The use of remote sensing and agrometeorological modelling for crop monitoring, damage and risk assessment in Belgium

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BEODayS
Feluy, 20/11/2013

CONTEXT

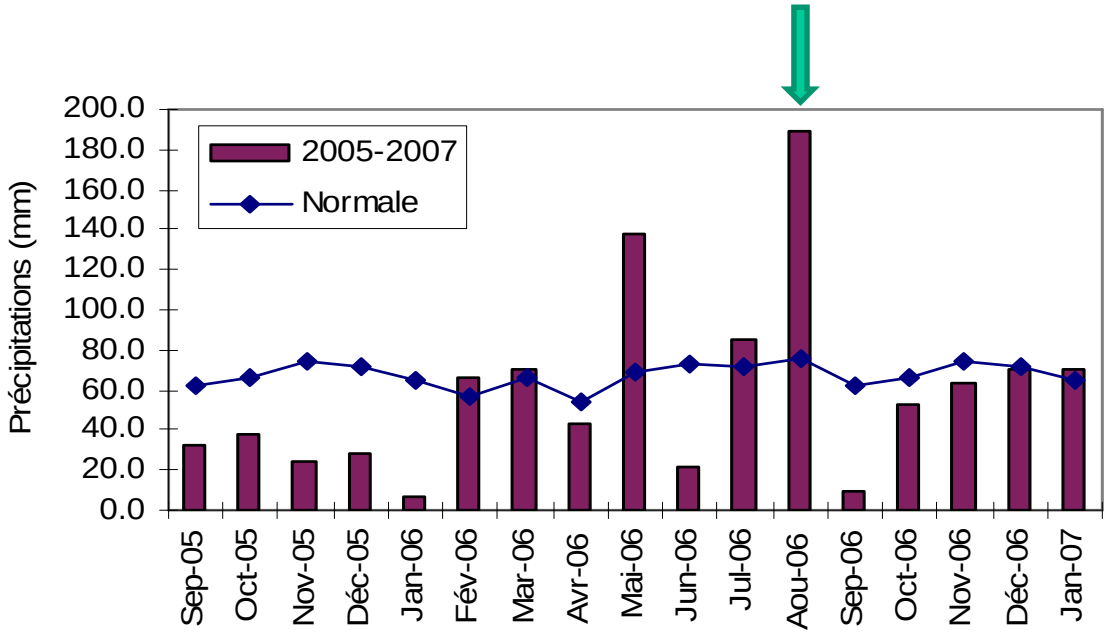
CLIMATE CHANGE

- Higher occurrence of **extreme weather events**

CONTEXT

CLIMATE CHANGE

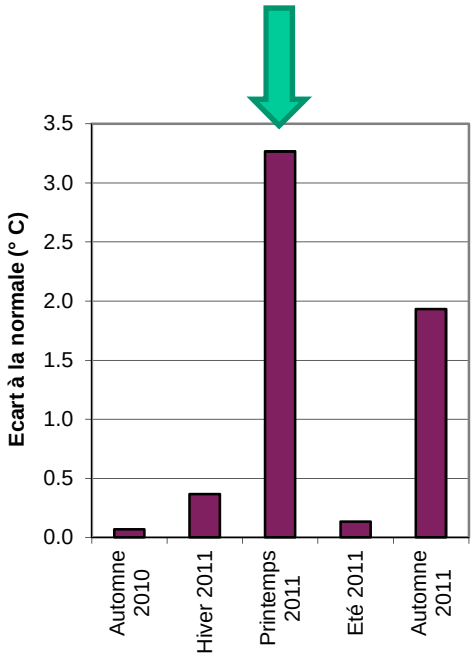
Excess rainfall in August 2006 in Belgium

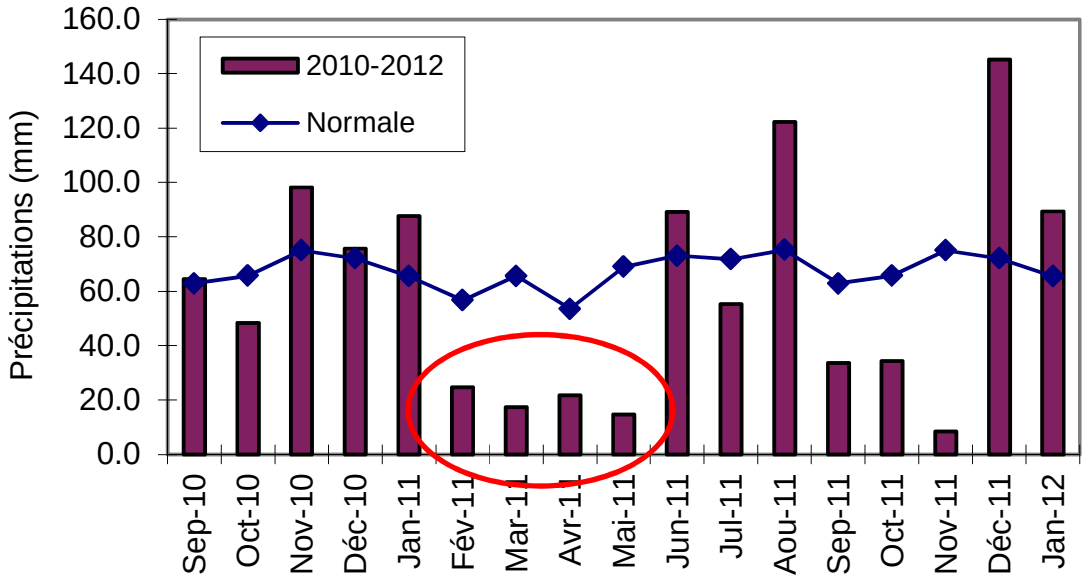


CONTEXT

CLIMATE CHANGE

Exceptional drought in early spring 2011





CONTEXT

CLIMATE CHANGE

- **Instability** of farmers **income**
- Increasing demand for **information** from the agricultural sector (ministries, policy makers, farmers' unions, etc.) and from citizens through the press or media

AGRICULTURAL CALAMITY

Natural phenomena of exceptional character or intensity

Massive and unforeseen pests that cause significant and widespread destruction of land, crops or harvest

AGRICULTURAL CALAMITY

- In Belgium the **Agricultural Calamity Fund**, managed by the Federal Public Service Economy, provides compensations in case of a calamity
- The Calamity Fund will be transferred to Flanders – Wallonia in 2014
- Additional risk management tools (eg. insurances) have to be developed according to the European legislation

AGRICULTURAL CALAMITY

Exceptional character of a weather event ?

- Return period higher than **20 years**
- Frequency checked by IRM/KMI, global assessment of the **affected area**

AGRICULTURAL CALAMITY

Exceptional character of a weather event ?

YES BUT …

- Analysis of **meteorological parameters** only
- Not taken into account:
  development stage & sensitive period(s) of the crop

AGRICULTURAL CALAMITY

Exceptional character of a weather event ?

YES BUT …

- Lack of **objectivity** and **consistency** in the handling of damage claims (different municipalities, provinces)
- Difficulties in **assessing the damage**

AGRICULTURAL CALAMITY

Exceptional character of a weather event ?

- … often contradictory information shared

RESEARCH PROGRAMME
FOR EARTH OBSERVATION "STEREO II"
Contract NR SR/00/127
2006-2013

ADASCIS

Earth Observation to support Agricultural Damage Assessment in Crop Insurance Schemes

www.adascis.be

Belgian Science Policy Office belspo

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ADASCIS project

CROP DAMAGE AND RISK ASSESSMENT

- End user: FPS Economy, Agricultural Calamity Fund
- Interest of insurance sector and regional agriculture administrations for the set-up of agricultural insurances

ADASCIS project

CROP DAMAGE AND RISK ASSESSMENT

- Set of relevant indicators reflecting crop damages
- Based on EO and meteorological data and agrometeorological models
  (B-CGMS : Belgian Crop Growth Monitoring System)
- Return period estimation

ADASCIS project

WEB BASED GEO-INFORMATION TOOL

Viewing and analyzing information for

- Crop monitoring
- Damage assessment
- Risk assessment

Monitoring

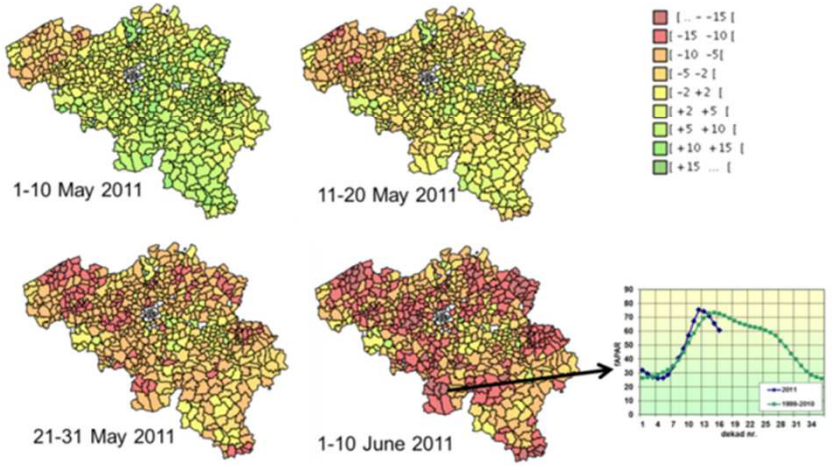
during the growing season “pre-disaster”

Anomaly maps

Comparison of actual indicators with long term average.

“fAPAR relative differences maps”

Grassland 2011

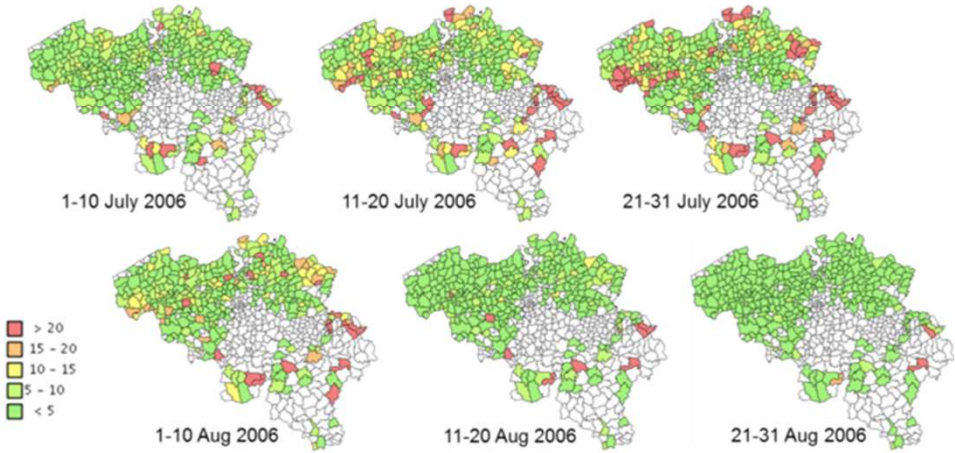


Exceptional?

From anomaly detection to crop damage assessment…

“fAPAR return period maps”

Maize 2006

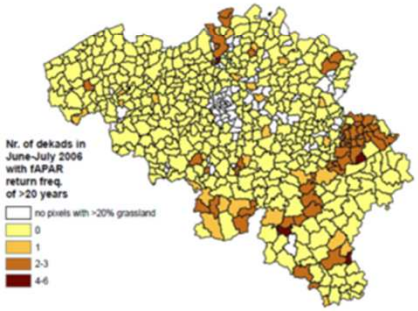


Damage assessment

after the growing season, “post-disaster “

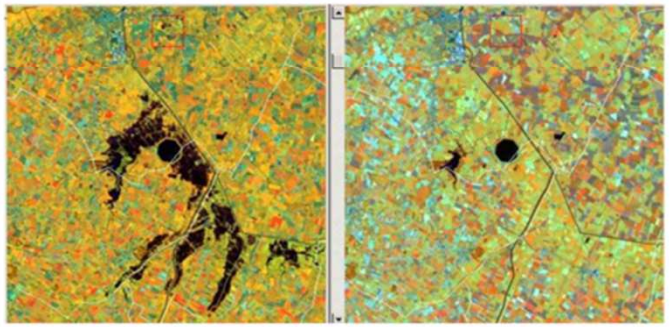
Potential damage maps

Nbr. of dekads with fAPAR return period of > 20 years during “vegetative period”

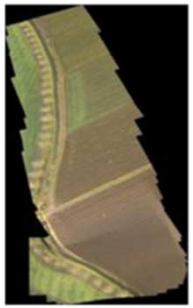


Damage maps

A posteriori detection of crop damage caused by local phenomena (flood, hail, drought) from HR and VHR images.



Floodings of September 2001, Westhoek (Landsat-TM, 30m)



Hail damages VHR (10cm) images .

Damage assessment

after the growing season, “post-disaster”

2006

Map 1 - days

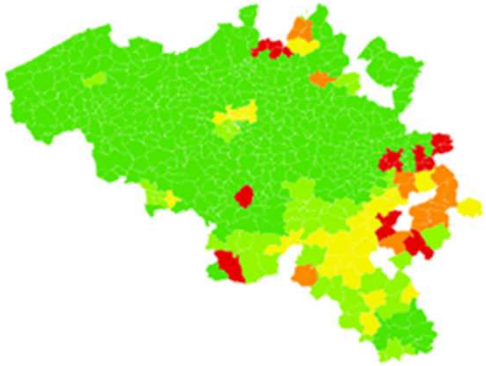
- < 8 days
- 8 - 12
- 12 - 16
- 16 - 20
- > 20 days

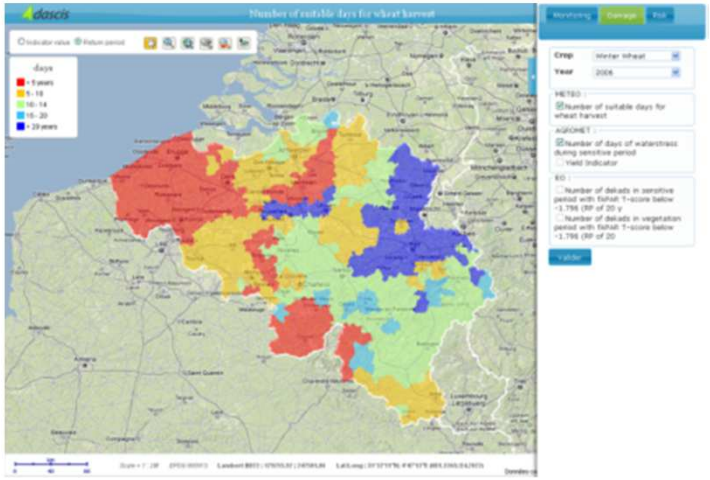
Map 2 - days

- < 12 days
- 12 - 24
- 24 - 36
- 36 - 48
- > 48 days

Number of suitable days for wheat harvest (map 1)

Number of days of waterstress during sensitive period (map 2)



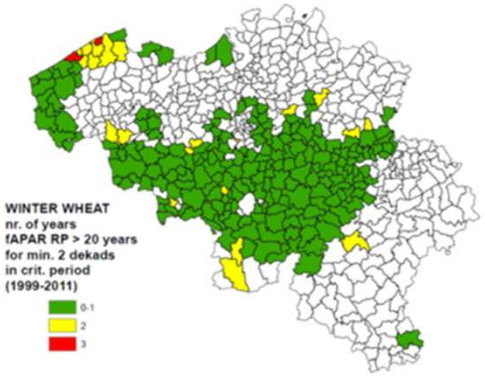


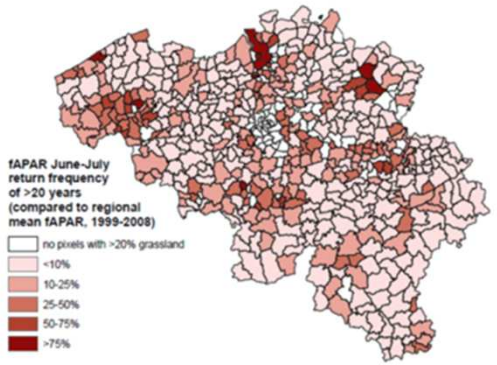
Risk assessment

over several years

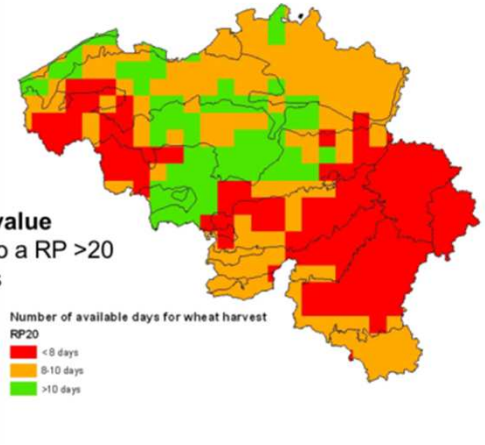
Risk maps

Occurrence of damage over the years. Count deviations below damage threshold in "sensitive period"

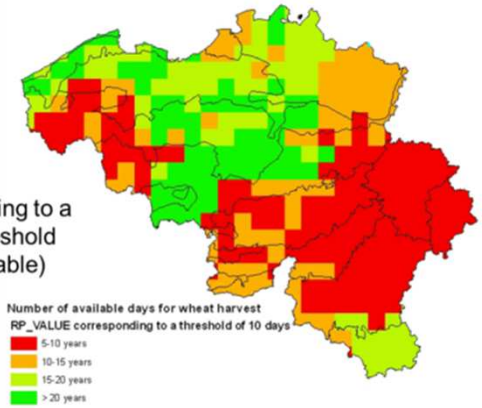




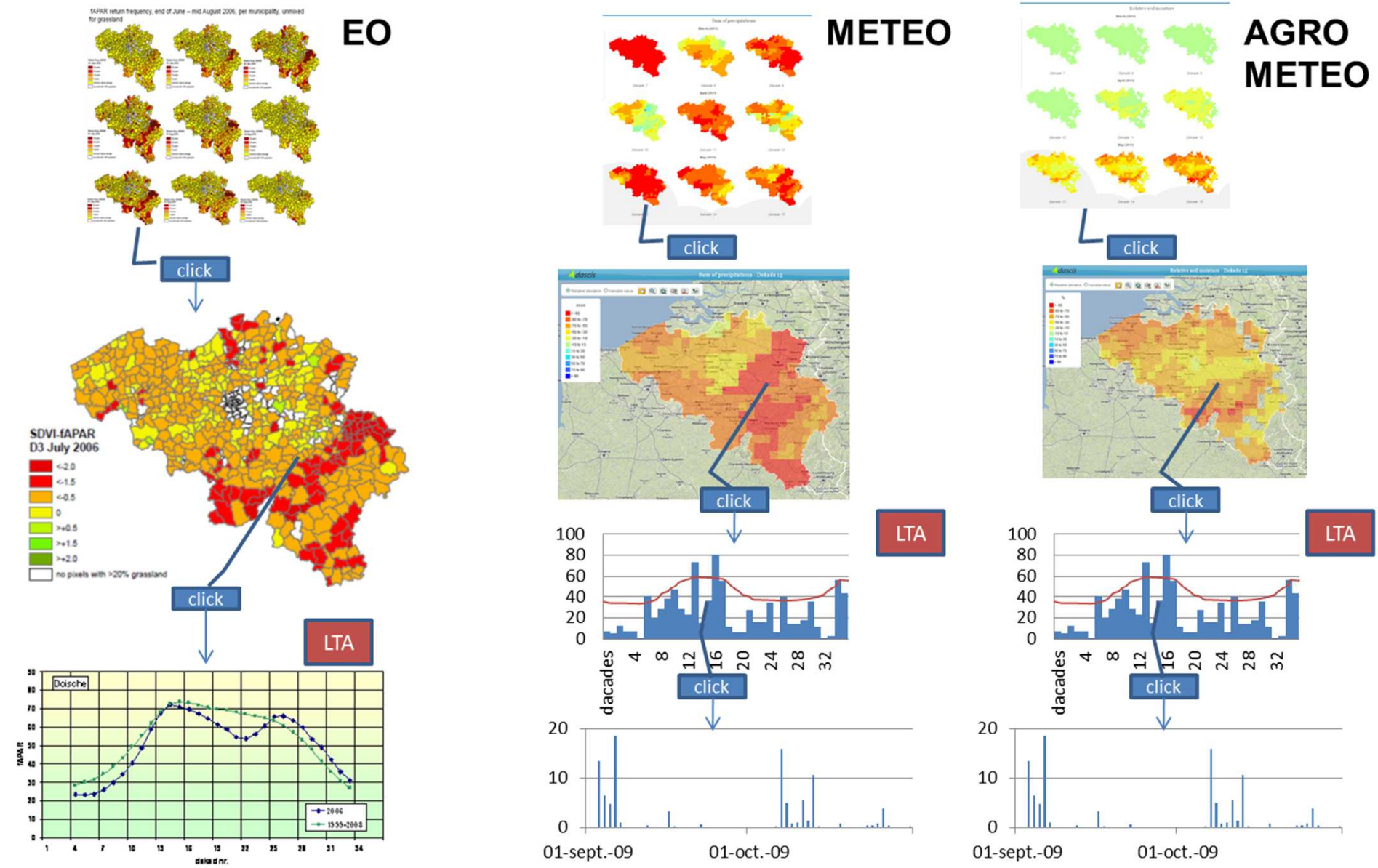
Indicator **value** corresponding to a RP >20 years



RP corresponding to a fixed critic threshold (10 days suitable)



ADASCIS web tool



Results

Selection of relevant crop damage and risk indices derived from meteorological data, agrometeorological models and (low to medium resolution) remote sensing information

Results

- These indices provide information at municipality level for the identification of problem areas by comparing the current situation with historical data and for risk assessment by looking at crop damage frequency in the past

Results

- In the frame of the ADASCIS project a pre-operational web tool was developed to allow the users to visualize and analyze the various crop damage and risk indices in the form of maps and graphs

Results

The ADASCIS web tool allows FPS Economy to identify calamity areas and to decide on the eligibility of compensation claims

Results

- The pre-operational tool was used during the 2011 growing season to assess the extent and the intensity of the spring drought

Perspectives

Clear interest from the Flemish and Walloon agriculture administrations and the insurance sector

- The service will make it possible to define the requirements for the development of insurance products which meet the needs of the private sector (insurers, farmers) and public administrations

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Use of ADASCIS tool

AGROMETEOROLOGICAL BULLETIN

- Provides information on meteorological conditions, overall development of the crops (from EO and modelling), yield forecasts
- Could be improved thanks to ADASCIS results

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11ème année, # 2 28 juin 2013

Bulletin Agrométéorologique
Situation au 20 juin 2013

Résumé

Le retard de croissance observé fin avril, lors du dernier bulletin, n'a toujours pas été résorbé. Les conditions météorologiques des mois de mai et juin furent globalement bonnes sans être exceptionnelles. Les modèles donnent pour l'instant des prévisions proches des rendements moyens 2007-2011 pour la plupart des cultures, à l'exception de la betterave qui est annoncée en hausse. A ce stade, tout semble enco
d'avoir des rendements exceptionnels.

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11e jaargang, # 2 2 juli 2013

Agrometeorologische Berichten
Situatie op 20 juni 2013

Samenvatting

Ondanks de relatief gunstige weersomstandigheden in mei en juni hebben de gewassen hun groeiachterstand nog steeds niet kunnen inhalen. Toch liggen voor de meeste gewassen de voorspelde opbrengsten in de lijn van het gemiddelde voor de jaren 2007-2011. Voor suikerbieten worden iets hogere rendementen verwacht, voor maïs iets lagere. Op dit moment kan het nog alle kanten uitgaan, maar op recordopbrengsten moet er wellicht niet meer gerekend worden.

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