

## Link Analysis in the Mission Planning Lab

Goddard Space Flight Center, Greenbelt, Maryland

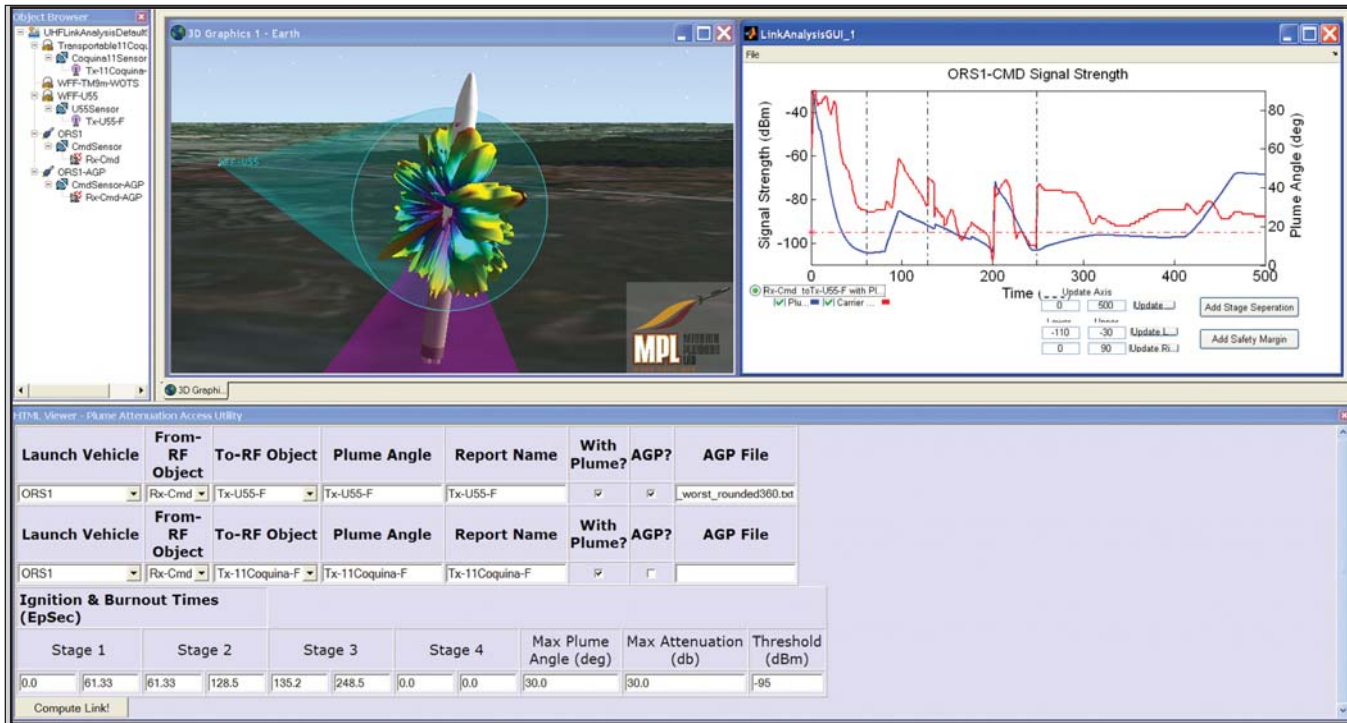
The legacy communications link analysis software currently used at Wallops Flight Facility involves processes that are different for command destruct, radar, and telemetry. There is a clear advantage to developing an easy-to-use tool that combines all the processes in one application. Link Analysis in the Mission Planning Lab (MPL) uses custom software and algorithms integrated with Analytical Graphics Inc. Satellite Toolkit (AGI STK). The MPL link analysis tool uses pre/post-mission data to conduct a dynamic link analysis between ground assets and the launch vehicle. Just as the legacy methods do, the MPL link analysis

tool calculates signal strength and signal-to-noise according to the accepted processes for command destruct, radar, and telemetry assets. Graphs and other custom data are generated rapidly in formats for reports and presentations. STK is used for analysis as well as to depict plume angles and antenna gain patterns in 3D.

The MPL has developed two interfaces with the STK software (see figure). The first interface is an HTML utility, which was developed in Visual Basic to enhance analysis for plume modeling and to offer a more user friendly, flexible tool. A graphical user interface

(GUI) written in MATLAB (see figure upper right-hand corner) is also used to quickly depict link budget information for multiple ground assets. This new method yields a dramatic decrease in the time it takes to provide launch managers with the required link budgets to make critical pre-mission decisions. The software code used for these two custom utilities is a product of NASA's MPL.

*This work was done by Jessica A. McCarthy, Benjamin W. Cervantes, Sarah C. Daugherty, Felipe Arroyo, and Divyang Mago of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-15733-1*



Mission Planning Lab Link analysis software tool.

## MatchGUI: A Graphical MATLAB-Based Tool for Automatic Image Co-Registration

NASA's Jet Propulsion Laboratory, Pasadena, California

MatchGUI software, based on MATLAB, automatically matches two images and displays the match result by superimposing one image on the other. A slider bar allows focus to shift between the two images. There are tools for zoom, auto-crop to overlap region, and basic image markup. Given a pair of

ortho-rectified images (focused primarily on Mars orbital imagery for now), this software automatically co-registers the imagery so that corresponding image pixels are aligned. MatchGUI requires minimal user input, and performs a registration over scale and in-plane rotation fully automatically.

*This work was done by Adnan I. Ansar of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov.*

*This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-47513.*