

RESEARCH PROGRAMME FOR EARTH OBSERVATION
“STEREO II” 2006-2013
Call for proposals 2012 - *Shared-cost Projects*

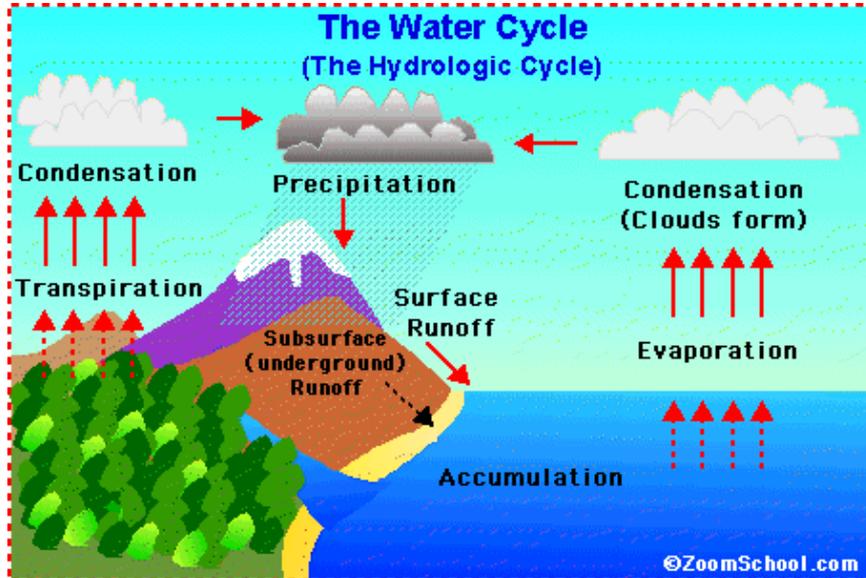
Monitoring evapotranspiration at high resolution with MSG and moderate resolution satellites

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- Evapotranspiration (ET) and water cycle



Global scale over land: ET represents 58 % of precipitation

- Transpiration: 48 %
- Evaporation from soil: 36 %
- Evaporation from interception: 16 %

From Dirmeyer, 2011 (J. Hydrometeorol., 12, 729-749)

Large discrepancies between time/place/vegetation species

ET seen as a lost of available water

$P - ET = \Delta W \rightarrow$ ET needed for water balance calculation

\rightarrow ET knowledge is necessary for many practical applications

- Mother project: part of EUMETSAT SAF network

EUMETSAT Monitoring weather and climate from space

Home > Satellites > Ground Network > Application Ground Segment > SAFs

Satellite Application Facilities

EUMETSAT supervises and coordinates the overall activities of the SAF Network, ensuring that the SAFs in operation are providing reliable and timely operational services related to the meteorological and environmental issues. The SAF Network manages and coordinates interfaces between the SAFs themselves and between SAFs and other EUMETSAT systems, overseeing the integration and operations of SAFs into the overall ground segment infrastructure. During this process EUMETSAT ensures that services are delivered in the most reliable and cost-effective way.

FURTHER INFORMATION ABOUT EUMETSAT'S SAF NETWORK

- What is a SAF?** Utilising specialist expertise from the Member States, Satellite Application Facilities (SAFs) are dedicated centres of excellence for processing satellite data. They form an integral part of the distributed EUMETSAT Application Ground Segment.
- SAF Projects** There are currently eight SAFs, all of which are providing products and services on an operational basis.
- Overall Planning** Following Initial Developments and Operations (1996-2004), the SAFs went into the Continuous Development and Operations Phase (CDOP), which is approved in five-yearly segments by the Council.
- Visiting Scientist Programme** The main objective of the SAF Visiting Scientists (VS) programme is to allow experts/scientists from the EUMETSAT Member States, other than those involved in a particular SAF development, to acquire expertise in the field of the SAF activities/products.
- Contacts** The deployment of the SAF Operational Architecture Services and associated products.
- Acronyms** SAF Network Acronym List.

DIRECT ACCESS TO THE SAF WEBSITES

- SAF on support to Nowcasting and Very Short Term Forecasting
- SAF on Ocean and Sea Ice
- SAF on Ozone & Atmospheric Chemistry Monitoring
- SAF on Climate Monitoring
- SAF on Numerical Weather Prediction
- SAF on Radio-Occultation Meteorology
- SAF on Land Surface Analysis
- SAF on Support to Operational Hydrology and Water Management

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RELATED INFO

- NWP SAF in the EUMETSAT IMAGE Newsletter Issue 32 (October 2009)

RELATED LINKS

- SAF Architecture
- Midwest croonature vegetation cover in African drought region



<http://www.eumetsat.int/Home/Main/Satellites/GroundNetwork/ApplicationGroundSegment/SAFs/index.htm>

- Mother project: 'Land Surface Analysis – Satellite Application Facility' (LSA-SAF)

Objectives

<http://landsaf.meteo.pt>

- Exploit potential of European meteorological satellites to monitor land surface characteristics and evolution
- Do R&D activities to derive pertinent variables for various land applications
- Assure operational service (products and user support) at host institute

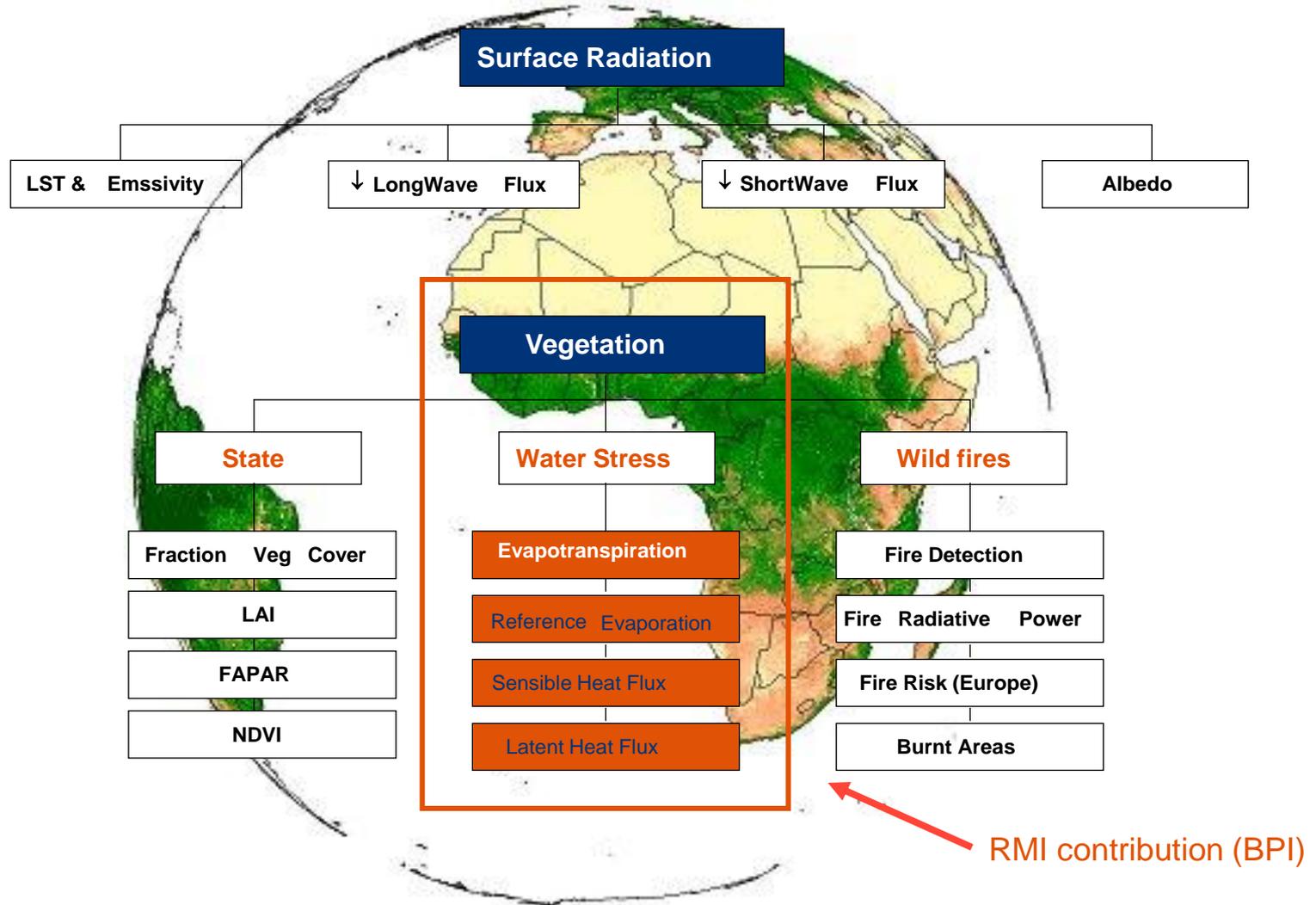


LSA-SAF consortium

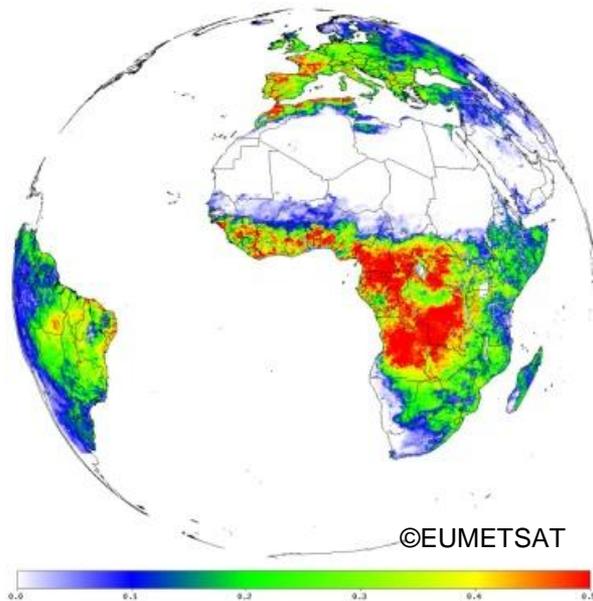
- Instituto Português do Mar e da Atmosfera (IPMA), Portugal
- Meteo-France (MF), France
- Royal Meteorological Institute (RMI), Belgium
- IMK, Karlsruhe Institute of Technology (KIT), Germany
- IDL, University of Lisbon, Portugal
- UV, University of Valencia, Spain
- KCL, UK
- VITO, Belgium

Context

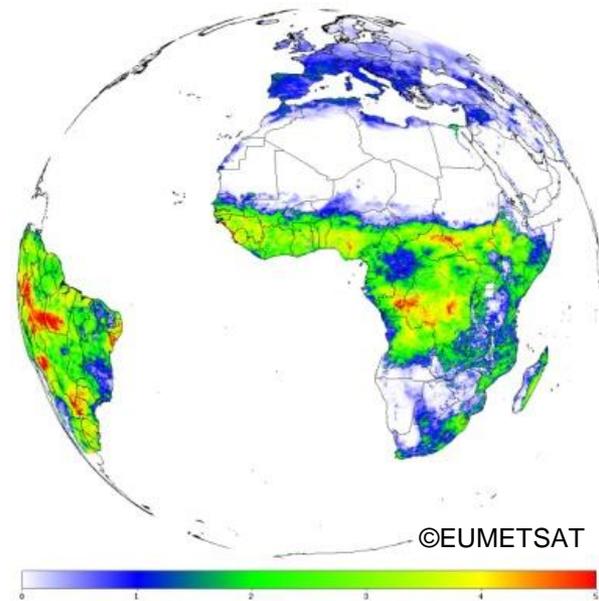
- Mother project: RMI role (products development)



- **Mother project: RMI role (methodology and output)**
 - Physically based land surface modelling
 - Input: LSA-SAF MSG-SEVIRI derived data: radiation, vegetation, thermal properties
 - Output: 30 min ET and daily ET; spatial res: 3*3 km (sub sat.)

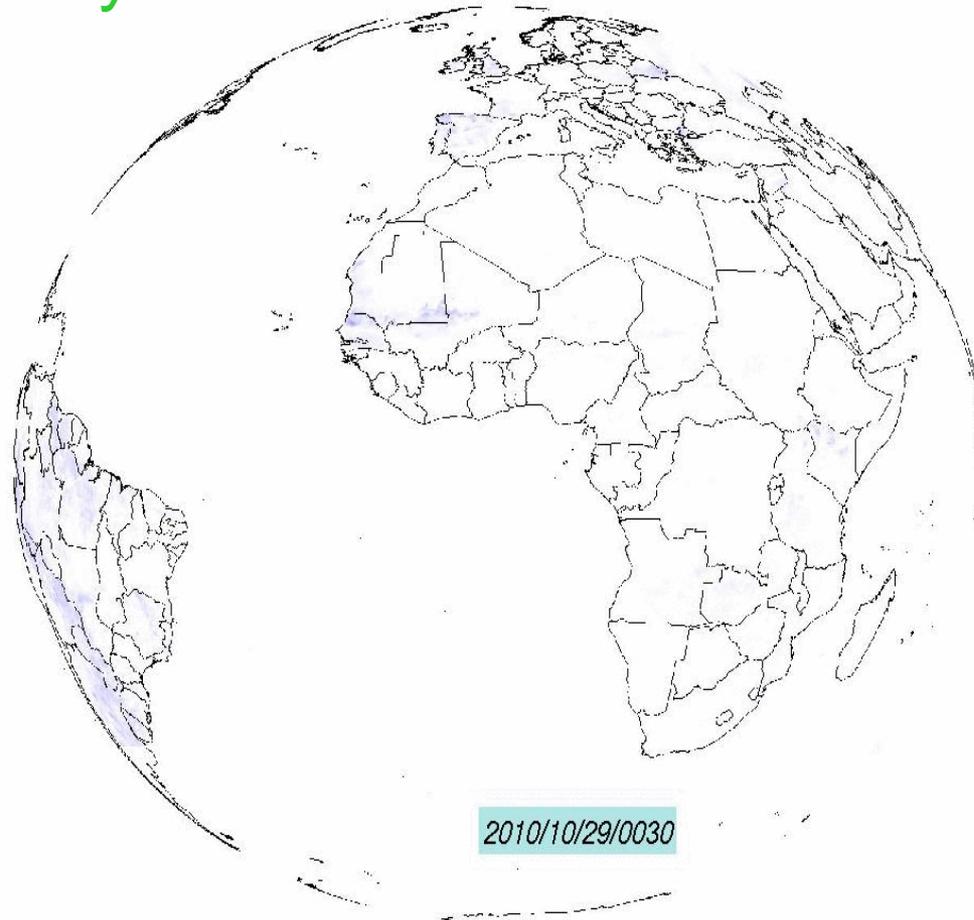


30 min ET (mm h^{-1}), 28/4/2010 15 UTC



Daily ET (mm d^{-1}): 11/9/2011

- ET diurnal cycle



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- **Mother project: Users community**
 - Hydrology, Land Surface Modelling – carbon fluxes
 - Agriculture and Forestry applications
 - Environmental monitoring
 - Food Security
- Well suited for large scale monitoring or input to various prediction models
- But ...

- **Main topic**

Evapotranspiration retrieval at high resolution and how to combine strengths of respectively geosynchronous and polar space born sensors.

High temporal resolution

Geostationary satellite data

Mother project: LSA-SAF

Ghilain et al., 2011, 2012b, Trigo et al., 2011



Medium spatial resolution

Polar satellite data

Past GLOBAM and PROBA-VET projects

Sepulcre et al, 2012, Ghilain et al., 2012a



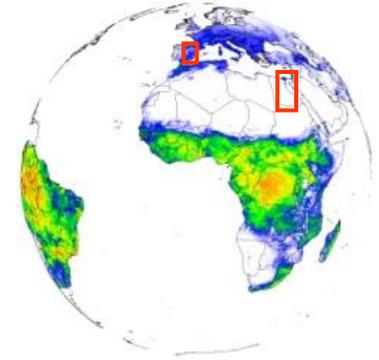
EVA3M project



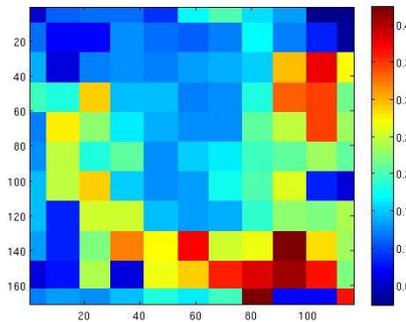
- Feasibility study (PROBA-VET)

- Downscaling of LSA-SAF ET to obtain maps at 300 m using moderate resolution satellite
- Done on few single cases

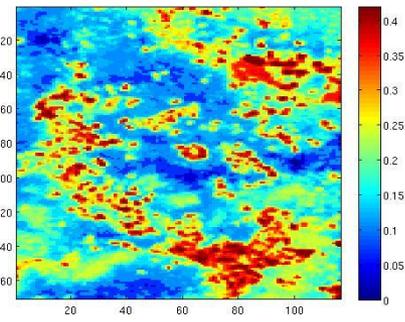
- Barrax-Albacete: 35% Irrigated fields (Summer + Spring)



LSA-SAF MET Barrax-Albacete: 2009/08/06 13:30 UTC



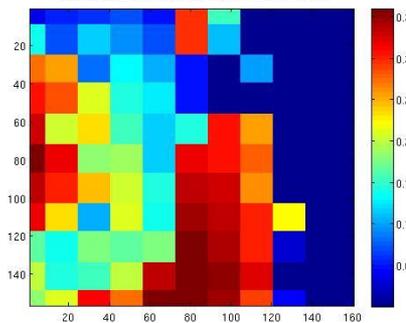
ET HR Option2 Barrax-Albacete: 2009/08/06 13:30 UTC



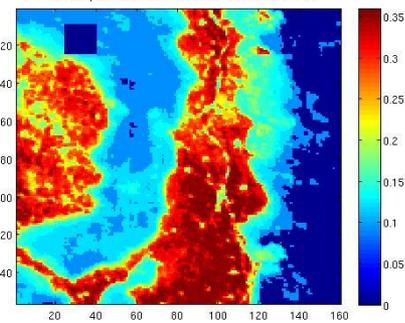
- Nile Valley: Irrigated fields



LSA-SAF MET Nile River: 2009/08/06 13:30 UTC



ET HR Option2 Nile River: 2009/08/06 13:30 UTC



Objectives

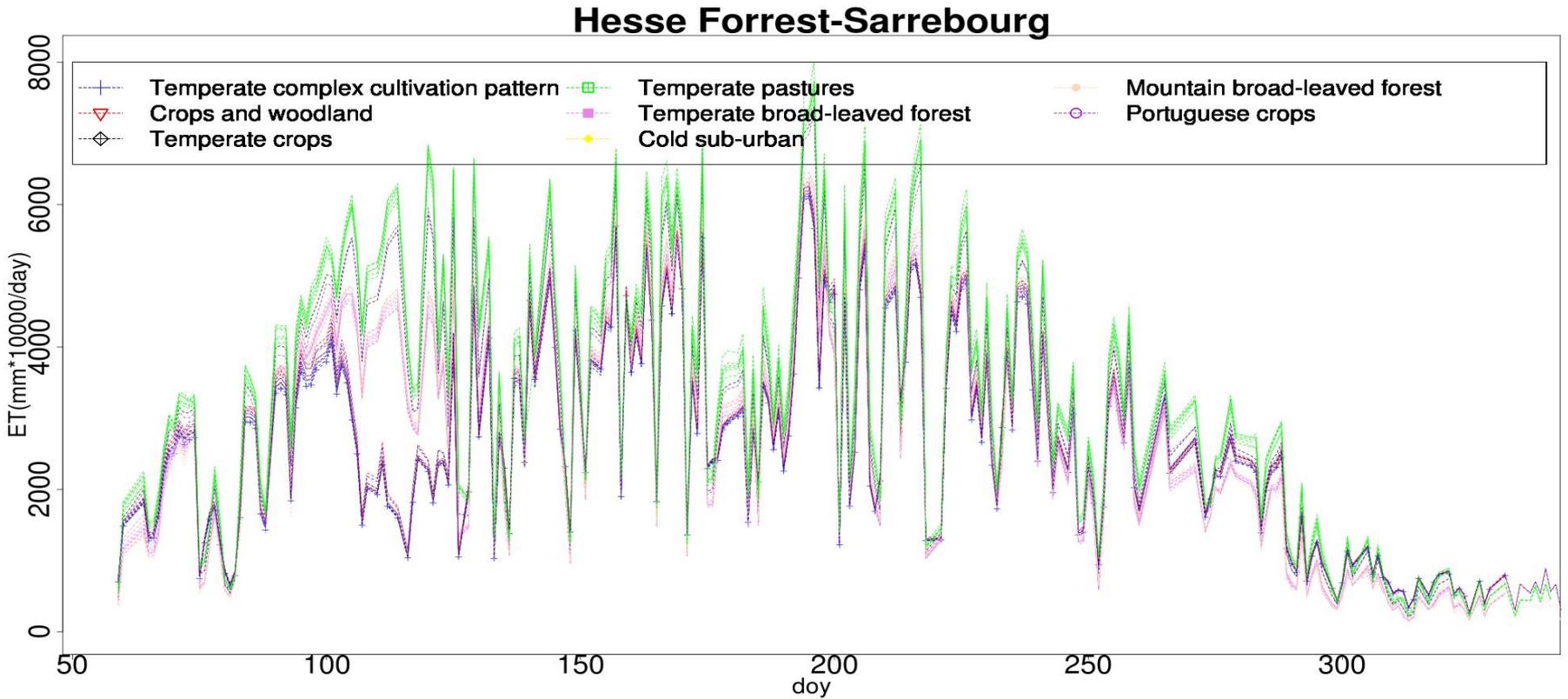
- **EVA3M driving objective**
 - ET retrieval at sub-km spatial resolution and at continental scale by combining strengths of geostationary and polar satellites
- **Methodology: comparing 2 downscaling approaches**
 - Downscaling/fusion on ET output (*'a posteriori'* method)
 - Using data with higher spatial resolution data prior to ET modelling (*'ab initio'* method)
- **Satellite data products**
 - MSG SEVIRI: ET, DSSF, DSLF, AL, LAI, FAPAR, FVC
 - SPOT -VEG: NDVI, AL
 - MODIS: NDVI, AL, LAI/FAPAR
 - MERIS: : NDVI, LAI/FAPAR

Tests sites

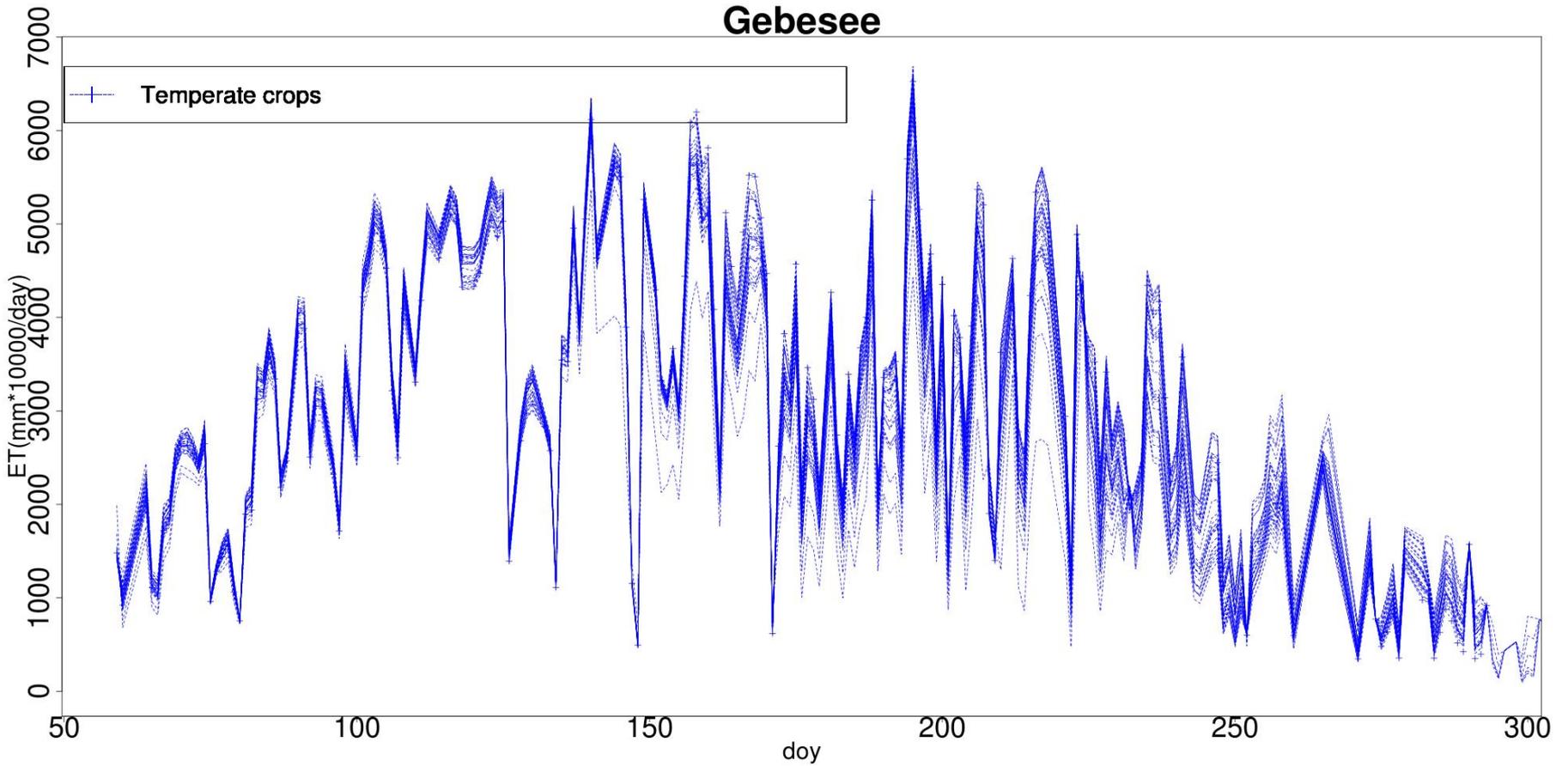
- Validation sites:
 - Fluxnet and AWS data from NWS



Tests sites



Tests sites



End of presentation

Thanks for listening !