



EarthDaily  
agro

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**Introducing the EarthDaily Constellation,**  
a scientific-grade Earth observation mission with daily revisit time

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# EarthDaily Agro

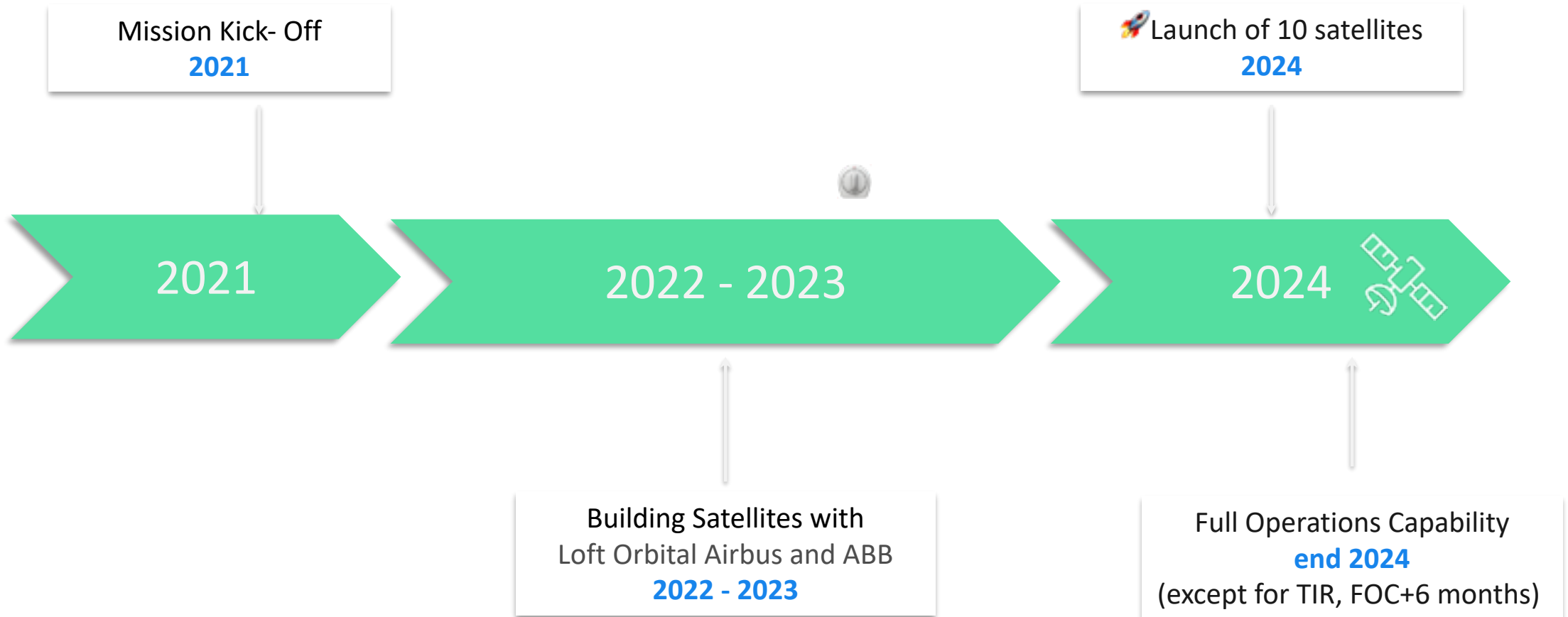
- **EarthDaily Analytics** (EDA) is a vertically-integrated software and analytics space company developing world-first technologies in data services, satellite processing, ML and actionable insights. Its subsidiary **EarthDaily Agro** (formerly Geosys) has over 35 years of experience in satellite and weather data agricultural analysis delivering services and expertise in over 50 countries.
- **EarthDaily Agro mission** is to help professionals in agriculture and natural resources management make better decisions using information and geographic technologies, and the latest results in agronomic research.
- **Customer portfolio** spans all major sectors, such as crop insurance, agriculture lending, commodities, precision agriculture, food and feed processing, and crop consulting, as well as to governments and international organizations.

*EarthDaily Agro office's locations*



# The EarthDaily Constellation

## Mission timeline





# The EarthDaily Constellation

## Space segment details



<b>Number of satellites</b>	10 (9 + 1 in-orbit spare)
<b>Launch period</b>	Q1-Q2 2024
<b>Spacecraft</b>	Arrow bus from Airbus
<b>Design life</b>	10 years
<b>Orbit</b>	Sun-synchronous, <b>10:30 AM local time passover</b>
<b>Orbit control</b>	Precisely maintained for consistent viewing over mission life
<b>Revisit</b>	<b>1-day, daily coverage of ~100% of Earth's landmass</b> <12h latency available
<b>Spacecraft mass</b>	200Kg (total) 74kg (payload)
<b>Swath</b>	<b>240 km</b>
<b>Altitude</b>	~630 km
<b>Viewing angle</b>	<b>Nadir (always)</b>
<b>Delivery method</b>	Cloud distribution, API-first approach

# The EarthDaily Constellation



## EarthDaily Constellation

EarthDaily Constellation will be deployed in early 2024 and will utilize 22 Spectral bands curated for agribusiness.

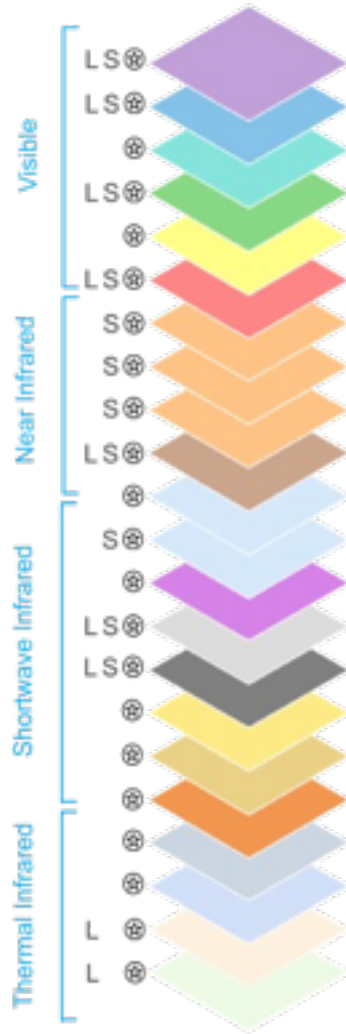
 **5m GSD**  
3.5m product sampling

 **Worldwide Coverage**

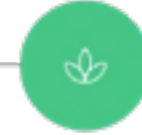
 **Daily Frequency**

 **Cloud Mask**

S - Sentinel  
L - Landsat  
⊗ - EarthDaily



## Characteristics of the 22 bands



### Core Vegetation

Monitor vegetation status (vigor, phenology, diseases), yield potential and productivity of crops, detect the changes



### Advanced vegetation

Monitor events such as flowering and diseases detection. Improved biophysical variables monitoring.



### Soil Content

Soil composition and health. Monitor carbon content and soil degradation. Help making decisions around soil management practices.



### Atmosphere

Enhance data quality and usability by correcting atmosphere effects, water vapor, aerosol, cloud haze. Ensuring actionable and measurable insights.



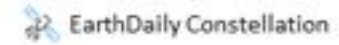
### Water

Monitor plants water stress and availability of water resources. Help manage irrigations strategies when combined with weather information.

# The EarthDaily Constellation

## Characteristics of the 22 bands

Band name	Center (nm)	Bandwidth (nm)	GSD (m)	Absolute calibration	Sat to Sat calibration	Geolocation	Purpose		
Coastal			5m GSD Products resolution up to 3.5m	Detailed data not available publicly yet			Atmospheric correction (aerosol scattering), ocean color, water quality & organic content		
Blue							Sensitive to vegetation senescing, carotenoid, browning and soil background, atmospheric correction (aerosol scattering)		
Aqua							Plant pigments & health, ocean color, water quality & organic content		
Green							Plant health, green peak, sensitive to total chlorophyll in vegetation.		
Yellow							Plant health, early detection of disease, drought, and lack of fertilization		
Red							Plant vigor (chlorophyll absorption), plant stress, leaf area, nutrients content		
Red Edge 1							Position of red edge (chlorophyll content), consolidation of atmospheric corrections / fluorescence baseline		
Red Edge 2							Position of red edge (chlorophyll content), atmospheric correction, retrieval of aerosol load		
Red Edge 3							Position of red edge (chlorophyll content), Leaf Area Index (LAI), edge of the NIR plateau		
Near Infrared							NIR plateau, sensitive to total chlorophyll, biomass, LAI and protein, water vapor absorption reference, retrieval of aerosol load and type.		
Water vapor 1			95m GSD Products resolution TBD	Radiometric error <5% Geolocation error <6m		Atmospheric correction and cloud detection, plant stress, moisture			
Water vapor 2						Atmospheric correction			
SWIR 1						Atmospheric correction, vegetated water content			
Cirrus						Cirrus detection and properties for cloud masking			
SWIR 2						Soil moisture, Snow / Ice			
Methane 1						Methane detection and characterization			
Methane 2						Methane detection and characterization, Plant water stress			
Wildfire						Radiative fire power, wildfire detection and characterization			
LWIR TIR 1						120m GSD Products resolution TBD			Surface temperature
LWIR TIR 2									Soil quality (carbon), soil moisture
LWIR TIR 3			Plant health, crop water use & water management						
LWIR TIR 4			Mineral composition & volcanoes Snow characterization Urban heat						

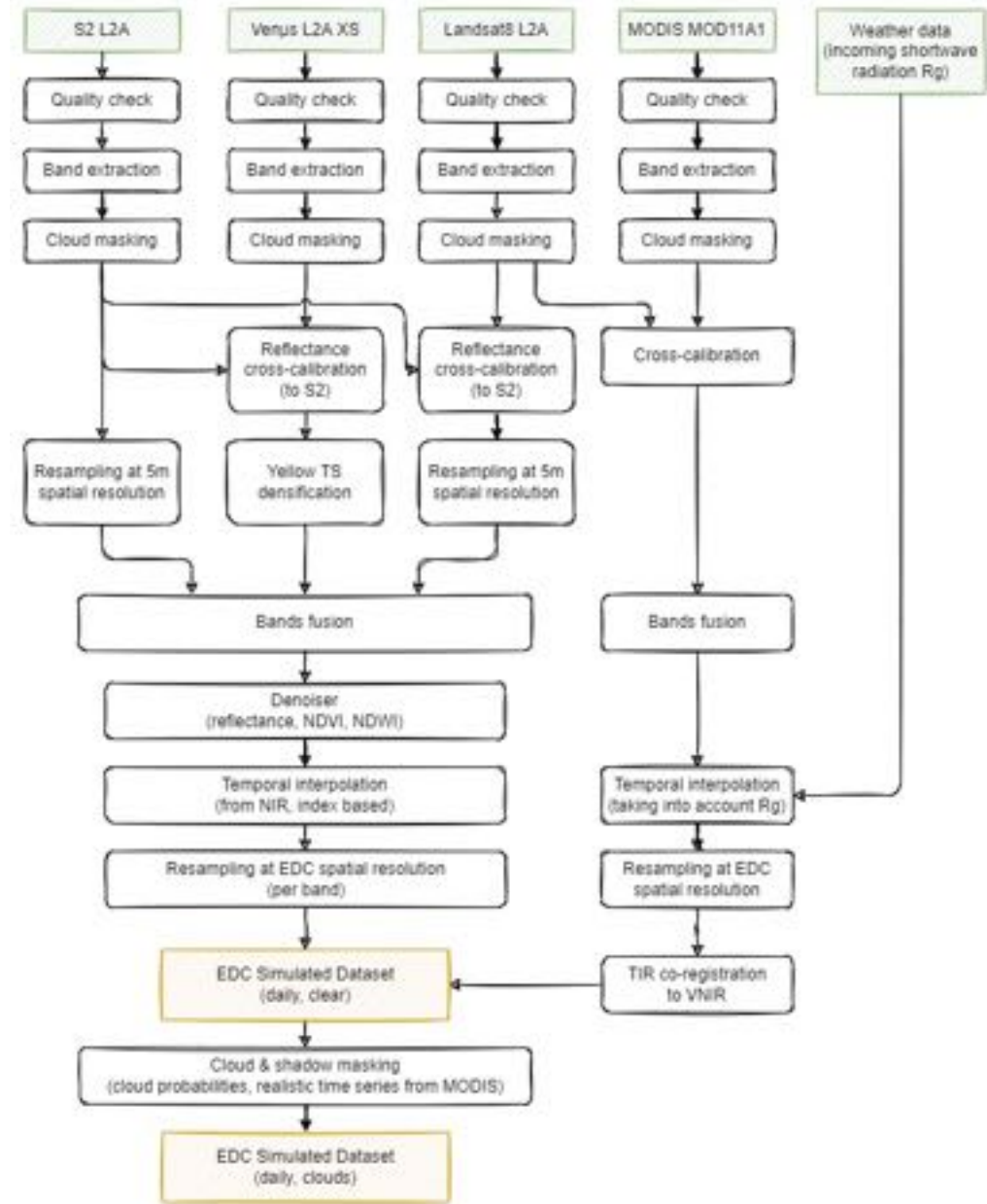


# EarthDaily Simulated dataset

## Dataset to be representative of future EDC data

- Used actual observations from available sensors
- Data fusion and spatio-temporal resampling to fit EDC specs
- Cloud masking to reflect realistic coverage over time

Spectral Bands	Sentinel-2 (SRE)	Venus (SRE)	Landsat8	MODIS	ED equivalent
Blue	B02 (10m)	B03 (5m)	B2 (30m)	x	B02
Green	B03 (10m)	B04 (5m)	B3 (30m)	x	B04
Yellow	x	B05 (5m)	x	x	B05
Red	B04 (10m)	B07 (5m)	B4 (30m)	x	B06
Red Edge 1	B05 (20m)	B08 (5m)	x	x	B07
Red Edge 2	B06 (20m)	B09 (5m)	x	x	B08
Red Edge 3	B07 (20m)	B10 (5m)	x	x	B09
NIR	B08 (10m)	B11 (5m)	B5 (30m)	x	B10
SWIR	B11 (20m)	x	B6 (30m)	x	B15
TIR	x	x	B10 (30m)	MOD11A1 (1km)	B22 (120m)





# EarthDaily Simulated dataset



## Bands available:

Blue - 5m  
Green - 5m  
Yellow - 10m  
Red - 5m  
Red Edge 1 - 10m  
Red Edge 2 - 10m  
Red Edge 3 - 10m  
NIR - 5m  
SWIR - 95m

**Land Surface Temperature - 120m**

## Time & Region:

September 3<sup>rd</sup> 2018 to August 31<sup>st</sup> 2020  
Toulouse, SUDOUE CalVal area – France

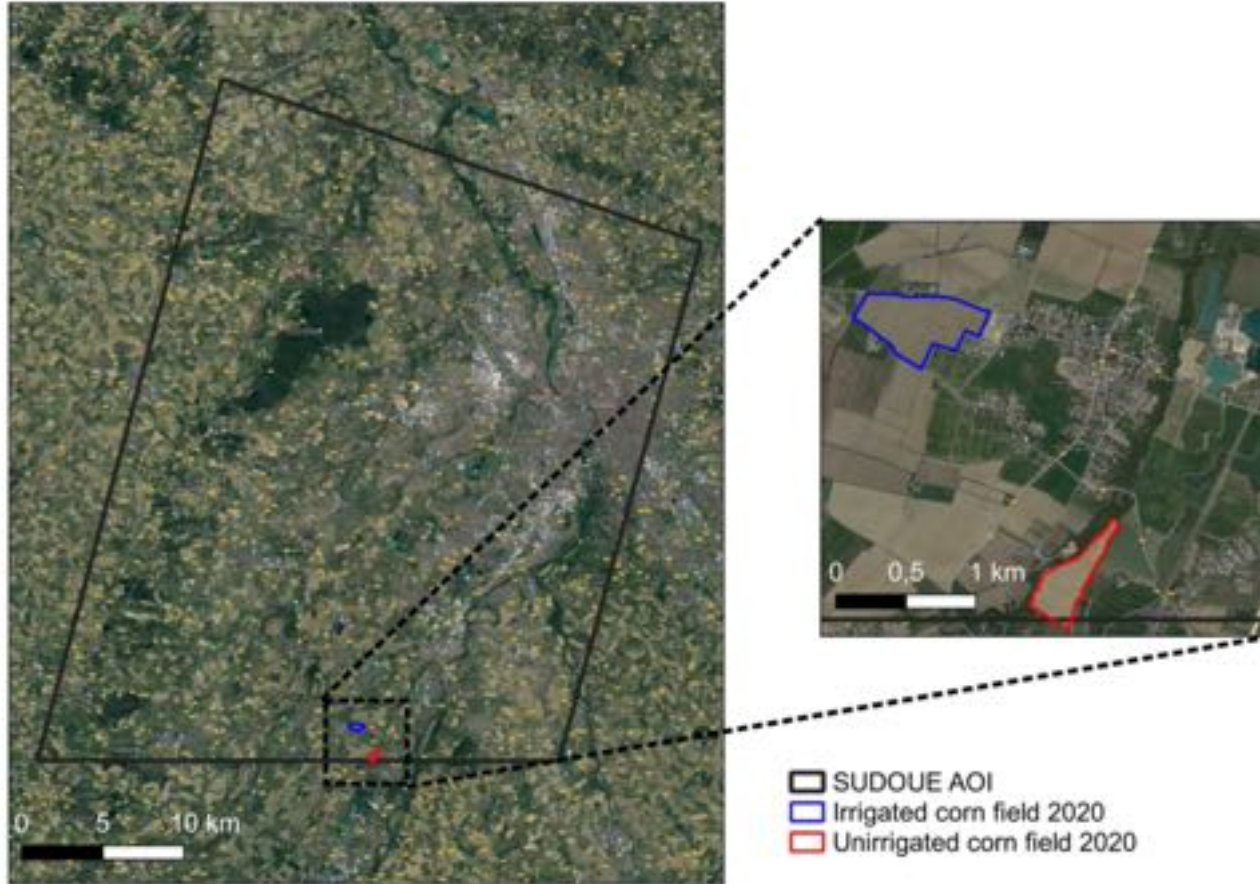
## Access to demo data will be available:

Internet connection, Python environment to access  
Azure blobstorage + given credentials



# Results on irrigation events detection from TIR

## Study site



## Methodology

Ts-VI Triangle method (Goward et al., 1985)  
→ parametrization proposed by Jiang and Islam (1999) with fractional vegetation cover (Fr) as proposed by Tang et al. (2010).  
→ Fr is estimated from NDVI using the formula proposed by Carlson and Ripley (1997). Weather data from ERA5 Land.

$$Fr = (NDVI - NDVI_{min} / NDVI_{max} - NDVI_{min})^2$$

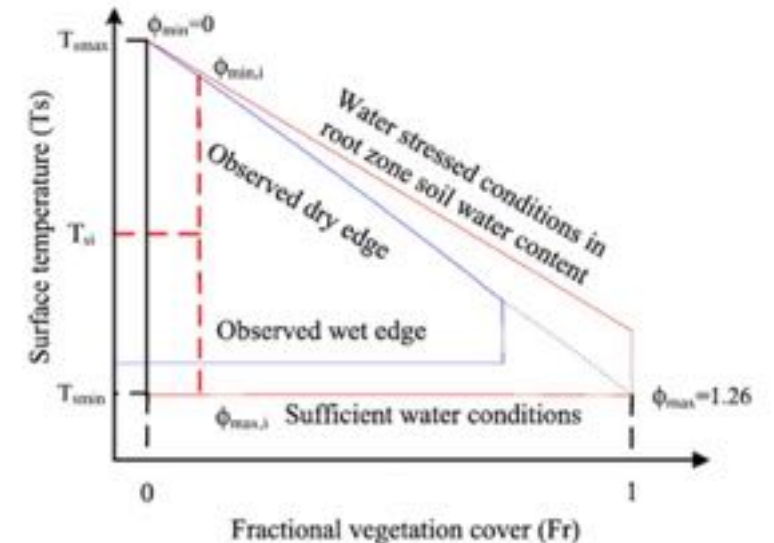
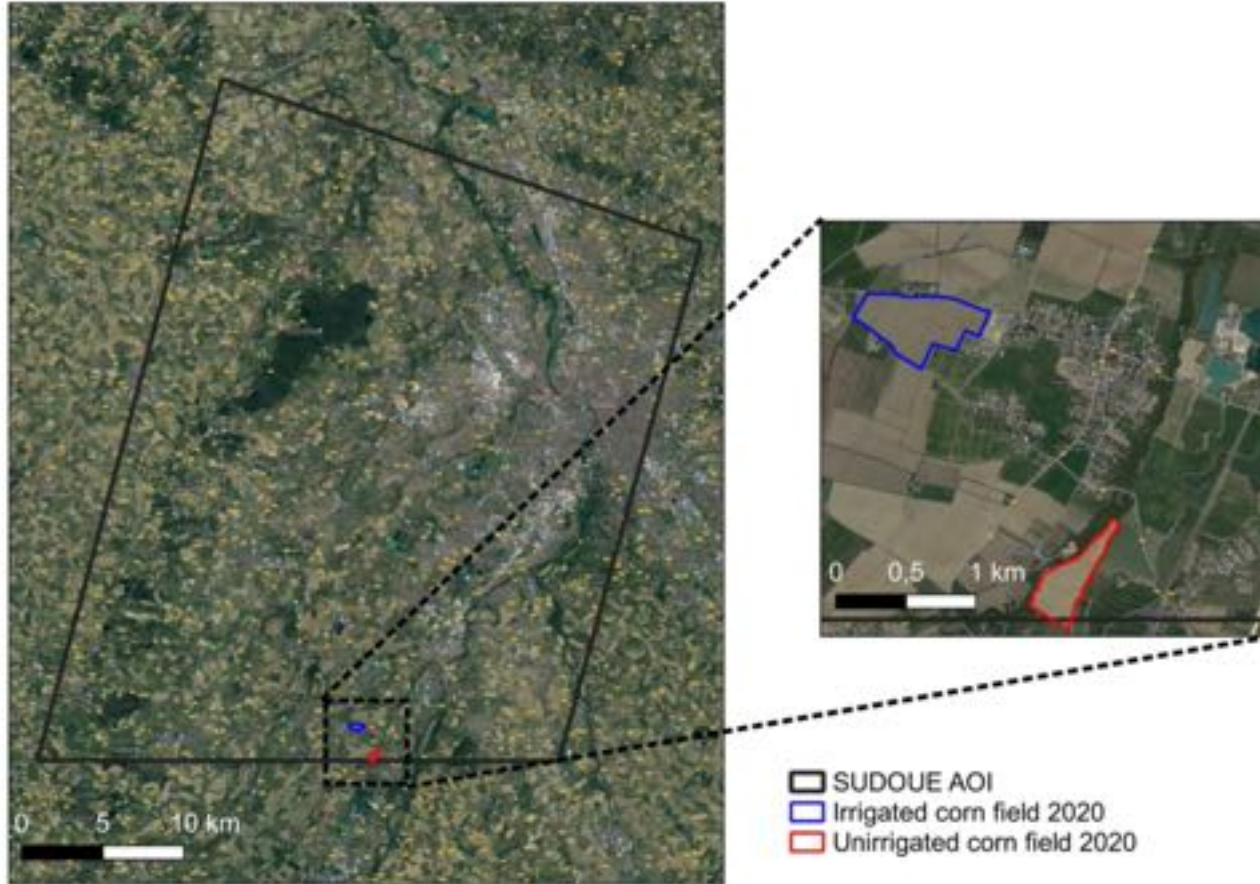


Figure from Tang et al. (2010)

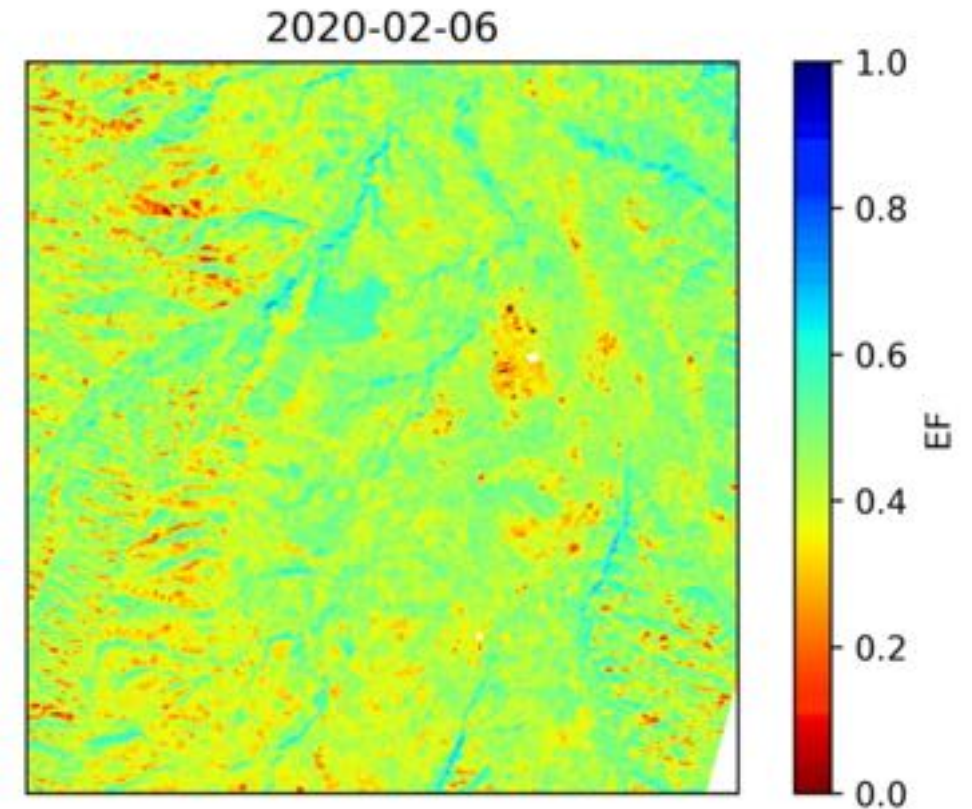
Methodology Jiang and Islam (1999), Allies (2018)

# Results on irrigation events detection from TIR

## Study site



## Methodology



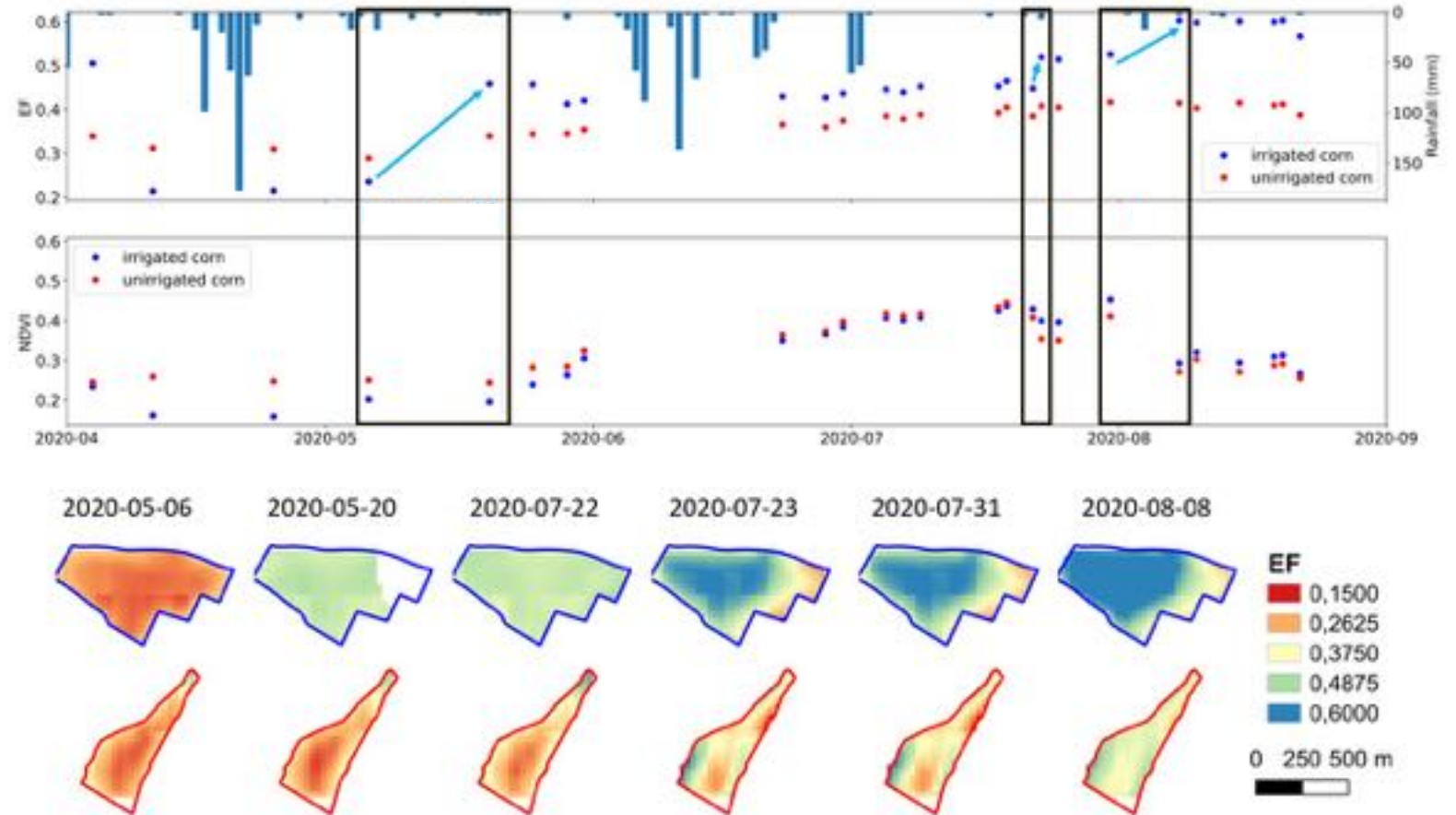
Evolution of the evaporative fraction on the SUDOUE Venus site



# Results on irrigation events detection from TIR

## Monitoring EF over season for 2 plots

- Abrupt increases can be detected
- Spatial correlation within fields, potentially associated to pivot for irrigated corn field





# Data & Analytics distribution

Data and services access for end-users



Access to scientists based on short proposal submission / hackathon event & through collaborative funded projects



EarthPlatform



Earth Analytics

Data as a Service

Analytics as a Service

Platform as a Service



Analytics Ready Data

Build Your Own Analytics

- Dr Harold CLENET - Scientific Lead, Data Science team  
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- Anne DUBOIS - R&D partners and funded projects Lead  
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# Thank You

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