the snow cover image contains cloud cover, regression tree analysis is used to predict the presence of snow cover under clouds.

The Gridded Temperature and Precipitation Forecast Toolbar will ingest forecasts from numerical weather prediction models and produce gridded forecasts that can be used as input for distributed hydrologic models. This toolbar will enable users to easily produce gridded fields of temperature and precipitation from location-specific forecasts, which is needed since a majority of hydrologic models are run on a distributed basis. This is completed using temperature data, and will be expanded in the future to include precipitation data.

The Streamflow Forecast Visualization Toolbar will generate visualizations of streamflow forecasts. Outputs include a variety of tables, charts, and figures depicting streamflow forecasts in formats that can be easily interpreted by the general public.

The interpolation process entails: (1) obtaining a DEM for the watershed (basin) of interest; (2) obtaining temperature (forecasted or observed) and elevation values for an individual weather station (base station) located within the watershed; and (3) applying the monthly temperature lapse rates to create gridded values. After a DEM is selected for the area of interest, the GIS tools essentially complete the interpolation process for any specified day automatically. Tools are included to assist in the validation of the forecast grids.

This work was done by Brian J. Harshburger, Troy Blandford, and Brandon Moore of Aniuk Consulting, LLC, for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-15791-1

Adaptation of G-TAG Software for Validating Touch-and-Go Comet Surface Sampling Design Methodology

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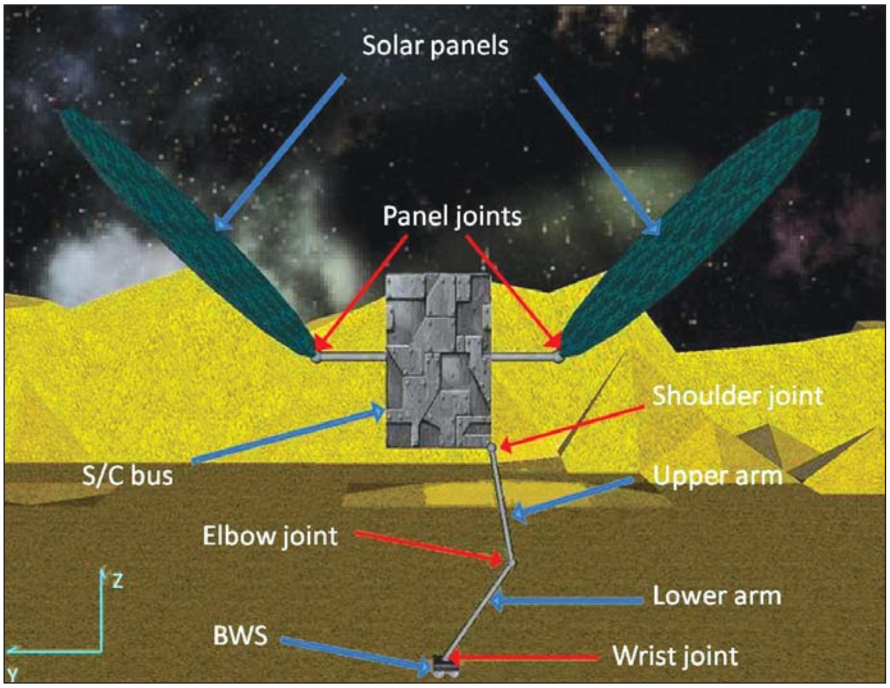
The G-TAG software tool was developed under the R&TD on Integrated Autonomous Guidance, Navigation, and Control for Comet Sample Return, and represents a novel, multi-body dynamics simulation software tool for studying TAG sampling.

The G-TAG multi-body simulation tool provides a simulation environment in which a Touch-and-Go (TAG) sampling event can be extensively tested. TAG sampling requires the spacecraft to descend to the surface, contact the surface with a sampling collection device, and then to ascend to a safe altitude. The TAG event lasts only a few seconds but is mission-critical with potentially high risk. Consequently, there is a need for the TAG event to be well characterized and studied by simulation and analysis in order for the proposal teams to converge on a reliable spacecraft design.



Comet Spacecraft Concept: Red arrows point to joints, blue arrows to spacecraft body components. The frame used for the simulation and for creating simulation movies is shown in the lower-left corner (x-axis completes coordinate system using the right-hand rule).

This adaptation of the G-TAG tool was developed to support the Comet Odyssey proposal effort, and is specifically focused to address comet sample return missions. In this application, the spacecraft descends to and samples from the surface of a comet. Performance of the spacecraft during TAG is assessed based on survivability and sample collection performance.

For the adaptation of the G-TAG simulation tool to comet scenarios, models are developed that accurately describe the properties of the spacecraft, approach trajectories, and descent velocities, as well as the models of the external forces and torques acting on the spacecraft. The adapted models of the spacecraft, descent profiles, and external sampling forces/torques were more sophisticated and customized for comets than those available in the basic G-TAG simulation tool.

Scenarios implemented include the study of variations in requirements, spacecraft design (size, locations, etc. of the spacecraft components), and the environment (surface properties, slope, disturbances, etc.). The simulations, along with their visual representations using G-View, contributed to the Comet Odyssey New Frontiers proposal effort by indicating problems and/or benefits of different approaches and designs.

This work was done by Milan Mandic, Behcet Acikmese, and Lars Blackmore of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-47199.