EUMETCAST NEAR REAL-TIME DATA AND PRODUCTS DERIVED FROM MSG AND METOP FOR METEOROLOGICAL AND ENVIRONMENTAL APPLICATIONS
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Abstract. This report summarizes the workshop for EUMETCast near real-time data and products derived from MSG and Metop for meteorological and environmental applications, which was held 5 May 2011 at the XV Brazilian Symposium of Remote Sensing (SBSR), Curitiba, Brazil. The three goals of the short course were: 1) to provide a forum for presentation and discussion of research and development regarding the applications of MSG and Metop data to meteorological and environmental studies; 2) to expose existing MSG products to a wide audience and to provide more educational material on the use of these products; and 3) to solicit feedback from the Brazilian user community regarding current desired EUMETCast-DevCoCast user products. This report outlines the workshop's four oral presentations and panel discussion.

Key words: EUMETSAT, VITO, LSA SAF, CPTEC

1. Introduction

In order to address the meteorological Meteosat Second Generation (MSG) and environmental Metop users need in Brazil, the workshop for *EUMETCast near real-time data and products derived from MSG and Metop* was conceived as part of the XV Brazilian Symposium of Remote Sensing (SBSR) promoted by Brazilian Institute for Space Research (INPE). The workshop was held on 5 May 2011, at the Estação Convention Center, Curitiba, Brazil.

The workshop was attended by 50 participants from governmental (Federal, state, and local), private, and educational institutions across the Brazil. There were three primary goals of the workshop. 1) to provide a forum for presentation and discussion of research and development regarding the applications of MSG and Metop data to meteorological and environmental studies in Brazil. 2) to expose existing MSG and Metop products to a wide audience and to provide more educational material on the use of these products. 3) to solicit feedback from the Brazilian user community regarding current desired EUMETCast-DevCoCast user products.

In order to accomplish these goals, the workshop consisted of four, invited 40-minute oral presentations, followed by five-minute discussions. In addition, a 20-minute panel discussion was held at the end of the workshop.

2. Workshop presentations

The workshop commenced with welcoming remarks by Prof. Humberto Barbosa, coordinator of Laboratory for Analyzing and Processing Satellite Images (LAPIS). Prof. Barbosa gave an overview of the concept of EUMETCast and its structure. He described the EUMETCast receiving technology, which is based on using widespread and off-the-shelf components allowing for widespread adoption of the service at low cost. An entire receiving station can be purchased and installed for US$2,000–3,000 (Fig. 1). He also stressed that the number of registered EUMETCast reception stations continues to increase with about 40 registrations across the Brazil (Fig. 2).

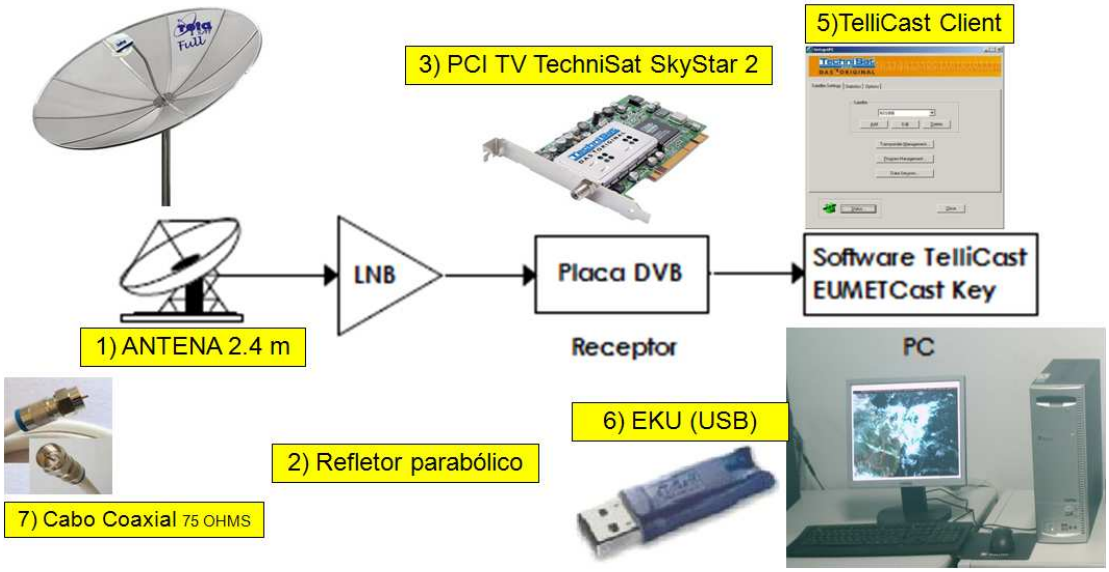
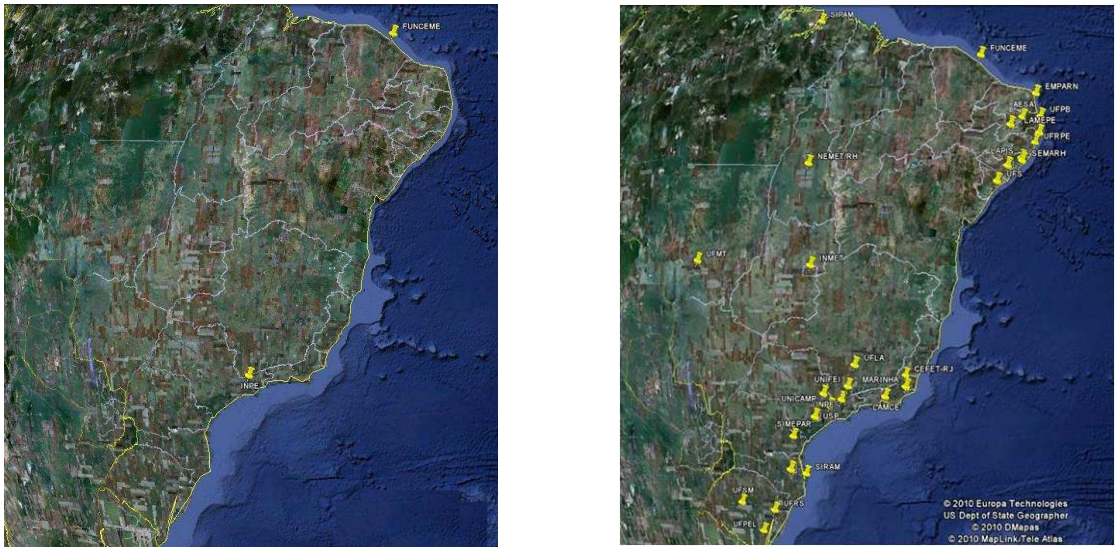


Figure 1 – LAPIS: EUMETCast receiving technology and its components.



(a) Two-EUMETCast stations (2007) (b) 40-EUMETCast stations (2011)

Figure 2 – Distribution of EUMETCast licensed users across the Brazil.

First, Mrs Isabel Monteiro (Meteorologal Institute of Portugal) offered details on an overview of the more recent applications of Satellite Application Facility (SAF) on Land Surface Analysis (LSA) products. Numerous examples the LSA-SAF products applied in three main groups: energy balance and surface radiation products; vegetation biophysics and ecology products and forest fires products were presented (Fig. 3). From direct applications of the products, like heat waves or drought effects on vegetation monitoring applications, to more sophisticated approaches such as assimilation of LSA-SAF products in land models or as initial or boundary conditions for crop monitoring models. Throughout the presentation several links and references are given to the LSA-SAF user community allowing a more deepening into land applications presented. The work finishes with some practical information about the software available to access LSA-SAF products

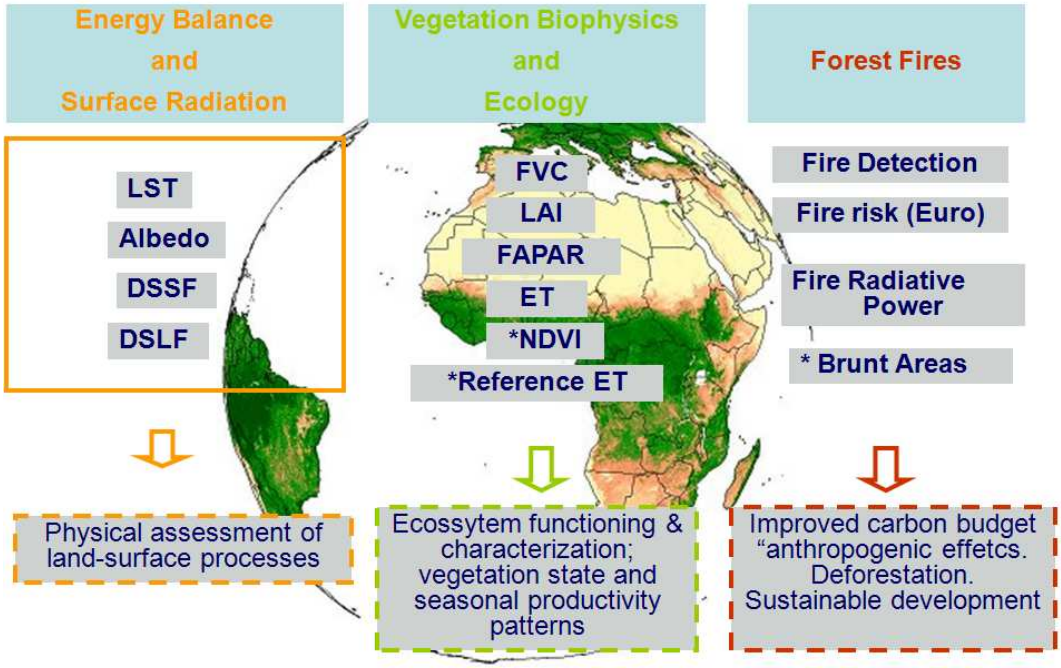


Figure 3 – The LSA-SAF products.

Mrs. Monteiro was followed by Dr. Luiz Machado (Center for Weather Forecast and Climatic Studies – CPTEC at INPE), who gave a talk on behalf of Mrs. Carolien Tote (VITO) about the current overall status of the "GEONETCast for and by Developing Countries" (DevCoCast) project, funded by the European Community's 7th Framework Programme for Research (FP7), which freely shares a wide variety of EO products, some produced in Africa or Latin America, through GEONETCast. Dr. Machado offered details on product coverage, dissemination mechanism, examples of INPE-CPTEC provide CBERS imagery, etc. In the case of Latin America, the data flow consists of environmental data produced by INTA (Argentina), INPE-CPTEC (Brazil) and by VITO (Belgium). He emphasized the VITO products derived from SPOT-Vegetation (LAI, FGC, albedo, NDVI, dry matter productivity) (Fig. 4) and DevCoCast also supports the actual use of the products by a broad user community through the organization of training courses and the distribution of training materials.

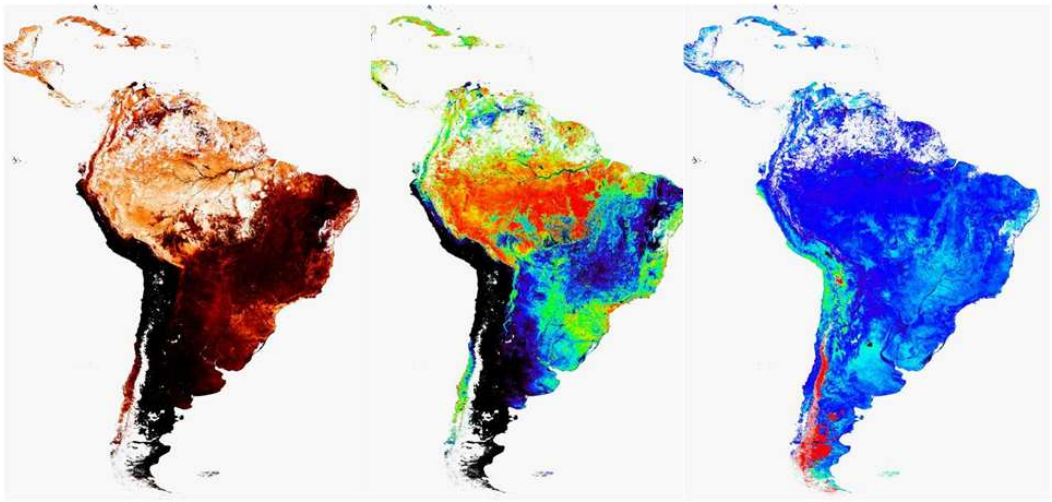


Figure 4 – VITO products: Leaf Area index (LAI), Fraction of Green Cover (FGC) and Albedo, 1st dekad of Aug 2010.

Next, Dr. Marianne König (EUMETSAT's scientific coordinator for the meteorological products extracted from the MSG) spoke. This talk focused on a number of applications of Meteosat data (MSG) for the characterization of atmospheric instability. Dr. König reviewed several methods by which the MSG infrared channel selection makes it possible to assess the air stability in pre-convective. Instability indices typically combine measures of the thermal and the moisture properties and often only use a small quantity of vertical profile parameters (Fig. 5). MSG based temperature and moisture retrievals are used for the derivation of stability indices, which are a part of the MSG meteorological products derived centrally at EUMETSAT and disseminated via EUMETCast. Examples were shown to demonstrate the generally good warning potential of the derived instability field, together with a more quantitative verification analysis provided by the South African Weather Service. Good agreement was found. She also outlined the recently EUMETSAT Convection Working Group (CWG) website for the attendees, available on line at: http://www.convection-wg.org/. This website currently provides a single platform for all scientist members from more than 40 countries to interact, exchange material related to convection.

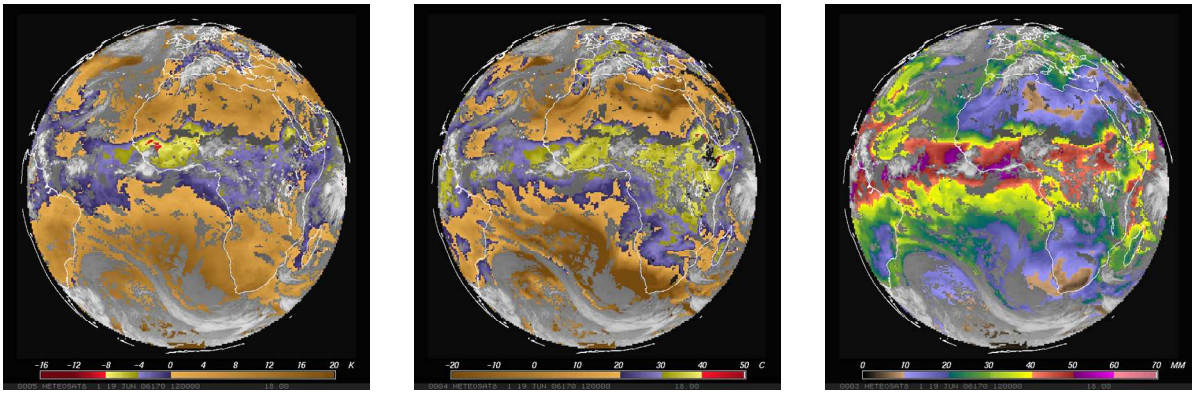


Figure 5 – Global view of Lifted Index, K-Index and Total Precipitable Water (3 x 3 pixel averages).

The final invited presentation was by Dr. Stephen English (CPTEC-INPE). This talk focused on the applications in atmospheric data assimilation for Numerical Weather Prediction (NWP). Dr. English offered details on an overview of the assimilation of data from a wide range of infrared and microwave sounders and imagers. He pointed out that modern data assimilation systems such as 4D-var and Ensemble Kalman Filter can exploit radiances directly, albeit care is needed with biases and quality control, inclusive of issues such as cloud detection. EUMETCast-Europe includes raw radiances from many sensors, whereas EUMETCast-Americas focuses on SEVIRI and some derived products from other sensors. To be more useful for Numerical Weather Prediction in South America EUMETCast-America needs the same access to raw radiances as is enjoyed in Europe (Fig. 6). He emphasized that solutions such as principal components for data transmission should be actively pursued where transmission of the full spectra is unaffordable. He also presented the results of data from the Infrared Atmospheric Sounding Interferometer (IASI) onboard Metop, which are assimilated in model configurations. It was highlighted the importance of IASI data in the assimilation applications for temperature sounding radiances (Fig. 7).

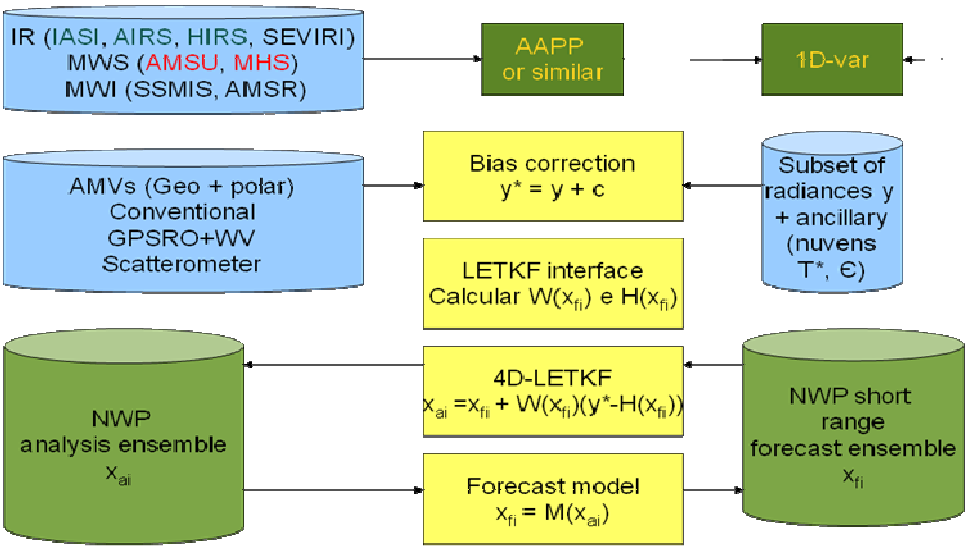


Figure 6 – Assimilation of observations.

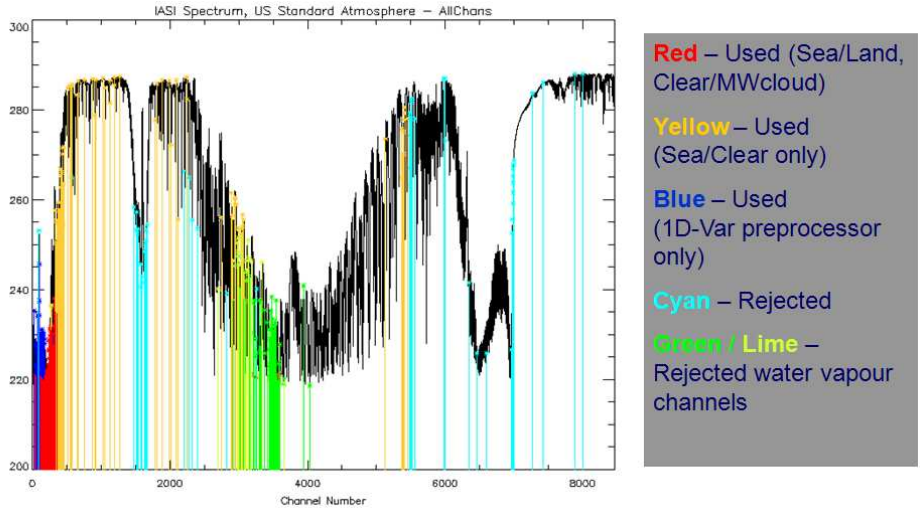


Figure 6 – IASI data: 1000 channels use 150.

Following the invited talks, a panel discussion was held with Mrs Isabel Monteiro, Dr. Luiz Machado, Dr. Marianne König, Dr. Stephen English, Mr. José Prieto (training officer at EUMETSAT), Prof. Humberto Barbosa serving as panelists. A common theme expressed by the attendees was the integration of Metop data dissemination on EUMETCast including data access for users. Mr José Prieto (EUMETSAT) pointed out the current overall status and the next term evolution of Metop. He encouraged attendees to use the opportunity to collaborate on employing MSG for environmental and meteorological applications. All presentations can be downloaded from a LAPIS website at: www.lapismet.com/XVSBSR/presentations/.

3. Workshop conclusion

Prof. Barbosa provided concluding remarks at the end of the discussion. The workshop was very productive and efficient. Attendees were pleased by the number of opportunities the workshop offered to satisfy user input and initiate new collaboration partnerships. It improved the lines of communication between satellite product suppliers and satellite user groups with developments regarding the EUMETCast data dissemination. This

improvement was accompanied by a significant increase in the access to EUMETCast Brazil (40-stations licensed) as well as by supports of DevCoCast project.

After the end of the workshop, attendees were invited to visit the EUMETSAT stand at the Estação Convention Center to find out more about the MSG data, SPOT-VEGETATION and LSA-SAF products.

Acknowledgements

A special thanks to the XV SBSR for the wonderful organization and warm hospitality, in particular to Dr. José Carlos Neves Epiphanio, Dr. Lênio Soares Galvão and their staff for support provided under the workshop. And thanks to MSc Ivon Wilson da Silva Júnior(LAPIS) for the great technical support. This workshop was supported by XV SBSR, EUMETSAT and LAPIS group.

References

For additional information on the workshop and future plans, please consult the web resources indicated below.

For further details on EO portal registration and licensing:
https://eoportal.eumetsat.int/userMgmt/login.faces

Further details on DevCoCast and the products disseminated:
http://www.devcocast.eu

Further details on Metop
http://www.metops10.vito.be

For further details on LAPIS and the products:
http://www.lapismet.com/II_Encontro/Apresentacoes_PDF/bloco2_produtos_gerados_pela_UFAL.pdf

For further details on Land Surface Analysis Satellite Applications Facility (LSA SAF):
http://landsaf.meteo.pt/

For further details on the EUMETSAT Convection Working Group (CWG):
http://www.convection-wg.org/

For further details on DevCoCast contact point (help desk):
info@devcocast.eu

Abbreviations

The following abbreviations are used in this document.

CPTEC: Center for Weather Forecast and Climatic Studies
DevCoCast: GEONETCast for and by Developing Countries.
EO: Earth Observation
EUMETCast: EUMETSAT's Broadcast System for Environmental Data
GEONETCast: Global broadcast system for Environmental data, part of the GEO System of Systems (GEOSS) core infrastructure. It operates by inter-linking regionally operated systems (EUMETCast, GEONETCast-Americas and CMACast over Asia).
IASI: Infrared Atmospheric Sounding Interferometer

INPE: Brazilian Institute for Space Research
INTA: Argentina's National Agricultural research Center
LAPIS: Laboratory for Analyzing and Processing Satellite Images
Meteosat: European Geostationary (Meteorological Satellite)
Metop: European Polar-orbiting (Meteorological Satellite)
MSG: Meteosat Second Generation
NDVI: Normalized Difference Vegetation Index
NDWI: Normalized Difference Water Index
SBSR: Brazilian Symposium of Remote Sensing
SAF-LSA: Satellite Application Facility on Land Surface Analysis
VITO: Vision on Technology, Flemisch Institute of Technological Research