the disparate and often incomplete streams of Mars Explorer Rover (MER) telemetry data described in the immediately preceding article. As used here, "tactical" refers to the activities over a relatively short time (one Martian day in the original MER application) and "strategic" refers to a longer time (the entire multi-year MER missions in the original application).

Prior to installation, ROAMING must be configured with the types of data of interest, and parsers must be modified to understand the format of the input data (many example parsers are provided, including for general CSV files). Thereafter, new data from multiple disparate sources are automatically resampled into a single common annotated spreadsheet stored in a readable space-separated format, and these data can be processed or plotted at any time scale. Such processing or plotting makes it possible to study not only the details of a particular activity spanning only a few sec-

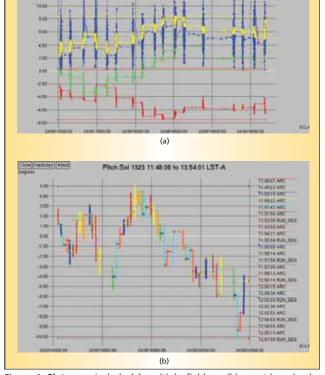
> onds, but also longer-term trends. ROAMING makes it possible to generate mission-wide plots of multiple engineering quantities

[e.g., vehicle tilt as in Figure 1(a), motor current, numbers of images] that, heretofore could be found only in thousands of separate files.

ROAMING also supports automatic annotation of both images and graphs. In the MER application, labels given to terrain features by rover scientists and engineers are automatically plotted in all received images based on their associated camera models (see Figure 2), times measured in seconds are mapped to Mars local time, and command names or arbitrary time-labeled events can be used to label engineering plots, as in Figure 1(b).

This work was done by Mark W. Maimone and Robert R. Liebersbach of Caltech for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45367.



Easterly_18t Sol 1323 12 29 59 to 13 14 58 LST-A

Figure 1. **Plots** may include (a) multiple fields or (b) event-based color coding, and support interactive zooming.

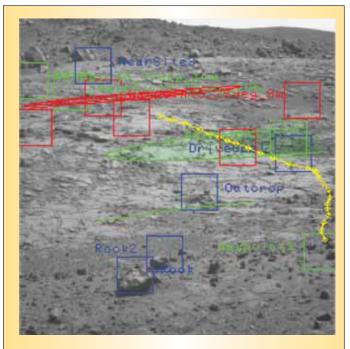


Figure 2. Images are automatically annotated with detailed drive information.