Software

Processing AIRS Scientific Data Through Level 3

The Atmospheric Infra-Red Sounder (AIRS) Science Processing System (SPS) is a collection of computer programs, known as product generation executives (PGEs). The AIRS SPS PGEs are used for processing measurements received from the AIRS suite of infrared and microwave instruments orbiting the Earth onboard NASA’s Aqua spacecraft. Early stages of the AIRS SPS development were described in a prior NASA Tech Briefs article: “Initial Processing of Infrared Spectral Data” (NPO-35243), Vol. 28, No. 11 (November 2004), page 39.

In summary: Starting from Level 0 (representing raw AIRS data), the AIRS SPS PGEs and the data products they produce are identified by alphanumeric labels (1A, 1B, 2, and 3) representing successive stages or levels of processing. The previous NASA Tech Briefs article described processing through Level 2, the output of which comprises geo-located atmospheric data products such as temperature and humidity profiles among others. The AIRS Level 3 PGE samples selected information from the Level 2 standard products to produce a single global gridded product. One Level 3 product is generated for each day’s collection of Level 2 data. In addition, daily Level 3 products are aggregated into two multi-day products: an eight-day (half the orbital repeat cycle) product and monthly (calendar month) product.

This work was done by Stephanie Granger, Robert Oliphant, and Evan Manning 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 Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-42146.

AutoGen Version 5.0

Version 5.0 of the AutoGen software has been released. Previous versions, variously denoted “Autogen” and “auto- gen,” were reported in two articles: “Automated Sequence Generation Process and Software” (NPO-30746), Software Tech Briefs (Special Supplement to NASA Tech Briefs), September 2007, page 30, and “Autogen Version 2.0” (NPO-41501), NASA Tech Briefs, Vol. 31, No. 10 (October 2007), page 58.

To recapitulate: AutoGen (now signifying “automatic sequence generation”) automates the generation of sequences of commands in a standard format for uplink to spacecraft. AutoGen requires fewer workers than are needed for older manual sequence-generation processes, and greatly reduces sequence-generation times.

The sequences are embodied in spacecraft activity sequence files (SASFs). AutoGen automates generation of SASFs by use of another previously reported program called “APGEN.” AutoGen encodes knowledge of different mission phases and of how the resultant commands must differ among the phases. AutoGen also provides means for customizing sequences through use of configuration files. The approach followed in developing AutoGen has involved encoding the behaviors of a system into a model and encoding algorithms for context-sensitive customizations of the modeled behaviors.

This version of AutoGen addressed the MRO (Mars Reconnaissance Orbiter) primary science phase (PSP) mission phase. On previous Mars missions this phase has more commonly been referred to as mapping phase. This version addressed the unique aspects of sequencing orbital operations and specifically the mission-specific adaptation of orbital operations for MRO. This version also includes capabilities for MRO’s role in Mars relay support for UHF relay communications with the MER rovers and the Phoenix lander.

This program was written by Roy E. Glad- den, Teraapat Khampornpan, and Forest W. Fisher of Caltech for NASA’s Jet Propulsion Laboratory.

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Time-Tag Generation Script

Time-Tag Generation Script (TTaGS) is an application program, written in the AWK scripting language, for generating commands for aiming one Ku-band antenna and two S-band antennas for communicating with spacecraft. TTaGS saves between 2 and 4 person-hours per every 24 hours by automating the repetitious process of building between 150 and 180 antenna-control commands. TTaGS reads a text database of communication-satellite schedules and a text database of satellite rise and set times and cross-references items in the two databases. It then compares the scheduled start and stop with the geometric rise and set to compute the times to execute antenna control commands. While so doing, TTaGS determines whether to generate commands for guidance, navigation,