Processing AIRS Scientific Data Through Level 2

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The Atmospheric Infrared Spectrometer (AIRS) Science Processing System (SPS) is a collection of computer programs, denoted product generation executives (PGEs), for processing the readings of the AIRS suite of infrared and microwave instruments orbiting the Earth aboard NASA's Aqua spacecraft. AIRS SPS at an earlier stage of development was described in “Initial Processing of Infrared Spectral Data” (NPO-35243), NASA Tech Briefs, Vol. 28, No. 11 (November 2004), page 39. To recapitulate: Starting from level 0 (representing raw AIRS data), the PGEs and their data products are denoted by alphanumeric labels (1A, 1B, and 2) that signify the successive stages of processing. The cited prior article described processing through level 1B (the level-2 PGEs were not yet operational).

The level-2 PGEs, which are now operational, receive packages of level-1B geolocated radiance data products and produce such geolocated geophysical atmospheric data products such as temperature and humidity profiles. The process of computing these geophysical data products is denoted “retrieval” and is quite complex. The main steps of the process are denoted microwave-only retrieval, cloud detection and cloud clearing, regression, full retrieval, and rapid transmittance algorithm.

This program was written by Kathleen Free- stone, Louis Simeone, Byron Robertson, Maytha Frankford, David Trice, Kevin Wallace, and DeLisa Wilkerson of Marshall Space Flight Center. Further information is contained in a TSP (see page 1). MNS-32339-1

Triaxial Probe Magnetic Data Analysis

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The Triaxial Magnetic Moment Analysis software uses measured magnetic field test data to compute dipole and quadrupole moment information from a hardware element. It is used to support JPL projects needing magnetic control and an understanding of the spacecraft-generated magnetic fields. Evaluation of the magnetic moment of an object consists of three steps: acquisition, conditioning, and analysis. This version of existing software was extensively rewritten for easier data acquisition, data analysis, and report presentation, including immediate feedback to the test operator during data acquisition.

While prior JPL computer codes provided the best data to analyze, and is repeated three times for each of the z-axis and y-axis rotations. In this update, the y-axis rotation starting position has been changed to an option, allowing either the x- or y-axis to point towards the magnetometer. The code has been rewritten to use three simultaneous axes of magnetic data (three probes), now using two “rotations” of the device under test rather than the previous three rotations, thus reducing handling activities on the device under test. The present version of the software gathers data in one-degree increments, which permits much better accuracy of the fit.