



# SALGEE EXPERIENCE IN LAND SURFACE ANALYSES

# Julia Stoyanova





3rd SALGEE workshop on "MSG Land Surface Applications: Drought and Fire emissions", Lisbon/Ericeira, Portugal, 20 - 21 March 2013

SALGEE, The Satellite Applications in Land surface analyses Group for Eastern Europe, has been established in 2009 for gathering experts in the field of satellite meteorology to complement the activities of EUMETSAT Land Surface SAF for progression of using satellite Land Surface Analyses techniques in Eastern Europe and other regions of interest regarding their application (CGMS-38, 2010) in conjunction with other source of information, the Transaction of the Computation of the Comp

## **SALGEE Project of EUMETSAT**

## Aim of the SALGEE initiative

Support to LSA SAF activities in user services & training in Eastern Europe and order regions of interest to take full advantage of remotely sensed data on land, land-atmosphere interactions and biosphere applications.

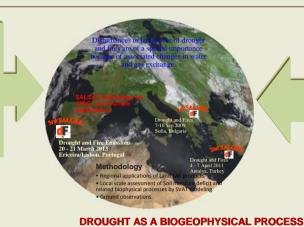
### Role & Objectives

- Facilitate exchange of knowledge on integrated approach for using satellite data in conjunction with ground observations and model outputs.
- ✓ Coordinate research and operational activates in using MSC and EPS data for quantification of land surface processes as well as to facilitate the validation and use of LSA SAF products.
- Contribute to increase benefits from the satellite products in target region.

NIMH, The National Institute of Meteorology of Bulgaria has initiated and hosted the 14"Drought & Fire" workshop (7-10 September 2009, Sofia), recognizing the importance of fire hazard, as:

An important process in modulating the Earth system, through the links among weather, climate, vegetation and human activities as well the potential to feed back to the global climate system,

One of the important aspects of global environmental change in the Earth system environment, that shapes the landscape and vegetation structure, affecting ecosystem functioning and land – atmosphere interface process.



# **SALGEE Project of EUMETSAT**

✓ Activities
✓ Fostering the use of satellite data in conjunction with other available information (e.g. NWP and Land Surface Model output, ground measurements, etc.)
✓ To establish mechanisms where scientists and user community provide feedback to product developers at EUMETSAT and LSA SAF.
✓ To support the use of new land surface analysis methods and operationally generated geophysical products.
✓ To support the implementation of EUMETSAT SAF Strategy related to climate monitoring and use of products for Terrestrial-Essential Climate Variables (T-ECVS).
✓ To maintain a close cooperation with he LSA SAF, NOAANESDIS and NASA.
✓ To organize blennial international workshops to review and discuss progress.

## SALGEE Workshops

Sofia, 7-10 September 2009, Bulgaria

http://info.metec

http://www.eumetsat.int/Home/Main/DataProducts/HowtoUseOurl

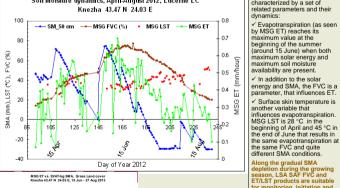
Lisabon/Friceira, 20 - 21 March 2013, Portuga

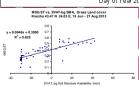
## MSG SEVIRI Capabilities for Land Surface Remote Sensing

- Landscape water balance
- · Surface energy balance
- Vegetation parameters
- Vegetation fires and carbon issue

The goal of this study is to evaluate the capacity of LSA SAF products based on MSG SEVIRI data to reflect some physical aspects of terrestrial drought conditions related to biogeophysical cycle on the Earth's surface.

# DROUGHT ASSESSMENT BY USING LSA SAF PRODUCTS 12:00 UTC Functional & structural properties of vegetation cover 15- 23 Jun 9-19 Jul ------ 3-8 Aug 2012 LSA SAF LST Land Surface Temperature LST, being involved in the energy and water exchange with the atmosphere is used a key parameter in drought analyses. governs the land -atmosphere interactions is reflected by ET dynamics during the growing season Fraction of Vegetation Cover (FVC) and Soil Moisture Availability (SMA) Due to the complex nature of di and integrated approach, account Drought is a specific state of biogeophysical cycle, characterized by a set of related parameters and their dynamics: Soil Moisture dynamics, April-August 2012, Lucerne LC Knezha 43.47 N 24.03 E oynamics: - Evapotranspiration (as seen by MSG ET) reaches its maximum value at the beginning of the summer (around 15 June) when both maximum solar energy and maximum soil moisture availability are present. → SM 50 cm → MSG FVC (%) MSG LST → MSG ET 0.7



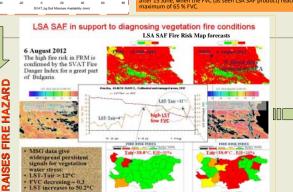


different SMA conditions.

Along the gradual SMA depletion during the growing season, LSA SAF FVC and ET/LST products are suitable for monitoring initiation and propagation of 'drought' annomalies.

Higher rates of MSG ET is related to higher SMA

ry increases to correlation coefficient 0.62 for the period 1.5 June, when the FVC (as seen LSA SAF product) reaches its num of 65 % FVC.



## **SVAT MODELING OF SOIL MOISTURE** Soil Moisture Availability /SMA/ Concept Levels of SM availability Physical meaning availability Field Moisture Capacity (FMC) Capillarity tearing moisture (CTM) of drought severity wilting point (PWP) Restricted Optimal soil below PWP moisture moisture availability No available moisture The maximum moisture content of capillaries in equilibrium with the force of gravity that is the field moisture capacity (FMC) Capillary tearing moisture (CTM) after that SMA sharply drops below this moisture level as a result of a salutatory alteration in soil moisture mobility and instead of its usual fluid state, the water movement to the evaporative soil surface becomes via water. The availability of Optimum of soil moisture availability the minimal of soil moisture

FIRE & FIRE EMISSIONS

# Fire Detection & Monitoring

Algorithms/Products for fire detections based on MSG SEVIRI MPEF SEVIRI FIR of EUMETSAT

Fire Radiative Power, FRP of LSA SAF • Validation of EUMETSAT FIR pr

MSG2 MPEF FIR Product: Data every 15 minutes, 2007. MSG1 MPEF RSS Product: Data at 5-minute, 2008. ns provided by the SFA of Bulgaria

MPEF FIR Product view over Bulgaria, Eastern Mediterra

Operational use & Meteorological Services in South Eastern Europe.

Bulgaria: Validation of operational MPEF FIR product since 2007. SEVIRI FRP applications in 2012. Turkey: Validation of FIR since 2006; Goggle Earth implementation for FIR visualization.

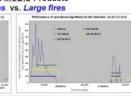
# Differences and mismatches betv LSA SAF FRP and MPEF FIR

- For small fires:
  FRP < 100 MW per pixel, measured by SEVIRI at different stages of fire development.
  FRP product may provide more efficient fire monitoring than FIR.
  SEVIRI algorithms may fail to detect fires detected by MODIS!

# For large fires: FRP > 200 MW per pixel, measured by SEVIRI, FRP > 200 MW per pixel, measured by SEVIRI, SEVIRI FRP and FIR (both from Full Scanning from 0° and Rapid Scan Service (RSS) from 9.5° E) can be equally efficient for fire detection. At Some stages SEVIRI FIR from RSS may be most efficient in fire detection.

# Monitoring fire development

**SEVIRI** and MODIS Products Small fires vs. Large fires



Detection of a Large Fire

