Advanced Strategic and Tactical Relay Request Management for the Mars Relay Operations Service

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This software provides a new set of capabilities for the Mars Relay Operations Service (MaROS) in support of Strategic and Tactical relay, including a highly interactive relay request Web user interface, mission control over relay planning time periods, and mission management of allowed strategic vs. tactical request parameters. Together, these new capabilities expand the scope of the system to include all elements critical for Tactical relay operations.

Planning of replay activities spans a time period that is split into two distinct phases. The first phase is called Strategic, which begins at the time that relay opportunities are identified, and concludes at the point that the orbiter generates the flight sequences for onboard execution. Any relay request changes from this point on are called Tactical.

Tactical requests, otherwise called Orbiter Relay State Changes (ORSC), are highly restricted in terms of what types of changes can be made, and the types of parameters that can be changed may differ from one orbiter to the next. For example, one orbiter may be able to delay the start of a relay request, while another may not. The legacy approach to ORSC management involves exchanges of e-mail with "requests for change" and "acknowledgement of approval," with no other tracking of changes outside of e-mail folders.

MaROS Phases 1 and 2 provided the infrastructure for strategic relay for all supported missions. This new version, 3.0, introduces several capabilities that fully expand the scope of the system to include tactical relay. One new feature allows orbiter users to manage and "lock" Planning Periods, which allows the orbiter team to formalize the changeover from Strategic to Tactical operations. Another major feature allows users to interactively submit tactical request changes via a Web user interface. A third new feature allows orbiter missions to specify allowed tactical updates, which are automatically incorporated into the tactical change process. This software update is significant in that it provides the only centralized service for tactical request management available for relay missions.

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This software is available for commercial licensing. Please contact Dan Broderick at Daniel.F.Broderick@jpl.nasa.gov. Refer to NPO-48337.

Software for Generating Troposphere Corrections for InSAR Using GPS and Weather Model Data

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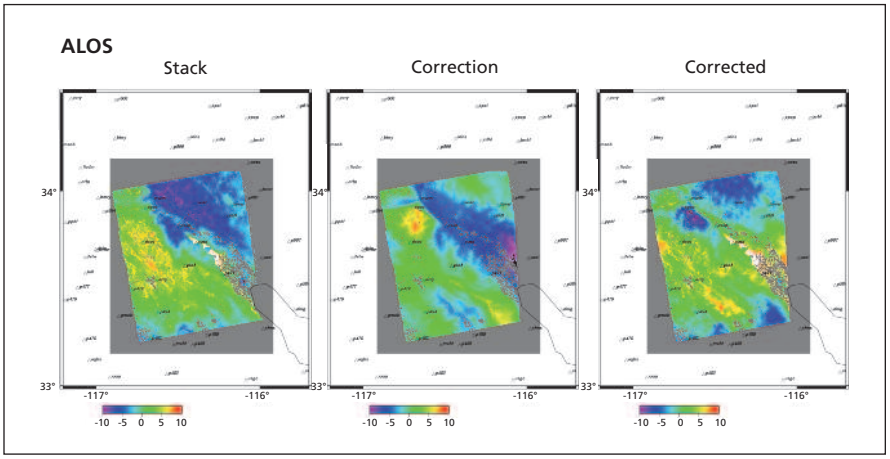
Atmospheric errors due to the troposphere are a limiting error source for spaceborne interferometric synthetic aperture radar (InSAR) imaging. This software generates tropospheric delay maps that can be used to correct atmospheric artifacts in InSAR data. The software automatically acquires all needed GPS (Global Positioning System), weather, and Digital Elevation Map data, and generates a tropospheric correction map using a novel algorithm for combining GPS and weather information while accounting for terrain.

Existing JPL software was prototypical in nature, required a MATLAB license, required additional steps to acquire and ingest needed GPS and weather data, and did not account for topography in interpolation. Previous software did not achieve a level of automation suitable for integration in a Web portal. This software overcomes these issues.

GPS estimates of tropospheric delay are a source of corrections that can be used to form correction maps to be applied to InSAR data, but the spacing of GPS stations is insufficient to remove short-wavelength tropospheric artifacts. This software combines interpolated GPS delay with weather model precipitable water vapor (PWV) and a digital elevation model to account for terrain, increasing the spatial resolution of the tropospheric correction maps and thus removing short-wavelength tropospheric artifacts to a greater extent. It will be integrated into a Web portal request system, allowing use in a future L-band SAR Earth radar mission data system. This will be a significant contribution to its technology readiness,



Advanced Land Observing Satellite (ALOS) Data. At left, the original stack of 33 interferograms. Center: The stacked correction maps, showing typical distribution of moisture in the Coachella Valley, CA. At right, the corrected stacked image.