

DEVELOPMENT OF THE DAM AND REP MODULES FOR THE EPS CALIBRATION/VALIDATION FACILITY USING ENVI+IDL

I. Echave

Research Systems International France, 4, rue de Lyon, 75012 Paris, FRANCE

KEY WORDS: ENVI, IDL, EUMETSAT Polar System, calibration, validation, visualization, templates, analysis.

ABSTRACT:

RSI (Research Systems) in collaboration with ACS (Advanced Computer Systems) participated in the development of the EPS (EUMETSAT Polar System) Calibration/Validation facility. RSI took in charge the development of the DAM (Data Analysis and Monitoring) module supporting the analysis and long term monitoring of the instruments and products, as well as the REP (Reporting function) module supporting the generation of reports on the Calibration and Validation activities (batch DAM exploitation). Taking advantage from all the capabilities of its ENVI and IDL software. The DAM module gives their users a fast way to visualize EPS products using templates, and a set of tools to make analysis easier.

1. INTRODUCTION

1.1 European Polar System

The IJPS (Initial Joint Polar-Orbiting Operational Satellite System) is the result of an agreement between NOAA (National Oceanic and Atmospheric Administration) and EUMETSAT (European Organization for the Exploitation of Meteorological Satellites). The aim of this system is to provide global meteorological data by using a set of polar satellites and by exchanging information between agencies. This cooperation will allow to process information from "morning" and "afternoon" orbits.

The European contribution to this system is the EPS (European Polar System). The EPS will use a series of three METOP (Meteorological Operational) satellites that will provide data for 14 years from 2006. The first satellite will be launched in the second quarter of 2006.

1.2 Calibration/Validation Facility

Inside the EPS ground segment lies the CVF (Calibration and Validation Facility), developed by the company ACS (Advanced Computer Systems).

- Test quality of current calibration parameters.
- If necessary, generate new calibration parameters.
- Validate data.
- If necessary, generate new validation data.

In order to do that, CVF is structured in a set of modules:

- DHA: Data HAndling function supporting the reception, acceptance and pre-processing of the CVF input data.
- DAM: Data Analysis and Monitoring function supporting the analysis and long term monitoring of the instruments and products.
- DPR: Data PRocessing function supporting the generation of reports on the calibration and validation activities.
- REP: Reporting function supporting the generation of reports on the calibration and validation activities.
- DIS: DIStribution function supporting the distribution of data and reports generated by the CVF.
- LSD: A local data store function supporting the Local Storage of Data.

2. DATA ANALYSIS AND MONITORING MODULE

RSI (Research Systems Inc.) was put in charge of the development of DAM and REP modules by using his software products IDL and ENVI. The main challenge of this task was to make these modules easy to use in spite of the huge amount of functionalities required.

DAM is the module in charge of data visualization and analysis. It must provide a set of graphical tools to allow users to show any data inside an EPS product, and also a set of analysis tools. Both, visualization and analysis tools, must be flexible in order to allow users to add new functionalities.

The risk of an easy to use tool is that making it very interactive can make hard to perform repetitive tasks. The users requested for a quick way to generate visualizations, so we developed DAM module based on the idea of templates.

Considering the user requirements, the DAM module was built using three main components:

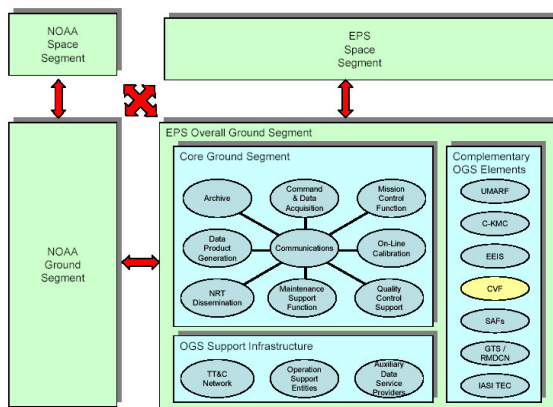


Figure 1. EPS System Overview

The tasks that this facility must develop are:

- DAM Browser
- GDT: Graphical Display Templates
- DMT: Data Management Templates

2.1 DAM Data Browser

The DAM data browser is the component in charge of data management inside DAM module. It provides data input from EPS product files or CVF LDS module, and allows users to see product internal organization.

For the user, DAM data browser is a GUI (Graphical User Interface) showing a tree with the different data (and metadata) contained in an EPS product.

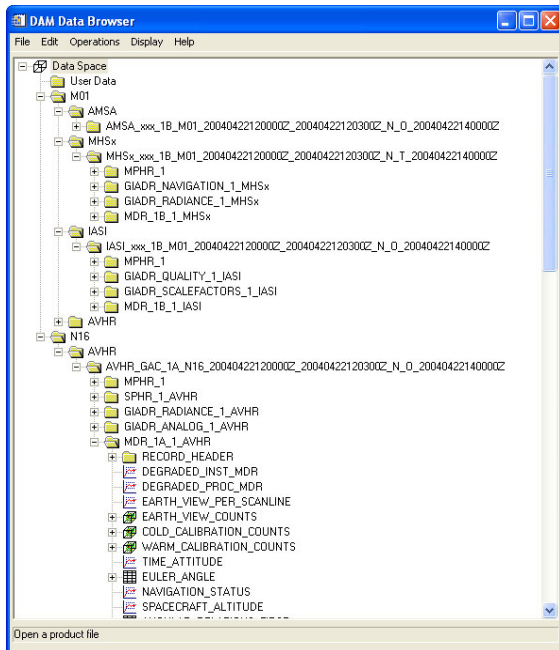


Figure 2. DAM Data Browser

This window is the starting point for all the functionalities of the DAM module. It gives us the possibility of selecting any kind of data from an EPS product and generating visualization. It is also possible to run an analysis operation on the data, and any new data created by it will be added to the DAM data browser.

2.2 GDT (Graphical Display Templates)

GDT are a set of graphical primitives without any data inside it. These templates cannot be shown on their own, and a parameter assignment operation must be performed. During this operation several datasets have to be selected from the DAM data browser to fill the parameters of template graphical primitives.

Each graphical primitive contains a set of parameters (it can be a null set) that can be mandatory or optional. A GDT parameter set is the union of all the parameter sets from his contained graphical primitives.

GDTs include also window layout. They can define how window space will be managed by separating it into views, and adding to each view the corresponding graphical primitives.

The DAM module comes with a set of default GDTs, but new ones can be created by using the GDT editor tool. This tool allows users to add, remove or simply edit properties from his contained graphical primitives.

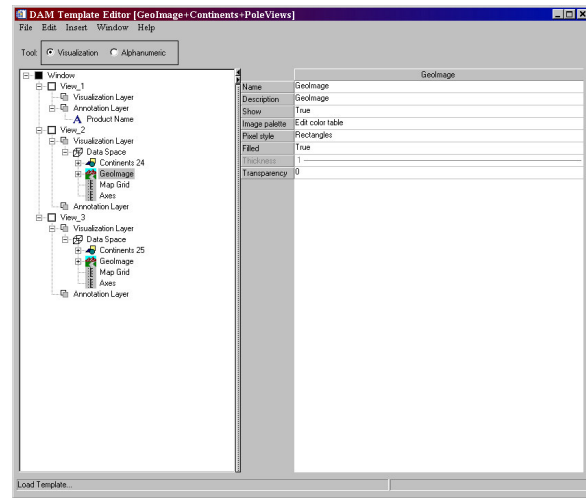


Figure 3. DAM Template Editor

There is an special case in GDTs, the alphanumerical GDTs. These alphanumerical templates generate tables of data instead of graphical primitives, but they are managed in the same way as the rest of templates.

2.3 DMT (Data Management Templates)

Parameter filling can become a hard task when it has to be done often, and even harder when we fill the same parameters with the same data for different products. In order to improve that DMT were added to DAM.

A DMT is a GDT where each parameter knows which data has to take from the input products. On this way we just need a DMT and one or more EPS products to generate a visualization. The parameter filling task is done automatically by the DMT.

DAM provides a set of basic DMTs for each of the EPS products, but new ones can be created by using the DMT Editor Tool included in DAM. This tool allows user to select a GDT, a type of EPS product, and to define the links between parameters and data.

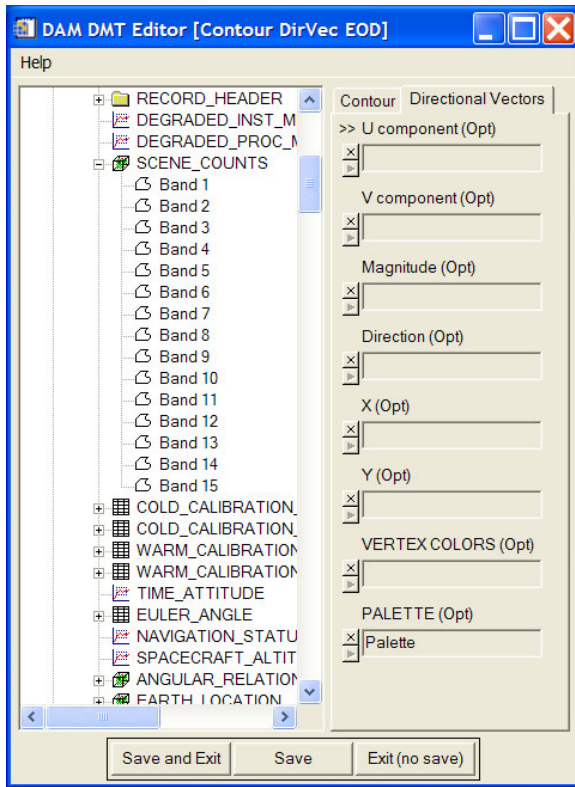


Figure 4. DAM DMT Editor

3. REPORTING MODULE

The REP module is in charge of generating reports of the calibration and validation activities. His output is really similar to the DAM module and we took advantage of it. Most of the REP functionality has been implemented by running DAM in batch mode.

First time we have to create a template that follows our report layout, and then we have only to give a product. This mechanism makes simpler batch report generation.

4. CONCLUSIONS

DAM module is a good tool to make calibration tasks easier. It allows user to quickly visualize products and his flexibility makes easy to customize it. Anyone can create his own templates to reduce product visualization to a single click.

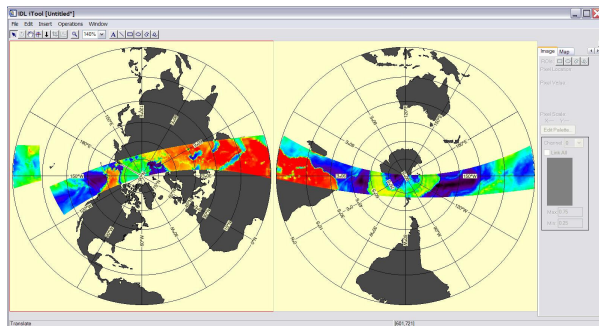


Figure 5. DAM visualization example

Operation system can also be customized with a basic knowledge of the IDL language, allowing users to perform specific processing.

All these functionalities are used in batch mode by the REP module. This gives all the DAM power to the generated reports.