The ITC GEONETCast-toolbox approach for developing countries

Introduction.

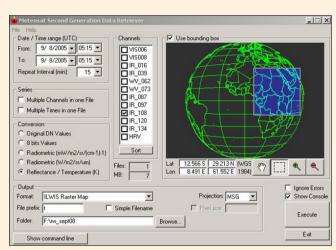
More and more sensor data and derived products are (re) distributed via communication satellites which can be received using a simple and cheap ground reception infrastructure. Problems related to a limited bandwidth available in many (African) countries are overcome. To make efficient use of these data sources in developing countries, import and semi-automated (multi temporal) processing routines are an absolute requirement, preferably using freeware packages combined with generic MS-Windows functionality. Here an overview and examples are presented of the tools developed at ITC in support of GEONETCast.

The tools developed.

Images that have been used previously mainly by the Meteorological community are becoming an important data source to a wide variety of users that deal with environmental analysis. Sensor improvements, especially spatial and temporal resolutions, and the distribution of the data are to be attributed in this respect. To handle the continuous stream of data from different sensors that is received via digital video broadcasting a software tool called the MSG File Manager was developed, which moves the (selected) newly received data onto a storage device in a structured manner. With the help of the MSG Data Retriever the MSG-8 and 9 files can be imported and used in common available remote sensing software packages. The Data Retriever uses the MSG Level 1.5 data product format and can therefore also be used in conjunction with data obtained from the online EUMETSAT Archive (http://archive.eumetsat.int). In the menu of the Data Retriever different options can be selected to handle the pre-processing and radiometric - geometric conversions. In this way time series of images can be easily created. For import of other images in the GEONETCast data stream (e.g. SPOT-VGT4Africa products) and further analysis of the data, use can be made of ILWIS 3.31 (a keyless version is now freely available at http://www.itc.nl/ilwis). Additional tools to assist in multi temporal data analysis and visualization have been integrated in this release. Next to this freeware resource, tools for GRIB(2) and BUFR decoding are used to handle the products from the EUMETSAT archive. Simple batch routines have been developed to import common products such as the Cloud Mask, the Cloud Image, Cloud Top Height and the Multi Sensor Precipitation Estimate. Data segments of these products received via EUMETCast are first merged together to obtain a single file and are subsequently imported. Using a loop sequence the import routine handles the import of multiple images in an automated manner (also dealing with geometry and data conversion into appropriate unit). For (near) real-time visualization batch routines that are run using the Scheduled Task Manager of the Windows Operating System initiate ILWIS and ILWIS based scripts that handle the import, processing and visualization in an automated manner. Having efficiently imported and (pre-) processed the data further analysis is possible using the generic GIS and Remote Sensing capability of ILWIS for different applications. A number of examples are provided highlighting the procedures described above.

Conclusion.

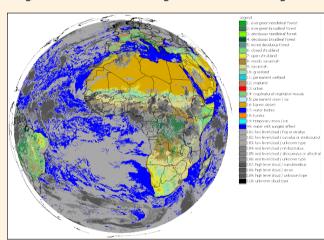
With the ongoing development of GEONETCast, broadcasting (globally) a multitude of satellite observations and associated products and use of cheap ground receiving infrastructure the data is now at the doorstep of the user community anywhere in the world. Efficient processing and analysis routines are required to facilitate incorporation of these environmental data sources and products to improve national and regional policy and decision making for a better management of the natural resources and face the challenges posed by sustainable development. The described infrastructure and tools have been successfully implemented at the Centre for GIS at the National University of Rwanda, Butare, Rwanda.



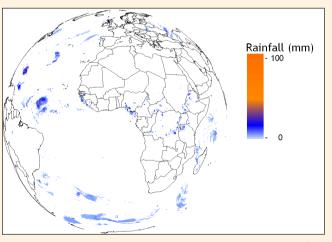
Screen dump of the MSG Data Retriever. This tool facilitates easy import of MSG channels (over time), performs required radiometric and geometric conversions. The command line string generated can be copied to be used in e.g. a batch routine.

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L-000-MSG1_	MPEF	CLM	000002_	200701301145	587 KB File	30/01/2007
L-000-MSG1_	MPEF	CLM	000002	200701301200	587 KB File	30/01/2007
L-000-MSG1_	-MPEF	-CLM_	000003	200701301145	587 KB File	30/01/2007
L-000-MSG1_	-MPEF	-CLM	-000003_	-200701301200	587 KB File	30/01/2007
L-000-MSG1_	MPEF	-CLM_	000004_	200701301145	587 KB File	30/01/2007
L-000-MSG1_	-MPEF	-CLM_	000004_	200701301200	587 KB File	30/01/2007
L-000-MSG1_	-MPEF	-CLM_	000005_	200701301145	587 KB File	30/01/2007
L-000-MSG1_	-MPEF	-CLM	-000005_	-200701301200	587 KB File	30/01/2007
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First file:					Browse	Run!
Output folder:					Browse.	Close

In the EUMETCast data stream a single image / product can consist of several smaller data packages / segments. Before an image can be restored these segments have to be merged.



Imported Cloud Analysis Image, available via EUMETCast at 3 hours interval. Values of the image have been reassigned into the appropriate classes specified.

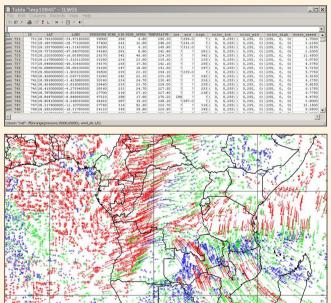




Once the data have been received, an automated (near) realtime visualization tool was developed: a user defined subset of the VIS006, VIS008 and IR016 channels is imported, transformed into geographic coordinates, a pseudo natural colour assingnment is implemented, together with overlay of political boundaries and (local) time stamp.

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Semi automated processing is facilitated using batch processing. The first batch file imports the (multi-temporal) GRIB file(s) and assigns the output as a parameter for execution of the second batch file. Here the original file name is modified and the ILWISComClient (running ILWIS from the command prompt) is executed taking care of further processing (import of raw data into ILWIS format, conversion of data values, rotating the image and assigning the appropriate coordinate system).



Resulting Multisensor Precipitation Estimate image, the rainfall intensity was reassigned into mm/hr. This product is available at 15 minutes interval.

The Atmosheric Motion Vectors shown here are an example of import of BUFR formatted data. An ILWIS table is generated and the wind direction and wind speed are indicated by the direction and size of the arrow. The colours indicate the altitude classes (low, medium and high) selected.

For more information:	References:		
Dr. B.H.P. Maathuis, Dr.Ir. C.M.M. Mannaerts	Further information at:		
maathuis@itc.nl, mannaerts@itc.nl	http://www.eumetsat.int/Home/Main/What_We_Do/ EUMETCast/index.htm?l=en		
Department Water Resources International Institute for Geo-Information Science and Earth Observation (ITC), Hengelosestraat 99, P.O. Box 6, 7500 AA Enschede, The Netherlands.	Download the PDF file entitled: Installation, setup and use of the EUMETCast reception station in Rwanda		



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