Regional crop & irrigation monitoring: some examples of (new) opportunities

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... Monitoring ‘space4food’
- applications at ≠ levels -
1.i Regional (coarse) crop monitoring

- Global Monitoring for Food Security -

- MODIS;
- NDVI temporal profiles.

climatic data:
- rainfall
- temperature
- ET₀

AgroMetShell
agro-meteorological data:
- planting
- crop cycle
- crop coefficients
- soil type

AgroMetShell

multiple regression

best variables
- cotton in Burkina:
  - initial water content
  - NDVI max
  - ETₐ development phase

R² = 0.75
error = 73 kg/ha
(5.9% of 1.120 kg/ha yield)

1.ii Regional (coarse) crop monitoring

- 'curve fitting' -

- MODIS;
- GAI temporal profiles.

Shape of decreasing curves of green area index

Regional wheat yield
2 Irrigation monitoring
- using SAR data -

Irrigated perimeter of Tadla (center of Morocco);
100,000 ha of wheat;
flood irrigation, 2 to 5 times;
irrigation water invoices database.

ERS-2; C-band; dual polarizations (VV); 25 m.

3.i Regional (detailed) crop monitoring
- work-flow -

Weather grid cell
Soil map
Crop database

HR satellite data

Parcel crop yield

Crop yield per simulation unit

Assimilation

Weather

AQUACROP

(adapted from Delécolle et al., 1992)
3.ii AquaCrop (FAO)
- how does it work? -

B = WP · ΣTr or Biomass = Water productivity · Sum of transpiration
Y = HI · B or Yield = Harvest index · Biomass

3.iii Crop input
- canopy cover -

Overhead pictures
Canopy cover (eCognition)

Graph:
- crop characteristics;
- canopy growth & decline;
- phenological stages.
3.iv Results
- soil moisture, canopy growth, yield: e.g. cabbage -

1. Soil moisture:
   - soil type;
   - irrigations;
   - ...

2. Canopy cover:
   - growth & decline coef.;
   - plant densities;
   - ...

3. Yield:
   - water productivity;
   - harvest index.

... Agricultural advice
- 'modelling for the masses’ -

Based on the priorly presented knowledge & expertise:

- Mobile phone:
  - GPS coordinates;
  - crop data (type, sowing, ...);
  - etc.

- Mobile phone:
  - Weekly updated irrigation guidelines;
  - Yield estimates.

- Send-in data;
  - National soil maps;
  - Meteo-broadcasts.

- Server with web-application
  - Yield forecasts;
  - irrigation calendars.
Grazie!