CURRENT USE OF IDV/HYDRA AND INTENDED USE OF MCIDAS-V AT EUMETSAT

The document describes the current use of IDV/Hydra and intended use of McIDAS-V in training and scientific activities at EUMETSAT.

CGMS XXXVI is invited to note the current use of IDV/Hydra and intended use of McIDAS-V in training and scientific activities at EUMETSAT.

CURRENT AND INTENDED USE OF MCIDAS-V AND HYDRA AT EUMETSAT

1   INTRODUCTION

McIDAS-V (McV) is a free, open source, visualisation and data analysis software package. It is in an advanced and quite stable stage of development (late alpha – early beta version) at Satellite Science and Engineering Centre (SSEC) at the University of Wisconsin (www.ssec.wisc.edu/software/v). McV is the next generation of in the 35-year history of McIDAS software (currently McIDAS-X, McX). It is built on SSEC's VisAD library and Unidata's Integrated Data Viewer IDV (www.unidata.ucar.edu/software/idv), and integrates SSEC's HYDRA functionalities for viewing and analysing multi/hyperspectral data. Migration from McX to McV is facilitated through a bridge that enables McX users to run commands and tasks in the McV environment. Data input may come from a multitude of sources/formats, most prominently from ADDE servers (www.unidata.ucar.edu/Presentations/UPCsemseries/ADDE.pps).

Both McV and IDV are Java based and install easily under either Windows, Linux or Mac operating systems. They run well on computers with 1 to 2GB of RAM. Larger data volumes (e.g. long SEVIRI RGB image sequences) are more efficiently processed and displayed with 4GB of RAM and a 64-bit operating system.

2   EUMETSAT'S EXPERIENCE WITH IDV

The User Service Division (USD) at EUMETSAT started using IDV in support of training and promotional activities two years ago. In these two years close contacts with the IDV developers at Unidata resulted in many improvements and enhancements regarding the processing of SEVIRI image sequences and NWP fields as well as image display and display saving functionalities. USD developed so-called plugins (including modules coded in Jython) displaying EUMETSAT's standard RGB composites based on SEVIRI data, extracting statistics from an image sequence, supporting weather briefings at training events and producing promotional imagery (e.g. many of the pictures shown on the EUMETSAT homepage www.eumetsat.int and in the case studies in www.eumetsat.int > Image Gallery > Case Studies > Gallery).

Ingest into IDV of SEVIRI data relied initially only on local native files and a co-resident McX installation. Later on an access-controlled ADDE server was made available, delivering near-real-time SEVIRI data from EUMETSAT's archive U-MARF on a best-effort basis. This rolling data set covers the seven days of the 0°-mission (Meteosat-9). The server may also be fed manually with ad-hoc SEVIRI data (including rapid-scanning images from Meteosat-8 at 9.5°E) retrieved from the EUMETSAT archive allowing for use of older SEVIRI scenes. This arrangement has proven to be beneficial both for analyses and display of current weather and of past events. In analysing weather events IDV's capability to roam and re-project image sequences as well as to combine them with NWP fields (usually GRIB files from the ECMWF archive) and other images (mostly MODIS or Google Earth) is most useful. It accelerates productivity considerably. A couple of successful attempts have also been made to use HYDRA with SEVIRI data on the ADDE server.

3 PROMOTIONAL IDV/MCV ACTIVITIES SUPPORTED BY EUMETSAT

USD participated in the Sahel 2007 Conference in April 2007 in Ouagadougou (Burkina Faso) actively supporting a hands-on workshop. IDV was used to demonstrate the usefulness of SEVIRI imagery for the Sahel region to African scientists and operational people.

At the EUMETSAT Meteorological Satellite Conference in September 2008 in Darmstadt (Germany) SSEC and USD presented IDV/McV in a dedicated session. The many participants were enthused about the capabilities of the tools

4 RECENT ACTIVITIES AND RESULTS – MCIDAS-V

In recent months USD has started to look into McV, in particular with a view of combining SEVIRI data with other EUMETSAT data and products. Particular effort is spent for being able to read HRIT SEVIRI data. Despite some technical problems, these capabilities are coming slowly on board.

Ingest of the OpenMTP files from Meteosat First Generation over the Indian Ocean is implemented through the OpenADDE facility. Fig. 1 shows an infrared full-disc scene.

Decoding of the HRIT format is in an advanced stage of development. The decoder processes both HRIT segments retrieved from the archive and received via EUMETCast. The decoder accepts both complete SEVIRI data sets as well as with segment/channel subsets. A sample of HRV segments is shown in Fig. 2. For the time being wavelet-compressed files have to be decompressed outside McV due to the lack of Java-based decompression code.

GRIB-coded MSG products (e.g. cloud analysis) still suffer from an unexplained navigation problem, while BUFR-coded products (e.g. atmospheric motion vectors) are in the pipeline. McV's capability to read the HDF5 format should also support HDF5-coded data sets from Metop instruments (image(-like) data of AVHRR 1B, GOME 1B, MHS 1B and IASI 1C/2. Some problems in decoding of the EUMETSAT HDF5 remain as the correct implementation is not so straightforward as one would hope.

A first big step has been made very recently with IASI level 1C data and the HYDRA functionality in McV. As an example Fig. 3 shows a match-up of an SO_2 streamer retrieved from a difference of two IASI spectral lines and from one of the standard SEVIRI RGBs. This opens the way to the analysis and display multi-sensor/platform data in one go.

5 THE FUTURE – CONCLUSIONS

The extended experience with IDV and initial contacts with McV show a bright future for these open-source software packages and ADDE server architecture. USD will intensify their use in training and promotional activities. It is anticipated that EUMETSAT's McX users will migrate to McV in the 2009-2010 time frame. EUMETSAT will endeavour to having sorted out the various remaining decoding problems. Of particular interest is the possibility of (combined) analyses of SEVIRI imagery, IASI level 1C EBBTs, IASI level 2 sounding products, microwave MHS 1B EBBTs and AVHRR imagery. A further step forward would be to have a selection of the many EUMETSAT data sets and products joining the SEVIRI data on the same ADDE server. Also, it would be beneficial if even more data sets would be made

available via ADDE servers also outside EUMETSAT as recommended by CGMS (see Recommendation CGMS 35.15).

IDV is an outstanding software package and has already reached a mature stage. McV is close on the heels. Both are attractive alternatives to commercial software packages if the type of activities allow for use of open-source software. Once McV decodes EUMETSAT data formatted in HRIT, GRIB, BUFR and HDF5, it may even be implemented as a back-end of a EUMETCast receiving station.
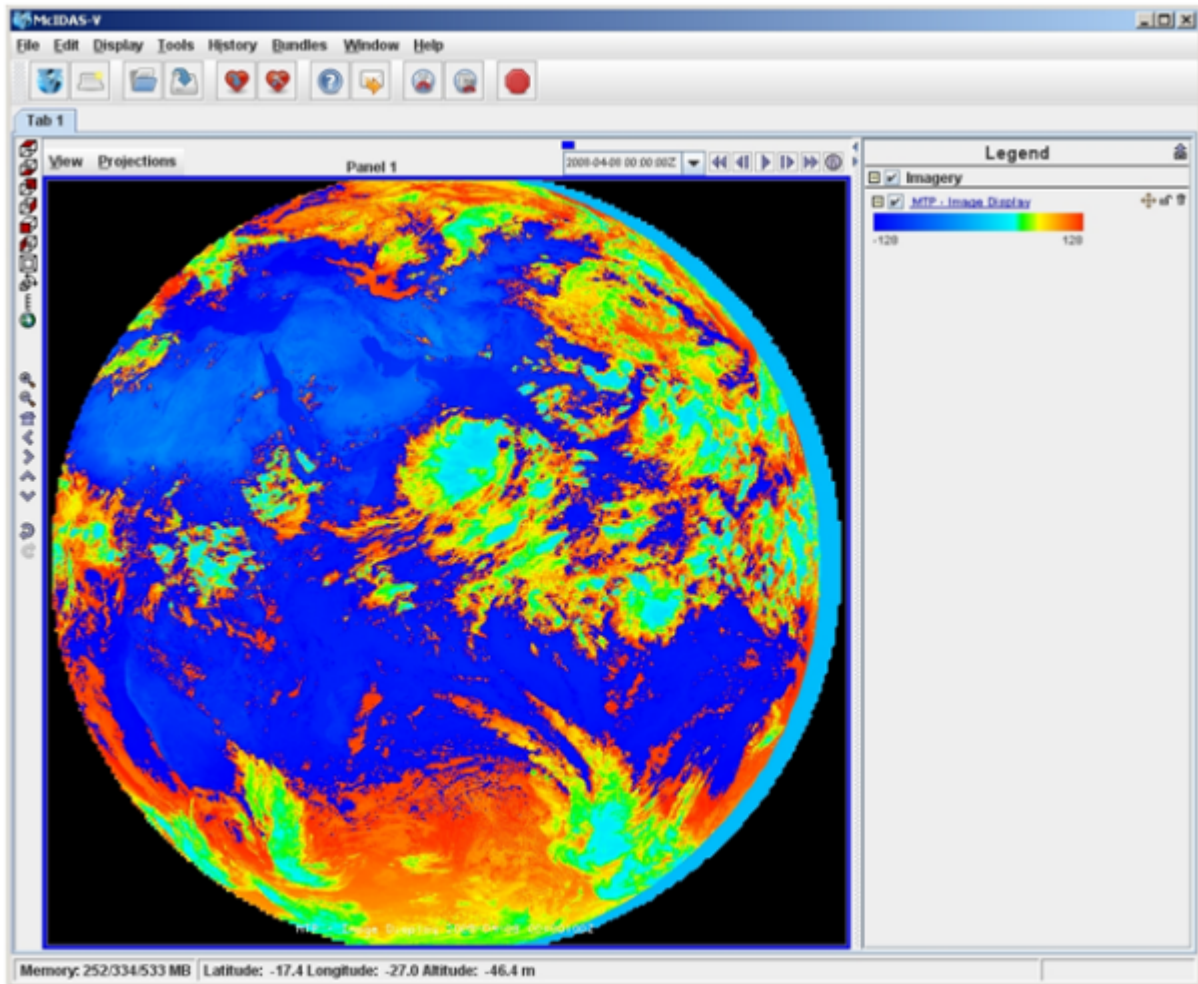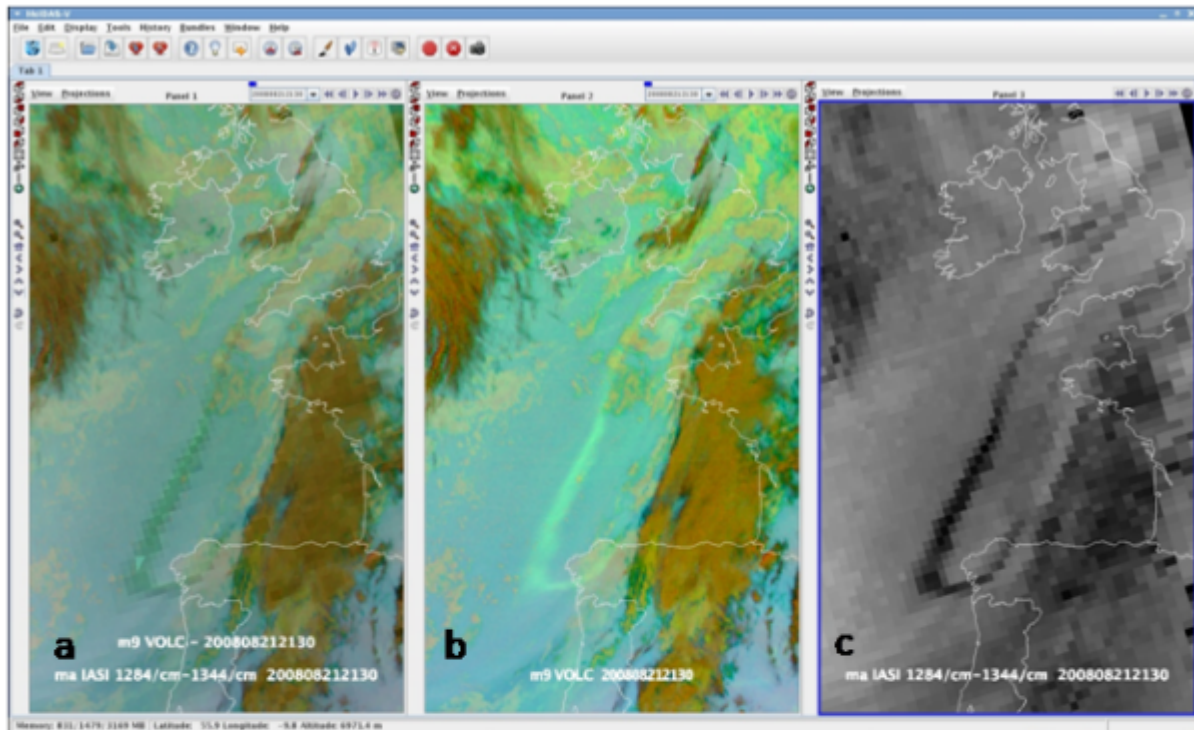

Fig. 1: Meteosat-7 IR scene on 8 April 2008 00:00UTC
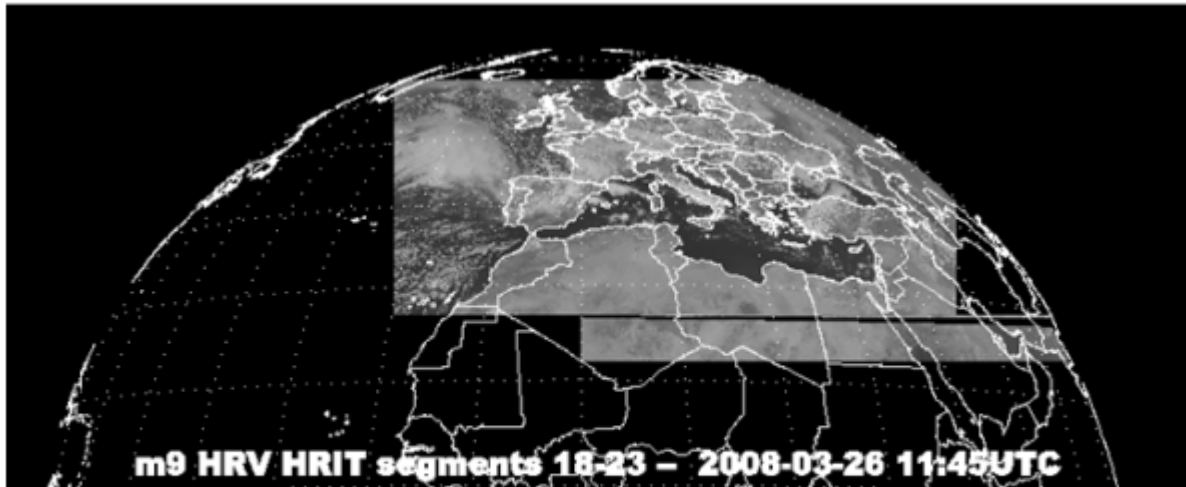
Fig. 2: HRIT segments 18 to 23 of SEVIRI HRV channel on 26 March 2008 at 11:45UTC

Fig. 3: SO2 streamer on 21 August 2008 21:30UTC resulting from Kasatochi eruptions (Aleutian Islands) after 7 August 2008, as observed by SEVIRI and IASI. Watch out for hook-like signature running from Galicia to North Sea.
(a) Match-up of semi-transparent (b) over (c)
(b) SO2 & volcanic ash RGB based on IR8.7, IR10.8 and IR12.0 (signature light-green)
(c) IASI EBBT difference between lines 1284cm^{-1} and 1344cm^{-1} (signature black)