



Universität für Bodenkultur Wien

**World Day to Combat Desertification**  
**Friday, 17<sup>th</sup> June 2016**  
BOKU Wien | Institute of Soil Research

# Remote sensing & water resource management: experiences from Europe and Africa

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# Agricultural Water Use in EU

Mediterranean areas:

Greece: **88%**

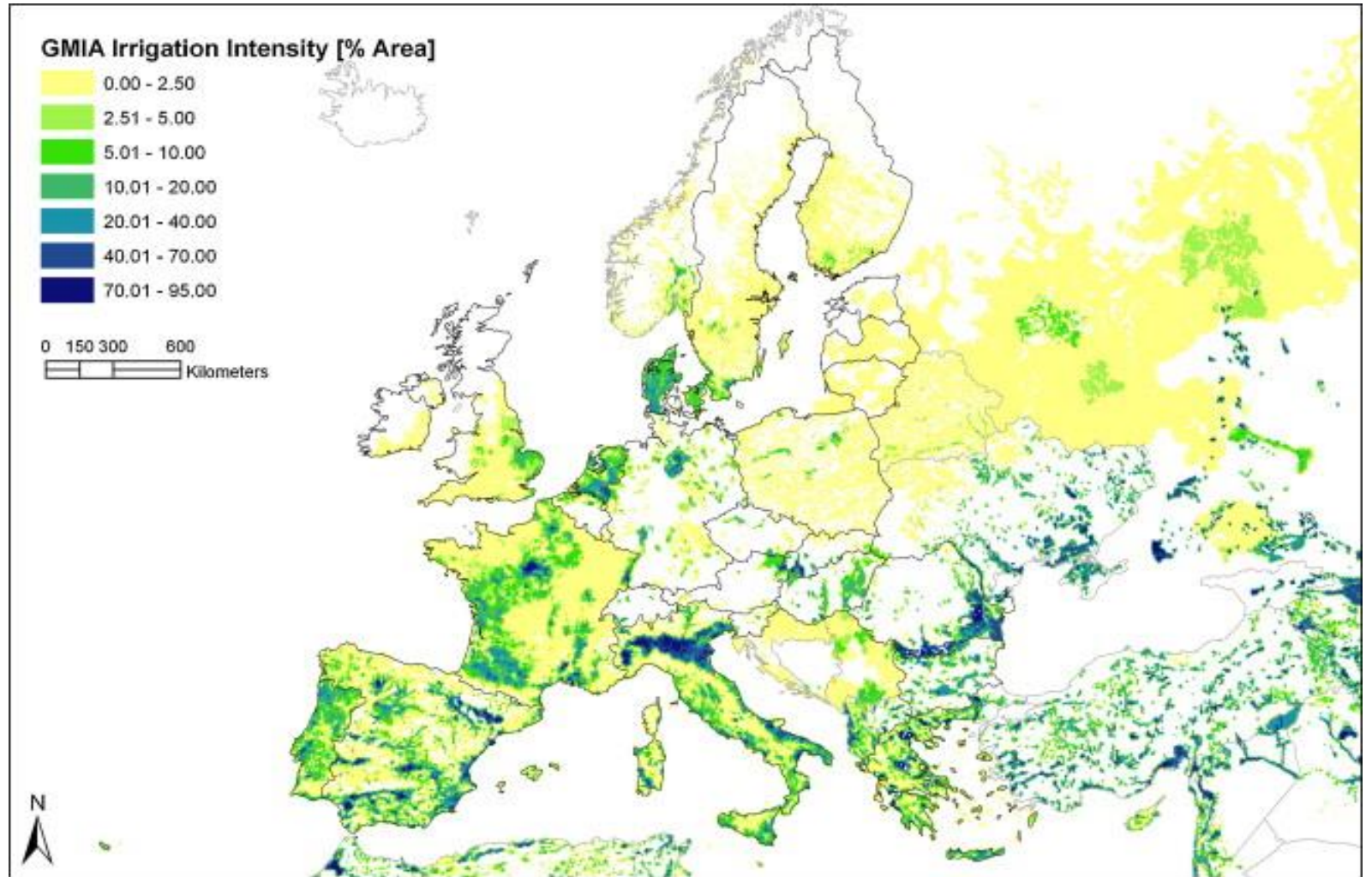
Portugal: **80%**

Italy & Spain: **64%**

Increasing in UK, Belgium, the Netherlands, Germany, Austria and France

**... more than 30%**

(OECD/Eurostat, 2000) (OECD, 2006)  
(EU, DG Environment, 2000)



Irrigation intensity in the EU as area equipped for irrigation in % of total area by 5' cell.

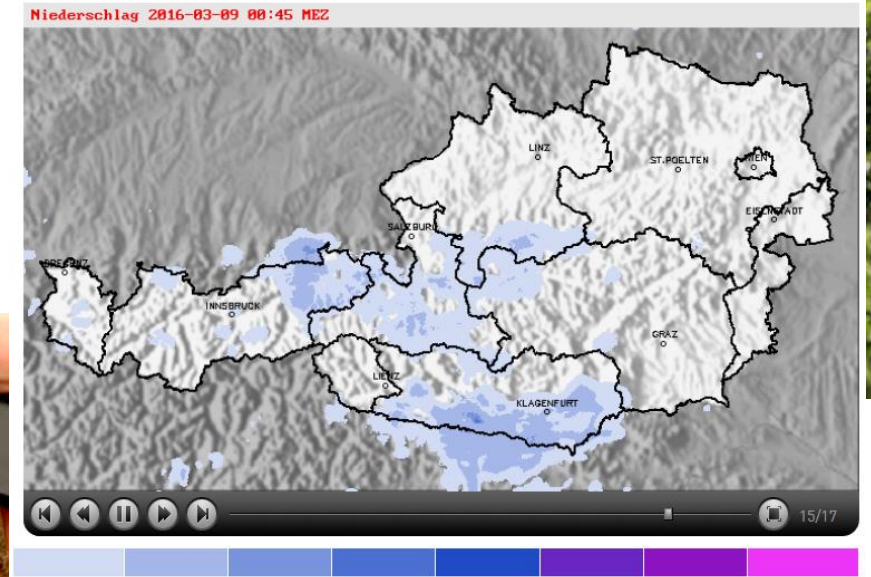
Gunter Wriedt et al., 2009,  
Agricultural Water Management  
Volume 96, Issue 5, May 2009, Pages 771-789



# ... efficient irrigation management

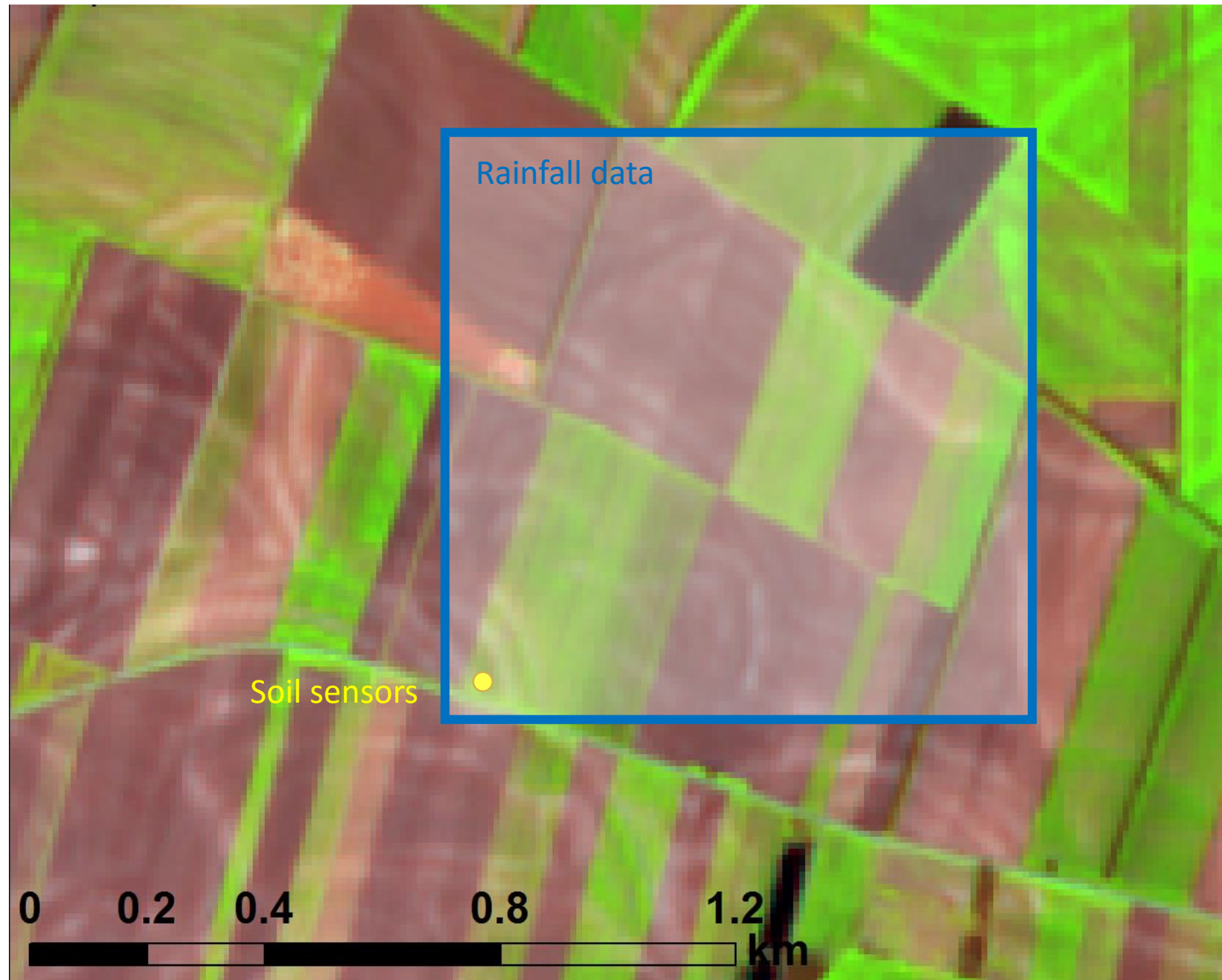


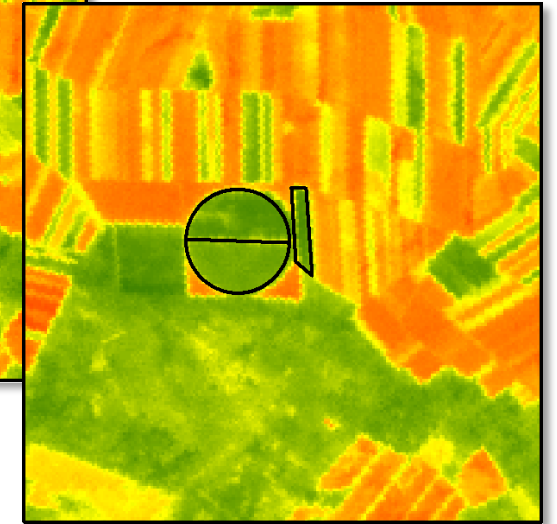
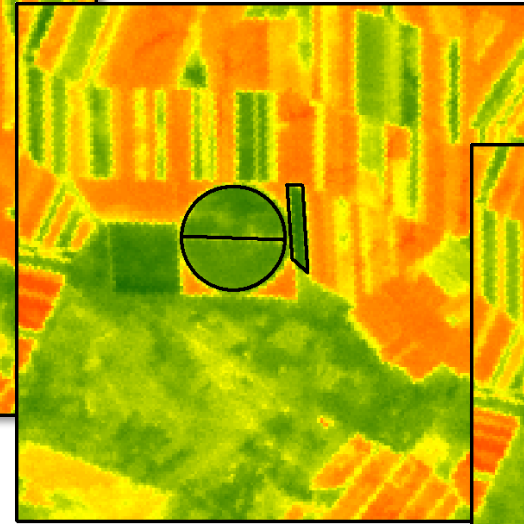
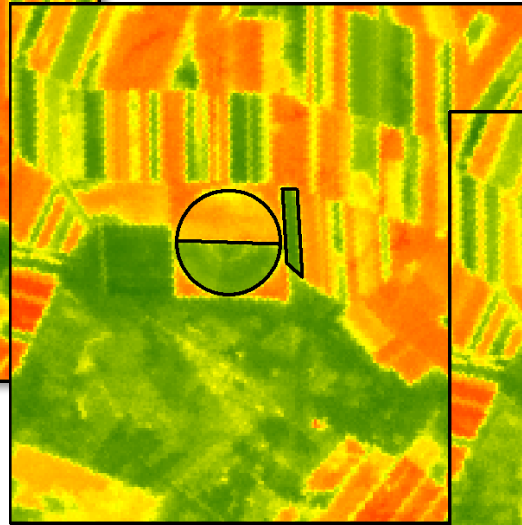
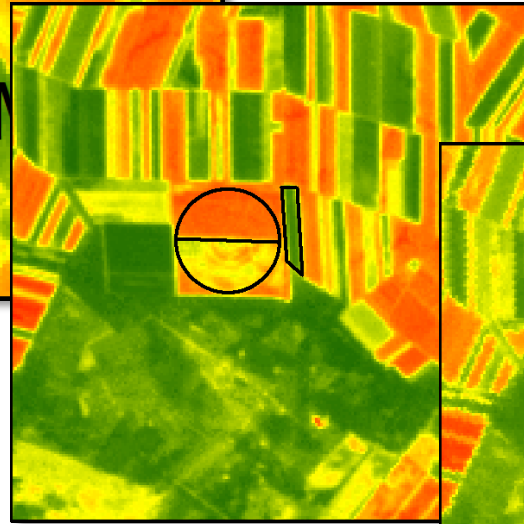
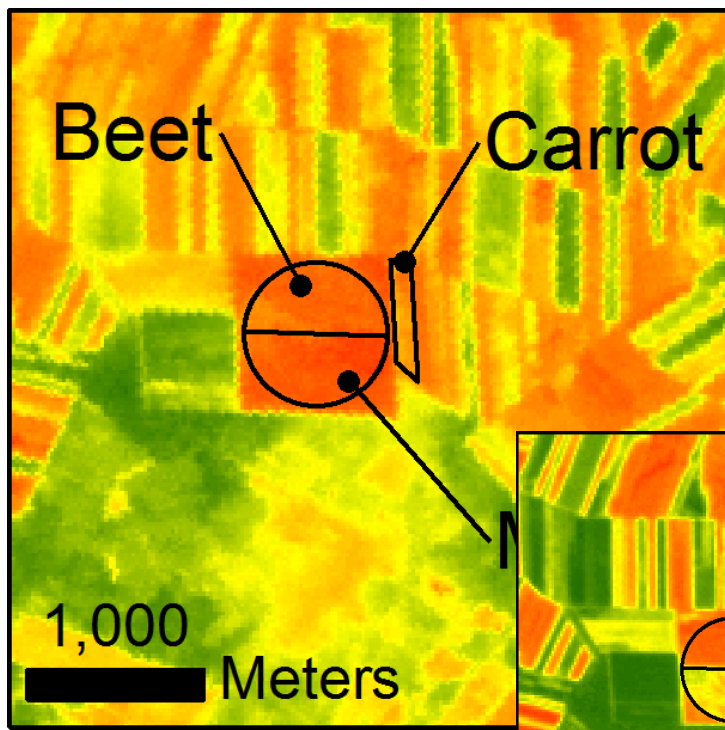
Weterradar Animation





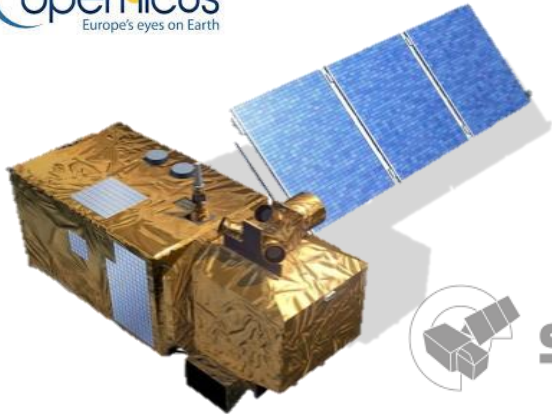
# Multi-spectral Sentinel-2 satellite image 3-April-2016





- ## Multi-spectral satellite data
- + Biophysical parameters of veg.
  - + Model (FAO) input forcing
  - + Multi-temporal (7-10 days)
  - + Near real-time processing (24h)
  - + Weather data & forecast
  - + Field validation

Copernicus  
Europe's eyes on Earth



sentinel-2





Mr Demo

Kontoübersicht ⚙️ ➡️



EO4Water

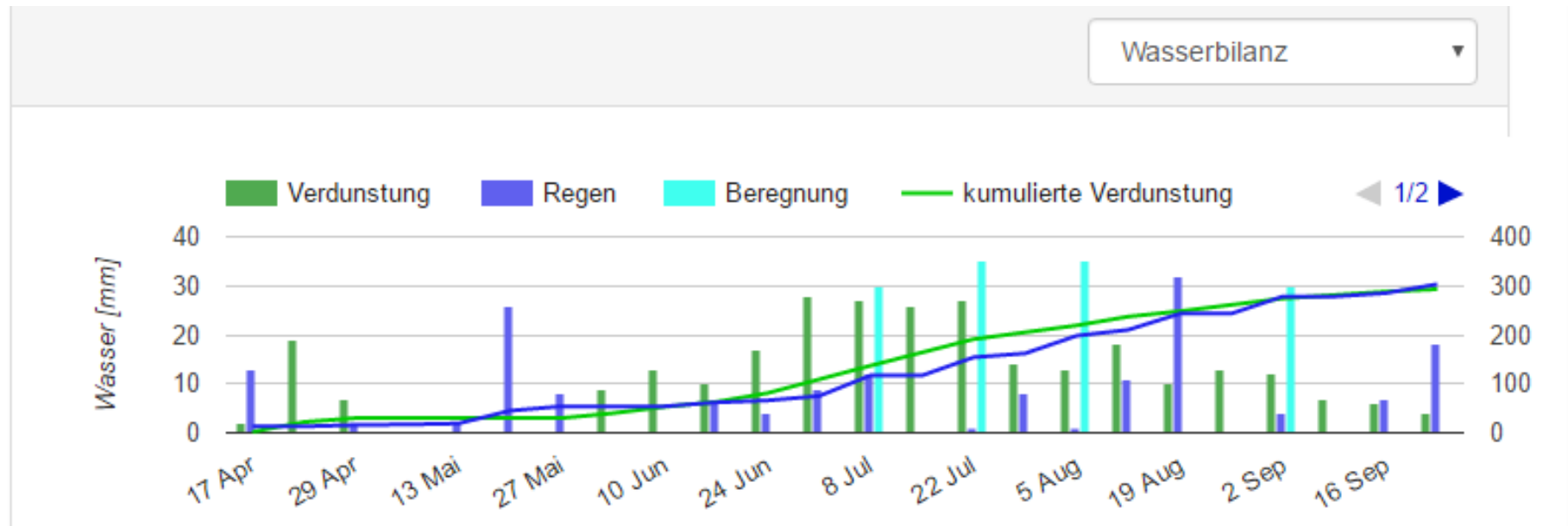


FFG

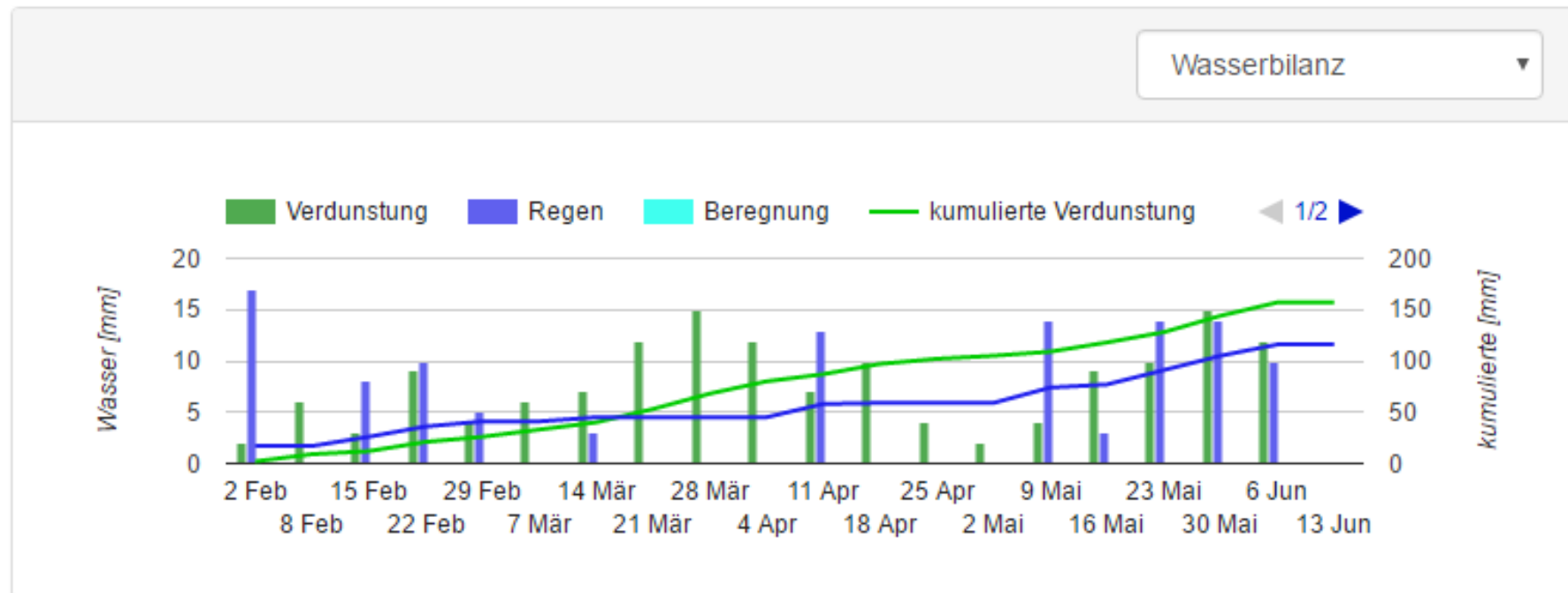
...assist individual farmers  
in the decision making  
process

right inputs  
right place  
right time

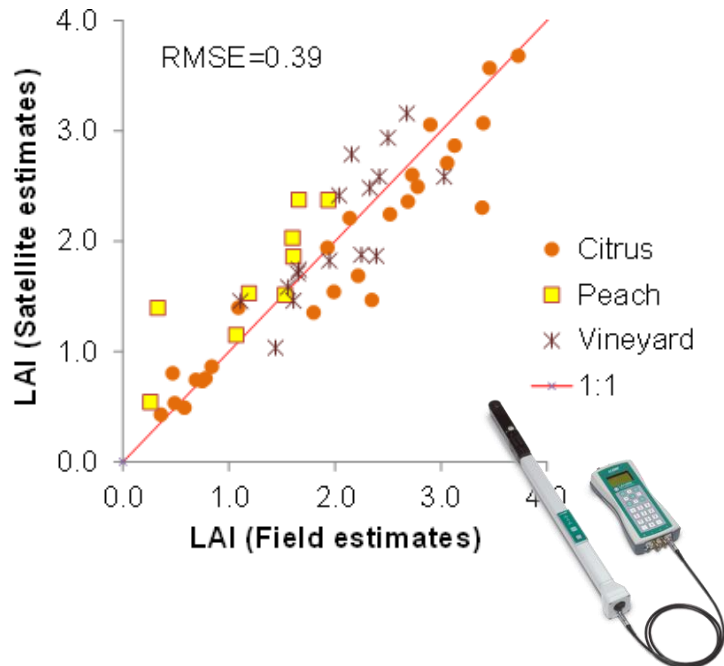
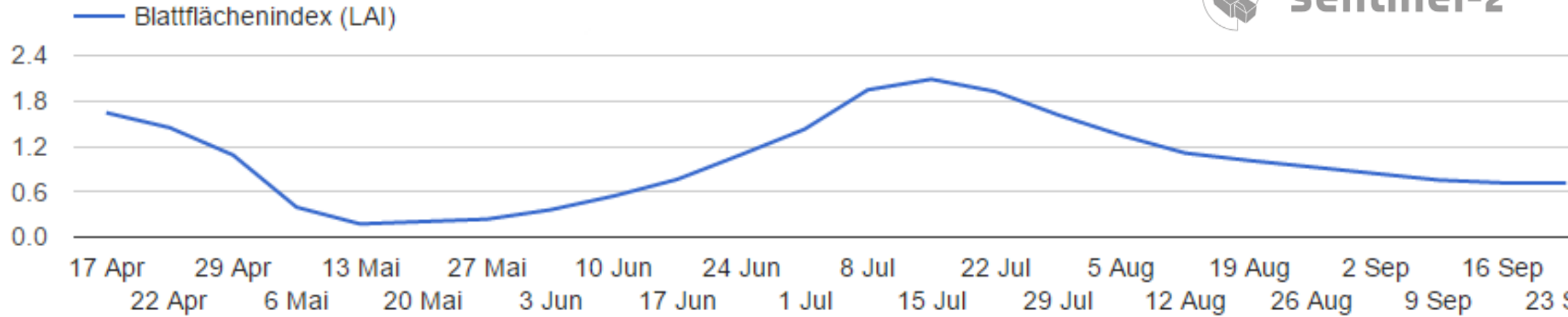
2015



2016

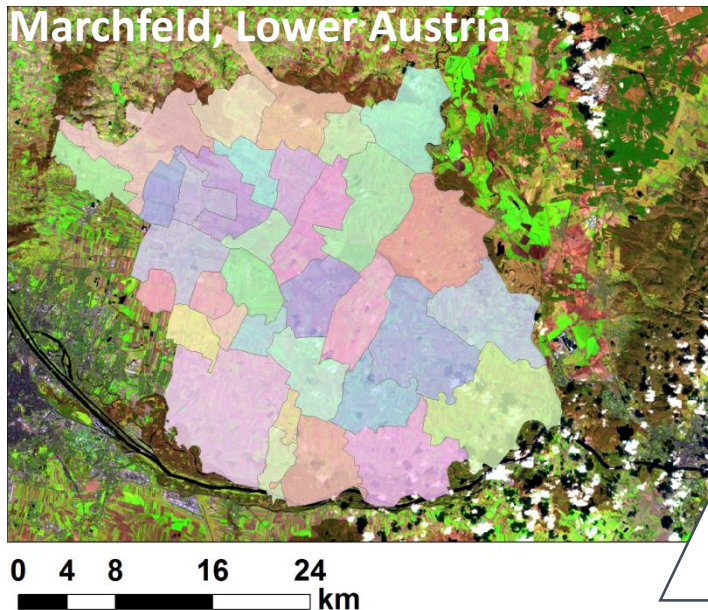
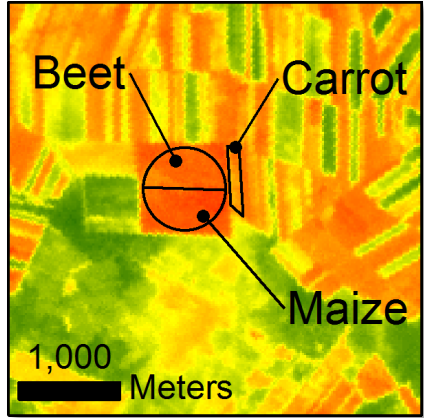


# Leaf area index





# Multi-scale



# Multi-purpose

Parcel

Resource use efficiency

District

Monitor & management

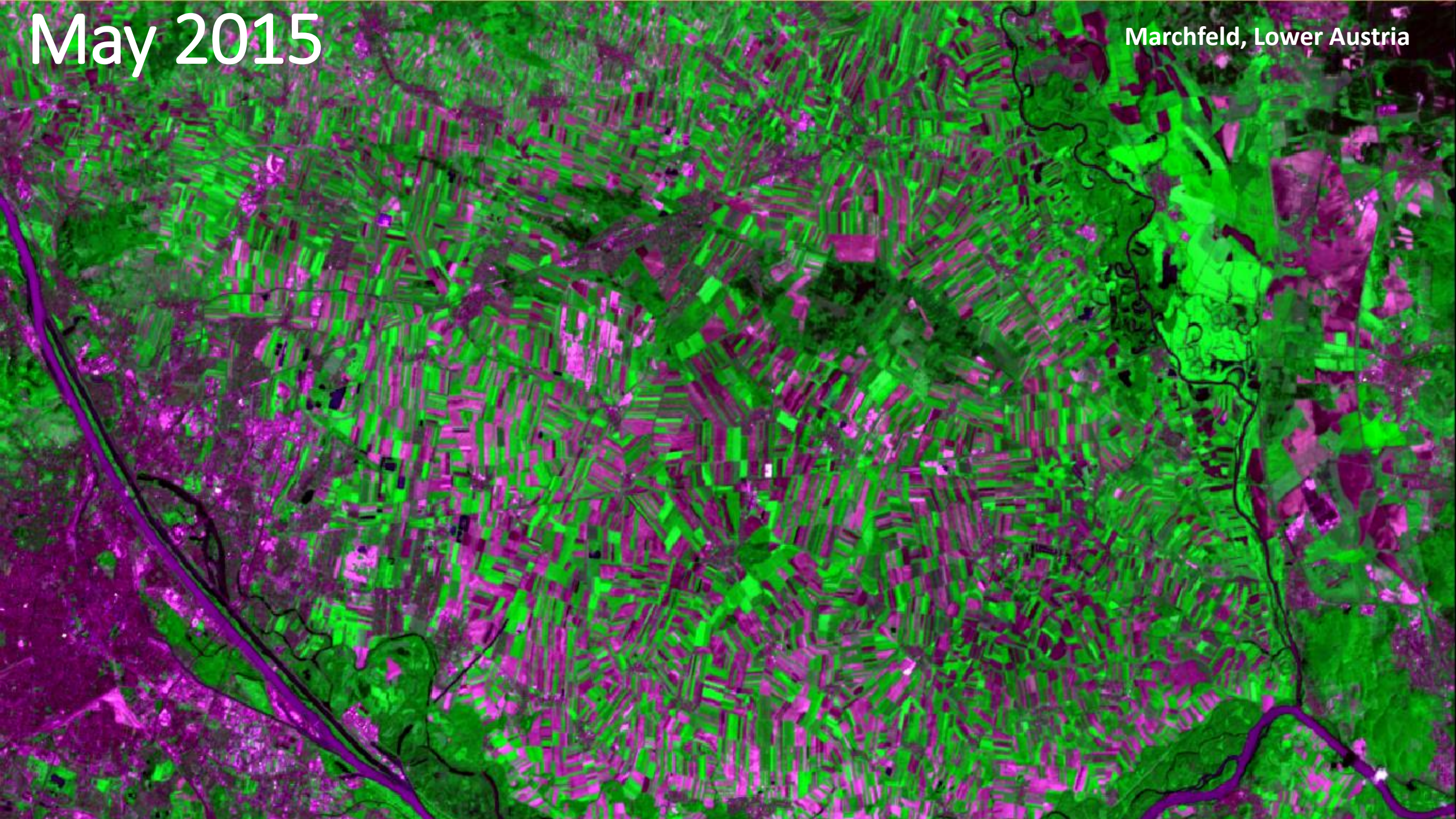
Region

Response to policies



May 2015

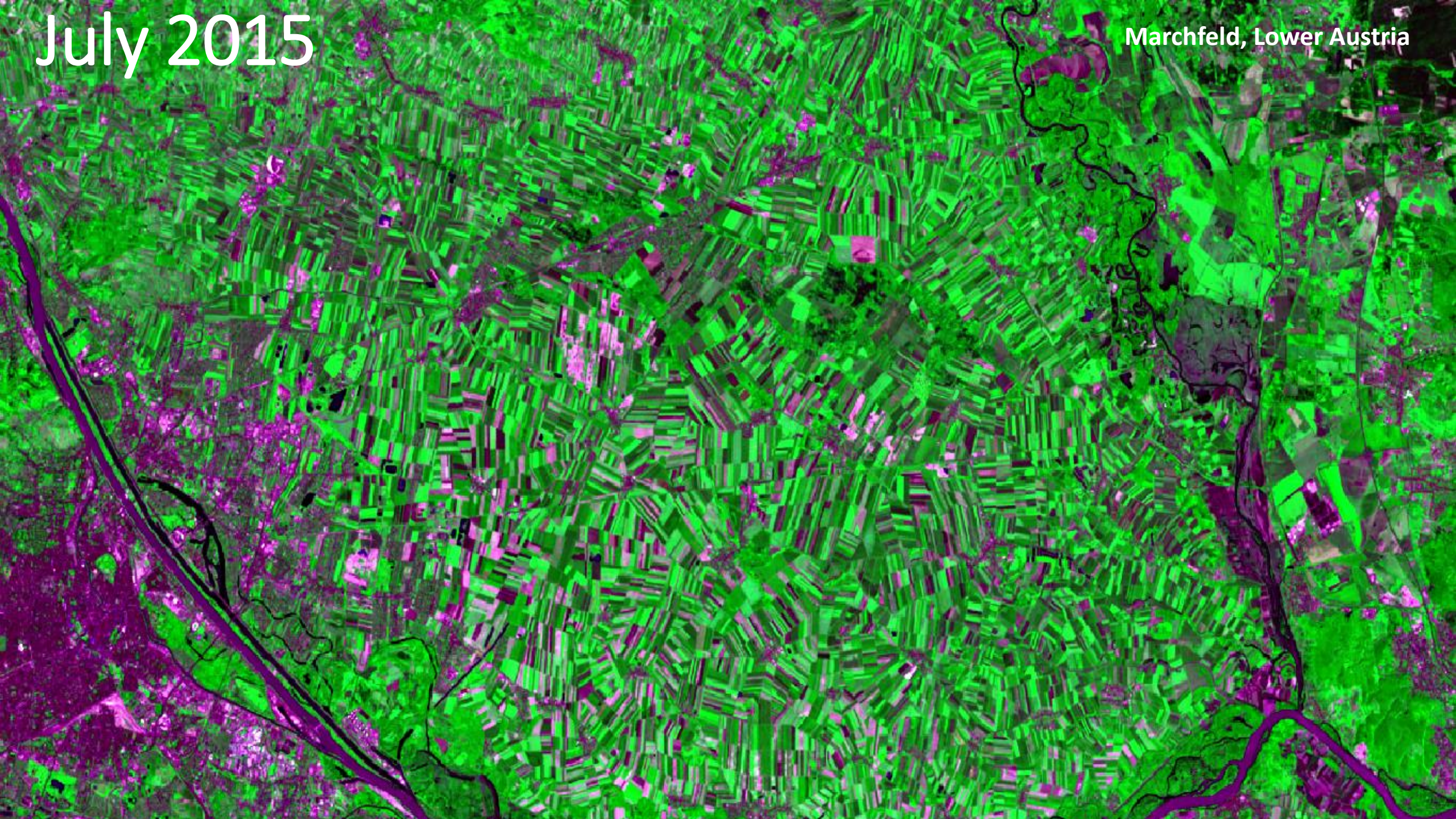
Marchfeld, Lower Austria





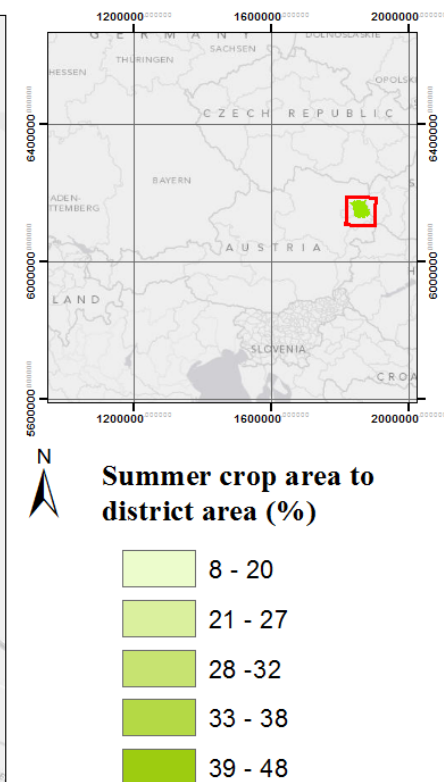
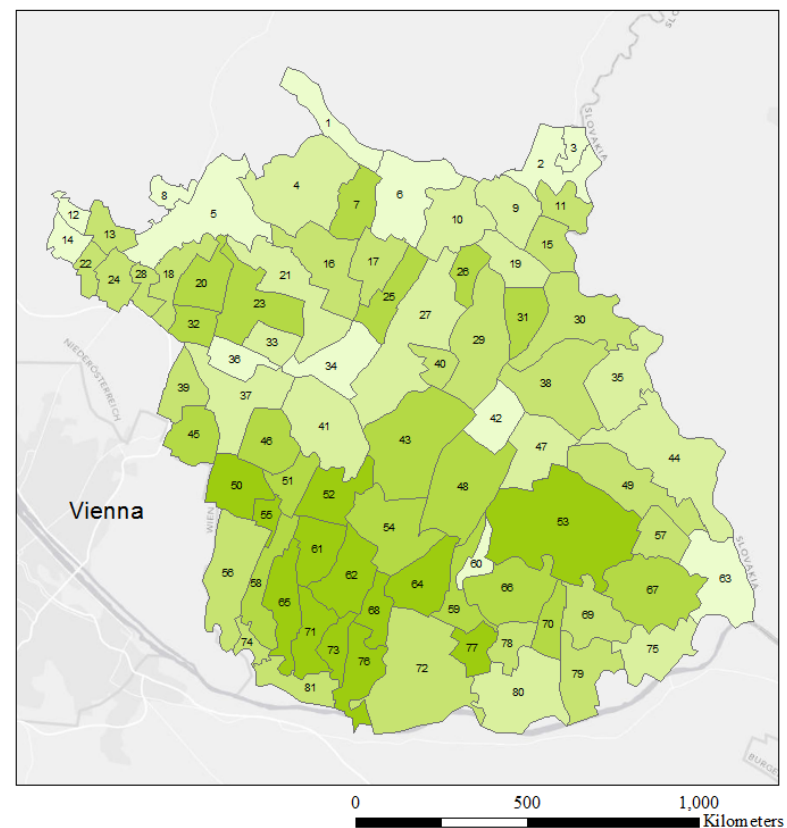
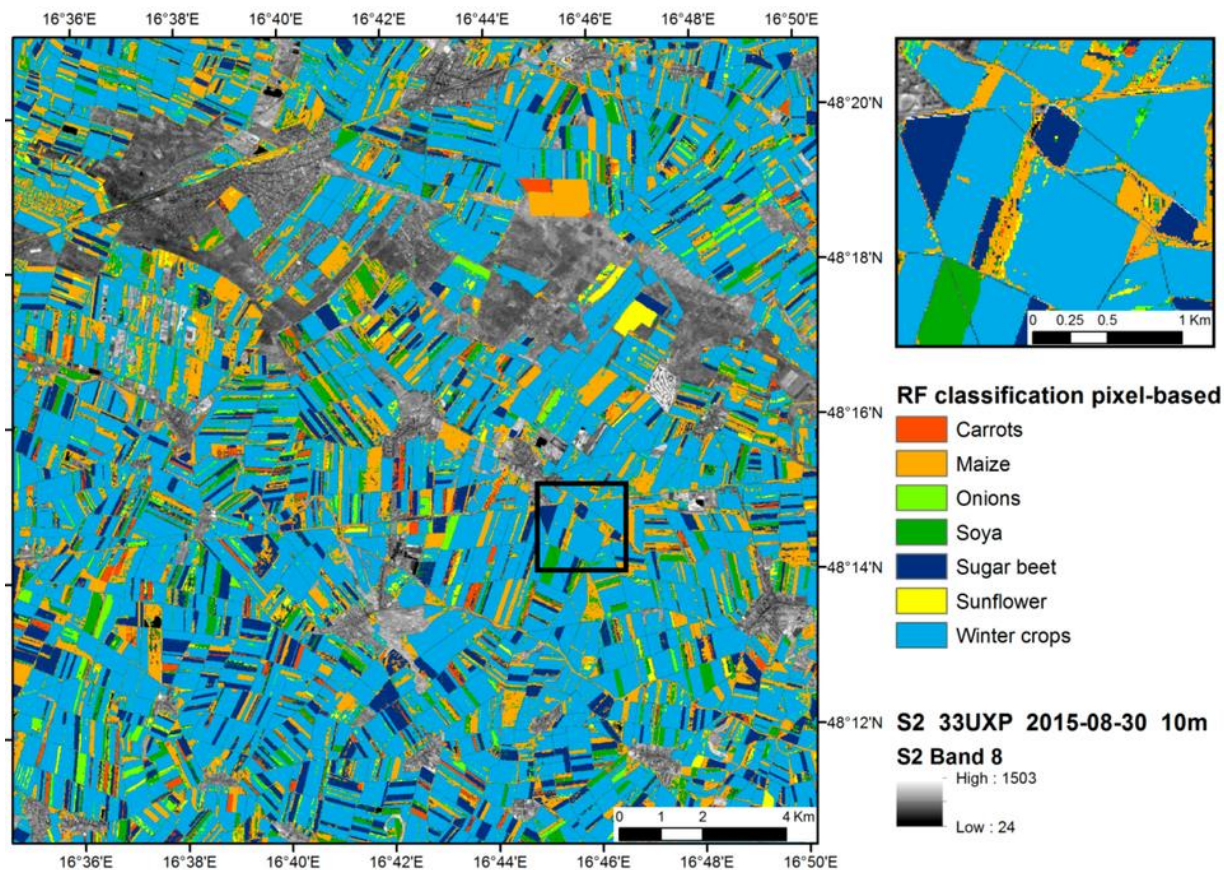
July 2015

Marchfeld, Lower Austria

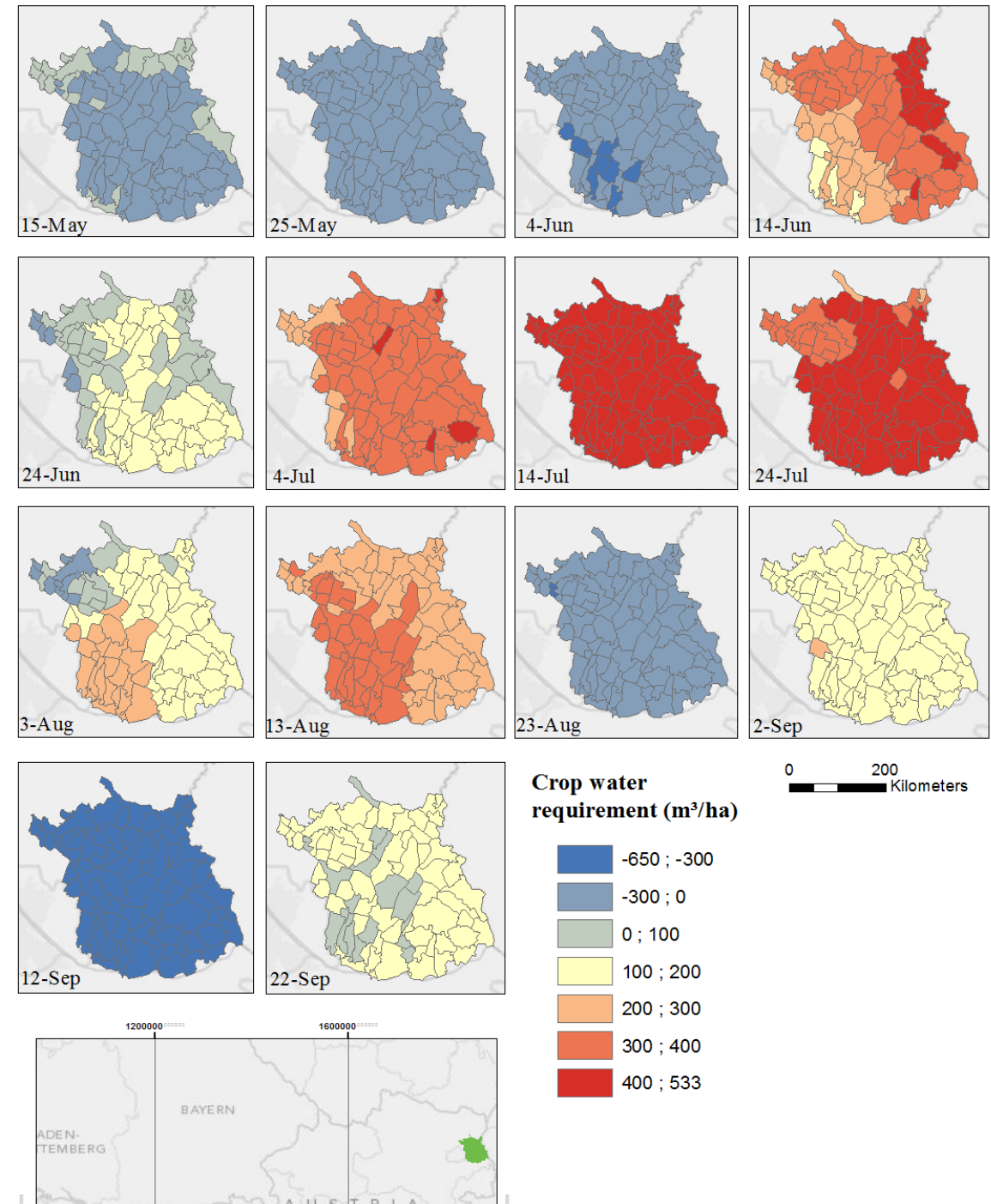
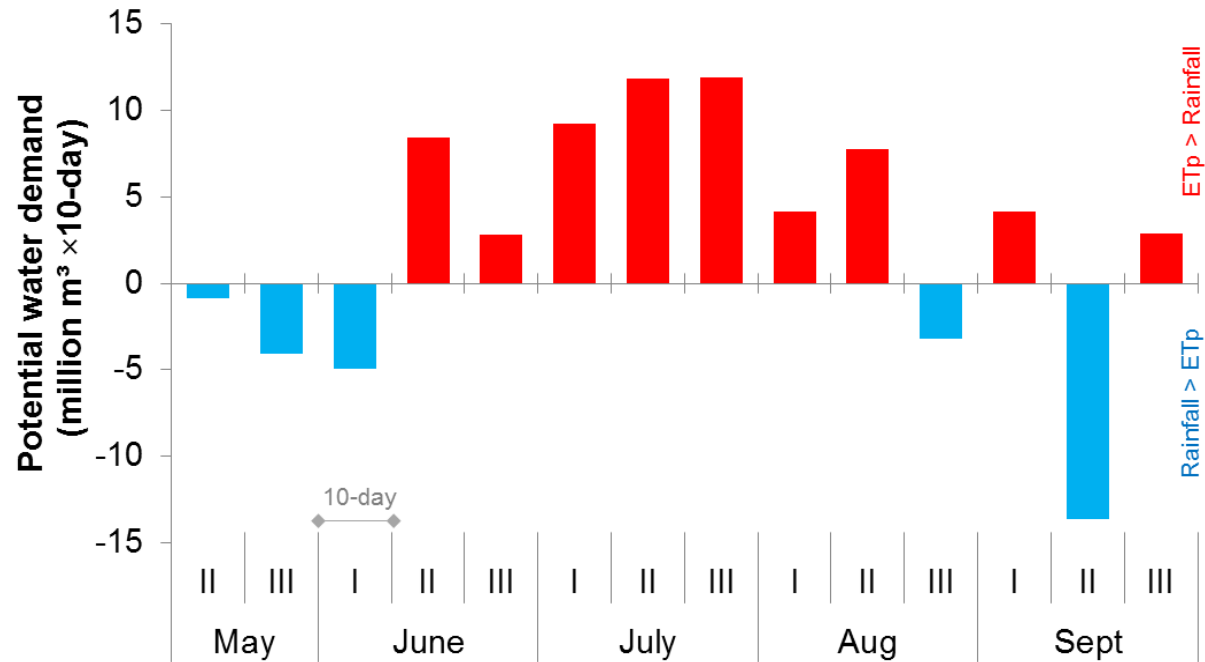




# District and crop specific analysis



# Potential water demand for summer crops in the year 2013





- Tool for **more informed decision making** in agriculture
- **Save water and money**; potentially increase yields and improve quality
- Reduce environmental impact
- Addresses individual farmers, communities and policy makers (provide a **wide range of benefits**)
- **Transparency** in the resource management process



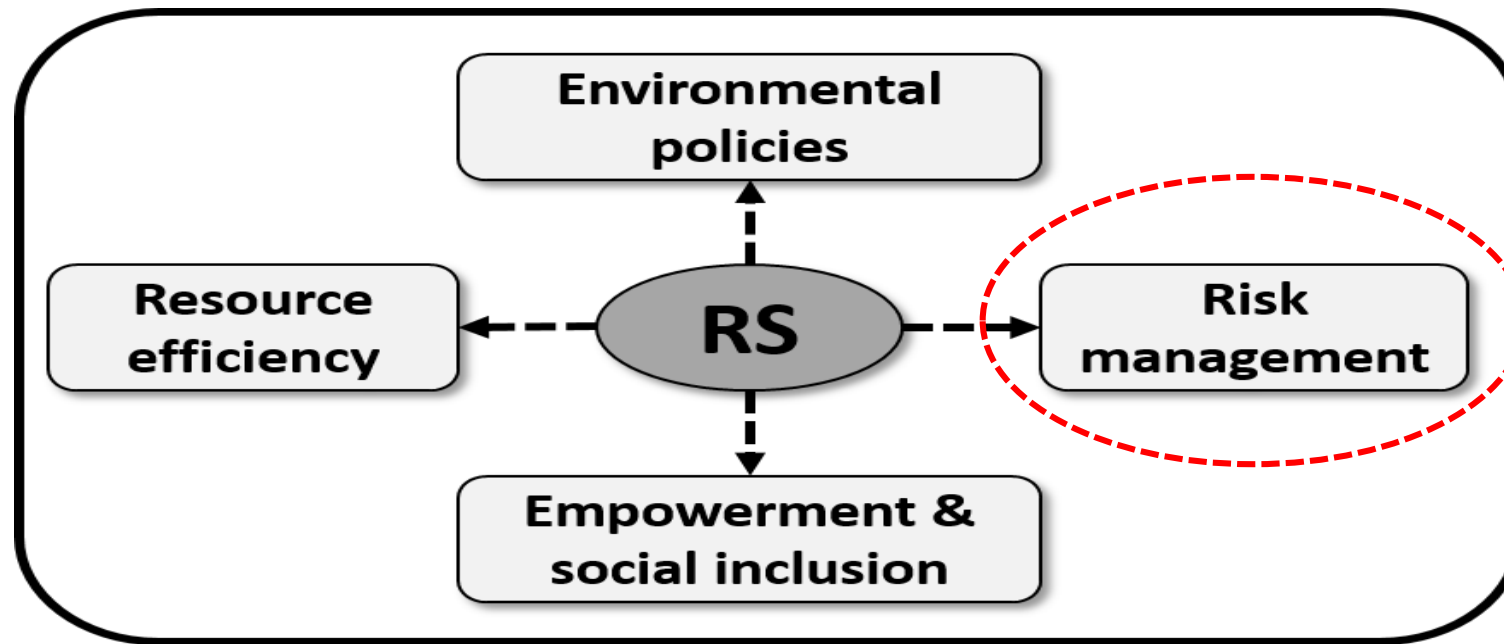
E04Water





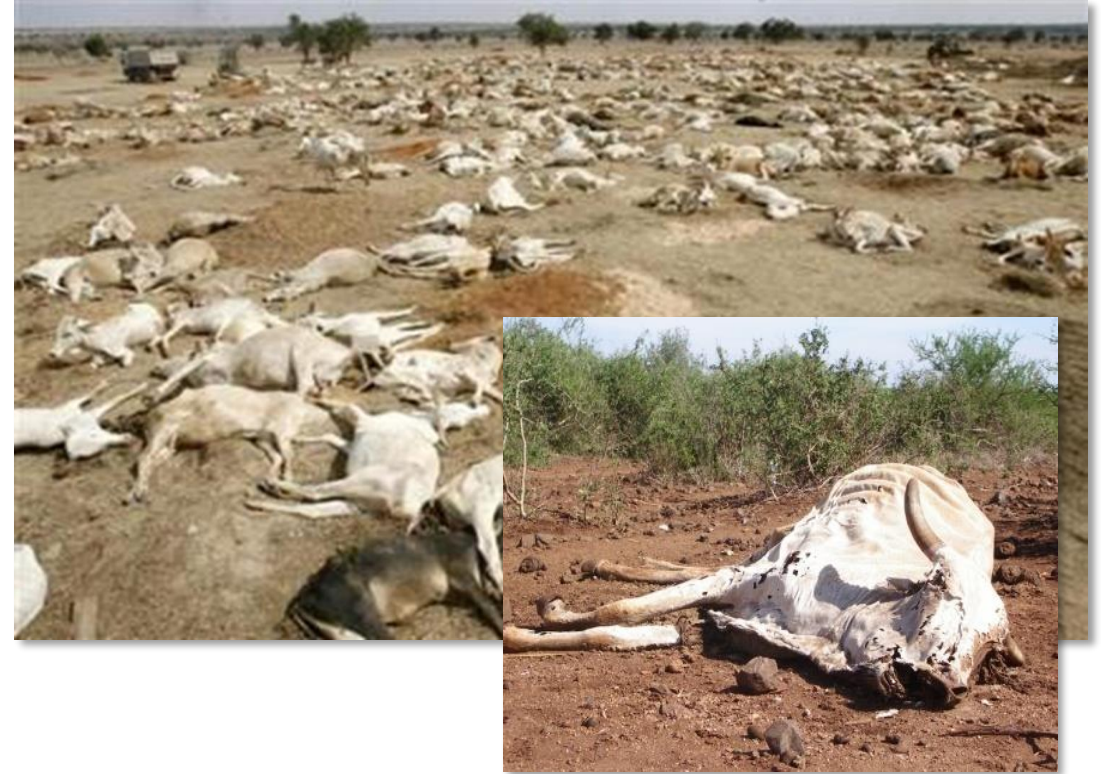
# Technology has to provide Social value

Remote Sensing & „good governance“



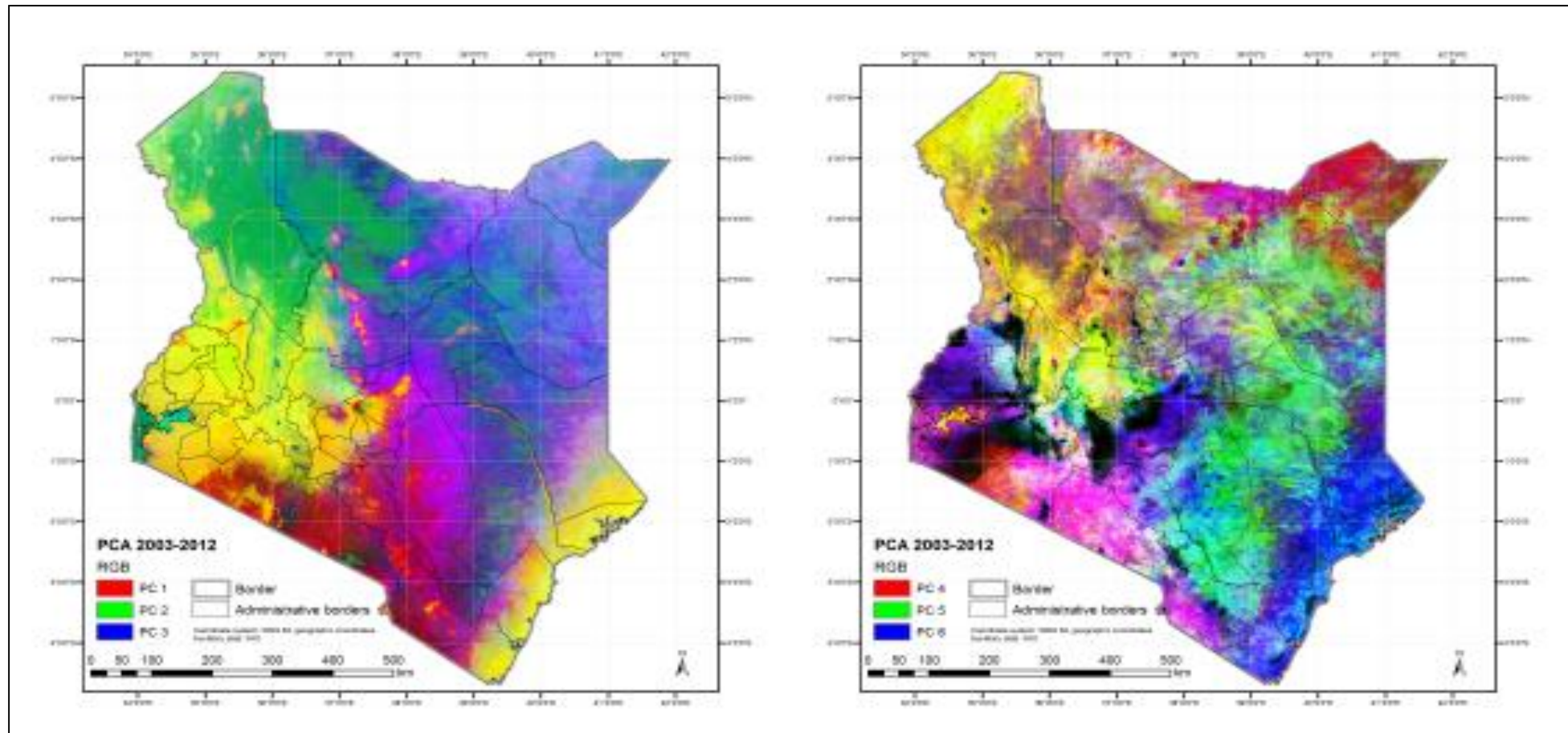
# Drought Early Warning SYSTEMS

The traditional reaction to drought and its effect has been to adopt a crisis management approach



Better: risk management approach ... being anticipatory and preventive

# REGIONAL CONTEXT - KENYA (ASAL)

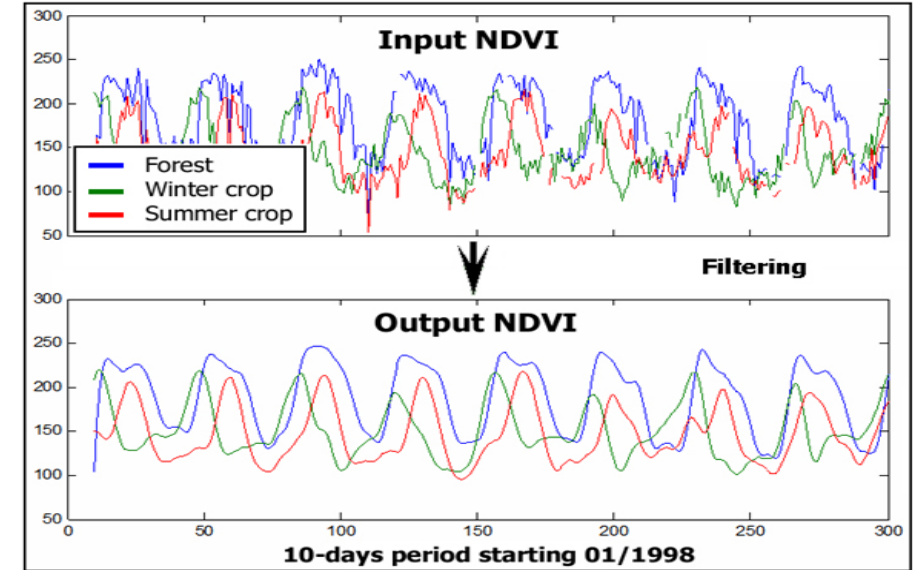




# RISK MANAGEMENT - DCF

## SPECIFICATIONS

**Efficient noise removal and gap-filling**



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**Efficient noise removal and gap-filling**

**Near real-time data processing & weekly updating cycle**



# RISK MANAGEMENT - DCF

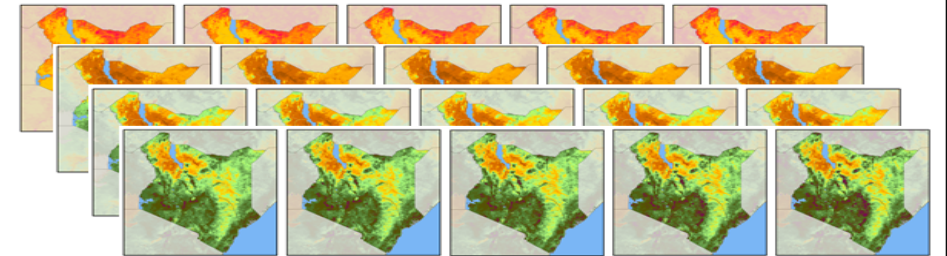
## SPECIFICATIONS

**Efficient noise removal and gap-filling**

**Near real-time data processing & weekly updating cycle**

**Consistent archive for the various consolidation phases**

**Archive  
(LTA,  $\sigma$ , min, max)**





# RISK MANAGEMENT - DCF

## SPECIFICATIONS

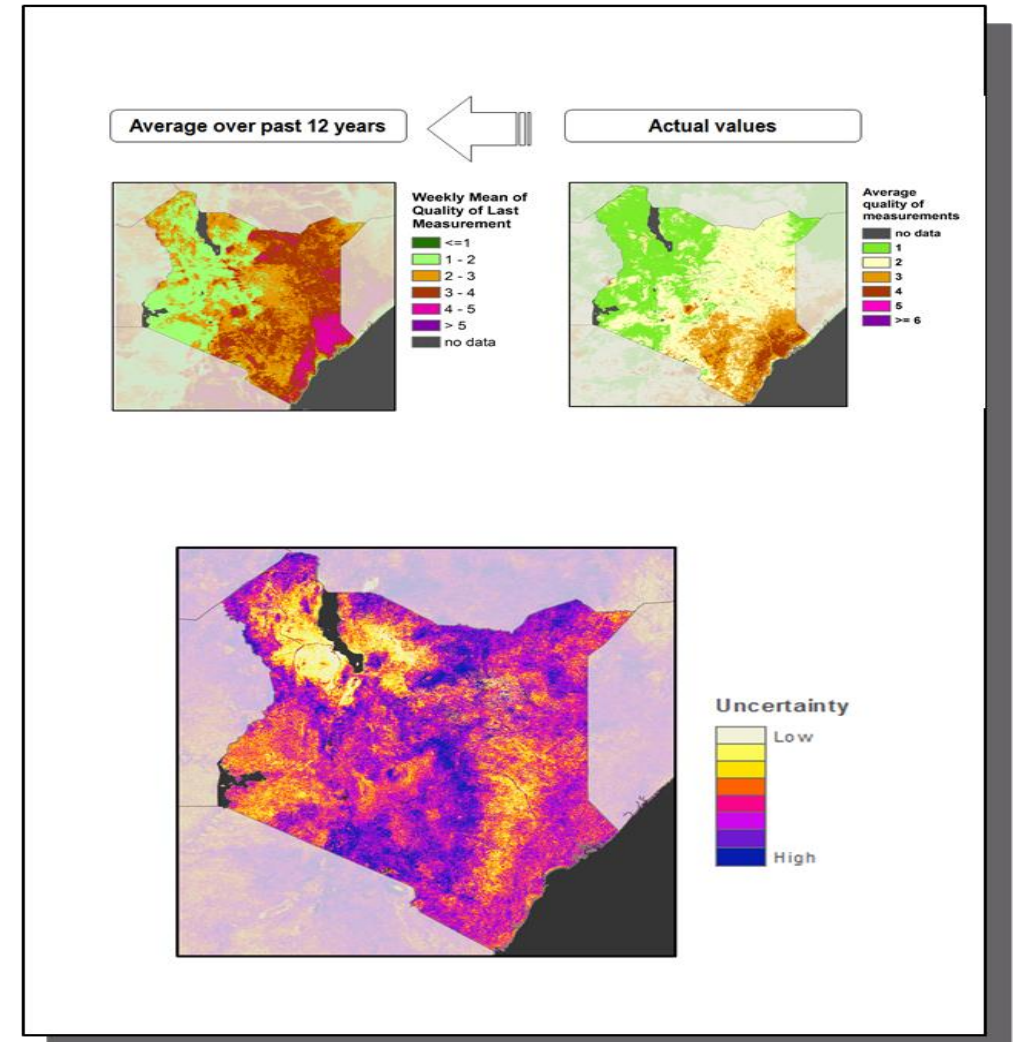
**Efficient noise removal and gap-filling**

**Near real-time data processing & weekly updating cycle**

**Consistent archive for the various consolidation phases**

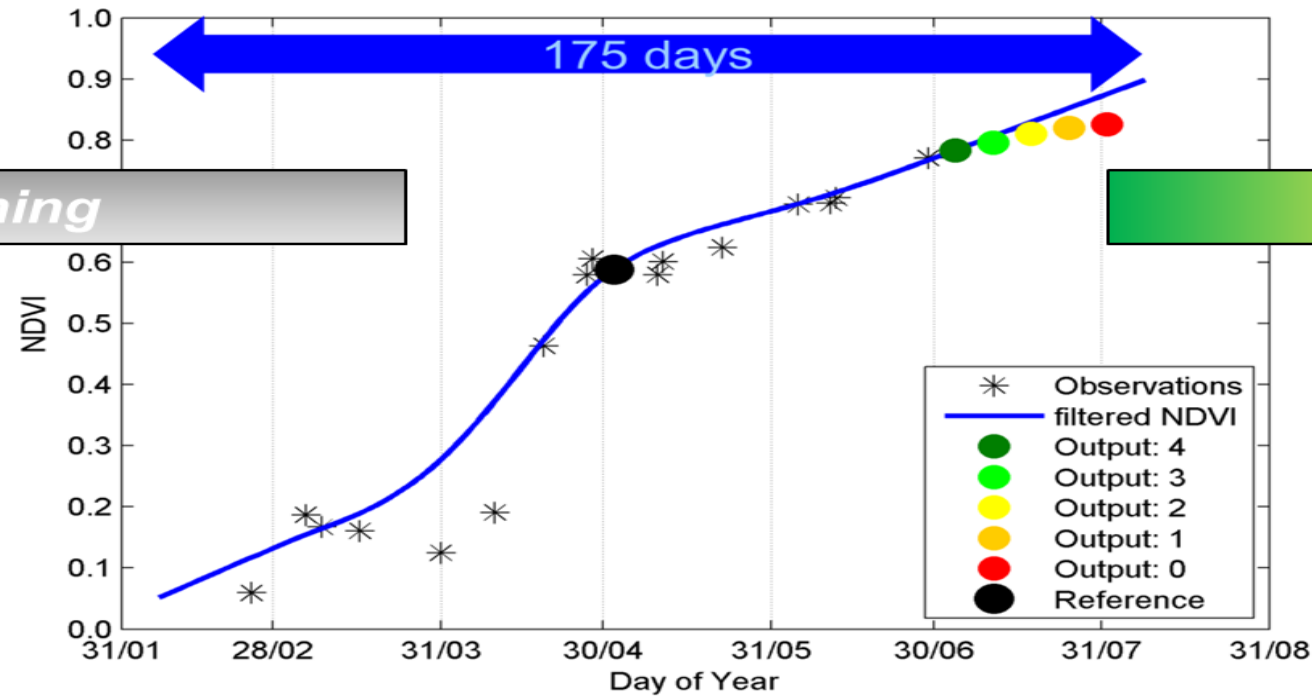
**Modeling of uncertainties at pixel level & for all products**

**Integration of uncertainty information during temporal (& spatial) aggregation**



# RISK MANAGEMENT - DCF

## SPECIFICATIONS



### Smoothing

**Smoothing** applies in a *post hoc* sense. It estimates a state based on data from *both* previous and later times.

*Sedano et al. (2014)*

### Filtering

**Filtering** involves calculating the estimate of a certain state based on a *partial sequence* of inputs.

*Sedano et al. (2014)*

**BOKU's  
approach :**

Smoothing

+

Filtering

***constrained near-real-time filtering***



Select a region for more information.

**Data/AOI:**

MODIS NDVI, TAMSAT  
Kenya, Africa

**Adm. Data Level:**

County Level Data

**Indicator:**

VCI 1 Month

**Statistic:**

Mean ▾

**Date:**

2016-05

Refresh Map

**Mean VCI 1 Month**

10



Scale setting:

☒ fixed ☐ dynamic ☐ min:

**Kenya:**

Tana River  
Mean VCI 1 Month  
Date: 2016-05

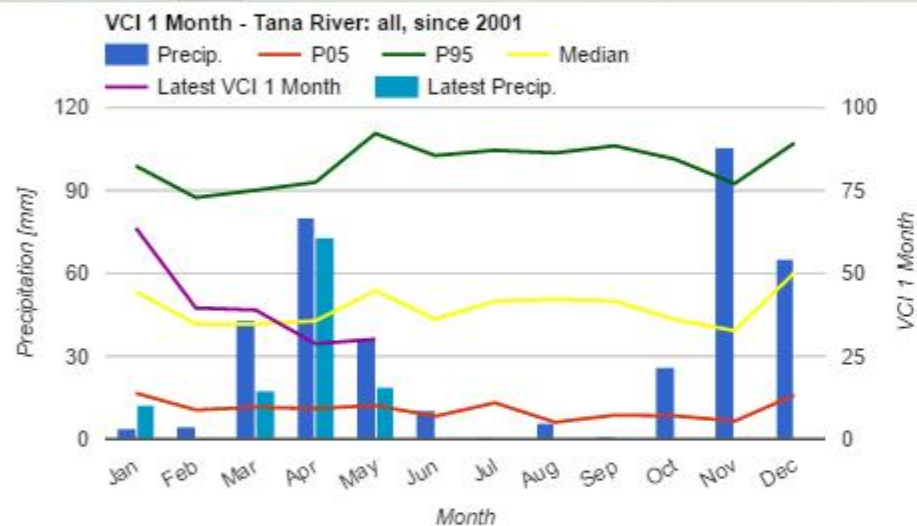


## Region details for selected date

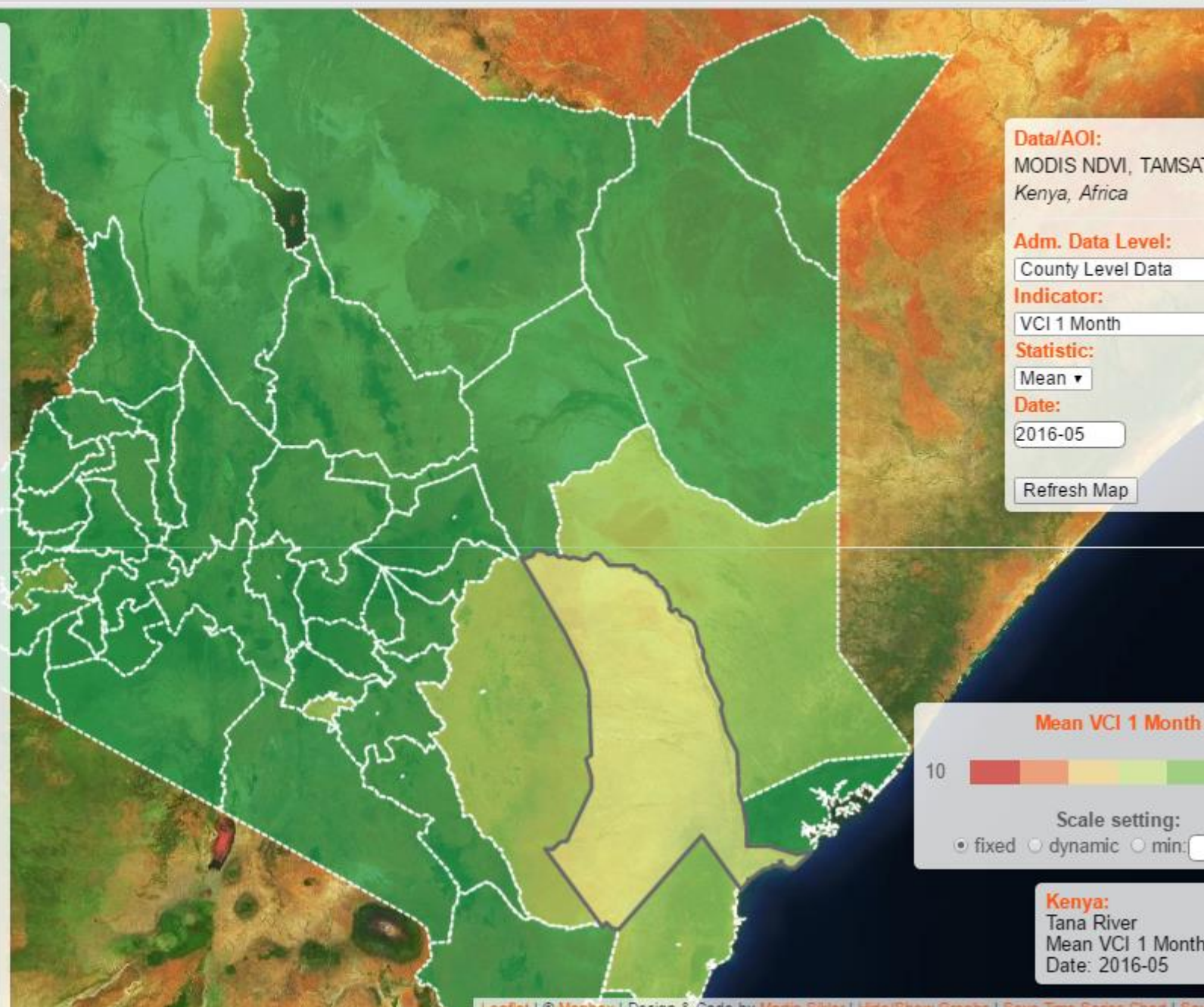
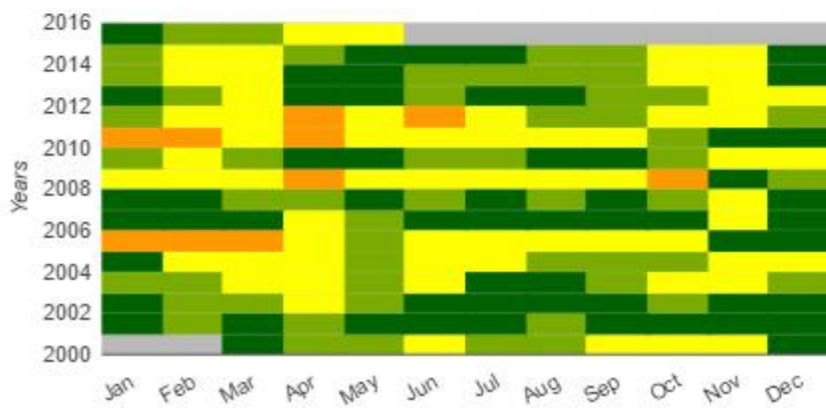
Mean VCI 1 Month Tana River 2016-05

All: 30.14 | Pastoralists: 30.36 | Agro-pastoralists: 36.75 | Agrarians: 28.26 | Nat. park &amp; forest: 32.72

## Anomaly analysis

Livelihood zone: Reference Period: 

VCI 1 Month Anomalies, Tana River: all



## Data/AOI:

MODIS NDVI, TAMSA  
Kenya, Africa

## Adm. Data Level:

## Indicator:

## Statistic:

## Date:

## Mean VCI 1 Month

10

## Scale setting:

☒ fixed ☐ dynamic ☐ min:

## Kenya:

Tana River  
Mean VCI 1 Month  
Date: 2016-05



## Region details for selected date

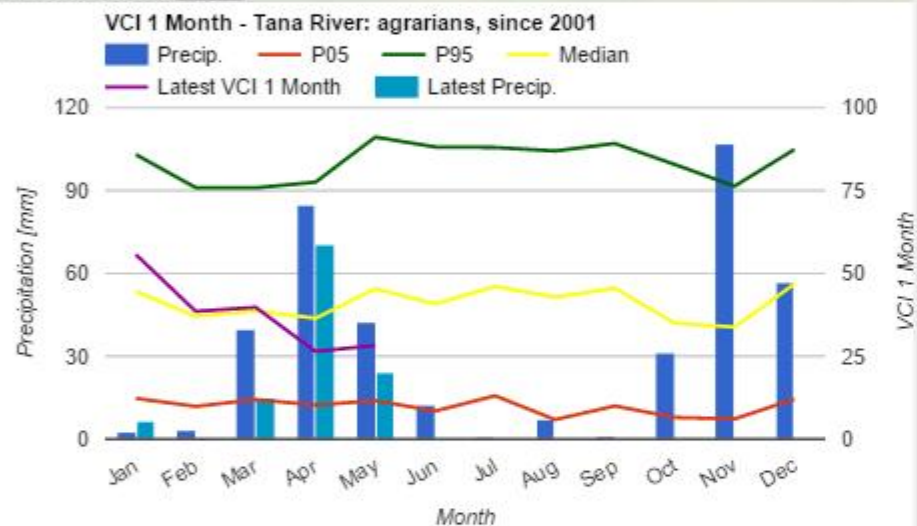
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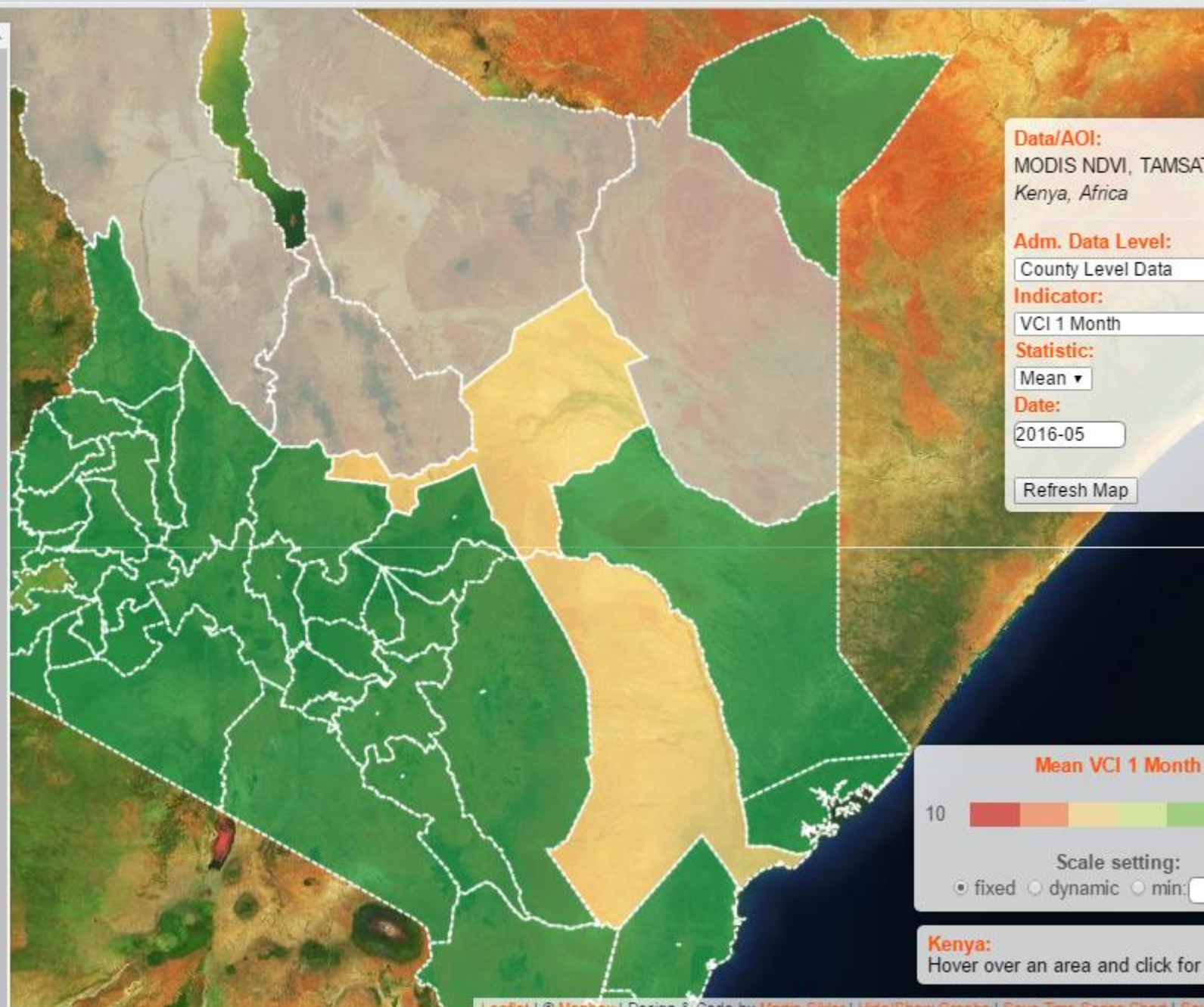
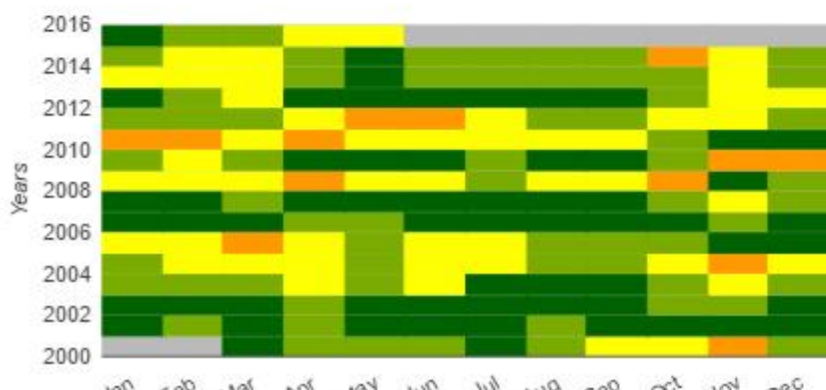
## Anomaly analysis

Livelihood zone: agrarians

Reference Period: 16



## VCI 1 Month Anomalies, Tana River: agrarians



## Data/AOI:

MODIS NDVI, TAMSAT  
Kenya, Africa

## Adm. Data Level:

County Level Data

## Indicator:

VCI 1 Month

## Statistic:

Mean

## Date:

2016-05

Refresh Map

## Mean VCI 1 Month

10

## Scale setting:

☒ fixed ☐ dynamic ☐ min:

## Kenya:


Hover over an area and click for




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<http://www.rali.boku.ac.at/ivfl>

**Institut für Vermessung, Fernerkundung und Landinformation (IVFL)**  
BOKU-Start > Department für Raum, Landschaft und Infrastruktur (RALI) > Institut für Vermessung, Fernerkundung und Landinformation (IVFL)




### Fernerkundung für Landwirtschaft

support improved crop production while minimizing environmental impacts

#### GIS Basiskurs

4.4.-8.4.2016


Vermittlung von Basiswissen im Umgang mit GIS Software.



#### IVFL-Seminar

12.04.16 Fabian Faßnacht: Individual tree crown detection and classification using WorldView-2 data

Dienstags um 16:00 Uhr im IVFL-Seminarraum: Präsentation von Masterarbeiten, Dissertationen und Forschungsarbeiten am Institut bzw. Vorträge von Gastwissenschaftlern.



#### E04Forest

Neues FFG Forschungsprojekt im Bereich forstlicher Fernerkundung untersucht die Eignung von Sentinel-2 und Pleiades Satellitendaten für die Ermittlung verschiedener forstlicher Parameter.

#### Drought monitoring in Kenya

Operational Drought Monitoring in Kenya Using MODIS NDVI Time Series

