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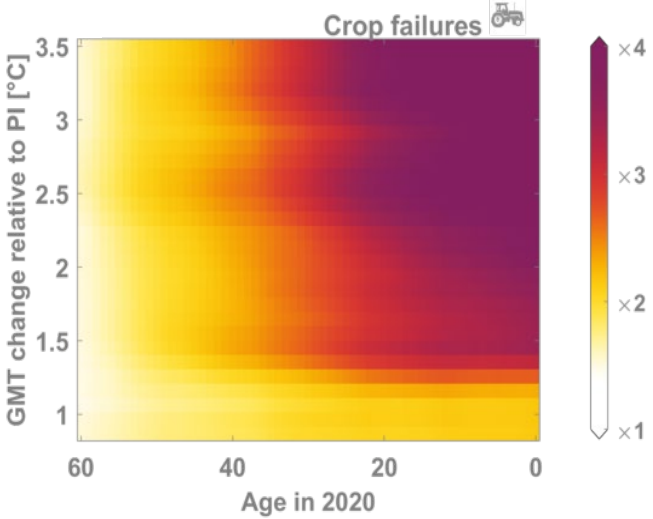
Jaemin Eun

TU Delft

Susan Steele-Dunne

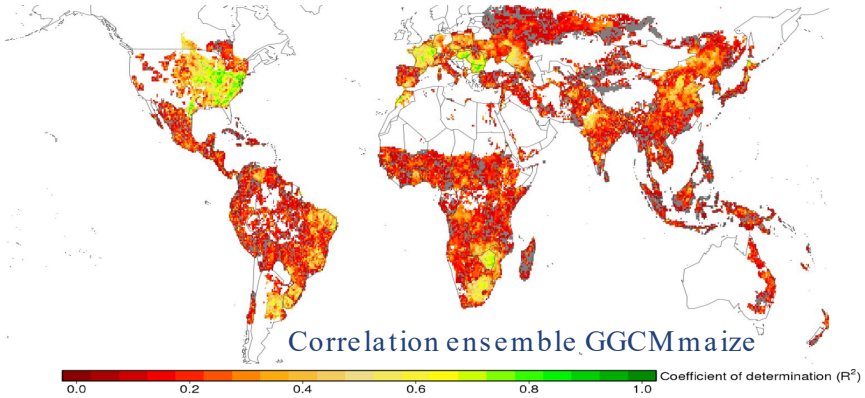
Climate impacts on crop losses: Using satellite data to foster food security

INCREASING RISKS



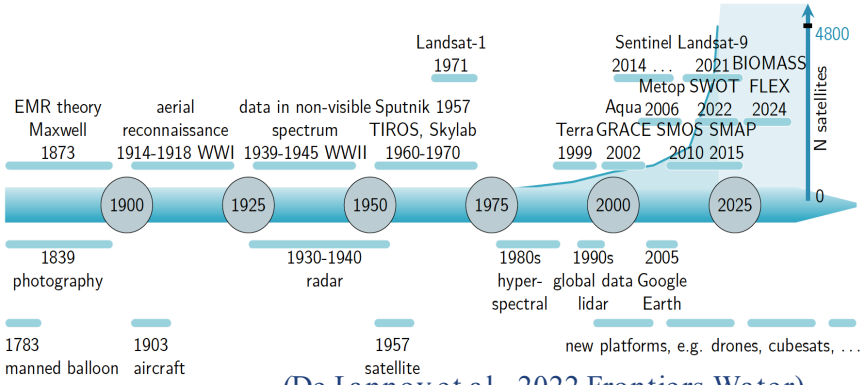
(Thiery et al., 2021 Science)

GRIDDED CROP MODEL STATUS



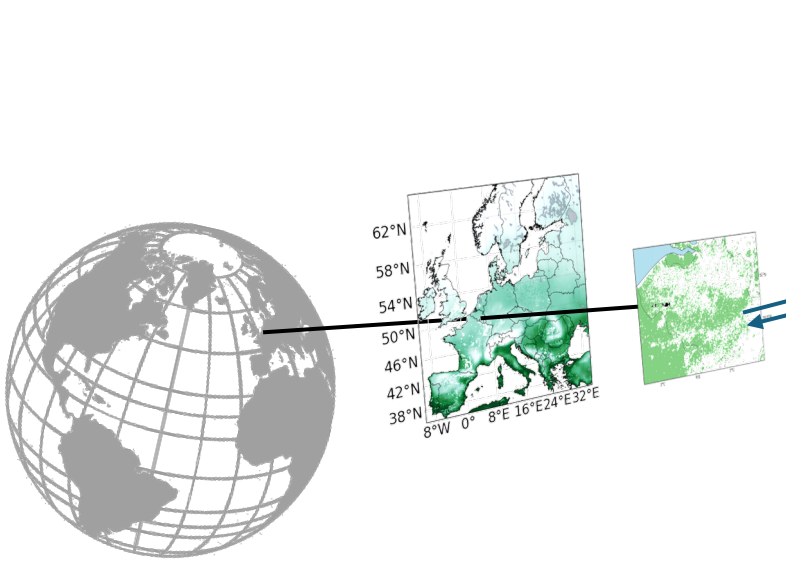
(Müller et al., 2017 GMD)

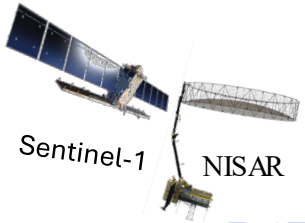
POTENTIAL EARTH OBSERVATIONS



(De Lannoy et al., 2022 Frontiers Water)

Combine satellite data and models for improved spatial crop modelling





FINE-SCALE DATA ASSIMILATION

TU Delft

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EARTH SYSTEM MODEL

resolution

scale

KU LEUVEN

CROP MODEL

CESM

CESM & AquaCrop

AquaCrop

CropWaves team

KU LEUVEN

Gabrielle De Lannoy

Jaemin Eun

Michel Bechtold

TU Delft

Susan Steele-Dunne

Postdoc

?

VUB VRIJE UNIVERSITEIT BRUSSEL

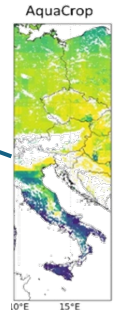
Wim Thiery

Shannon de Roos

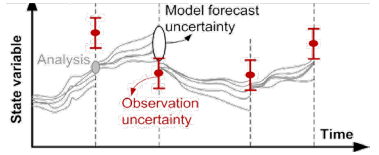
Expertise

FAO AQUACROP

AQUACROP

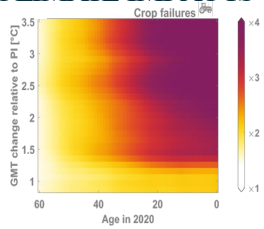


DATA ASSIMILATION

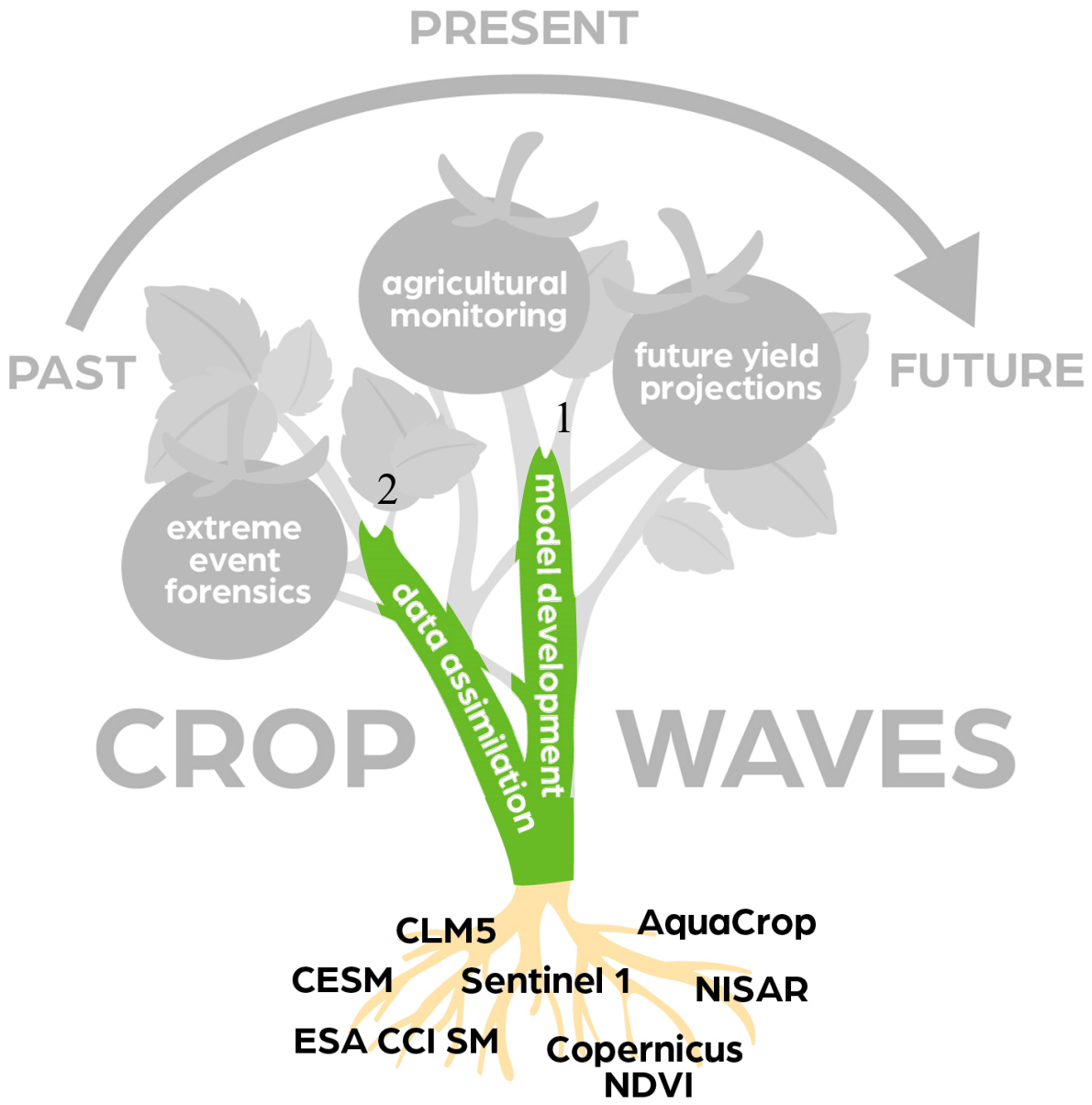


(MW) REMOTE SENSING

CLIMATE IMPACTS



EARTH SYSTEM MODELLING


PRESENT
PAST
FUTURE
agricultural monitoring
future yield projections
extreme event forensics
1
2
model development
data assimilation
CROP WAVES
CLM5
AquaCrop
CESM
Sentinel 1
NISAR
ESA CCI SM
Copernicus NDVI

1. Improve the representation of crops in AquaCrop & CESM

AQUACROP

KU LEUVEN

Implement EO-based crop maps & calendars

https://esa-worldcereal.org/en

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COMMUNITY LAND MODEL (CLM5)

Improve crop phenology response to heat stress

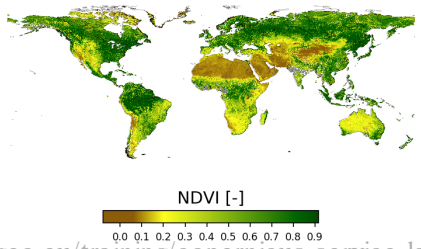
Evaluate in terms of:

- Surface soil moisture
- Biomass
- Yield

2. Fuse model simulations with EO products (25 km)

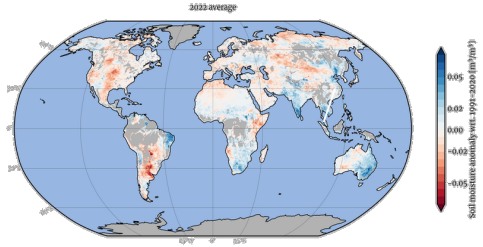
EO-based products

COPERNICUS NDVI



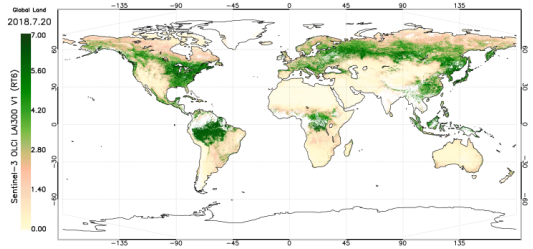
eo4geo.eu/training/copernicus-service-land/

ESACCI SSM



climate.esa.int/en/projects/soil-moisture/

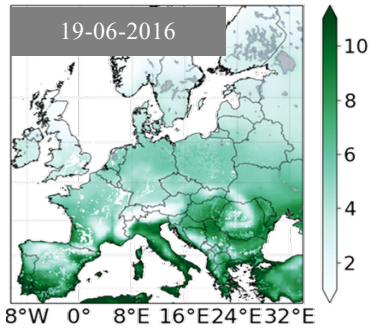
COPERNICUS LAI



land.copernicus.eu/en/products/vegetation/leaf-area-index-300m-v1.0

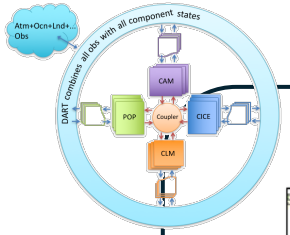
NASA LIS

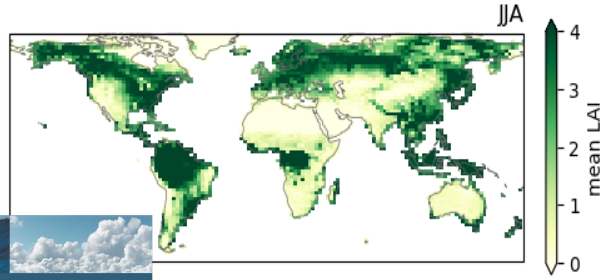
Biomass (t ha^{-1})



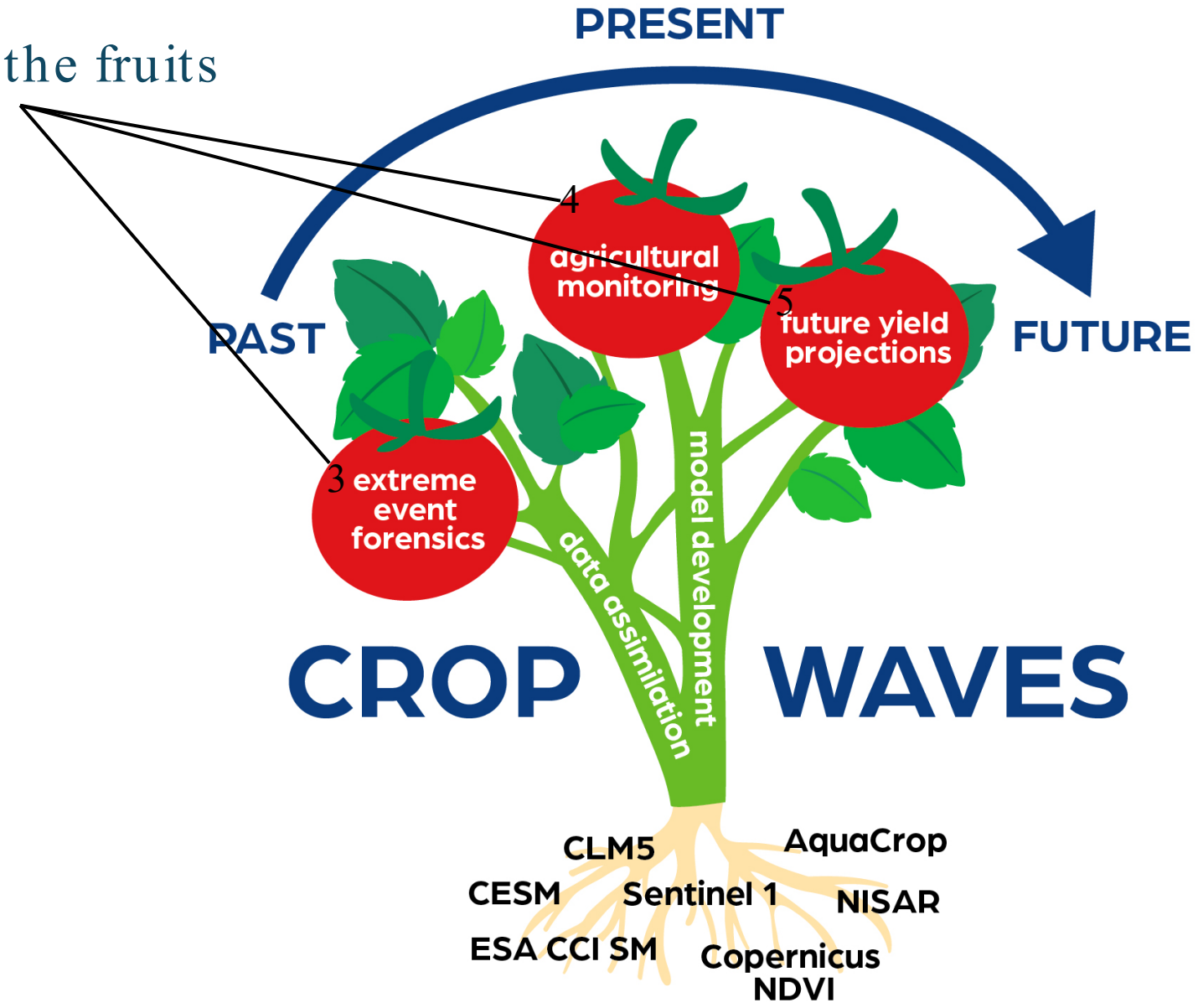
AQUACROP

DART



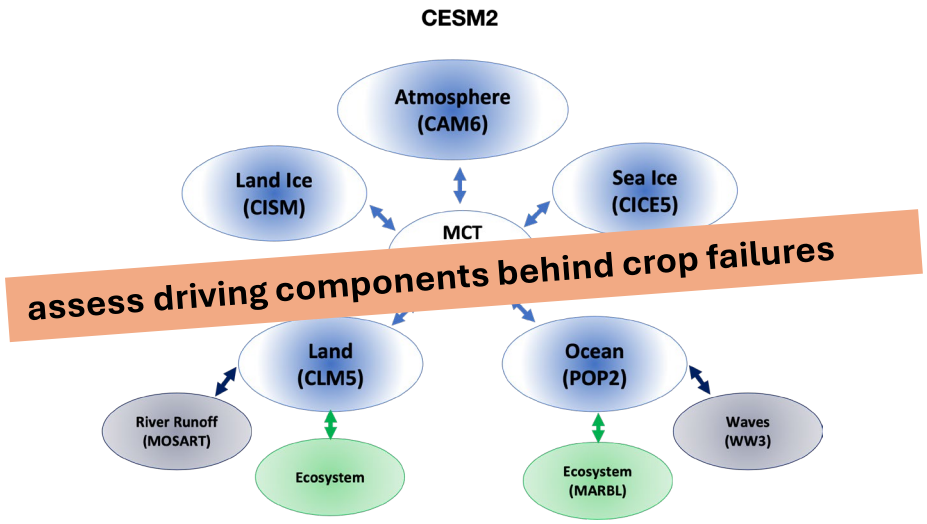


Picking the fruits



extreme event forensics

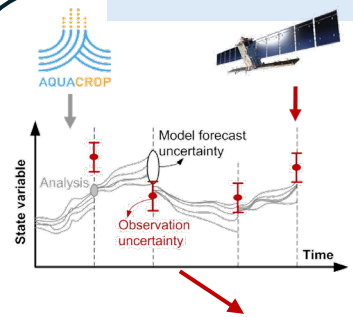
3. Extreme event forensics



assess driving components behind crop failures

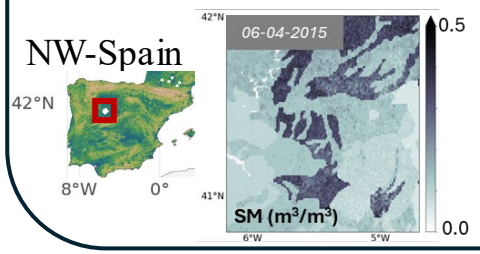
agricultural monitoring

4. Fine-scale agricultural monitoring

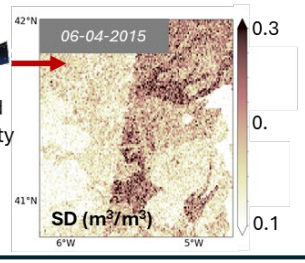


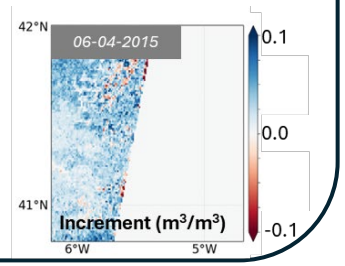
300m - 1km:

- soil moisture
- crop biomass
- yield
- …



Reduced uncertainty

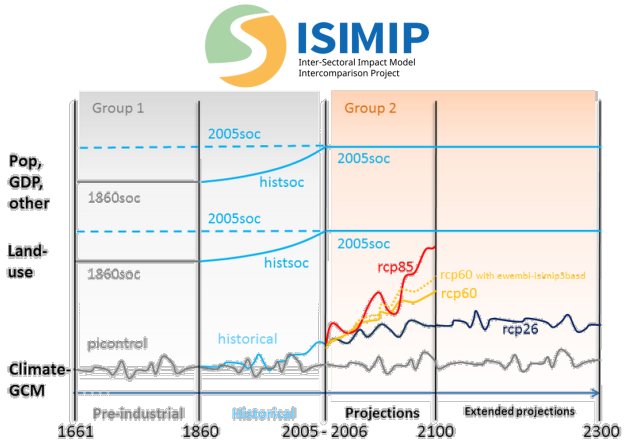




future yield projections

5. Future yield projections

AQUACROP



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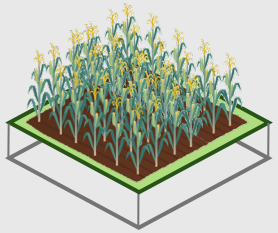
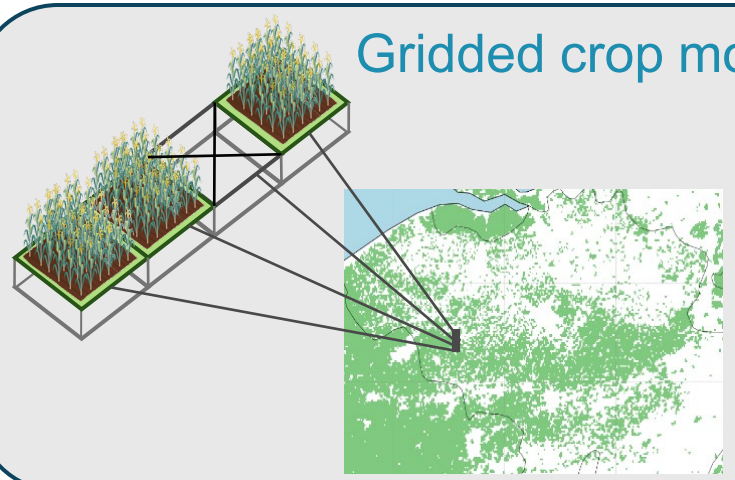
Field-based crop models

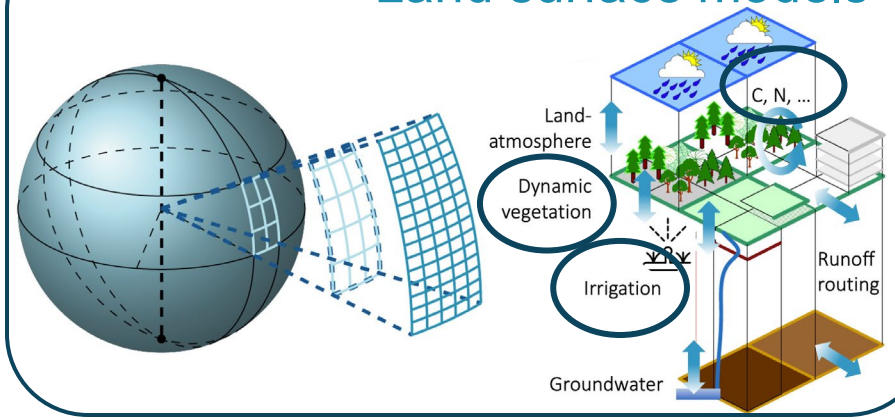


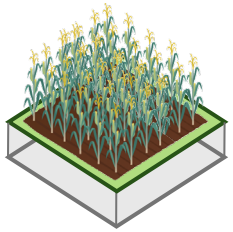
AQUACROP

Gridded crop models



Land surface models





Land surface-crop models