Software

Converting EOS Data From HDF-EOS to netCDF

A C-language computer program accepts, as input, a set of scientific data and metadata from an Earth Observing System (EOS) satellite and converts the set from (1) the format in which it was created and delivered to (2) another format for processing and exchange of data on Earth. The first-mentioned format can be either HDF-EOS 2 or HDF-EOS 5 ("HDF" signifies "Hierarchical Data Format"). The second-mentioned format is netCDF ("CDF" signifies "Common Data Format"), which is an open-standard, machine-independent, self-describing format for scientific-data files. In the absence of this or a similar program, incompatibilities among the three file formats can cause loss of metadata upon conversion.

This program preserves as many of the metadata as possible upon conversion. The program opens the input HDF-EOS 2 or HDF-EOS 5 file, queries the components of the file by use of the HDF-EOS 2 and HDF-EOS 5 Compatibility Library (which is described in the immediately following article and provides uniform access to HDF-EOS 2 and HDF-EOS 5 files), and writes the data and metadata components into a netCDF file following the Climate and Forecast (CF) metadata conventions.

This program was written by Richard Ullman of Goddard Space Flight Center; Bob Bane of Global Science & Technology, Inc.; and Jingli Yang of Earth Resources Technology, Inc. Further information is contained in a TSP (see page 1). GSC-15007-1

HDF-EOS 2 and HDF-EOS 5 Compatibility Library

The HDF-EOS 2 and HDF-EOS 5 Compatibility Library contains C-language functions that provide uniform access to HDF-EOS 2 and HDF-EOS 5 files through one set of application programming interface (API) calls. ("HDF-EOS 2" and "HDF-EOS 5" are defined in the immediately preceding article.) Without this library, differences between the APIs of HDF-EOS 2 and HDF-EOS 5 would necessitate writing of different programs to cover HDF-EOS 2 and HDF-EOS 5. The API associated with this library is denoted "he25."

For nearly every HDF-EOS 5 API call, there is a corresponding he25 API call. If a file in question is in the HDF-EOS 5 format, the code reverts to the corresponding HDF-EOS 5 call; if the file is in the HDF-EOS 2 format, the code translates the arguments to HDF-EOS 2 equivalents (if necessary), calls the HDF-EOS 2 call, and retranslates the results back to HDF-EOS 5 (if necessary).

This program was written by Richard Ullman of Goddard Space Flight Center; Bob Bane of Global Science & Technology, Inc.; and Jingli Yang of Earth Resources Technology, Inc. Further information is contained in a TSP (see page 1). GSC-15008-1

HDF-EOS Web Server

A shell script has been written as a means of automatically making HDF-EOS-formatted data sets available via the World Wide Web. ("HDF-EOS" and variants thereof are defined in the first of the two immediately preceding articles.) The shell script chains together some software tools developed by the Data Usability Group at Goddard Space Flight Center to perform the following actions:
- Extract metadata in Object Definition Language (ODL) from an HDF-EOS file,
- Convert the metadata from ODL to Extensible Markup Language (XML),
- Reformat the XML metadata into human-readable Hypertext Markup Language (HTML),
- Publish the HTML metadata and the original HDF-EOS file to a Web server and an Open-source Project for a Network Data Access Protocol (OPeN-DAP) server computer, and
- Reformat the XML metadata and submit the resulting file to the EOS Clearinghouse, which is a Web-based metadata clearinghouse that facilitates searching for, and exchange of, Earth-Science data.

This program was written by Richard Ullman of Goddard Space Flight Center; Bob Bane of Global Science & Technology, Inc.; and Jingli Yang of Earth Resources Technology, Inc. Further information is contained in a TSP (see page 1). GSC-15011-1

HDF-EOS 5 Validator

A computer program partly automates the task of determining whether an HDF-EOS 5 file is valid in that it conforms to specifications for such characteristics as attribute names, dimensionality of data products, and ranges of legal data values. ["HDF-EOS" and variants thereof are defined in "Converting EOS Data From HDF-EOS to netCDF" (GSC-15007-1), which is the first of several preceding articles in this issue of *NASA Tech Briefs*.] Previously, validity of a file was determined in a tedious and error-prone process in which a person examined human-readable dumps of data-file-format information.

The present software helps a user to encode the specifications for an HDF-EOS 5 file, and then inspects the file for conformity with the specifications: First, the user writes the specifications in Extensible Markup Language (XML) by use of a document type definition (DTD) that is part of the program. Next, the portion of the program (denoted the validator) that performs the inspection is executed, using, as inputs, the specifications in XML and the HDF-EOS 5 file to be validated. Finally, the user examines the output of the validator.

This program was written by Richard Ullman of Goddard Space Flight Center; Bob Bane of Global Science & Technology, Inc.; and Jingli Yang of Earth Resources Technology, Inc. Further information is contained in a TSP (see page 1). GSC-15015-1

XML DTD and Schemas for HDF-EOS

An Extensible Markup Language (XML) document type definition (DTD) standard for the structure and contents of HDF-EOS files and their contents, and an equivalent standard in the form of schemas, have been developed. ("HDF-EOS" and variants thereof are defined in the first two of four related articles immediately preceding this one.) More specifically, this standard describes the structure and contents of a single HDF-EOS 5 file based on the HDF-EOS model as published in Volumes 1 and 2 of the HDF-EOS Library Users Guide. The DTD and schemas are easy-to-use representations of a complex file format, enabling display of data in multiple ways.

By means of HDF5 XML software tools from the National Center for Supercomputing Applications, the user can transform HDF5 files into XML files or vice versa. Inasmuch as HDF-EOS 5 files are HDF5 files, the same software tools can