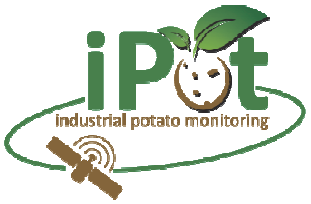


Industrial Potato monitoring for the Belgian potato sector using remote sensing and crop growth modelling

9th World Potato Congress
28-30 July, 2015 - Beijing

Joost WELLENS (et al.)

… iPot

- Industrial Potato monitoring for the Belgian potato sector -

iPot industrial potato monitoring = belspo

Financed by:
Belgian Science Policy

belgapom

Belgian potato trade & processing industry:
Romain Cools & Nele Cattoor.

cra-w

Walloon Agricultural Research Center:
Viviane Planchon, Jean-Pierre Goffart & Yannick Curnel.

vito vision on technology

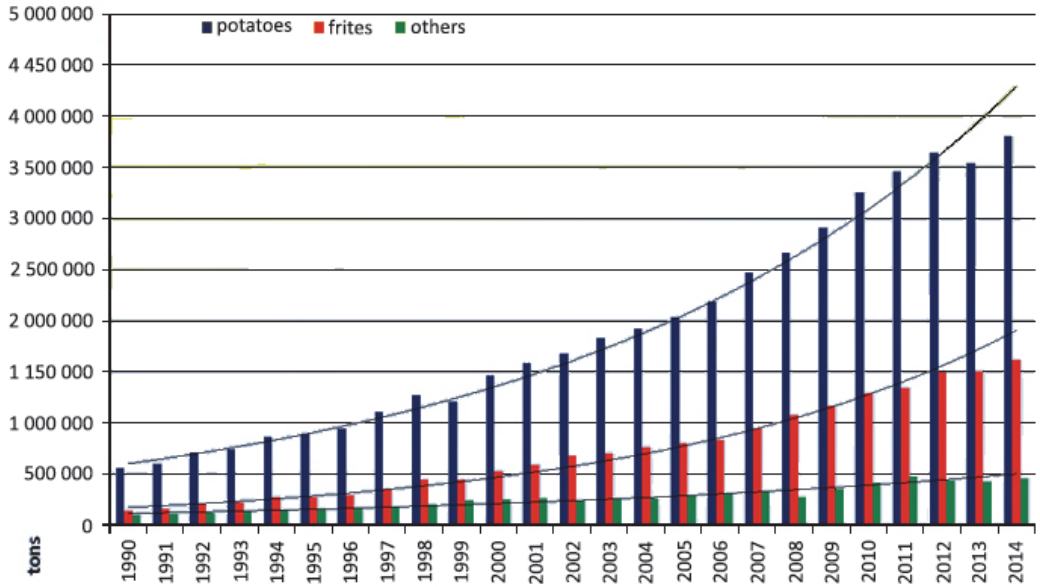
Flemish Institute for Technological Research:
Isabelle Piccard, Anne Gobin & Kris Nackaerts.

Université de Liège ULg Arlon campus environnement

University of Liège – Arlon Campus:
Bernard Tychon & Joost Wellens

1 Belgian potato sector

- some background -



- Fast growing sector:
  largest exporter & largest importer (?!)
- More & more contracts:
  in a volatile market!
- Crop consulting between:
  processors & traders – growers.
- Necessity to realize higher yields:
  in a sustainable way;
  in a competitive way.

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2 Monitoring

- a commonly accepted solution -

Importance of monitoring

- Improve quantity & quality;
- Manage storage, packaging & processing;
- Strengthen competitiveness of production & processing chain.

Potentials for a better quality & quantity management

- Real time information on potato growth and development:
  - yield and quality information on field level;
  - within field variability;
  - faster detection of “problem fields”.
- Risk assessment for diseases & deformations:
  - soil moisture;
  - temperature & solar radiation.
- Optimal information exchange:
  - between all concerned parties;
  - for a better harvest management;
  - for all related logistics.

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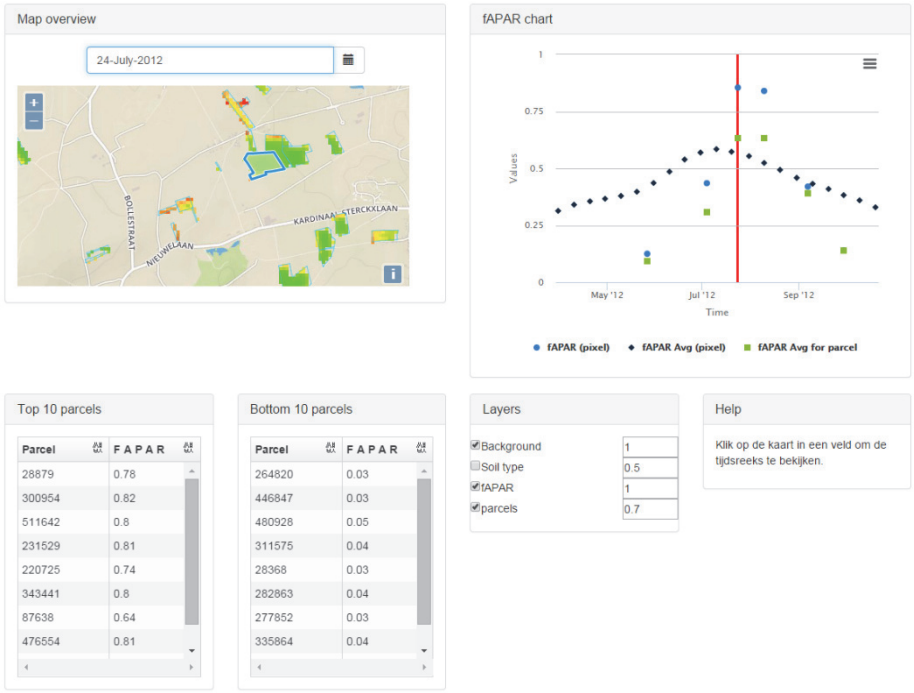
3 Objectives

- web-based geo-information platform -



- Information on crop growth & continuous yield estimates;
- For the Belgian potato processing industry & research centres;
- Information exchange, integration of:
  - field observations;
  - close range sensing measurements;
  - satellite images;
  - crop growth models.

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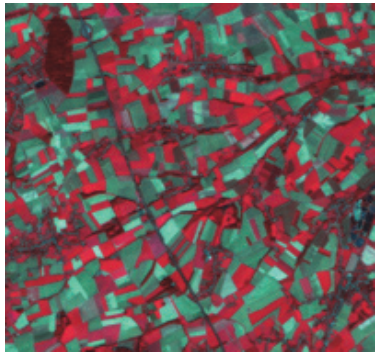
4 Methodology

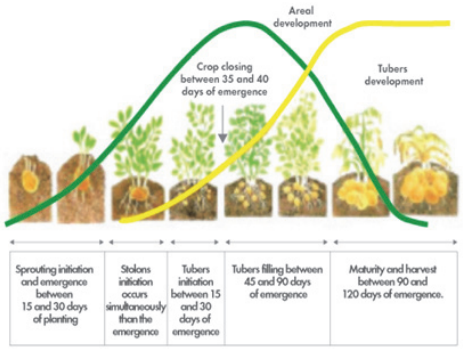
- 2 objectives & 2 approaches -

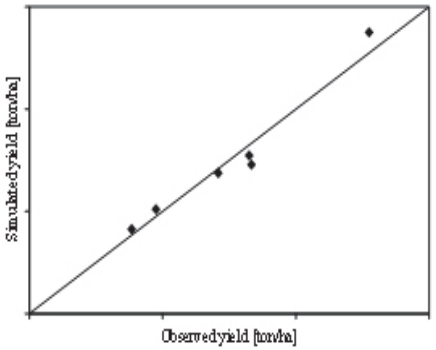
Crop monitoring



- Field observations;
- Close range sensing measurements;
- Satellite images;
- Taken at regular intervals !

Yield assessment



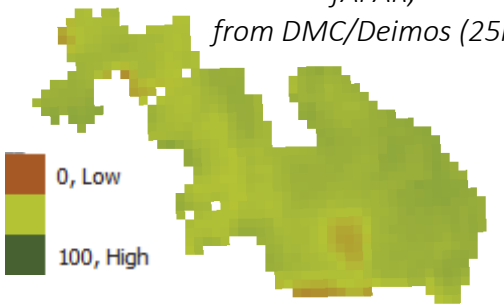


- Crop growth models;
- Continuously improved through ever growing available data.

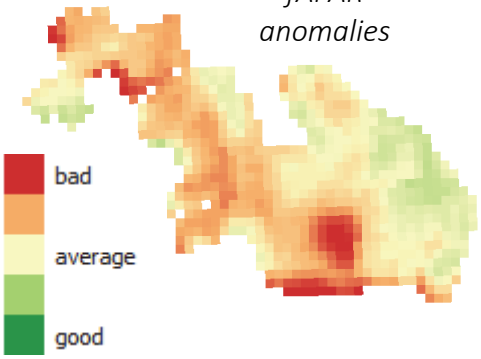
5.i Monitoring

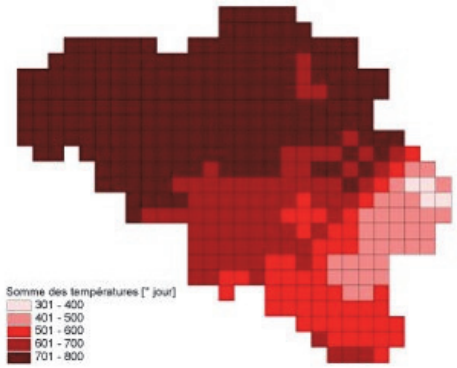
- field condition -

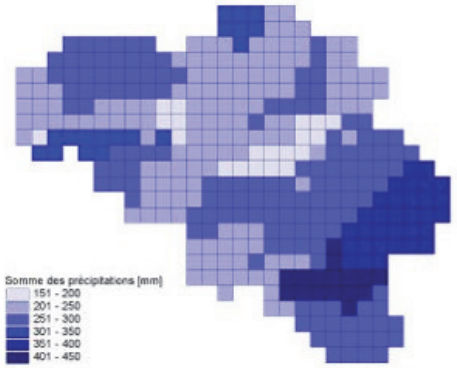
fAPAR, from DMC/Deimos (25m)



fAPAR anomalies







- Intra-field variability: fAPAR
  (photosynthetic activity/vegetation productivity)
- Vegetation moisture status:
  NDWI from Proba-V (100 m) or B-CGMS.
- Temperature (land surface) & radiation:
  Weather stations (10 km) & MSG (5 km).

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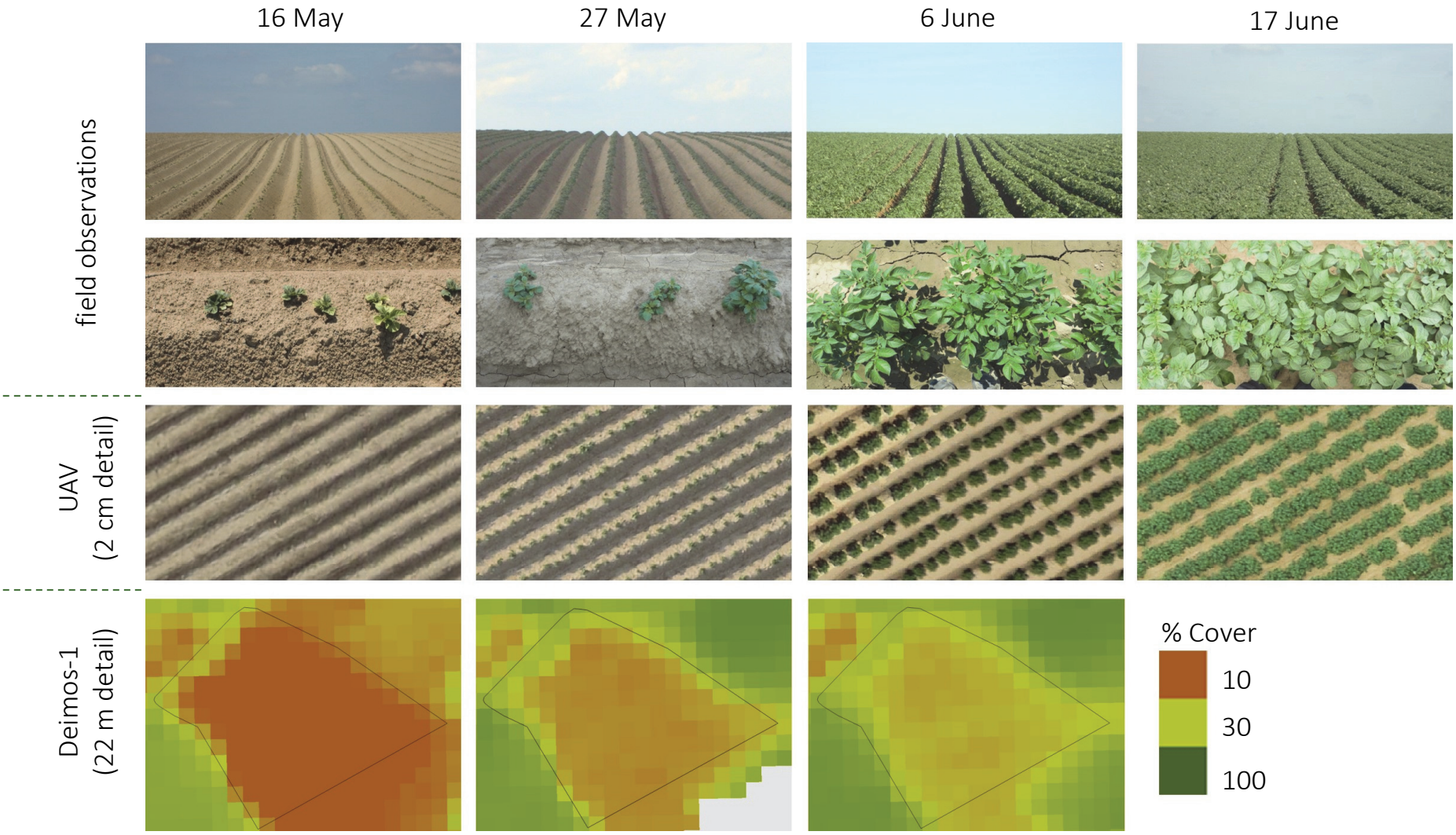
5.ii Monitoring

- crop growth -



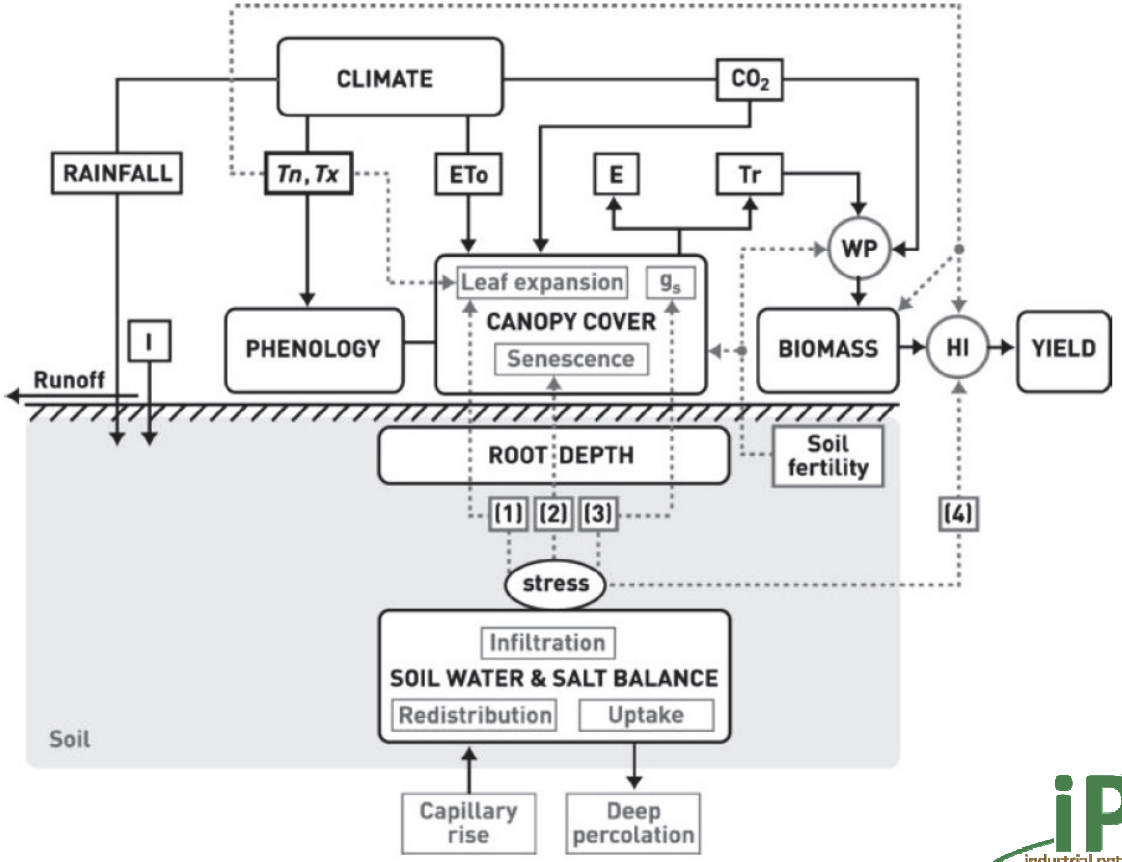
6.i Crop growth modelling

- e.g. AquaCrop (FAO) -

simple & solid

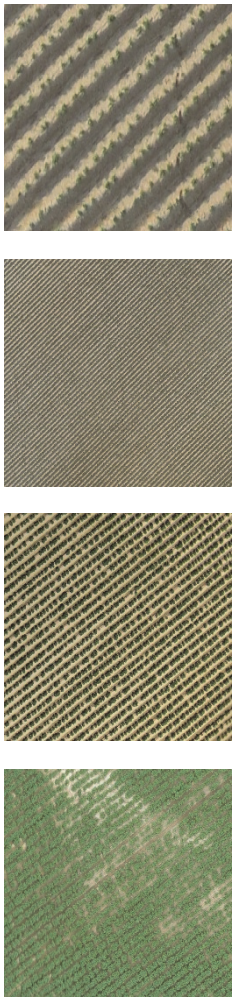
B = WP · ΣTr or Biomass = Water productivity · Sum of transpiration

Y = HI · B or Yield = Harvest index · Biomass

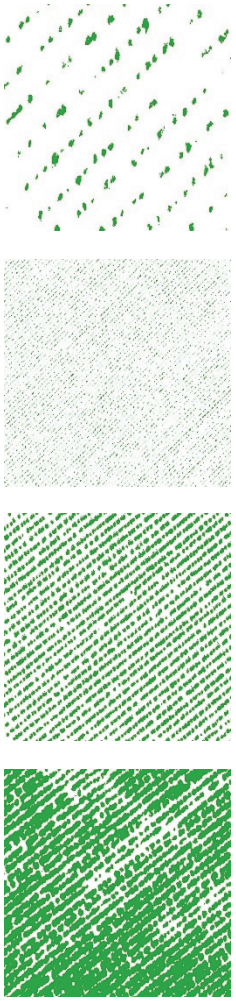


6.ii Crop input

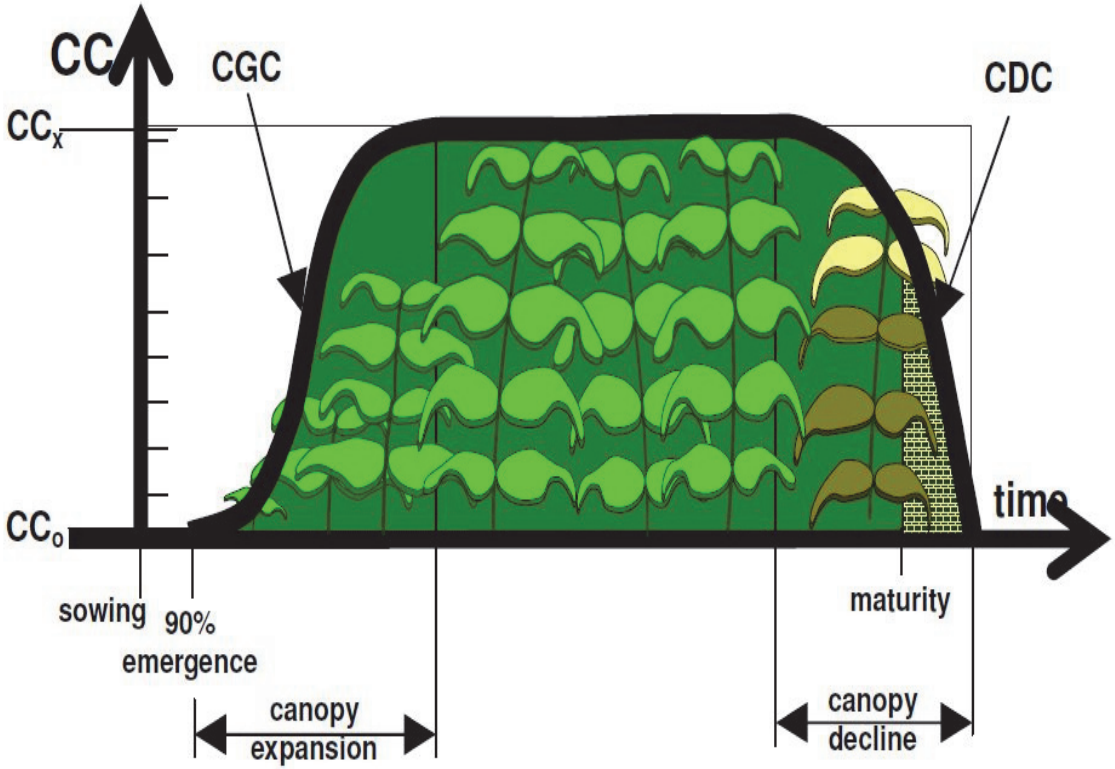
- canopy cover -



① UAV pictures



② Canopy cover (eCognition)



③ Graph:
- crop characteristics;
- canopy growth & decline;
- phenological stages.

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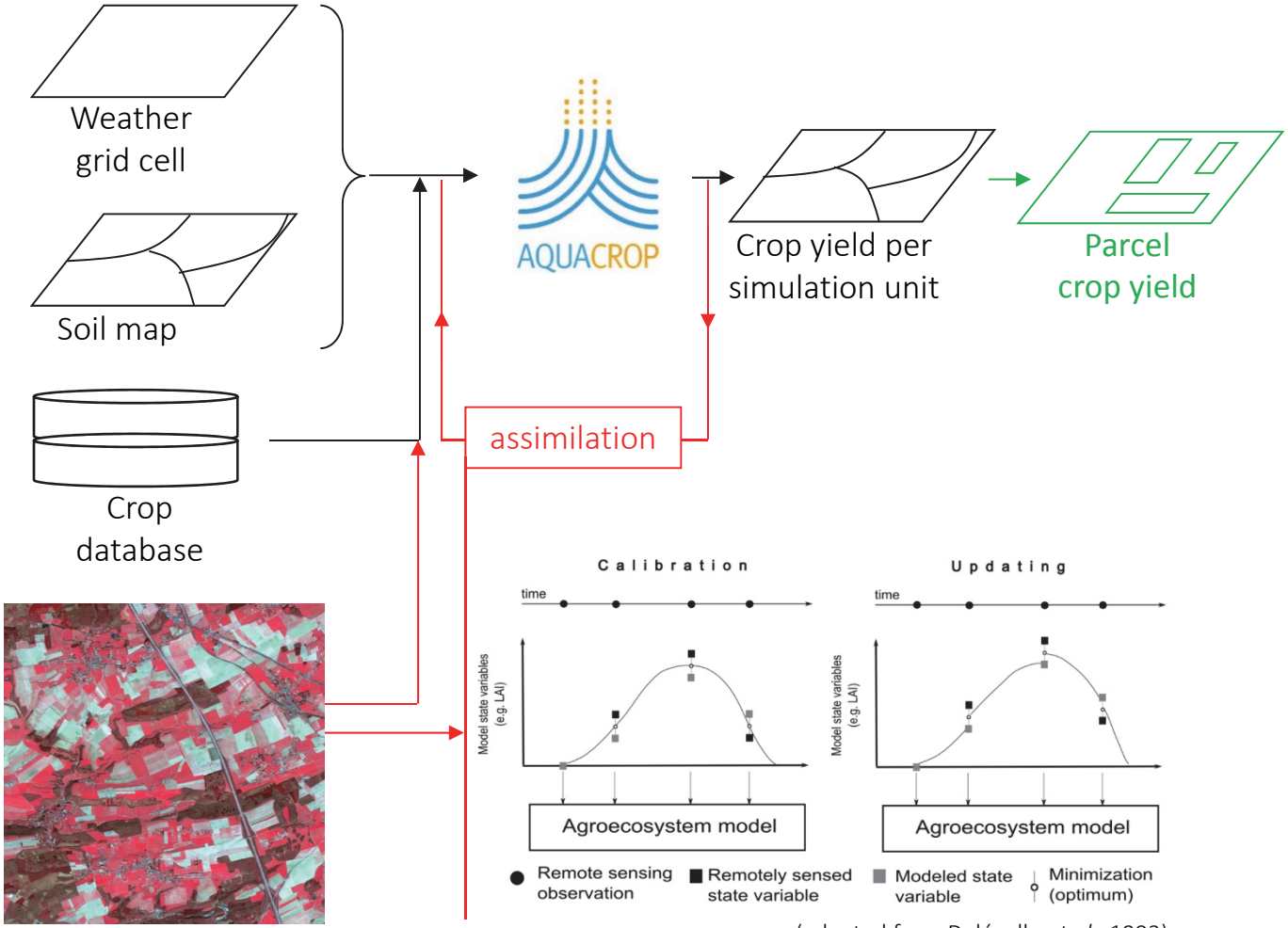
6.iii Crop growth modelling

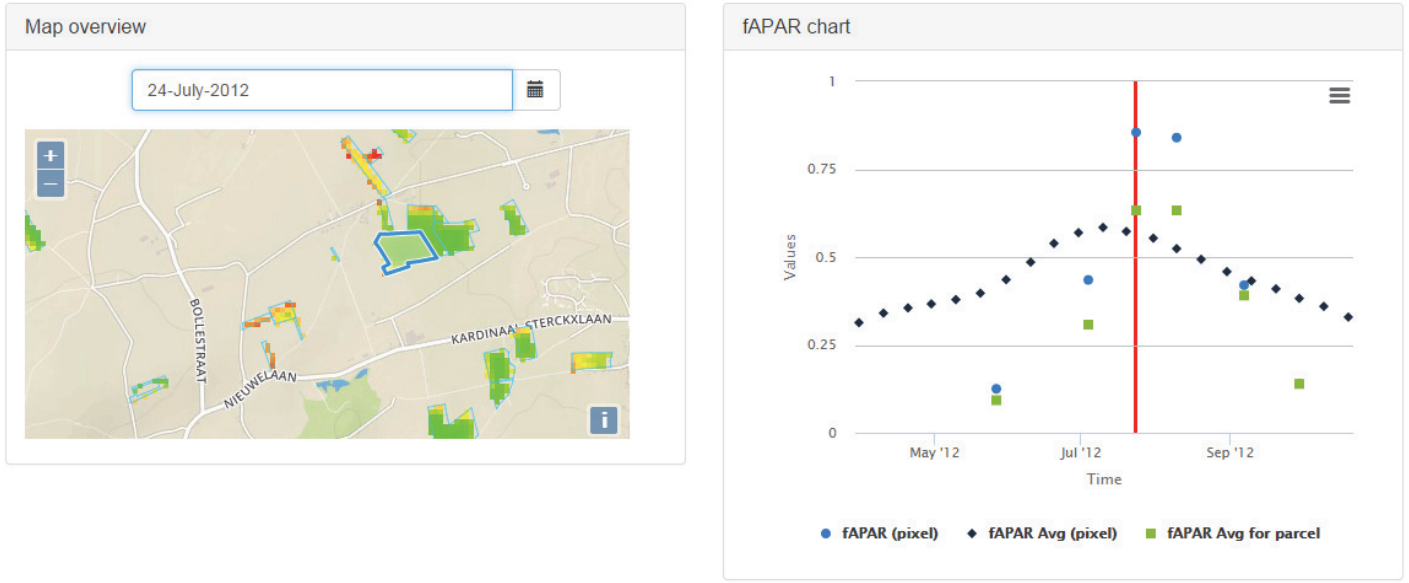
- work-flow -



(adapted from Delécolle *et al.*, 1992)

7 Geo-spatial web platform

- screenshot -



8 Conclusion

- iPot -

- Bridge the gap between latest research and industry:
  earth observation & crop growth modelling;
  trough Belgapom strong implication of industry.
- Readily available end products:
  user-friendly web based interface;
  data and model complexity is hidden for the end user.
- Better monitoring: quantity ↗ & quality ↗:
  - What is the state of my field?
  - What is the state of my crop?
  - What is the best time for haulm killing?
  - What is the expected yield?

Thank you!


Belgian Science Policy Office
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vito
vision on technology


cra-w


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