



Together for sustainable irrigation

Irrigation Forum Summer 2022

30 June, 2022

THE HOUSEKEEPING RULES FOR A SMOOTH FORUM

- The event is recorded and will be shared
- Please present your full name and your organisation properly
- Please mute your microphones while you not participating
- Please use the chat box for questions and comments
- If you can, turn on your camera on so we can see each other

THE HOUSEKEEPING RULES EIA CODE OF CONDUCT

- EIA believes it is important that its activities are at all times carried out in accordance with the applicable law, especially competition law.
- EIA believes that business shall be conducted in an atmosphere of free competition, i.e. based on price and quality.
- The Code of Conduct aims at providing clear rules to EIA's members, thus reducing the risk of improper conduct and consequently of fines being imposed.
- This Code of Conduct shall be binding on all members as well as all other participants when taking part in EIA activities.

Agenda for the summer forum

30 June 2022

14:00 -14:15	Opening Market review and EIA Updates	Moshi Berenstein/ EIA President
14:15 -14:25	Welcome to New Members	Fleur Martin/ EIA Communication Officer
14:25 -15:00	Guest speaker Irrigation scheduling tool based on satellite images	Dr Michel Lepage, IRD - CESBIO
15:00 -15:20	Innovation and Technology Dynamic agrivoltaics to protect crops from the effect of climate change	Damien Fumey/ Sun'Agri Agronomist and plant modeling scientist.
15:20 - 15:30	Closing session / Q&A	

General EU Economy update June 2022

- Two years after the start of the pandemic, Russia's war against Ukraine poses new challenges to the EU economy by **bringing renewed disruptions** in global supply, fuelling further commodity price pressures and mostly uncertainty.
- Among advanced economies the **EU is first in line to take a hit**, due to its geographical proximity to Russia and Ukraine, heavy reliance on imported fossil fuels, and high integration in global value chains.
- Today's EU outlook is set for **lower growth and higher inflation** especially this year. Expected GDP growth in the Euro area is now at 2.7% in 2022 and 2.3% in 2023 (down from 4%) and the projection for inflation has been revised up significantly, now expected to average an all-time high of 6.8% in 2022, before declining to 3.2% in 2023. In addition, we see food commodity prices under pressure due to rising input costs, notably for energy and fertilisers
- As a result, the context of high inflation, food prices and falling purchasing power heavily influencing also our sector.

An increasing demand for Irrigation solutions

European water framework directives

- At the same time, we see an increased demand for irrigation
- Growing demand for food, heat waves rural and urban, increase scarcity of freshwater resources, climate change and the rise on sustainability awareness, all and more impose the necessity for better, automated, precise & efficient irrigation solutions.
- We continue to see a growing interests for Green investments towards Decarbonization, water preservation and Clean Water goals.
- In the context of the European Green Deal, the European Commission has presented various initiatives to strengthen sustainability: biodiversity 2030, from farm to fork, balanced nutrient management and the new EU climate adaptation strategies.
- Water plays a crucial role on climate change. the European Commission wants to accelerate action and will continue to incorporate water management considerations in all relevant policy fields.
- Policy support has strengthened in Europe where Governments appear more committed to the increasing awareness of efficient irrigation

EIA Role

- Taking the right actions today, we can significantly contribute with our Knowledge to build a climate-resilient tomorrow
- We are here to show that, on a European scale, water savings are possible thanks to the improvement of the overall efficiency of irrigation, by combining technologies (infrastructures, application systems, planning tools) and more efficient practices
- The EIA is active on several levels aiming to become an influencing actor in the relevant water fields bringing the irrigation voice into relevant discussions.
- The EIA value is based on our vast experience made by the diversity of our members representing a variety of countries, technologies and expertise on different aspects of irrigation and water management technologies.
- It is also based on our ability to cooperate. We want to provide the platform to to secure food production and to improve livelihood.
- The more we'll participate in European initiatives, research, and innovation projects – the more we'll secure our place at the table for the future of sustainable irrigation.

Our engagement EIA Working Groups



Sustainability in
agriculture



Urban Landscape



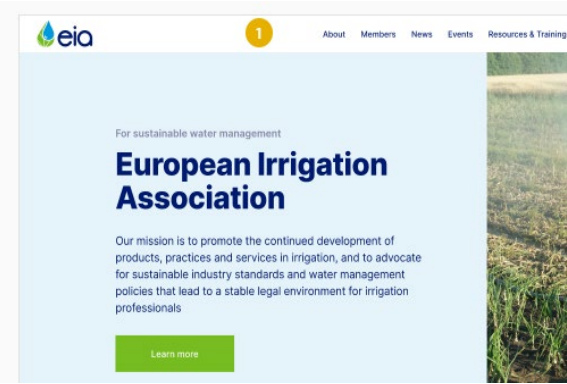
Standardization



Training



Wastewater Reuse



Communication

WG 1 : Sustainability in Agriculture

The vision: The Group intends to pay attention to issues concerning the promotion and activation of projects that pursue the sustainable development goals, with a focus on irrigation in agriculture

Main activities in 2022:

1. Creating a list of relevant contacts for the association activities
2. Initiate collaboration with Farming First
3. Certification labels for best irrigation practices/ Products from Sustainable Agriculture labels
4. Define a common model to calculate the saving of water, energy and fertilizers of irrigation



Leader : Giulia Giuffre, Irritec

Participants :

Ramunas Rederis, consultant

Xavier Corbella , ITC

Paolo Antini, Sentek

Giusy Inferrera, Irritec

Stefania De Pirro, Rivulis

Javier Juarez, Azud

Pablo Carnicero, Regaber

Moshi Berenstein, Netafim

Ido Raanan, Netafim

Sophie Gendre, Arvalis

Tomas Brzobohaty, Clever Farm

Subgroup/ WG 1 : Plastic collecting and recycling in agriculture

The vision: To advance the responsible use of plastic in irrigation in the EU market.

Main activities for 2022:

1. Compose the EIA-PWG position statement (vision) for the use of plastic in irrigation.
2. Set tangible goals timeline.
3. Create partnerships with farmers and plastic organizations.
4. Track and collaborate with standard institutions.
5. Track and collaborate with ongoing research about plastics in agriculture



Leader : Ido Rannan, Netafim

Participants: Jean Bomy, Rivulis

Francesco Monteduro, Irritrol

Michel Histel, Consultant

Fleur Martin, EIA and Irrigazette

Warren Gorowitz, Hunter

WG 2 : Urban Landscape

The vision: The Group intends to pay attention to the importance of Green Areas/Landscape in the Cities, Green Roofs & Green Walls, urban Forestry, New Parks, use of devices to reduce water, centralization of Irrigation systems, Smart Cities, maintenance of green areas, rainwater harvesting, sustainability (Ecolabels, Bream and Leed certifications).

Main activities for 2022:

1. Published 5 White Papers:

1. The need of green spaces in urban environments (*By Joao Florido*)
2. No blue, no green. No irrigation, no relevant benefits of green areas (*Tomás Brzobohatý & Lorenzo Arcangeli*)
3. More blue with less water. Improving the efficiency of irrigation systems and steps to take on defective established irrigation systems (*Tomás Brzobohatý & Rafael Diaz*)
4. Right irrigation designs, right irrigation products, right irrigation installation, right irrigation maintenance to maximize the benefits of green areas at long term (*Damir Cizmek & Rob Hoogeveen*)
5. Current products, water management systems and maintenance procedures to maximize the water efficiency on irrigation systems for green areas (*Xavier Botrel & Santi Casanella*)



Leader : Santiago Casanella Roca, Hunter Industries

Participants :

Xavier Botrel, Rain Bird
Lorenzo Arcangeli, Hunter
Ramunas Rederis, Consultant
Paul Van Breda, VBS Irrigation
Joao Florido, Norma Group
Rafael Diaz, Riegoturf
Damir Čizmek, In-Aqua
Vojtěch Malina, Clever Farm
Rob Hoogeveen, Certified Design Inc.

WG 3 : Standardization

The vision: to influence on the preparation of standards in both key areas of our industry's activities.

Main activities for 2021/ 2022:

joined two Technical Committees of the CEN, the European Standardization Committee:

- the CEN/TC 334 (Irrigation techniques)
- the CEN/TC 144 (Tractors and machinery for agriculture and forestry including hose reels machines, center pivots and lateral move systems).



Leader : **Michel Histel**, Specialist European Standards

Participants :

Jean-François Cornacchia, Irrifrance

Romeo Dragan, Rivulis

Alessandro Calanna, Irritec

WG 4 : Training & Knowledge Transfer

The vision: to promote advanced irrigation know-how, providing an educational value with a practical applicability that falls outside the product range of any specific manufacturer.

Main activities for 2022:

- To prepare first ever EIA course for professionals who want to become EIA teachers in their own countries or regions and in their local language.



Leader : Damir Cizmek, IN AQUA

Participants :

- **Ramunas Rederis**, Consultant
- **Romeo Dragan**, Rivulis
- **Paul Van Breda**, VBS Irrigation
- **Rob Hoogeveen**, Certified design Inc.

WG 5 : Wastewater Reuse

The vision: to rationalize water use and the necessary evolution towards a circular economy of resources.

Main activities for 2022:

1. Share technical experiences and obstacles to the development of Reuse's projects;
2. Identify the constraints involved (technology, risk mitigation), which are very different from a standard irrigation project; access to public data, decision support tools and research in this field;
3. produce thematic technical notes for EIA members; identify project leaders at European level and their national counterparts;
4. integrate these elements into a knowledge transfer policy;
5. being a stakeholder in the development policies regionally; contribute to the revision of the regulations.



- **Leader** : Bruno Molle /ex INRAE - Research Institute

- **Participants** :

Sophie Gendre, Arvalis Institut du vegetal

Sebastian Shifris, Netafim

Damir Čizmek, In-Aqua

WG 6 : Communication

The vision: to pass on to the different stakeholders the knowledge and best practices that our sector offers on Professional technical content & technological innovations; to build necessary communication tools to promote all varieties of irrigation; to promote the activities of the association through web-tools, social media, mailing, library of technical articles and more

Main activities for 2022:

1. EIA new website
2. Increase visibility of the EIA in our website and social media
3. Periodical newsletters
4. Editorial committee for the publication of articles on EIA platforms
5. Organizing Events



Leader : Fleur Martin, Irrigazette

Participants :

Pilar Uretta, Regaber

Keith Bellin, Irritec

Céline Palvadeau, Netafim,

Oriol Torrano, ITC

Bruno Perroni, Lindsay



- **WE INVITE YOU TO JOIN THE EIA AND TAKE PART IN BUILDING A SUSTAINABLE FUTURE FOR IRRIGATION!**

- [HTTPS://IRRIGATIONEUROPE.EU/](https://irrigationeurope.eu/)



Welcome new members

- We are very pleased to welcome 5 new members in the association since our latest forum.
- We now have 72 members

Clearwater Asia

Thierry Claireau - Email : tclaireau@clearwater-asia.com

Web : <https://clearwater-asia.com/en>

Activity :

Distributor in South East Asia and China, Fertigation Design, Filtration, Water treatment, Drippers, Drip Tape, Installation and Maintenance for irrigation, gardening, landscaping, aeroponics, urban and vertical farming.

Brands handled : Dosatron, Priva, AessenseGrow, AAS,





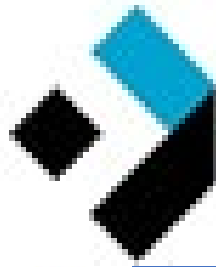
Sun'Agri

A company with a mission: To develop solutions and systems for adapting agriculture to climate change

As a pioneer and the leader in dynamic agrivoltaics, **Sun'Agri** responds to the urgency of climate change by providing farmers with a breakthrough innovation that sustainably protect their production while generating solar energy. Dynamic agrivoltaics makes it possible to combine agricultural land and smart solar louvers without conflict of use and without reducing cultivable land! The smart louvers above the crop are controlled according to the physiological needs of the plant and the protection against climatic hazard.

contact person: Damien Fumey, Sun'Agri
R&D manager; damien.fumey@sunagri.fr

Commercial sign



HYDRALIANS

Companies



Nb of employees

35

150

250

130

25 to 65

Activities

Swiming pool & turf irrigation

Plumbing, pipelines, turf irrigation, swimming pool

Swiming pool, turf irrigation, pumps, fittings

Ag irrigation, turf irrigation, pumps, services & maintenance

Supply chain & logistics centers

Turnover 2021

NC

61 300 k€

100 600 k€

40 000 k€

NC

Go to Market

6 pro outlets

26 pro outlets

40 pro outlets

9 pro outlets & 1 sales force for national retail business

3 logistic centers

Contacts for EIA : Luc Armand – larmand@hydralians.com
Web : www.hydralians.fr

Marco Bezzi



- PhD in Environmental Engineering in 2001 at the University of Trento
- Since 2002 freelancer in the irrigation sector (national and international experience).



- Founder and CEO of various companies in the environmental and ICT sector:
 - Jenera srl (2008) for the production of hydroelectric energy
 - F360 srl (2010): first scientific spin-off of the Council for Agriculture and Agrarian Economy (CREA);
 - TERA engineering (2016) environmental engineering company
 - Bluetentacles s.r.l. (2018) IoT and AI for Irrigation



Contract Professor: water resource management at international level



Programme Manager of the UNESCO chair in Engineering for Human and Sustainable Development



Business Developer Manager at xFarm, special focus on irrigation services



Vincent Trottet

Email : vinzthor@yahoo.fr

Activity :

Involved in irrigation business for 11 years (9 years with Rain Bird, and 2 years with France Arrosage).

I am very interested in issues related to irrigation. On each of the projects I work my objective is to propose the most efficient technical solutions to save water.

I also speak regularly in training center to explain the importance of a good design in irrigation.



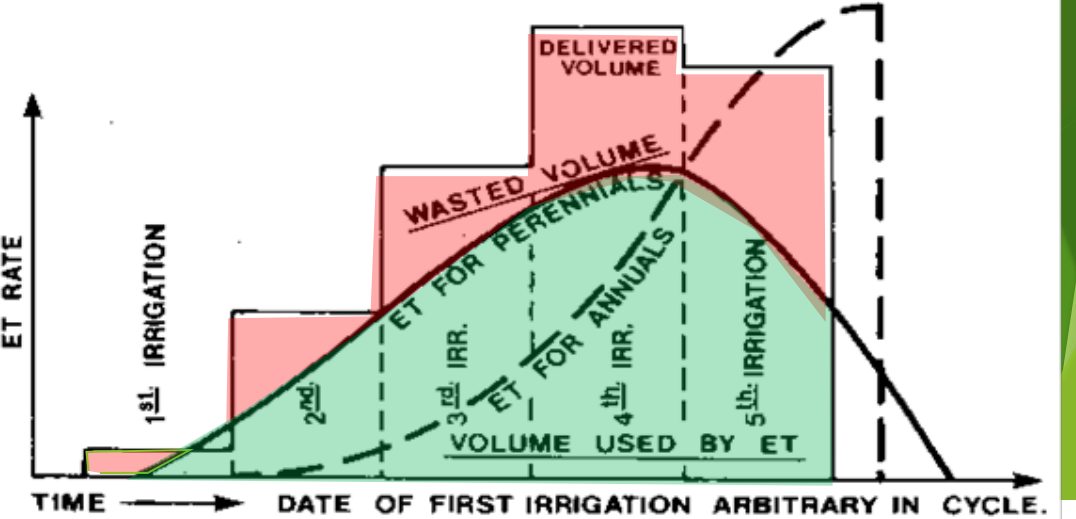
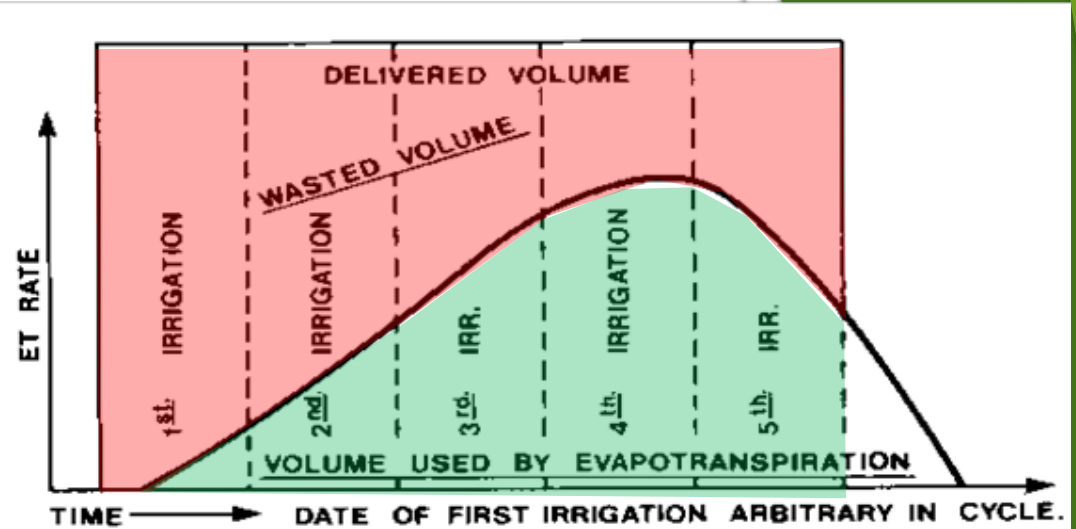
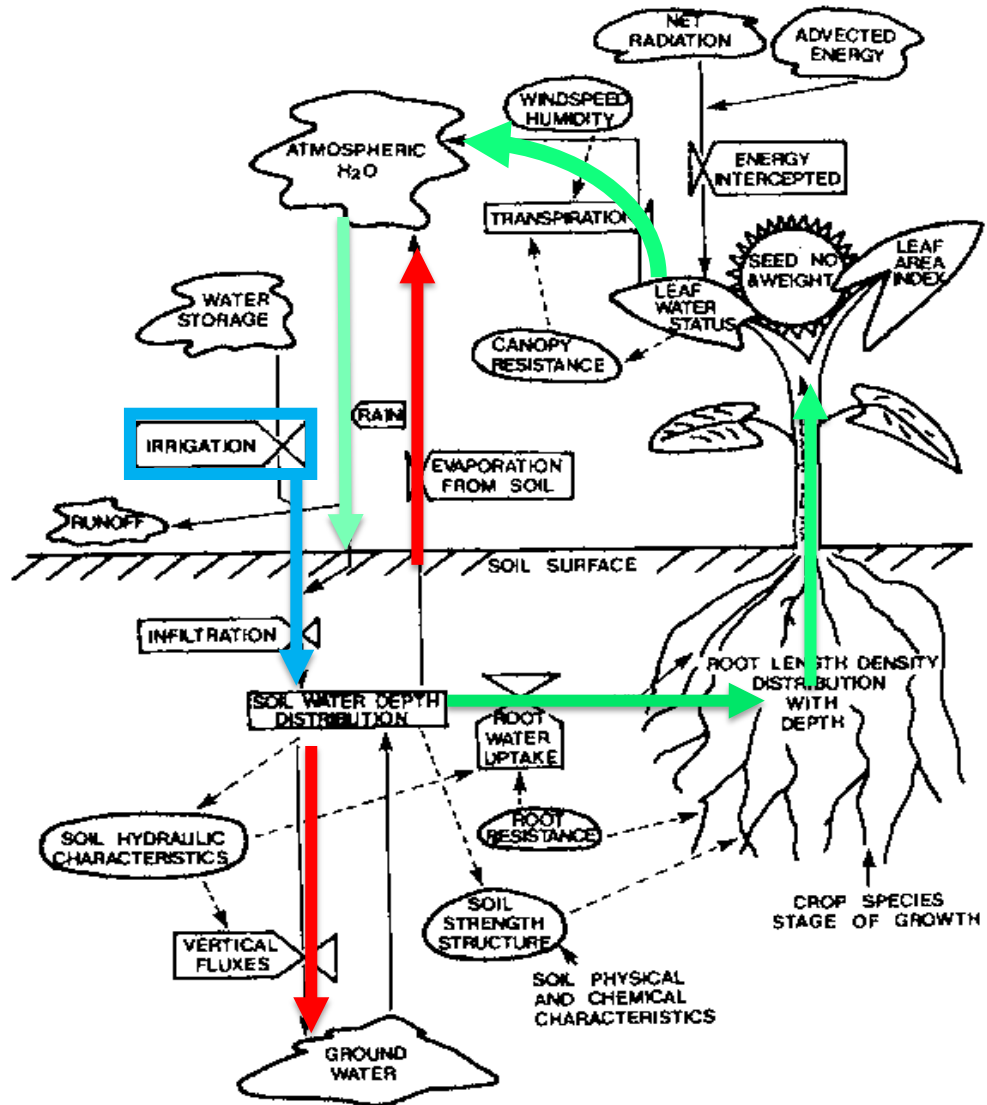
Our Members

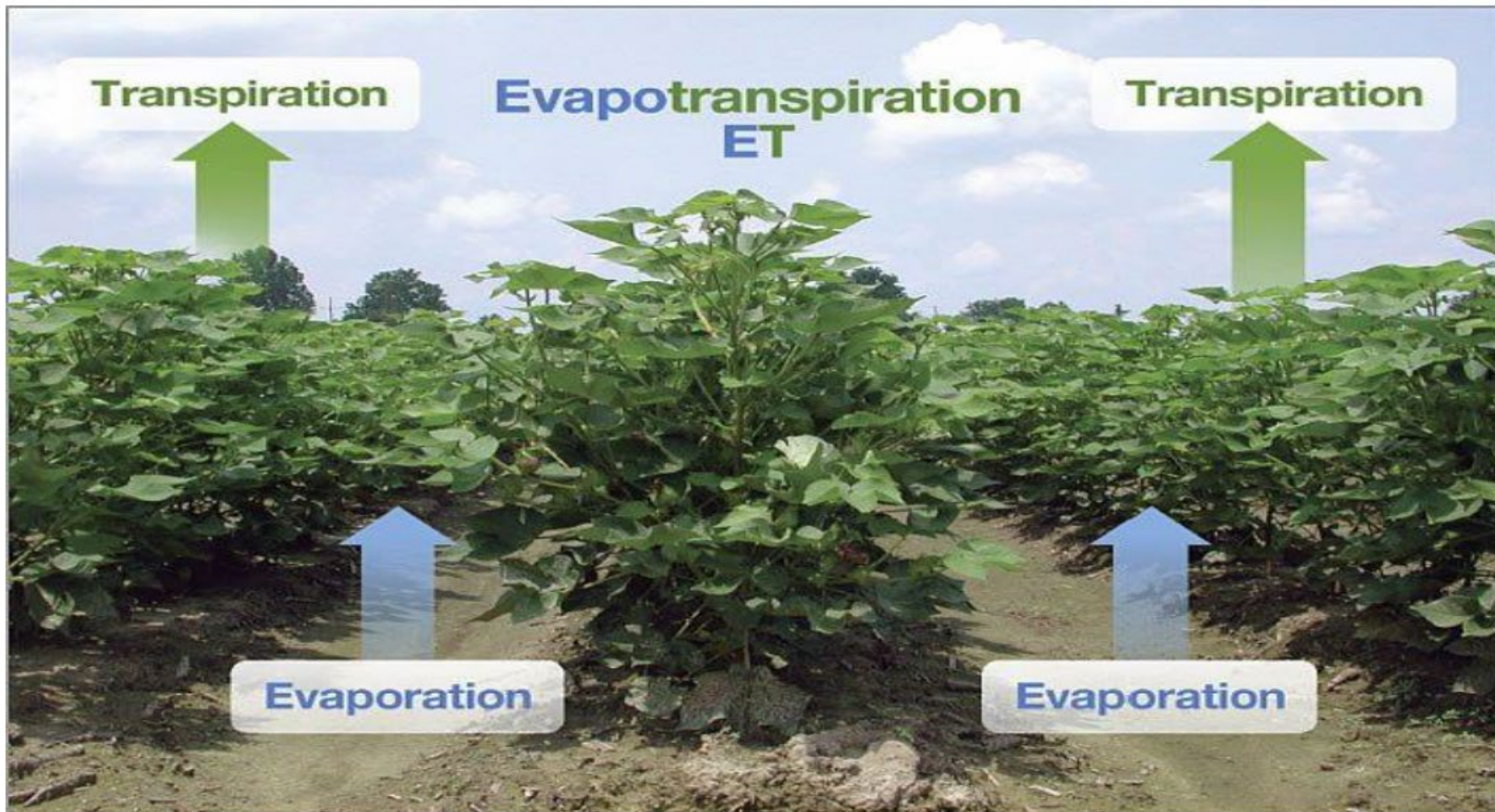


Remote Sensing and Irrigation scheduling

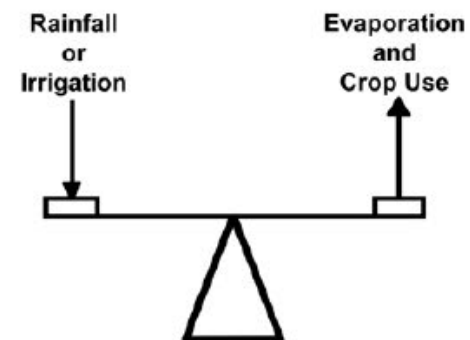
M. Le Page, L. Jarlan, M. Zribi, G. Boulet, V. Simonneaux
Centre d'Etudes Spatiales de la Biosphère (CESBIO)

Scheduling irrigation?



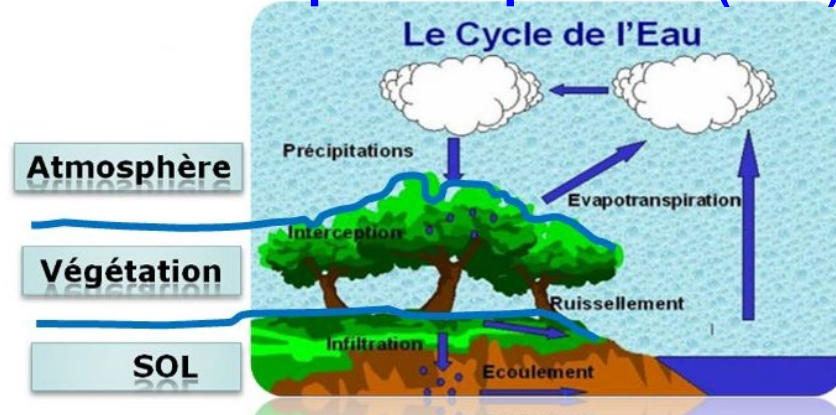


A good knowing of evapotranspiration allows to give to the crops the water needed in good time and quantity



Measurement of Evapotranspiration

Evapotranspiration (mm)



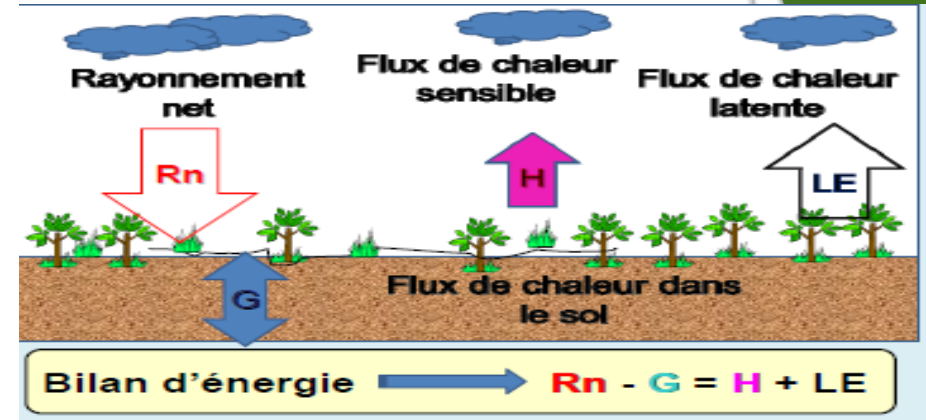
$$ET = P + I + RC - R - D$$

Water Budget

Lysimeter

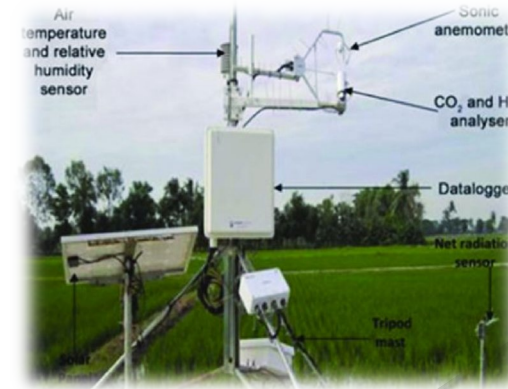


= Latent Heat Flux (W/m²)



$$LE = R_n - G - H$$

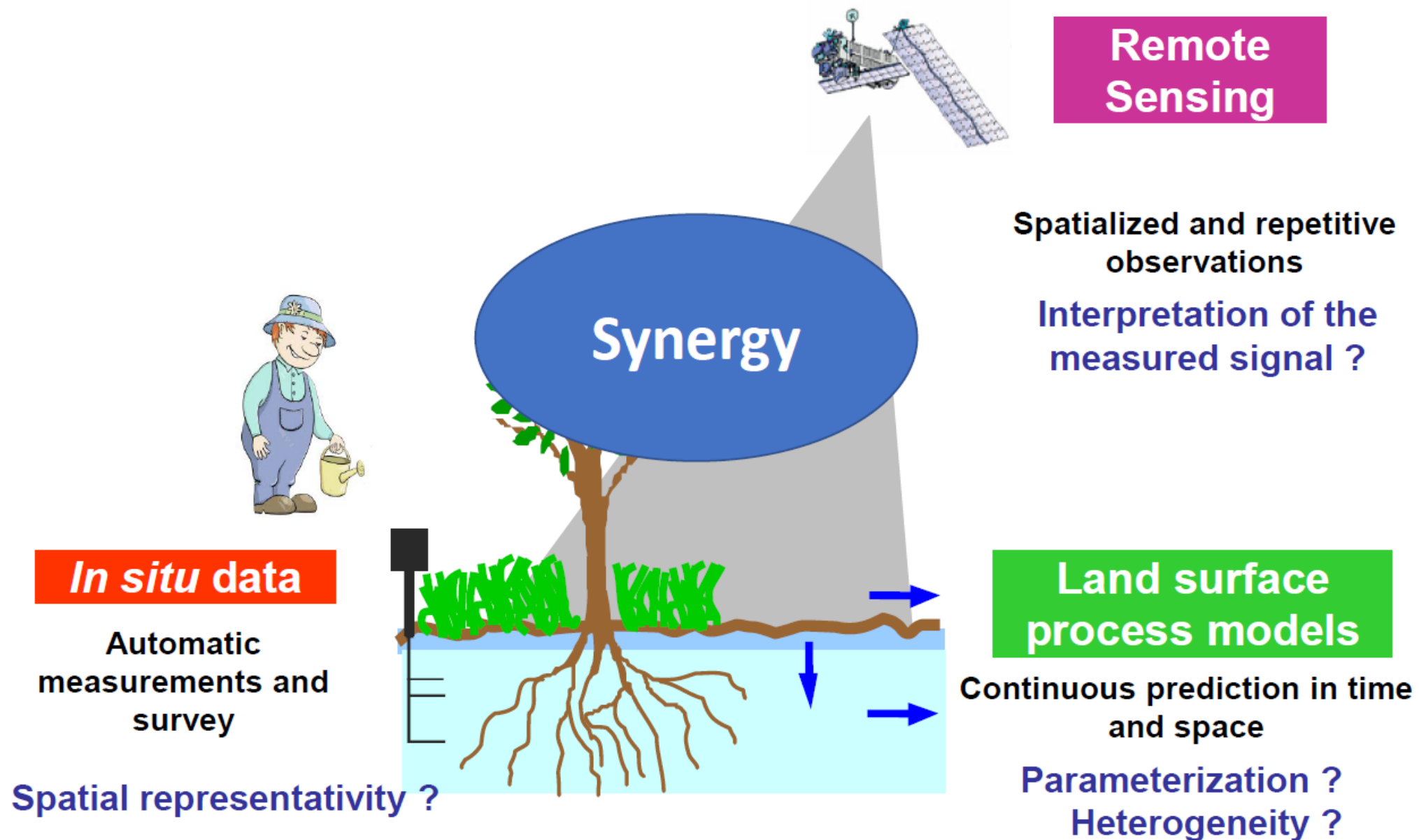
Energy Balance



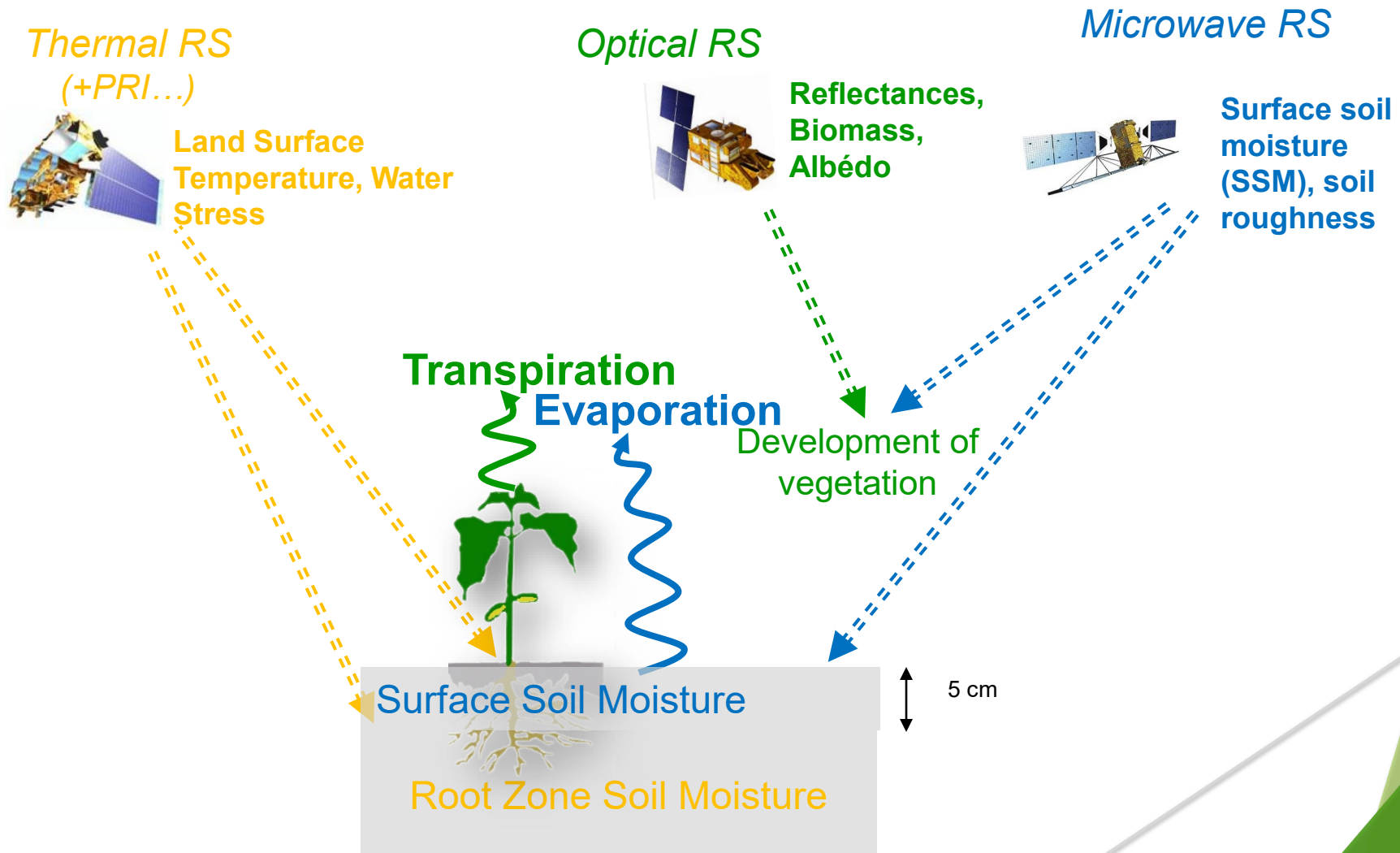
Eddy Covariance

Many unknowns: inputs (I), drainage $D = f(\text{soil characteristics})$, flux $G = f(\text{temperature gradient})$, available energy $R_n = f(T_s, \text{albedo, emissivity})$...

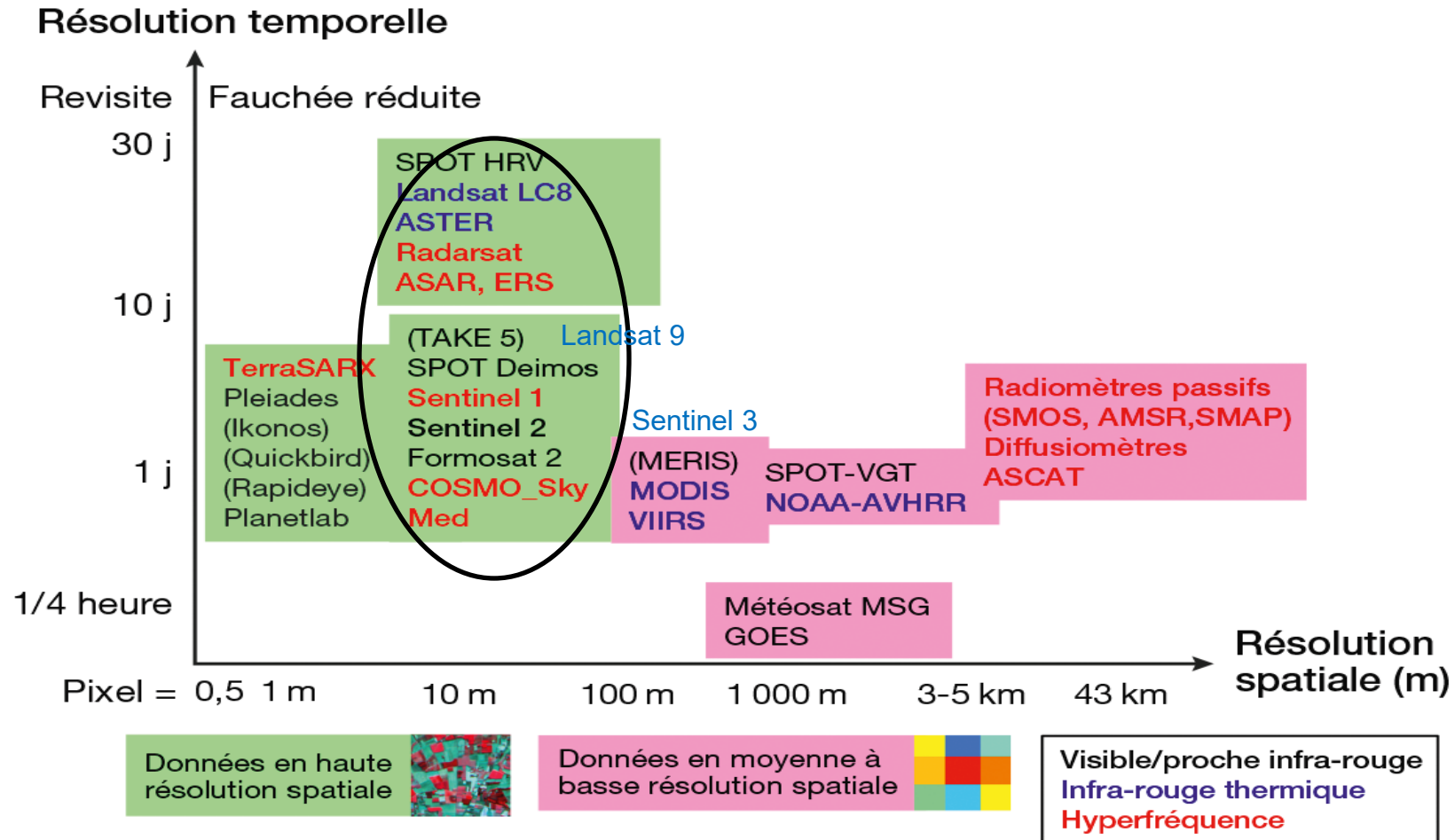
Different approaches of measuring evapotranspiration



The input of Remote Sensing observation for the estimation of evapotranspiration



State of Operational High Resolution Spatial Observation in 2022



Source: Courault et al. 2020

Sat'Irr - Satellite for Irrigation Scheduling

Sat'Irr timeline

2002

2012

2015

2019

2021

Applied research based on optical remote sensing (Spot, Landsat)

Applied research based on thermal remote sensing (Aster, Landsat)

Applied research based on radar remote sensing (Sentinel-1)

SAMIR: Satellite Monitoring of Irrigation
 - Offline
 - IDL
 - Multi-objective

First real-time experiment on wheat

First online prototype (Landsat-8)

Transfer to TerraNIS, France

Transfer to CRTS, Morocco

Sat'Irr registered



Convergence with thermal approach

WAGO©

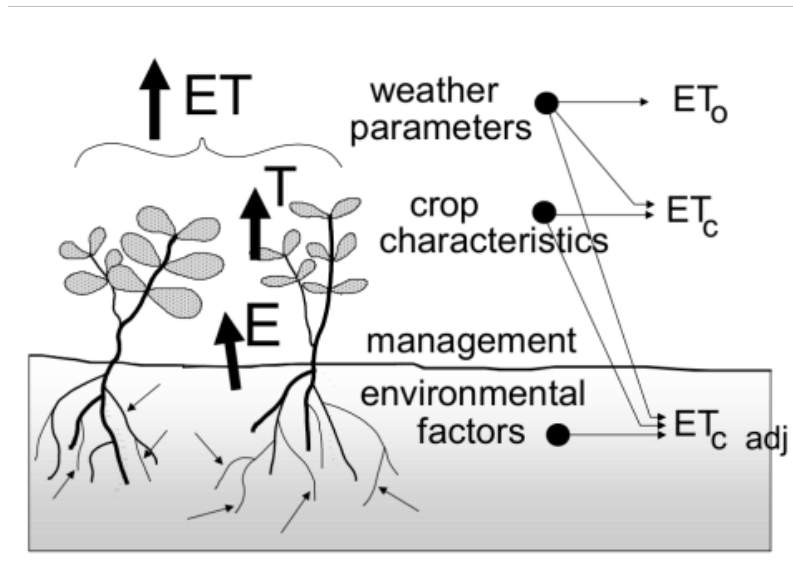
Euralis

Géant Vert

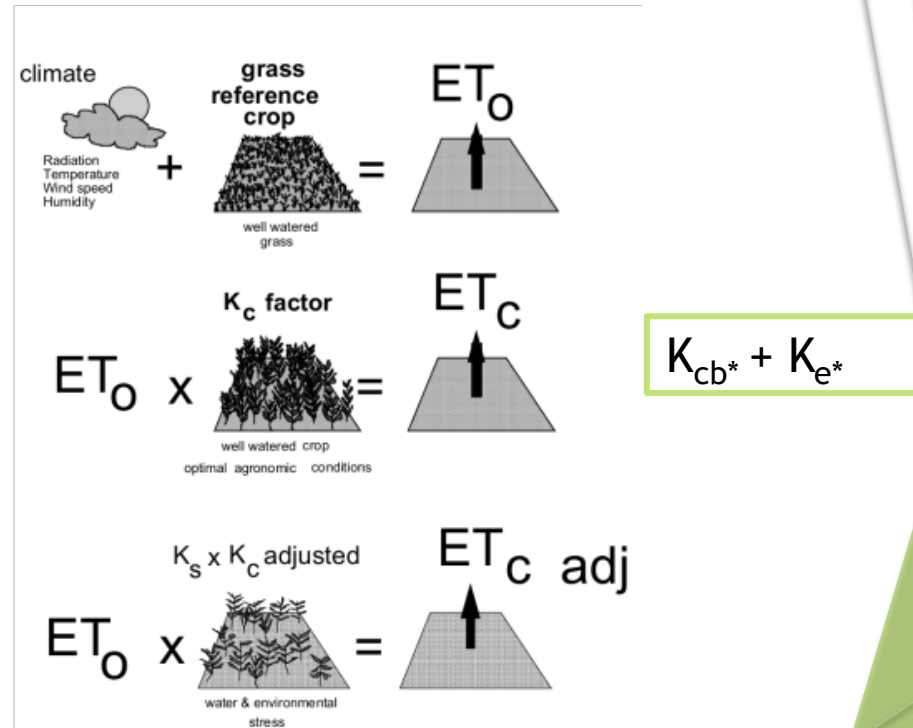
ESA Wineo



Recall about the FAO-56 method (Allen et al., 1998)



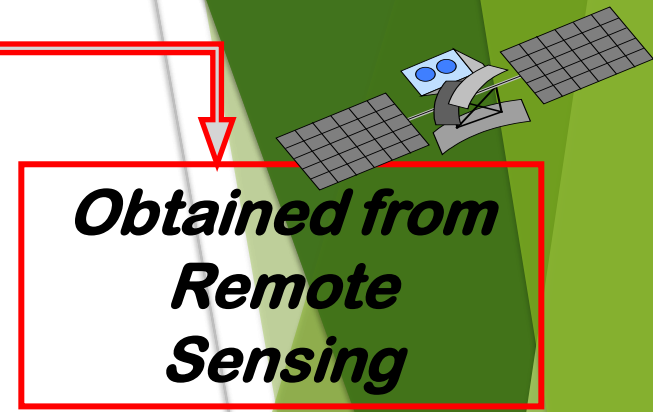
Evapotranspiration estimation



©FAO irrigation and drainage paper Allen & al. 2003

K_{cb^*} : Basal crop coefficient
 K_{e^*} : soil evaporation coefficient

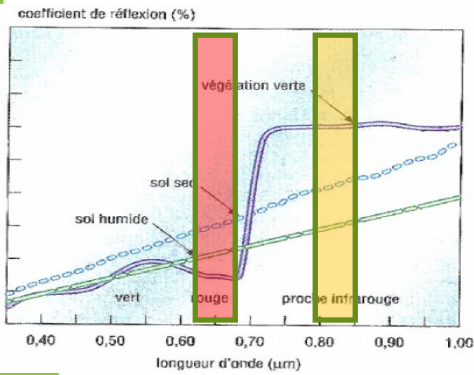
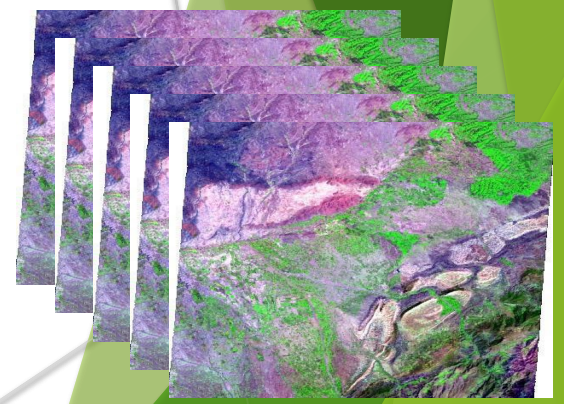
The FAO-56 method combined with optical RS



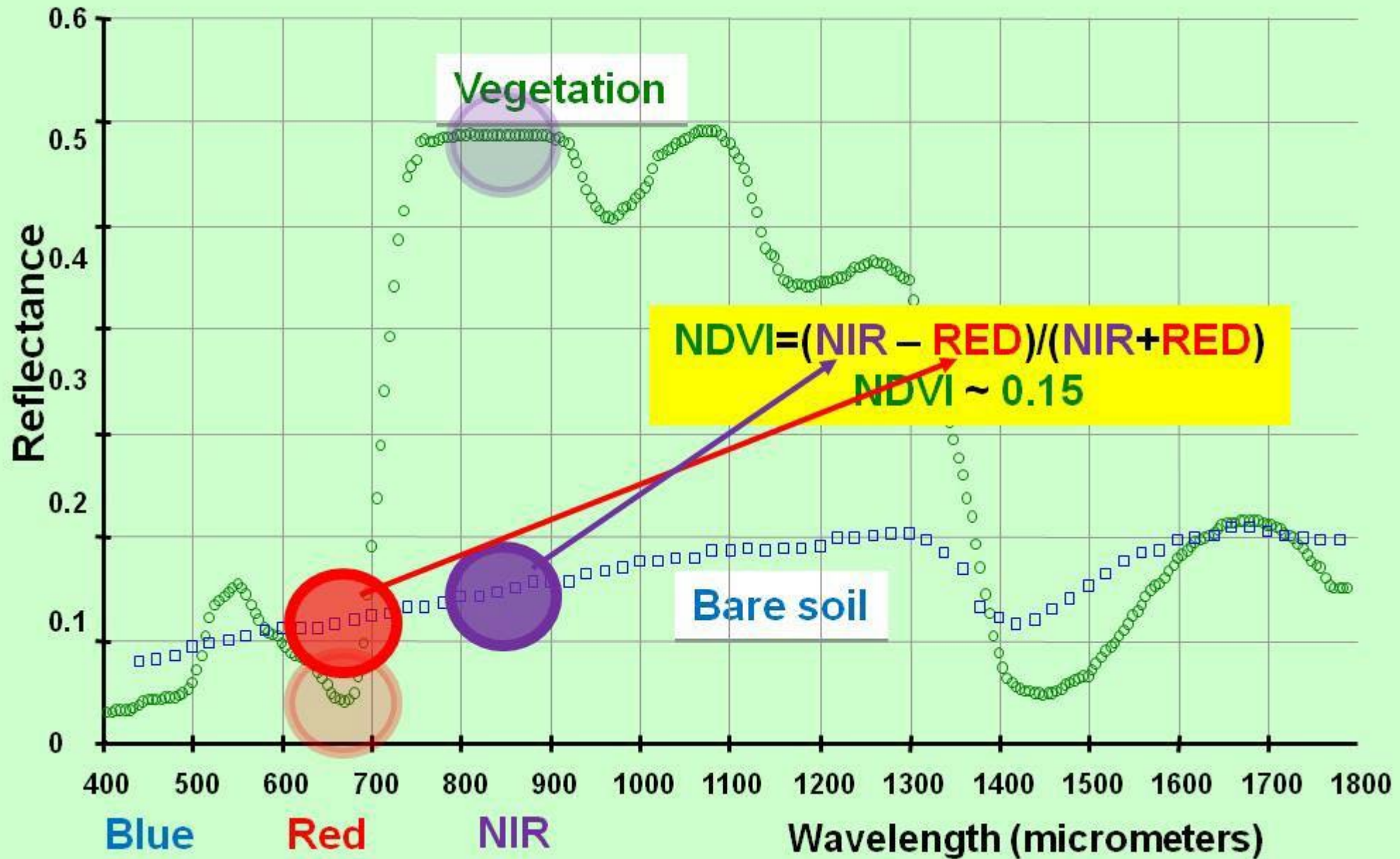
f(NDVI) depends on Land Cover

$$Kc = f(NDVI)$$

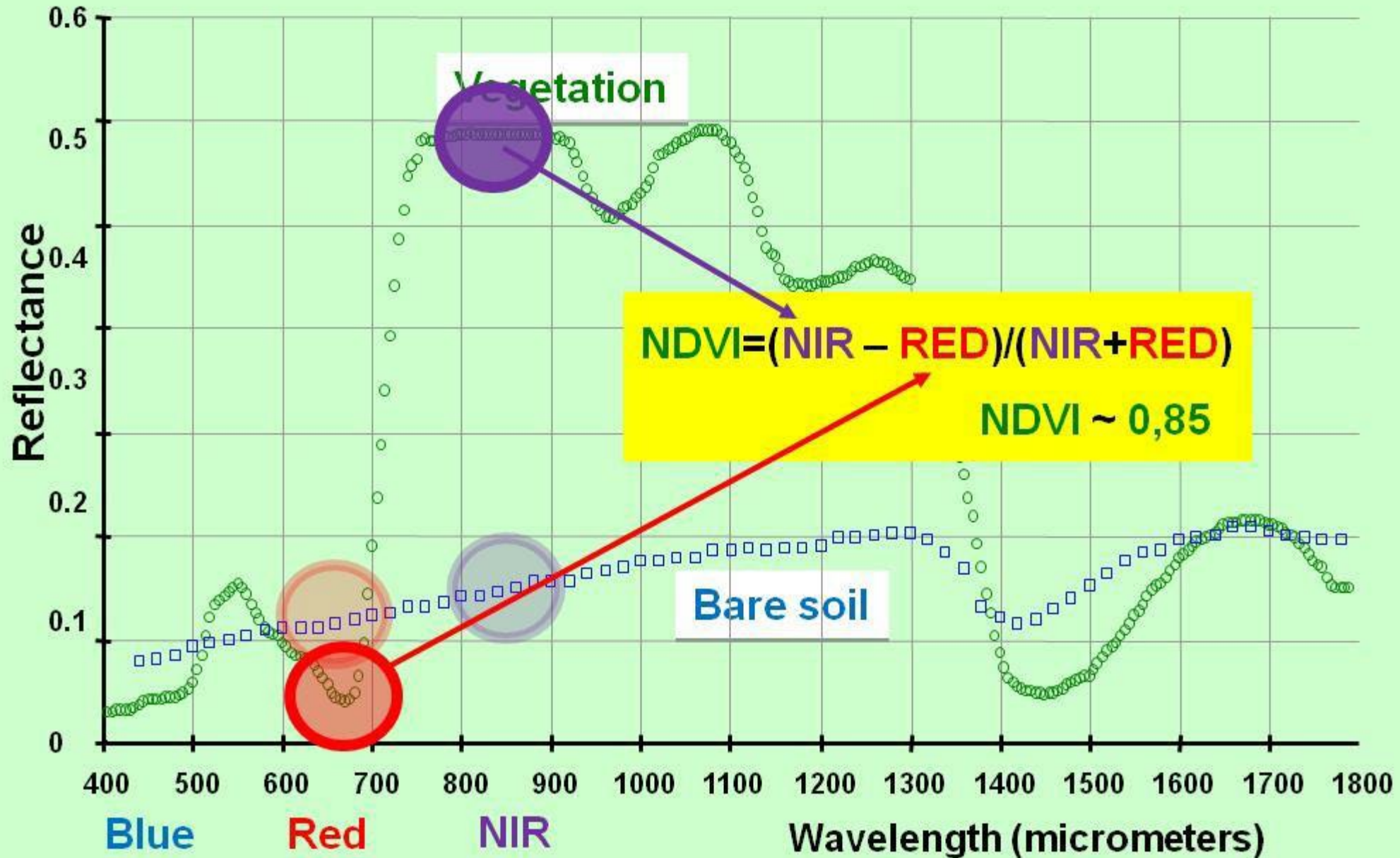
$$NDVI = (NIR - R) / (NIR + R)$$



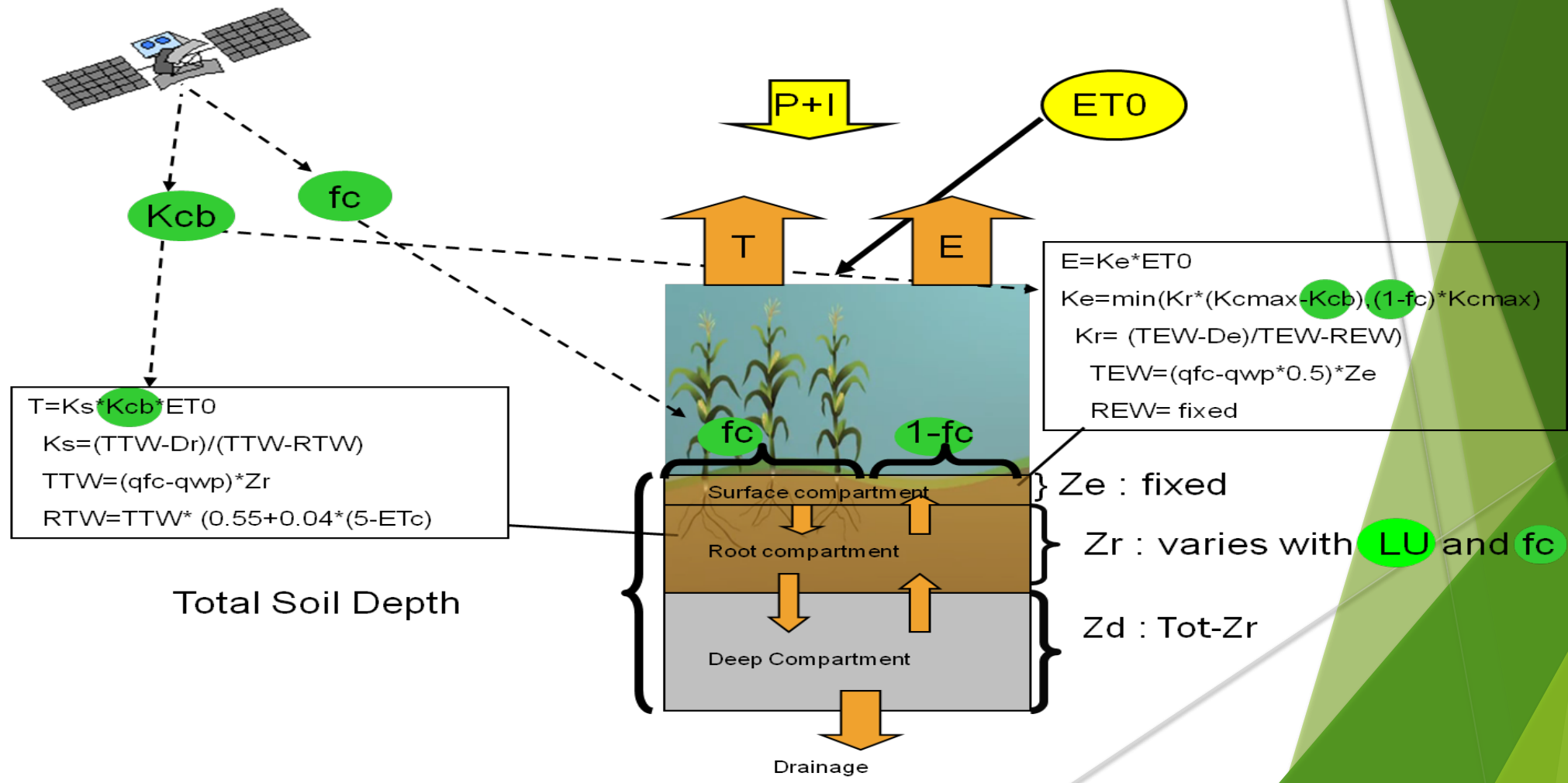
Spectral Signature and NDVI



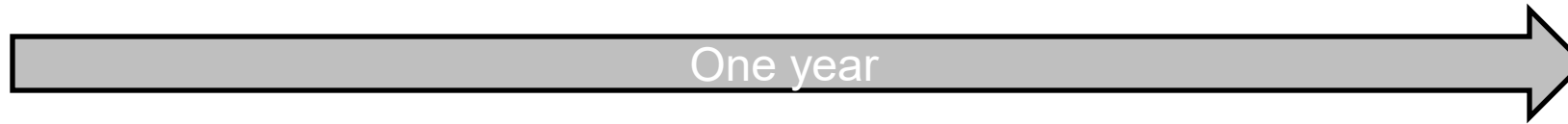
Spectral Signature and NDVI



The “dual-crop” approach combining a water budget and RS



Server side



0. Fill the year with climatology and an optimal Kcb and Fc



1. Get **weather**, **precipitation** and **Irrigation** of the last day



2. Update **weather forecasts**



3. If there is a new **NDVI image**, input it, interpolate between this image and the previous one
- If there is no new image, extrapolate between previous one and now



4. Compute **water budget**, with actual (past) and automatic trigger of irrigation (future)

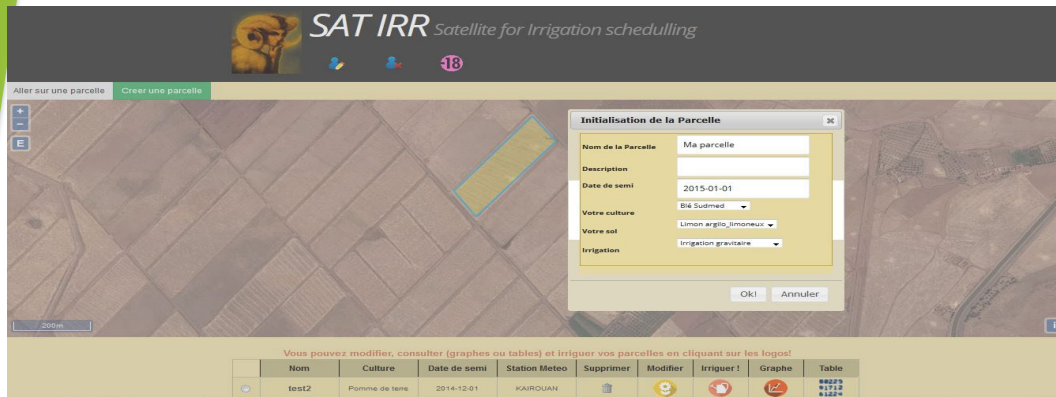
Next day



Client side



I draw and configure my plots



<http://osr-cesbio.ups-tlse.fr/Satirr>



I examine the results and the recommendation of irrigation

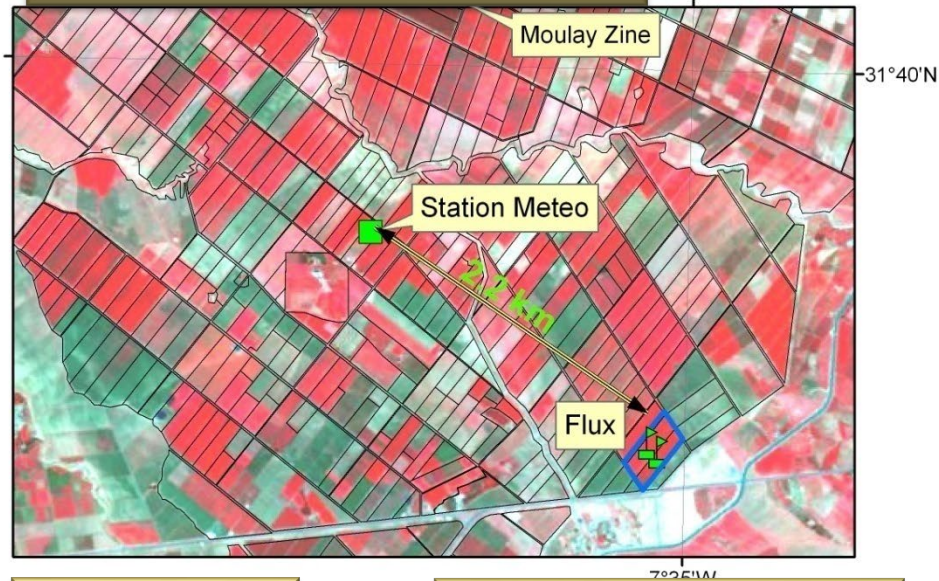
An experiment of irrigation scheduling in Morocco in 2013



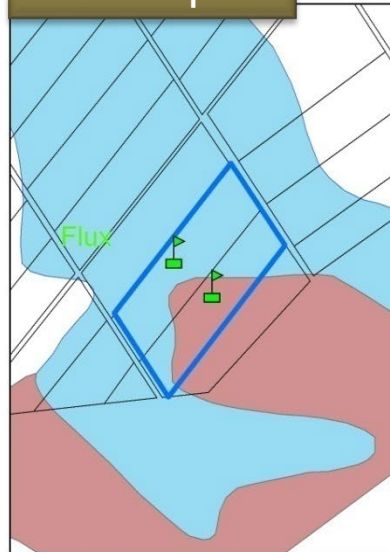
2 Plots of ~4ha

- Same Soil Texture (Clay: 36%, Sand 20%)
- Durum Wheat sowed 23/12/12
- Reference: Irrigation as usual
- Test: « Sat » Irrigation

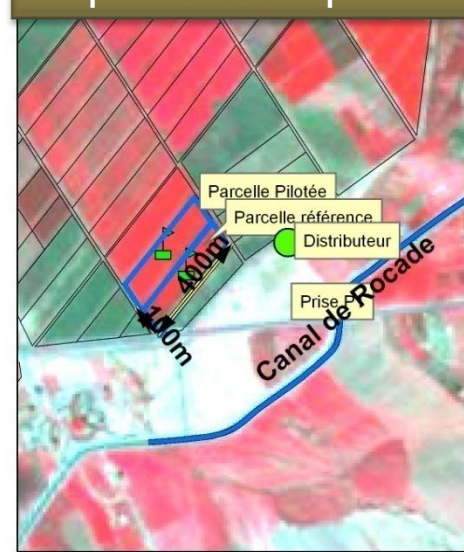
Irrigated Sector



Soil Map



Experimental plots



Profondeur m	SOIL_TYPE	TEXTURE	FC_MIN	FC_MAX	WP_MIN	WP_MAX	REW_MIN	REW_MAX
0-200	Silty clay	Argile limoneu	0.30	0.42	0.17	0.29	8.00	12.00
200-1500	Clay	Argile	0.32	0.40	0.20	0.24	8.00	12.00
1500-2000	Clay loam	Limon argileu:	0.32	0.33	0.17	0.20		



METEO (forcing)

- Alfalfa maintained to 15cm
- Installed January 3rd, 2013
- ET₀ very comparable to the meteo station of Marrakech

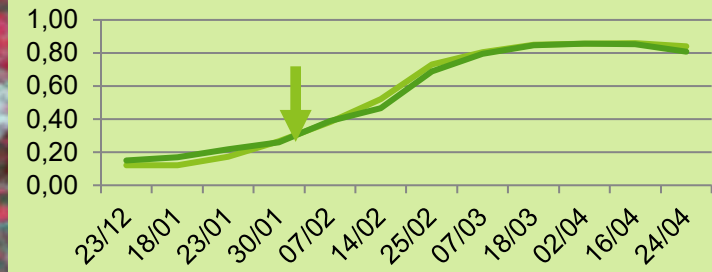
FLUX (validation)

- South installed on Dec, 24th 2012
- Nord installed on Dec, 25th, 2012



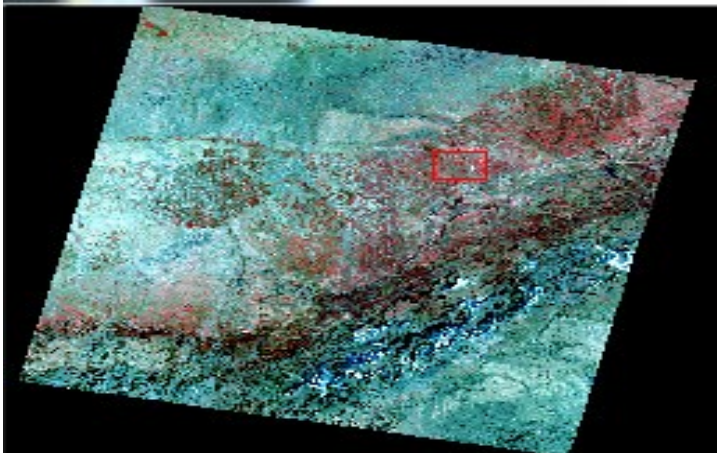
- Soil Texture (Parametrization) (Validation)
- Areal Biomass (Yields estimates)
- Technical itinerary and irrigations inputs
- Cropscan Measurements and LAI

Jan, 31

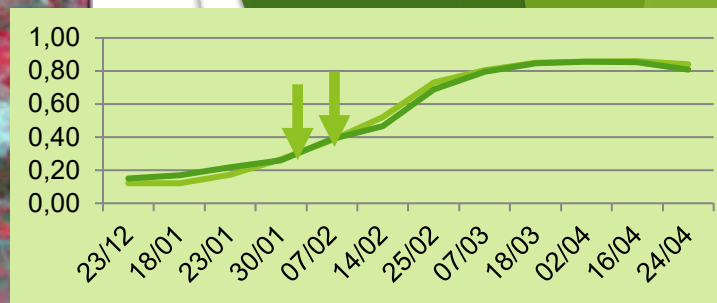


#1 Scroll (0.03200)

#1 Zoom [5x]

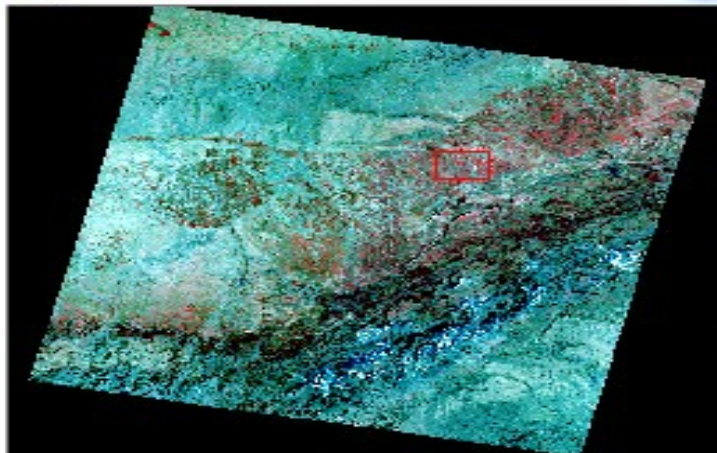


Feb, 05

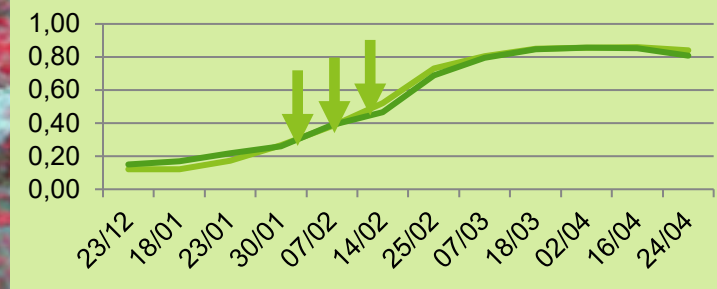


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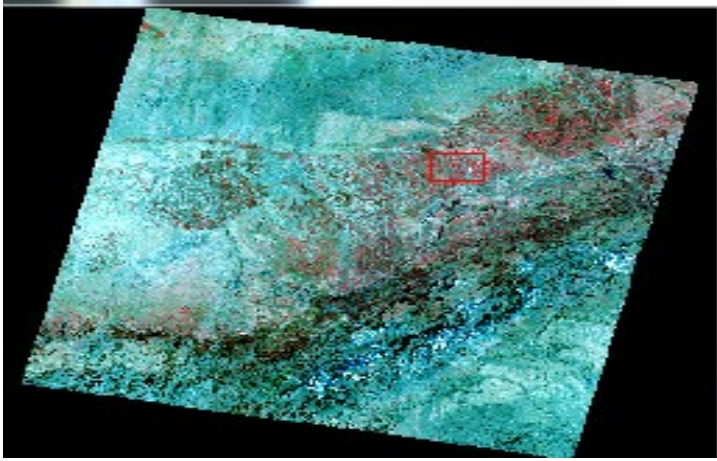
#1 Zoom [5x]



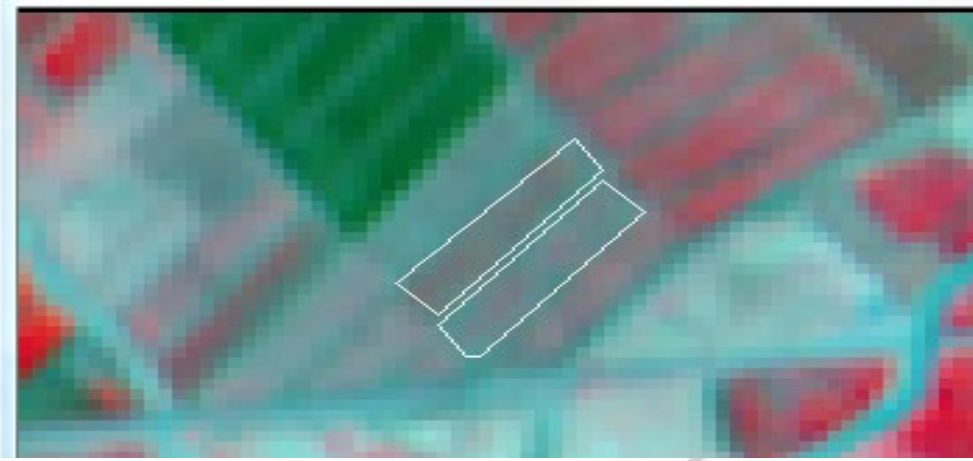
Feb, 10



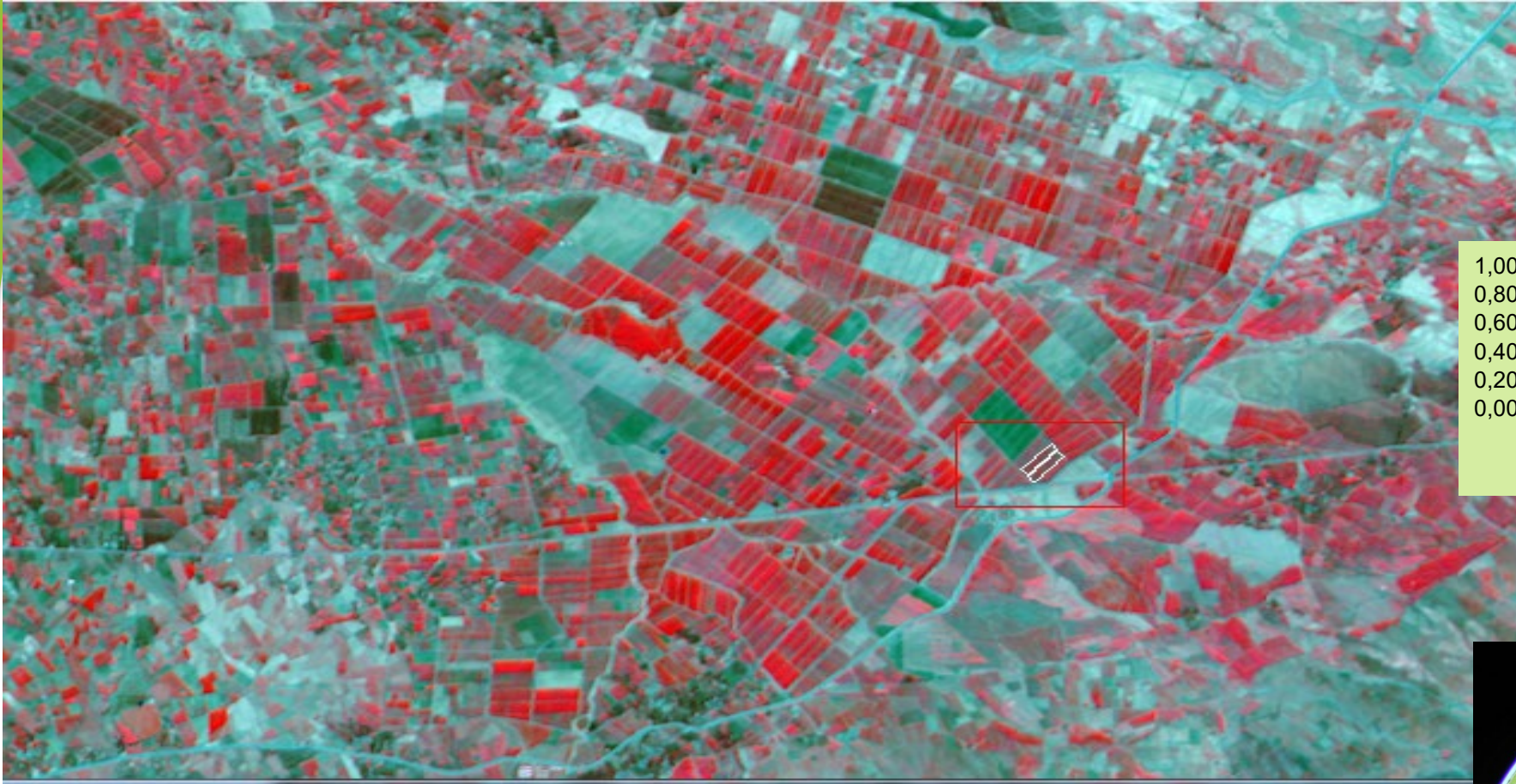
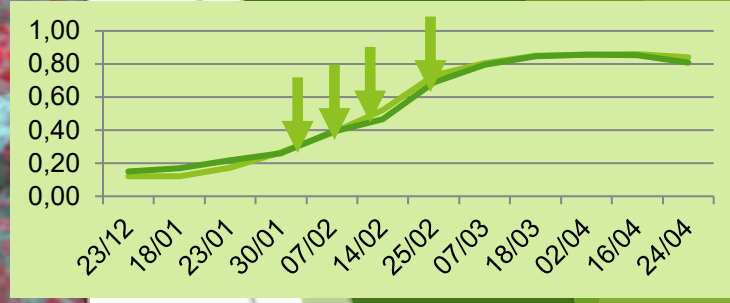
#1 Scroll (0.03200)



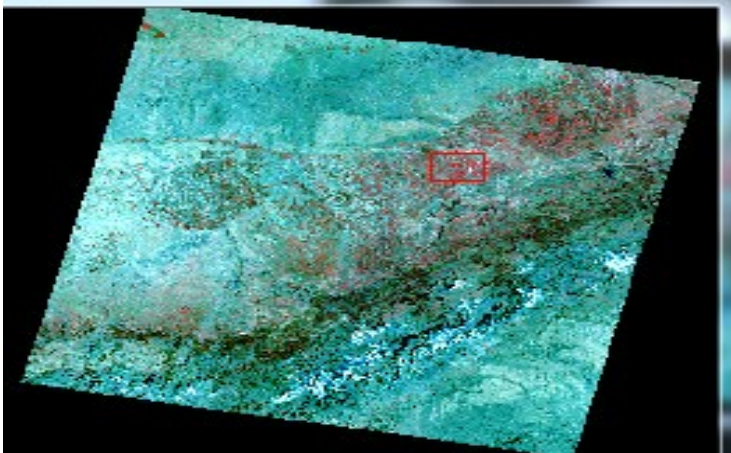
#1 Zoom [5x]



Feb, 25



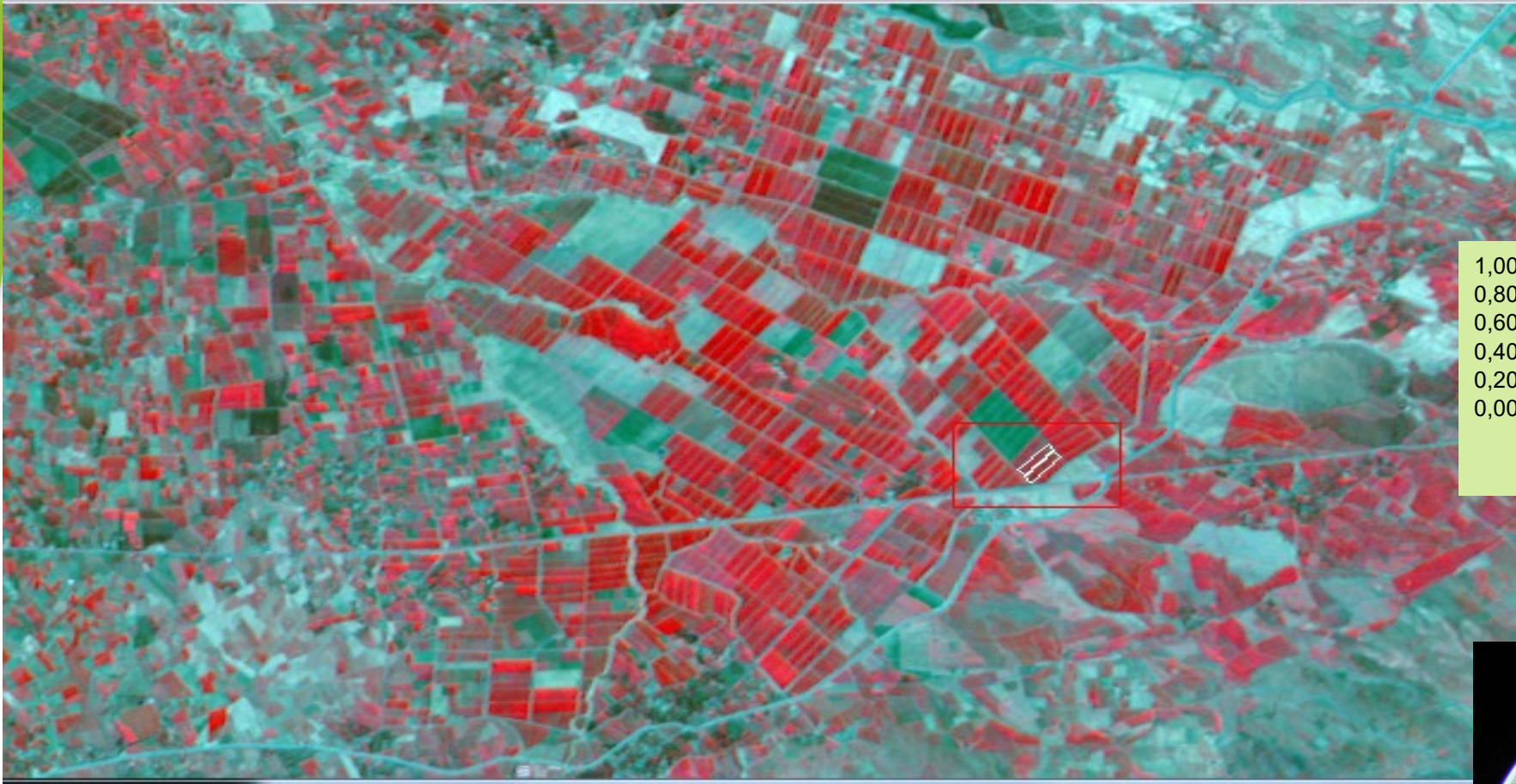
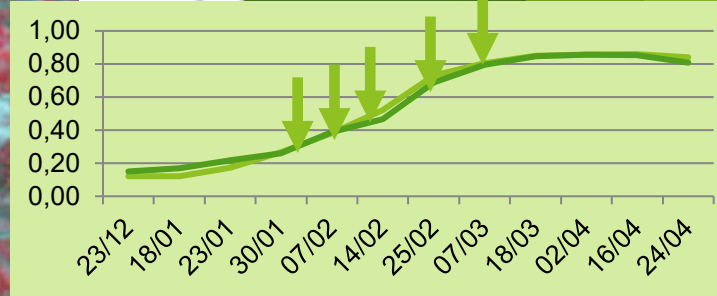
#1 Scroll (0.03200)



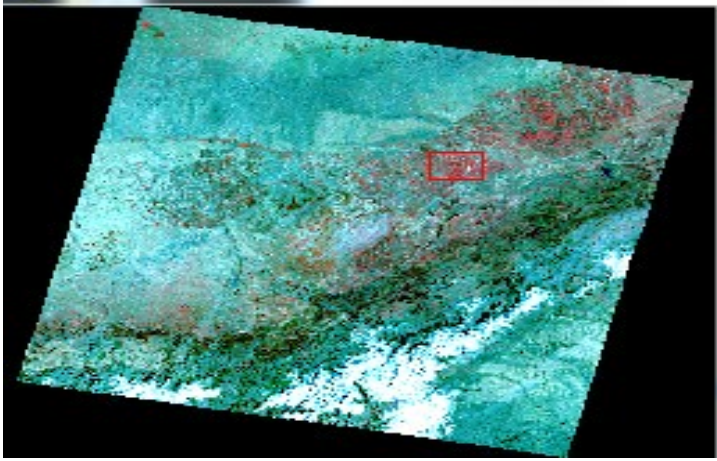
#1 Zoom [5x]



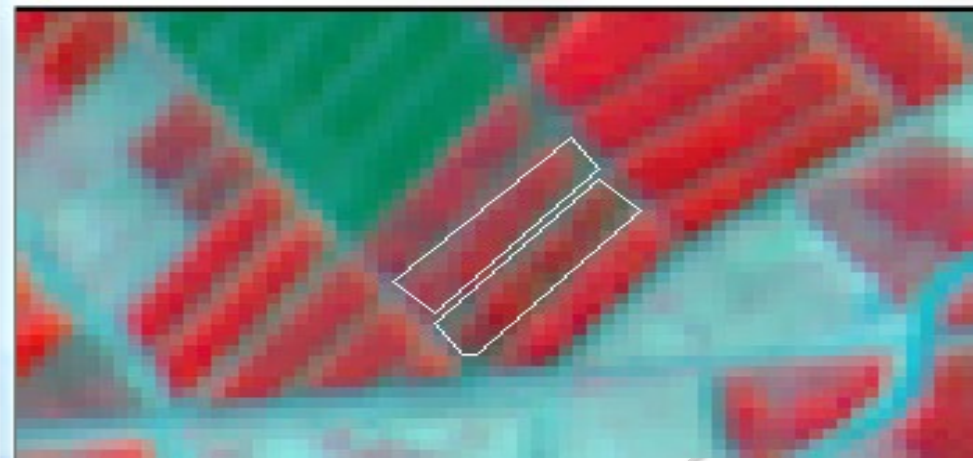
Mar, 07



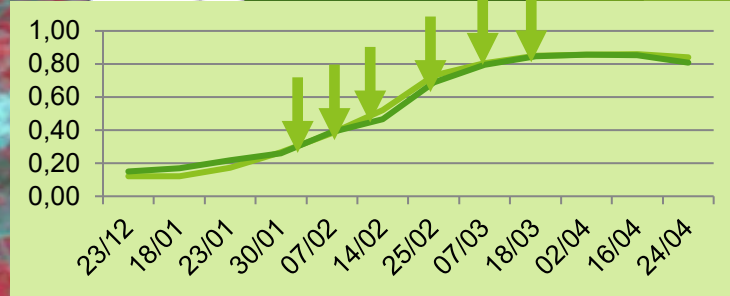
#1 Scroll (0.03200)



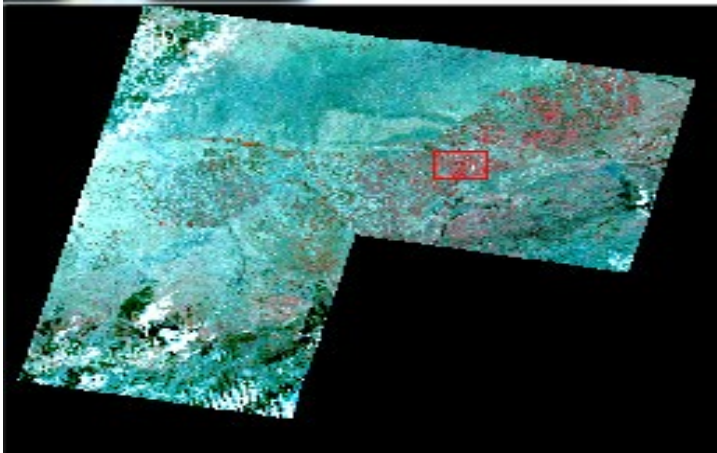
#1 Zoom [5x]



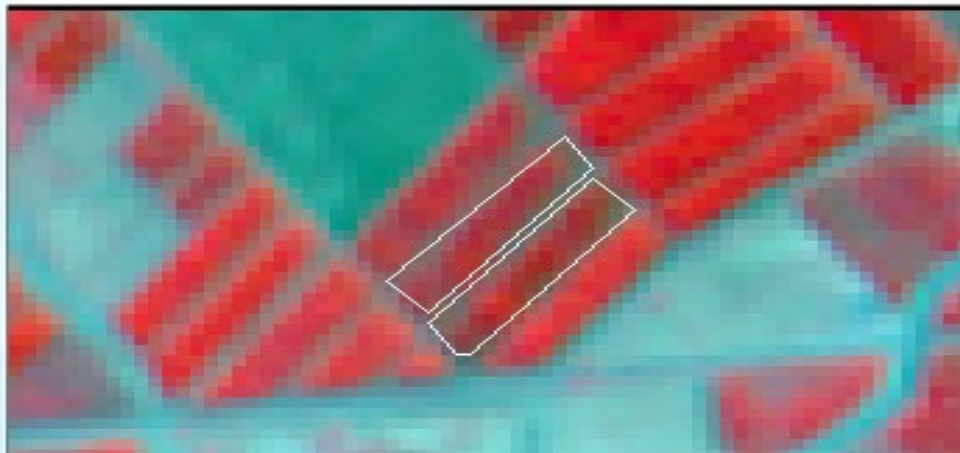
Mar, 17



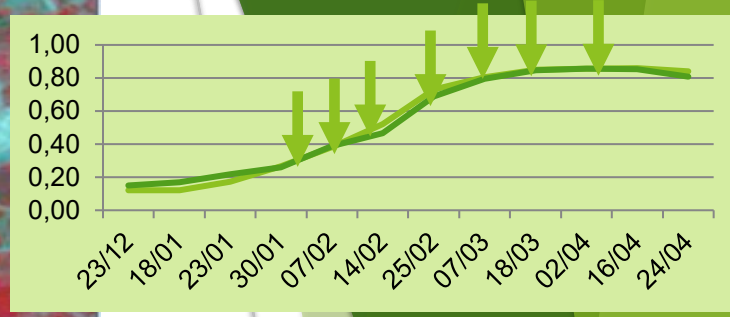
#1 Scroll (0.03200)



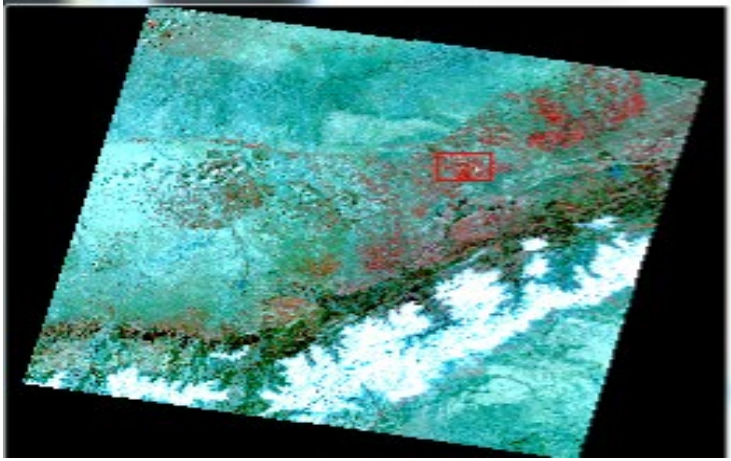
#1 Zoom [5x]



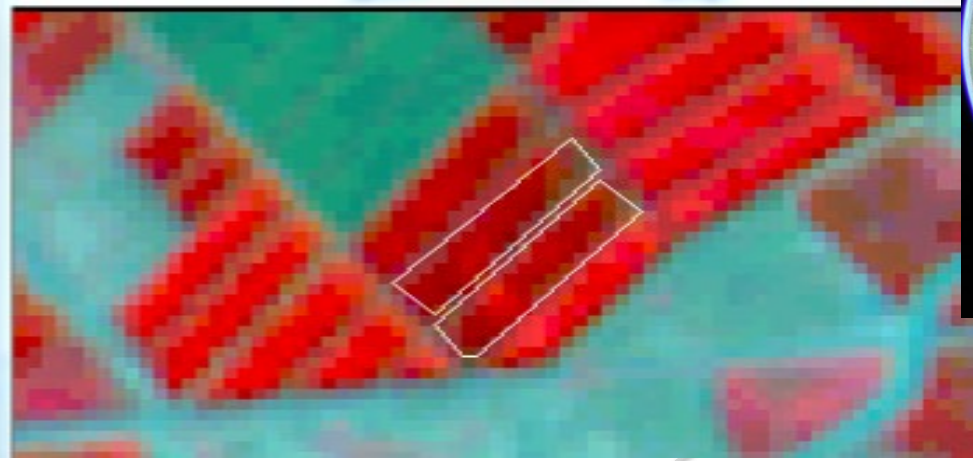
Apr, 06



#1 Scroll (0.03200)

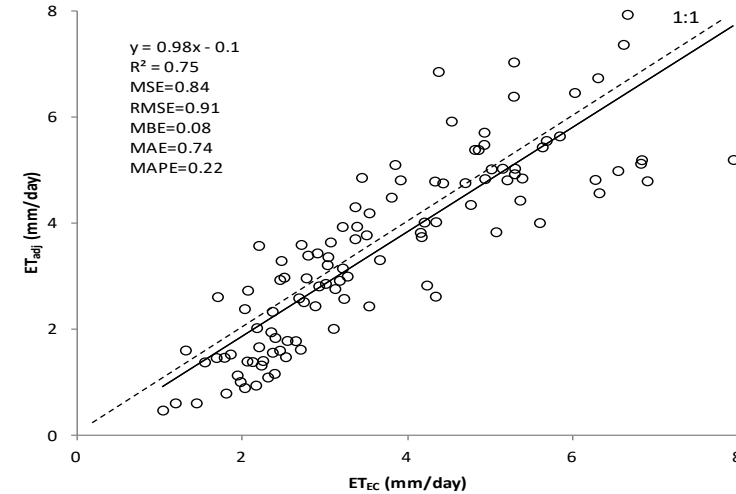
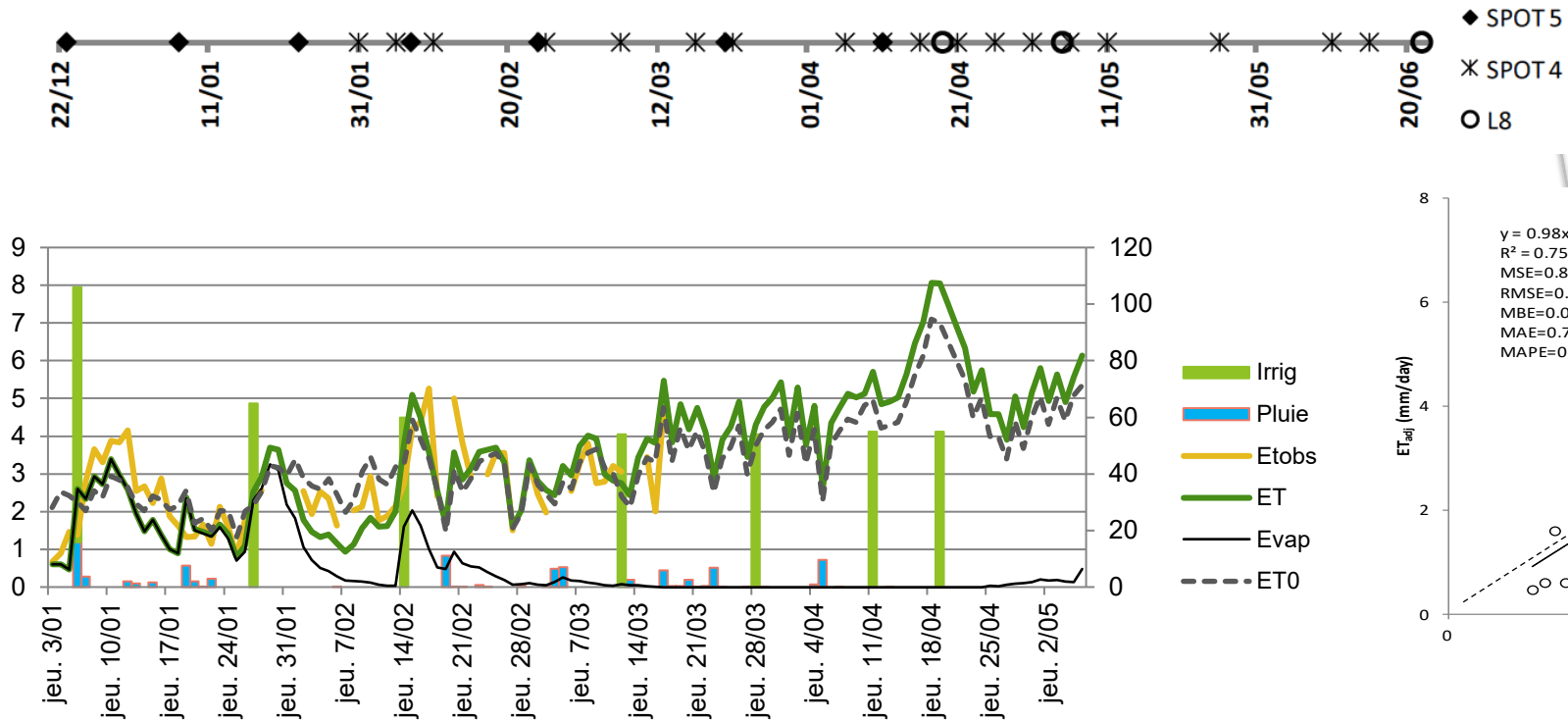


#1 Zoom [5x]

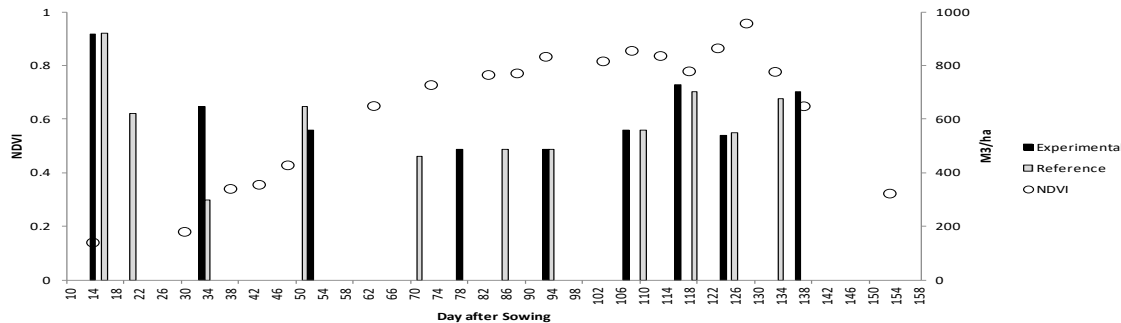


Imagery
SPOT4
Take5

Evapotranspiration
estimates



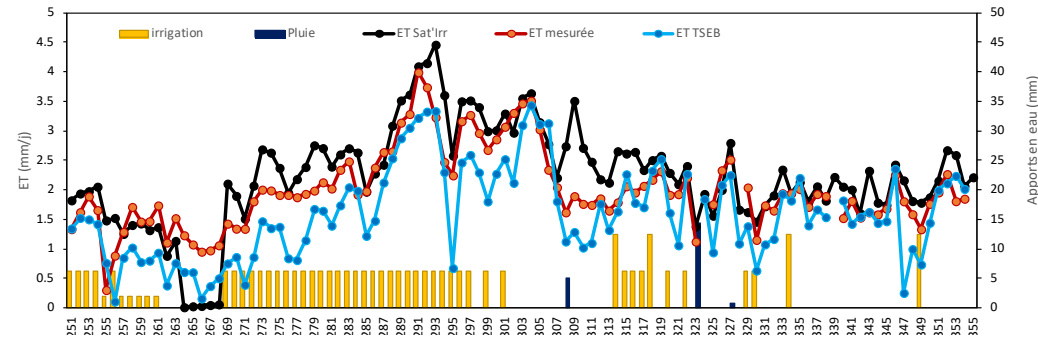
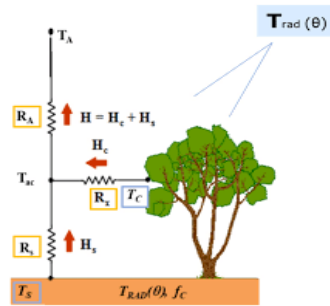
Irrigation scheduling. Sat'irr vs farmer



- ET0: 604 mm, Rain: 99 mm
- Irrigation: **less total water** (562mm against 640 mm) and **less water turns** (9 against 11), but irrigation doses are not controllable.
- **Fair results on Yields** in spite of the crust problem:
 - Minus 20% on straw
 - Equal grain yield
 - Better Water productivity on grain (1.34 m³/kg against 1.52 m³/kg for the reference plot)

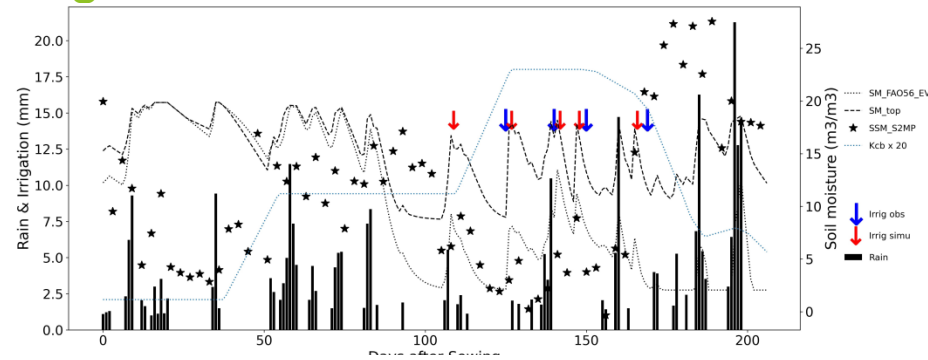
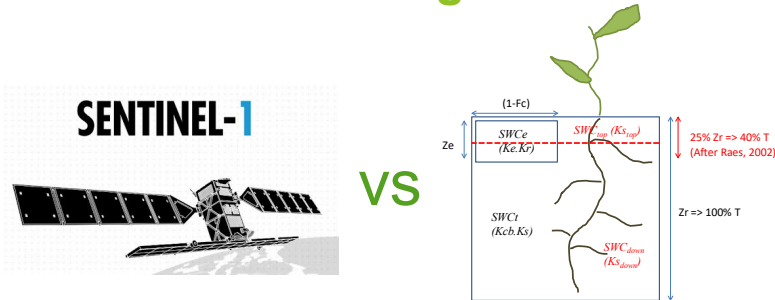
Sat'Irr: on-going research

* Assimilation of thermal infra-red ET



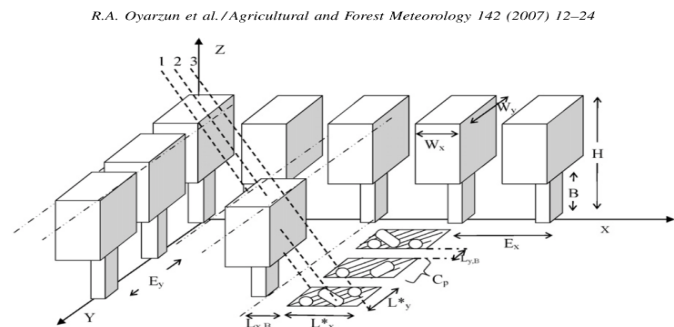
Tavernier et al., 2013
Boulet et al., 2015
Diarra et al., 2017

* Estimation of irrigation events comparing SSM from S1 and model

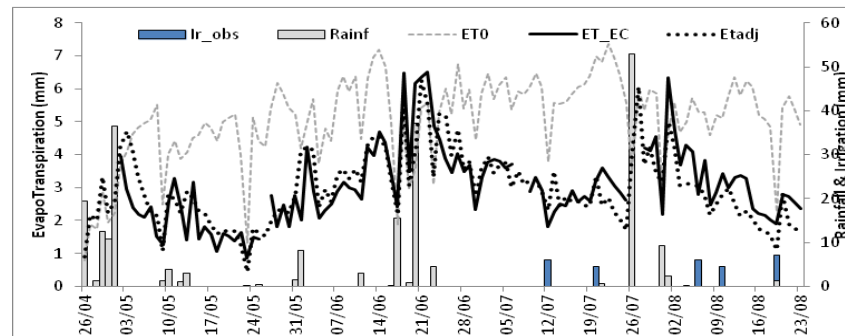


Irrigation+ project
Le Page et al., 2020
Ouaddi et al., 2020

* Vineyard: better estimate of Kcb by estimating intercepted radiation



R.A. Oyarzun et al. / Agricultural and Forest Meteorology 142 (2007) 12–24



WineEO project
Le Page et al., submitted



Thank you for your attetion





Sun'Agri

Dynamic agrivoltaics to protect crops from the effects of climate change



Sun'Agri

01

Context

Crops largely threatened by climate change

Context

Agriculture faces new challenges

€ 9b: yearly cost of drought damages on agriculture in Europe

It will **increase** with climate change

+ 2°C in France by 2050

An average **10 to 25 % decrease** in precipitation in France by 2050





Sun'Agri

01

Our agrivoltaic solution

Sun'Agri Solution = Unique "Smart louvers"

Protecting crops against water stress, thermal and radiative stresses and producing electricity. **Crop Priority.**



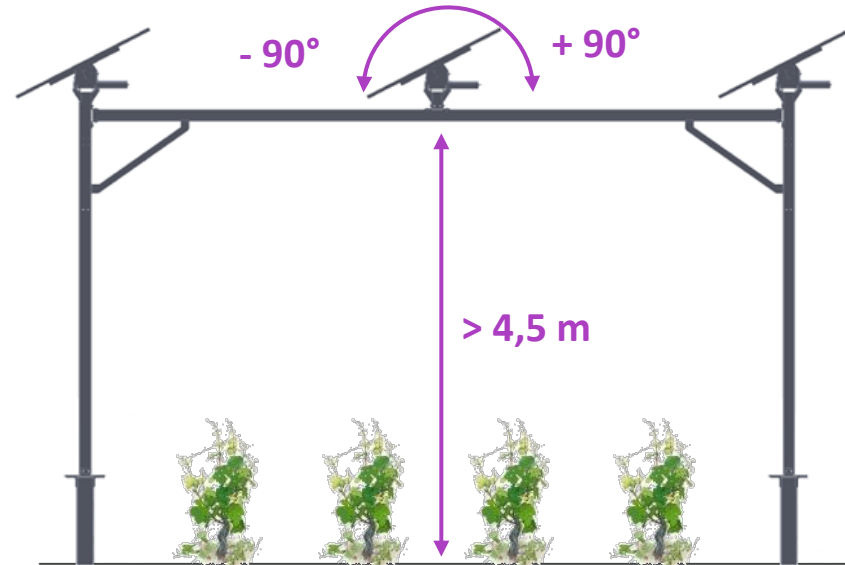
Excessive radiation



Hydric stress



Climate hazards



A well-adapted structure for the agriculture works







Sun'Agri

01

From R&D to optimized
solution

13 years of collaborative R&D

2009-2013

2013-2017

2017-2023

> 2021

SUN'AGRI 1
Proof of concept

SUN'AGRI 2
Products and softwares development

SUN'AGRI 3
Demonstration phase

COMMERCIAL DEVELOPMENT

1st FIXED SITE

1st DYNAMIC
SITES

15 EXP. SITES
20 COMMERCIAL SITES

FRANCE
INTERNATIONAL

INRAE

INRAE
Photowatt®
cea ines
INSTITUT NATIONAL
DE L'ENERGIE SOLAIRE

INRAE
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Le laboratoire de Technologie des Plantes
Sous Serre et Environnements
leperse Montpellier
G-eau
Gestion de l'Eau, Acteurs, Usages

INRAE
PSH
UR 1115

Projet Systèmes Biodiversifiés
ABSys
Biodiversified Agrosystems



INRAE MUSE
Unité expérimentale de
PECH ROUGE - UE 0999

INRAE
UE - Maraîchage

Mistea
Mathématiques, Informatique et Statistique
pour l'Environnement et l'Agronomie



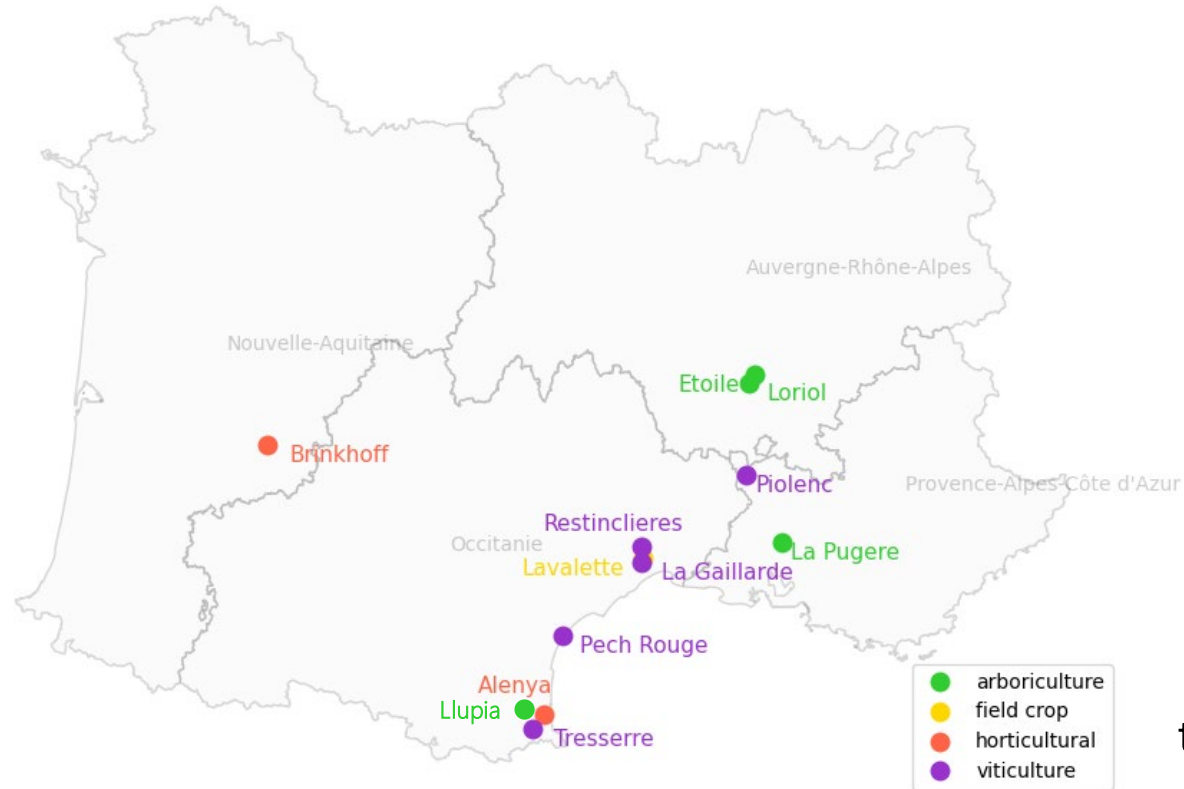
From Experimental site



To real size demonstrator



Today : 9 sites in operation in the south of France



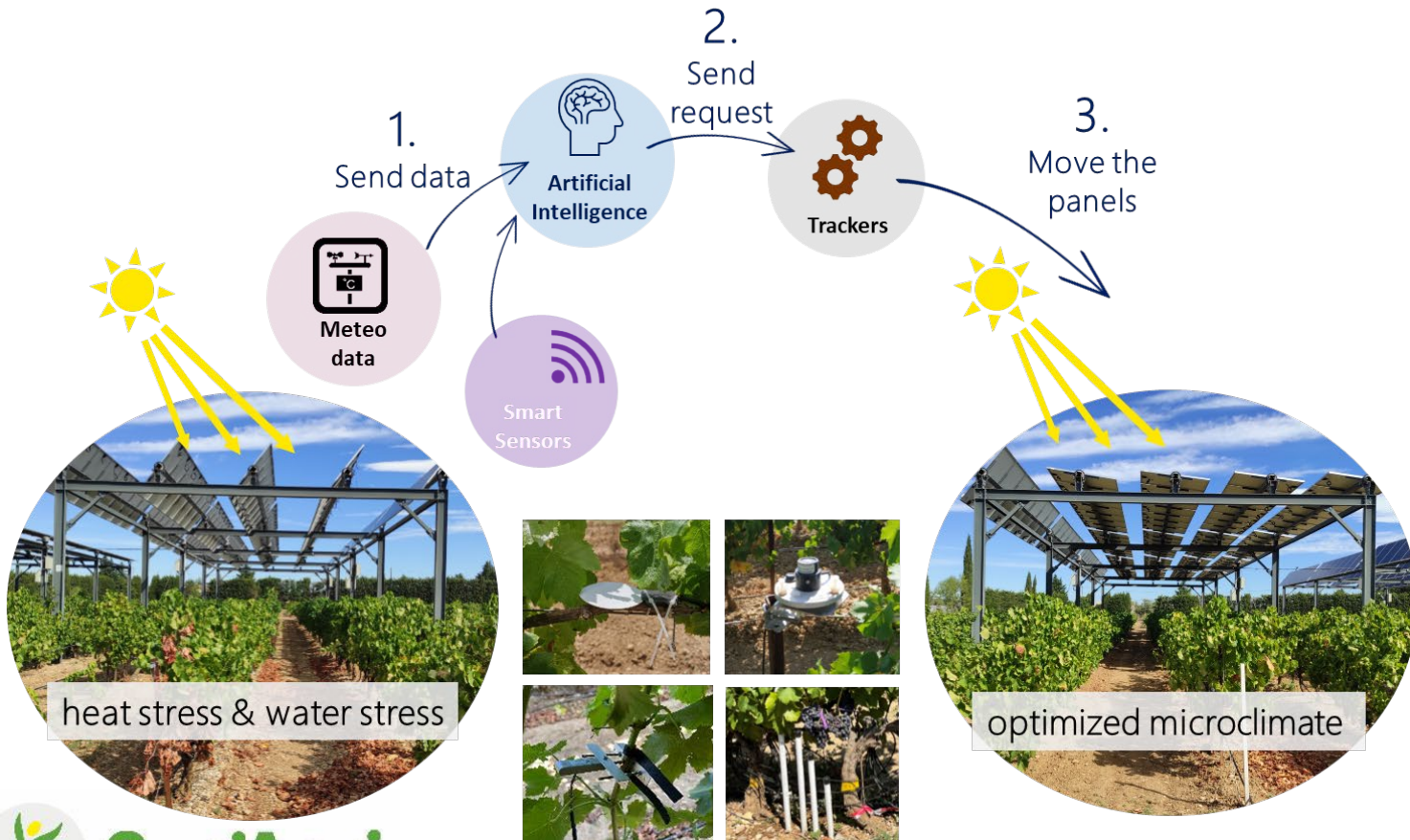
01

Our core expertise

Sun'Agri adds artificial intelligence algorithms to

define protection strategy using a smart infrastructure, composed of solar panels, sensors, ...

... and create a micro-climate adapted to crop needs



-4°C
during heat waves

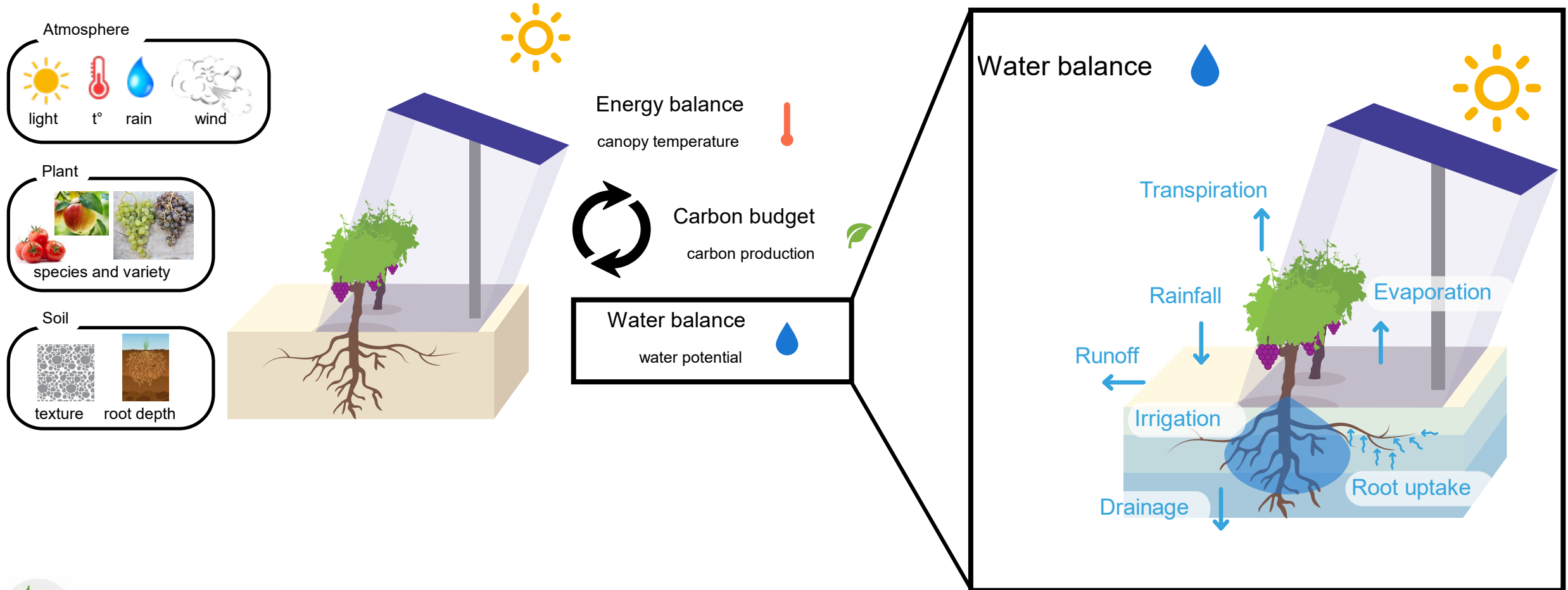


+2°C
during frost

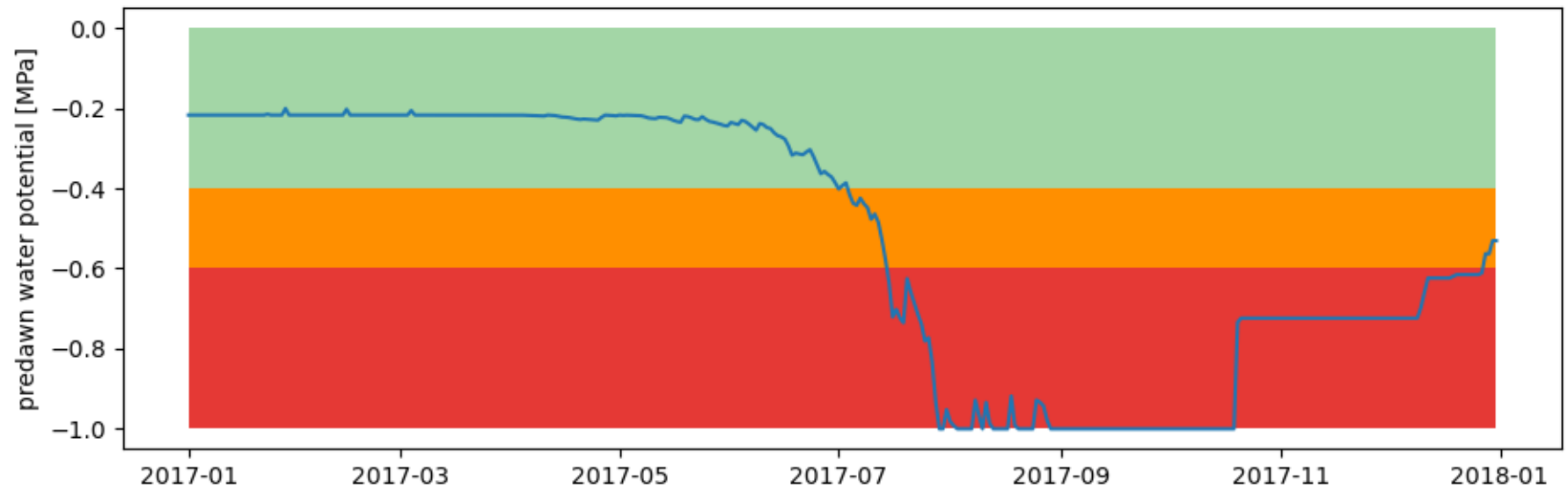
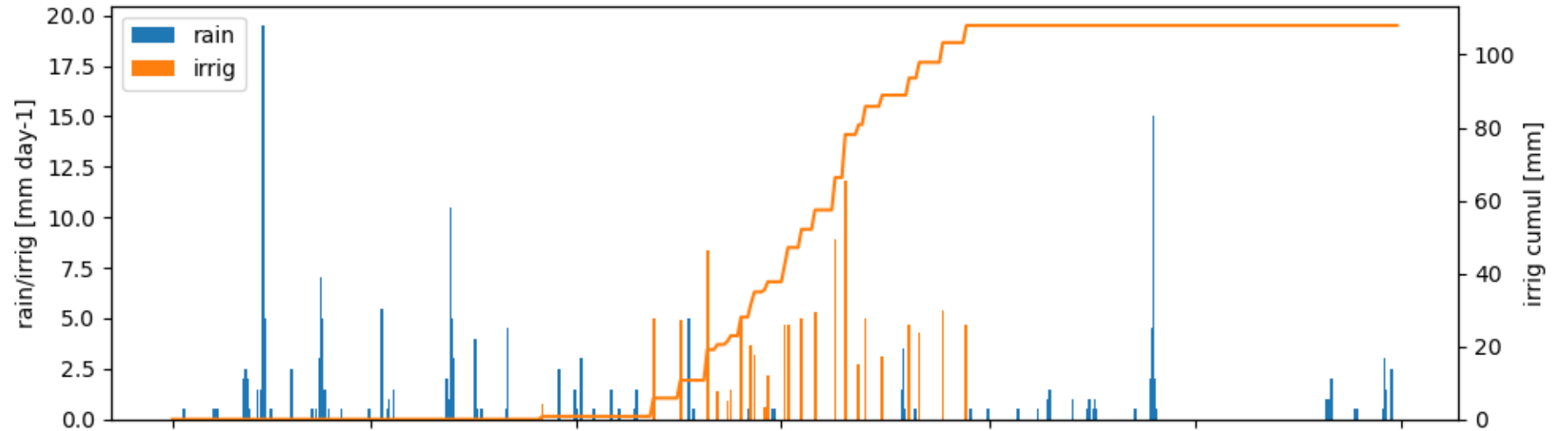
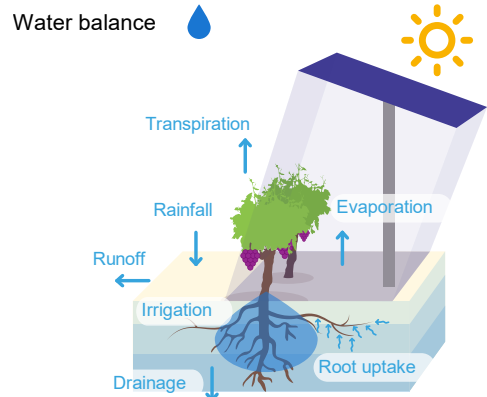


-30%
Water savings

How to steer panels to protect plants? Crop modeling



Water balance modeling to characterize water status





Sun'Agri

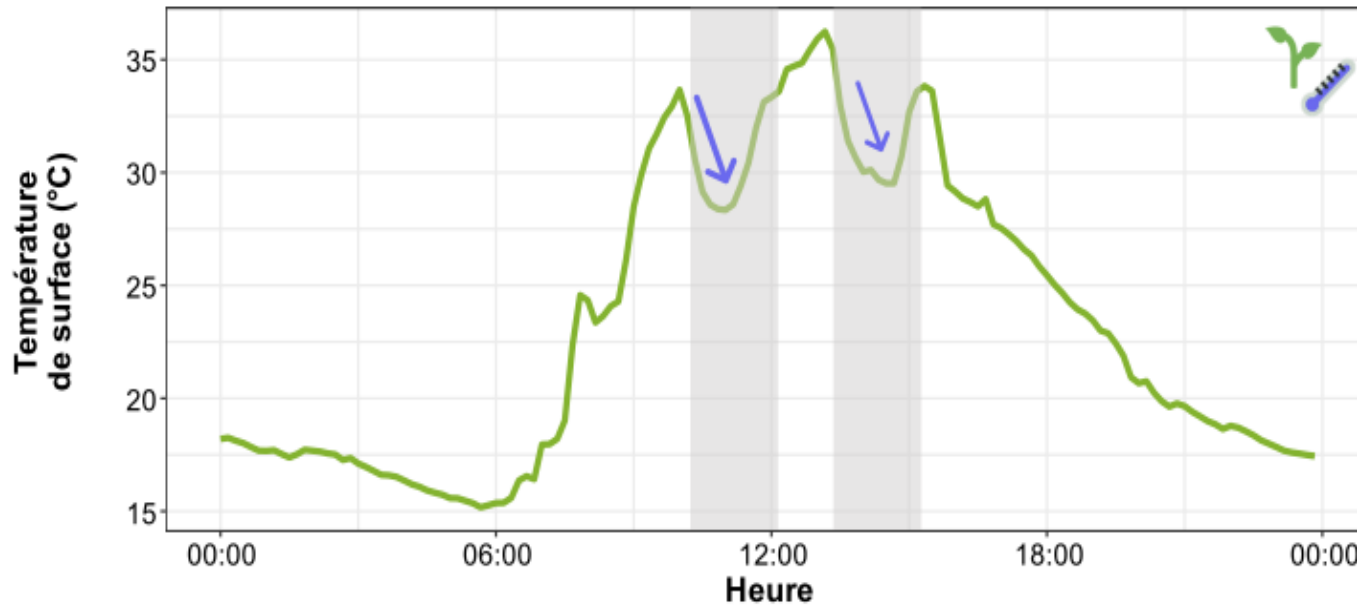
01

Results

Reduce heat stress



- Air temperature Decrease **2 to 4°C**
- Less **leaf burns & fruit burns**
- More growth under AVD → **14 days of growth more**



Source : Données capteurs Sun'Agri Tresserre

Tresserre, 2020



Control, 02/07/19



AVD, 02/07/19

Piolenc, 2019

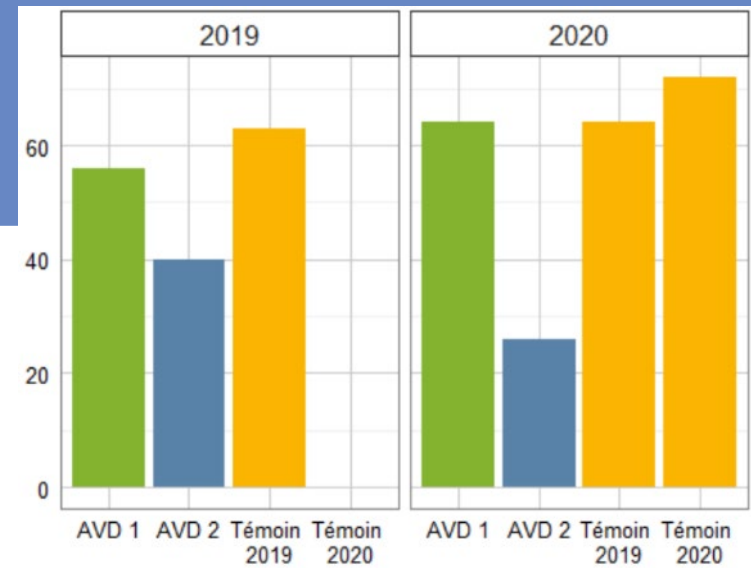
Reduce water stress



Better water status of plants under AVD

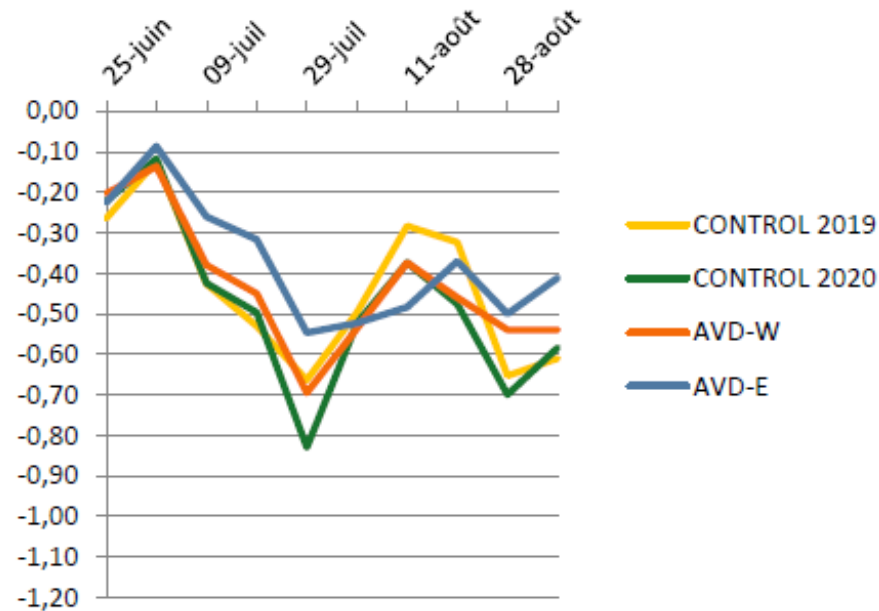
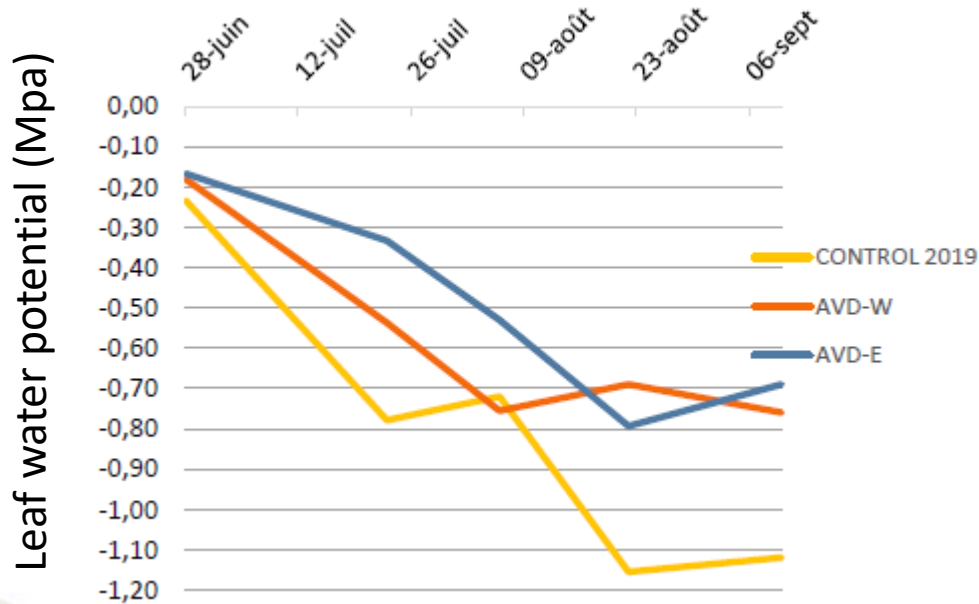
-12 to -37%
of water needs

Annual amount of water - irrigation (mm)



Piolenc, 2019 & 2020

Dynamics of predawn leaf water potentials (2019 left & 2020 right)



Piolenc, 2019 & 2020

Thank you!



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damien.fumey@sunagri.fr





▶ WE INVITE YOU TO JOIN THE EIA AND TAKE PART IN BUILDING A SUSTAINABLE FUTURE FOR IRRIGATION!

▶ [HTTPS://IRRIGATIONEUROPE.EU/](https://irrigationeurope.eu/)

▶ LINKEDIN :

<https://www.linkedin.com/company/european-irrigation-association/?viewAsMember=true>

▶ FACEBOOK :

[HTTPS://WWW.FACEBOOK.COM/FLEURMARTIN207](https://www.facebook.com/fleurmartin207)

