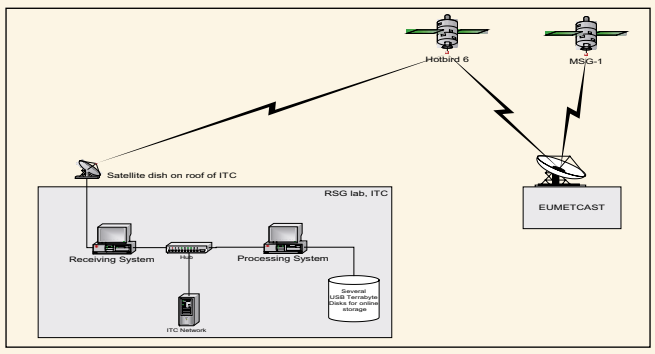
Meteosat Second Generation @ ITC

Introduction

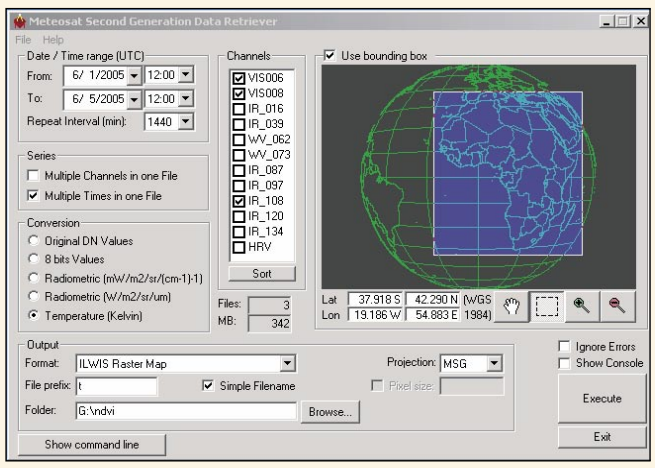
Since June 2004 Meteosat Second Generation data from the SEVIRI instrument is received at ITC using the EUMETCast service. At ITC all EUMETCast data is received but only the high rate information transmission (HRIT) data is archived. This data set is about 85 % of the total data stream. A software tool has been developed to move the relevant data, based on the acquisition date and time, to specific folders on a dedicated system. The tool also creates entries in a log file if data is missing and optionally it can send warning emails if large problems, like system failures may occur.

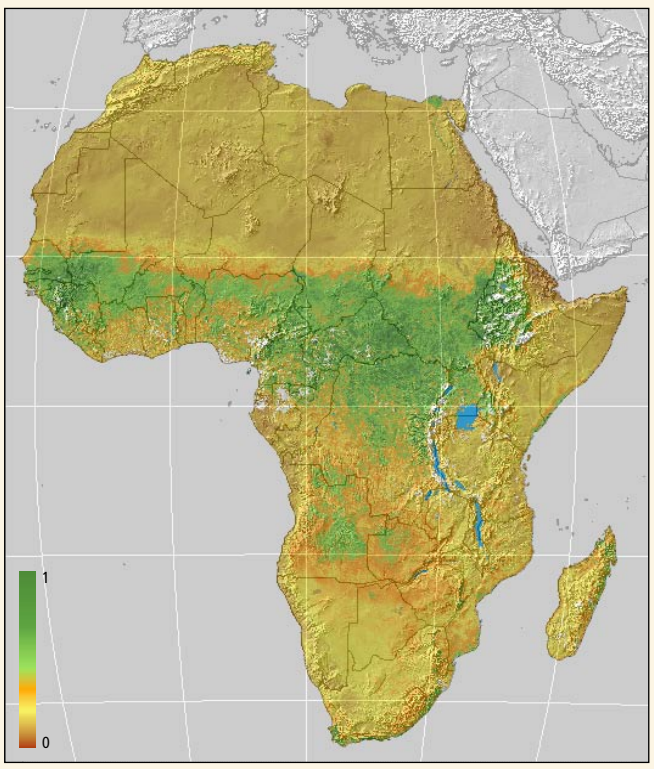


Therefore at present every 15 minutes the high resolution and 11 low resolution channels are received. The high resolution channel consists of 24 segments stored as separate files, the low resolution channels consist of 8 segments. All segments are stored in their original lossless wavelet compressed file format. This results in the smallest demand for storage disk space, coupled with no further user interference (fully automated, only a provisional system check once a day). In total 14000 files, equivalent to 7.5 Gigabyte, are stored per day. The data is stored on high capacity disks of 1 Terabyte to provide easy access and retrieval. These disks are connected to a system that shares the disks over a network.

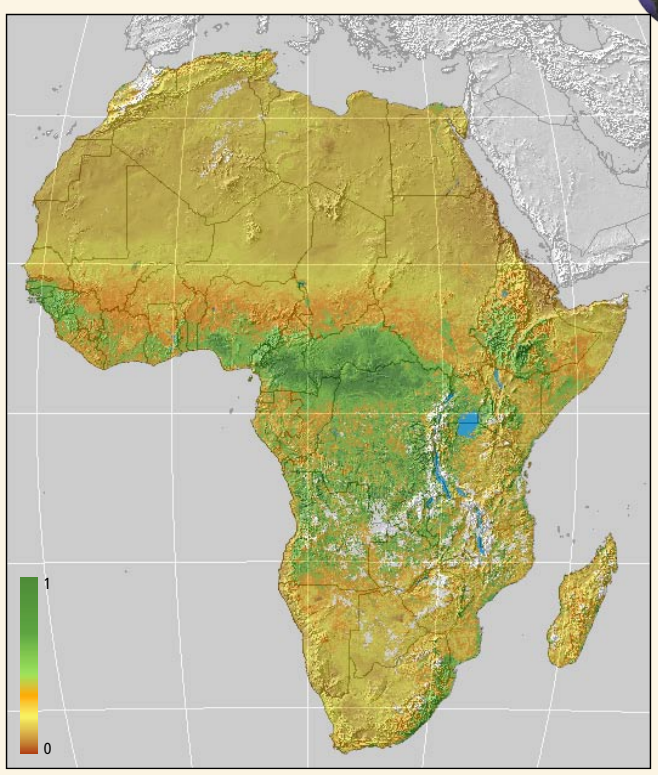
Meteosat data retriever.

The problem with MSG data is that the file format is not standard. None of the commonly used remote sensing packages is able to open or process the raw compressed images. It was decided that the solution with the most future prospects was to implement a driver for reading the images in Geospatial Data Abstraction Library (GDAL, http://www.gdal.org). GDAL is a translation library for raster geospatial data formats that is released under an MIT style Open Source license. All source code is in C++, and great effort is put into keeping the code platform-independent. Drivers for writing files in popular RS formats (e.g. ENVI, ERDAS, ILWIS, GeoTiff) but also picture formats like JPEG, GIF and BMP have already been implemented by the community, so appending a driver for reading MSG image files to this driver seemed to be the most appropriate. Through the user interface all relevant parameters can be adjusted and a time series can be easily constructed. The figure below shows the data retriever / time series generator.

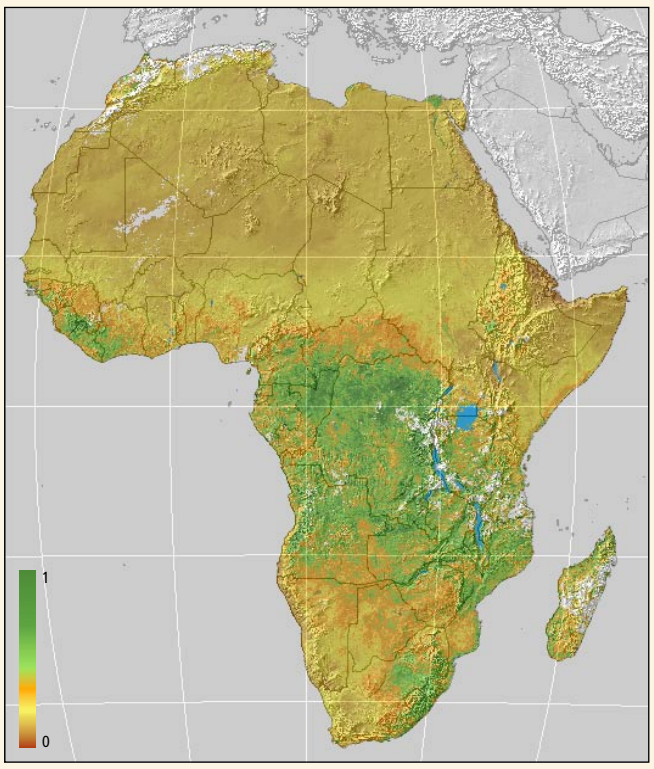




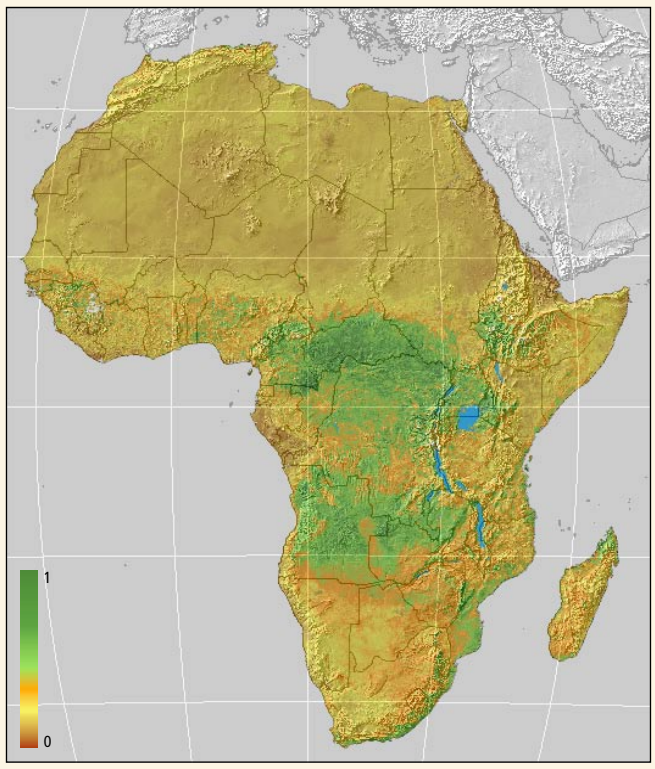
Average NDVI Sept 1-5 2004, 1200 UTC.



Average NDVI Dec 1-5 2004, 1200 UTC.



Average NDVI March 1-5 2004, 1200 UTC.



Average NDVI June 1-5 2004, 1200 UTC.

Application example: Average NDVI comparison using ILWIS based time series analysis capability

On top of this existing capability additional ILWIS functionality for time series data analysis and visualization are currently implemented and some of this added statistical functionality will be included in the next ILWIS release.

For import of the online MSG data, conversion to Top of Atmosphere reflectance (for the VIS006 and VIS008 bands) and temperature (for the IR_108 band) the MSG data retriever is used. Four time windows have been selected covering 5 days each. For every day in such a window the 12.00 hr UTC image was taken. The NDVI was computed and the thermal channel was used for cloud detection. An average NDVI of the 5-day window was computed to eliminate the cloud cover effect. This 5 day average NDVI can be used as an indicator of relative biomass and greenness. The examples given, with an elevation model on the background, resampled to a Hammer Aitoff projection (with a Central Meridian of 15° East), shows the remarkable seasonal variation in response to the shifting Inter Tropical Convergence Zone.

Conclusion

The enhanced ILWIS capability to handle and analyse time series, together with the MSG-Data Retriever tool developed, can provide a low cost alternative to the "non-traditional meteorological" user community in e.g. the African continent, applying the Meteosat data to a multitude of potential earth science related applications given the new and enhanced MSG sensor capabilities and current favourable data distribution policy of EUMETSAT. With the construction of an online MSG archive (currently consisting already of over 4 TB of compressed data), coupled with easy data retrieval and Top of Atmosphere radiometric and geometric calibration the main bottleneck for effective data analysis has been well taken care off. More applications based on the SEVIRI instrument are currently under development such as the estimation of rainfall and evaporation.

For more information:

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http://cwis/support/it/support/documents/01. expertise and knowledge/07. earth observation systems/meteosat second generation.htm

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