

# EO 4 Ecosystem Accounting 2022



## Customized Ecosystem Service Models for Crop and Carbon Stock by ARIES Platform

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# ARIES(Artificial Intelligence for Environment and Sustainability)



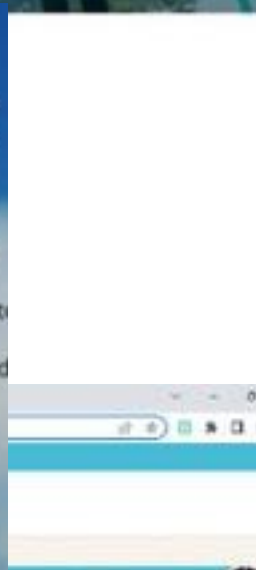
<https://aries.integratedmodelling.org>



## ARtificial Intelligence for Ecosystem Services

ARIES is a networked software technology that redefines ecosystem service assessment and valuation for decision-making. The ARIES approach to mapping natural capital, natural processes, human beneficiaries, and service flows to society is a powerful new way to visualize, value, and manage the ecosystems on which the human economy and well-being depend.

[Learn more](#)



## k.LAB Japan

*Nagoya University Prof. Hayashi* 

*Osaka University Dr. machimura* 

*Chubu University Dr. Sugita* 

*Tokyo University of Agriculture Prof. Okazawa* 

*NIES*

*etc.*

# ARIES(Artificial Intelligence for Environment and Sustainability)

## #ARIES15years: Celebrating 15 years of AI for environmental sustainability

Since 2007, ARIES has been building the first Wikipedia-like open-source platform for interoperable data and models, through AI. Check out the infographic providing an overview of our vision to take open science to the next level and watch for a series of new ARIES online infographics to be released throughout the following months.

[Learn more](#)

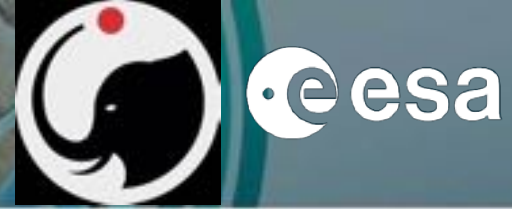


- Uninformed policies
- Multi- and transdisciplinary science
- Black Box
- Transparency
- Industry-oriented research
- Society-oriented research

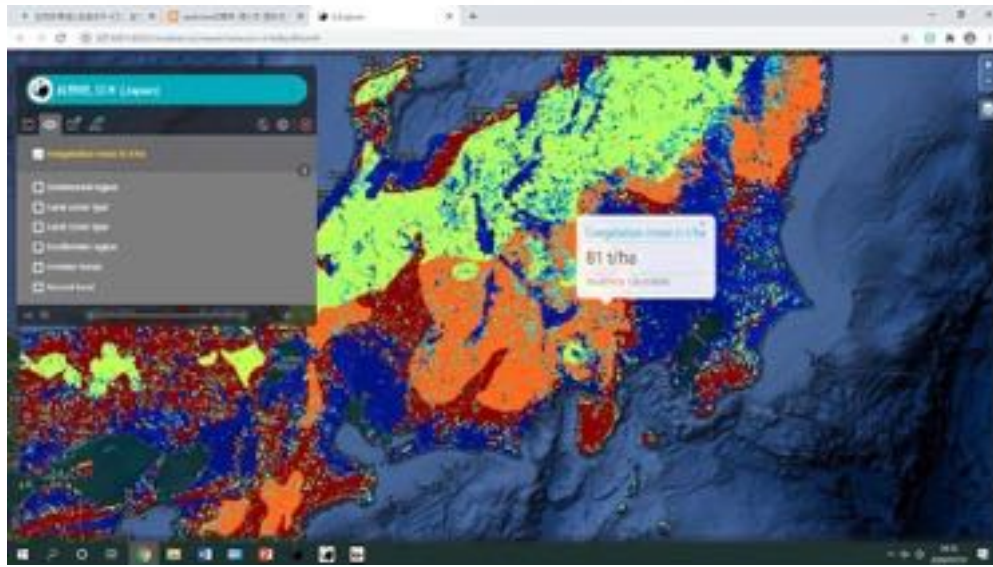




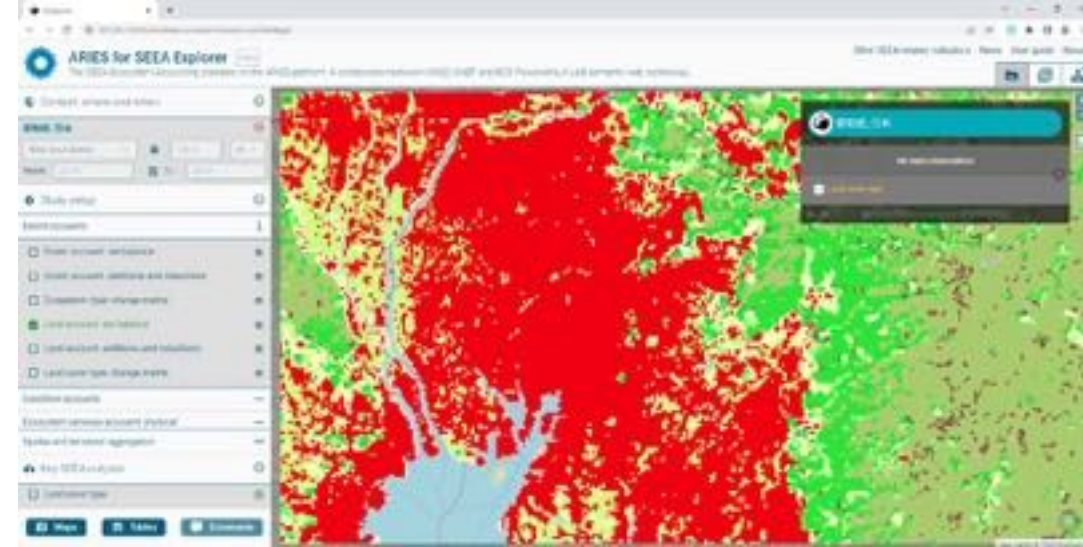
# Three+ one ARIES/k.LAB interface



k.Explorer



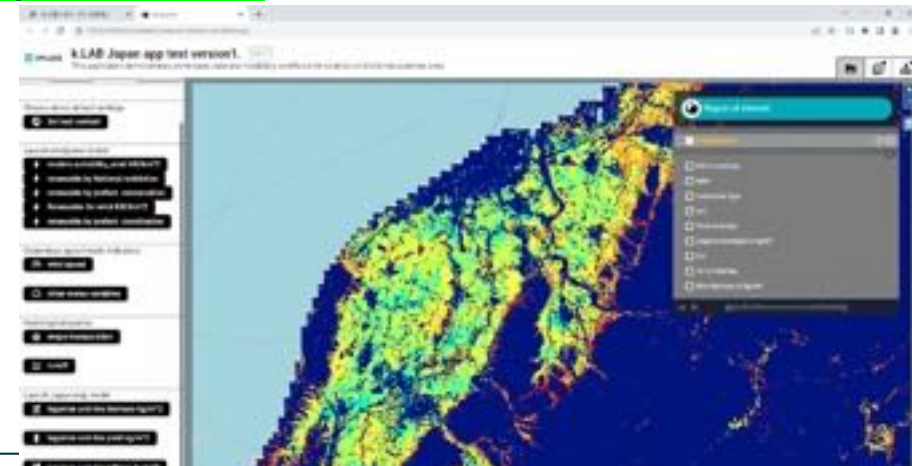
ARIES-for-SEEA explorer



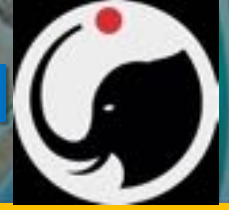
k.Modeler



k.LAB Japan model



# ARIES Global ES model and k.LAB Japan ES model



Carbon stock: G-carbon, J-Carbon stock

Climate regulation: J-Forest volume, J-LST

Air regulation: J-NO<sub>2</sub>, J-SO<sub>2</sub>, etc.

Flood regulation: G-flood regulation, *J-Flood Luration area*

Pollination: G-pollination

Landslide prevention: G-landside, G-sediment, *J-Sediment Disaster hazard area*

Biomass: G-Biomass(Maize crop, wood), J-crop model, J-tree biomass

Water: G-water(under development)

Culture: G-Recreation, *National park, Nature conservation area, Wildlife area, Local tourism resources, Urban park*

## MAIN EO data used:

- ALOS by JAXA: images
- HRLULC by JAXA: LULC map
- AW3D by JAXA, NTT data, RESTEC: Height data



# Simplified Crop model based on AquaCrop by FAO



Landcover type: Agriculture land

ESA. Land Cover CCI Product User Guide Version 2. Tech. Rep. (2017). Available at: [maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2\\_2.0.pdf](https://maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2_2.0.pdf)

HRLULC(Japan)

HRLULC: High-Resolution Land Use and Land Cover Map by JAXA, [https://www.eorc.jaxa.jp/ALOS/en/dataset/lulc\\_e.htm](https://www.eorc.jaxa.jp/ALOS/en/dataset/lulc_e.htm)

## Relation between canopy cover and NDVI

ZHANG et.al.(2021) IJERD,12-2

## Evapotranspiration

Antonio Trabucco, Robert J. Zomer, Global Aridity Index and Potential Evapo-Transpiration (ET0) Climate Database v2

*This study is supported by Kakenhi 20K06351, JSPS, Japan.*

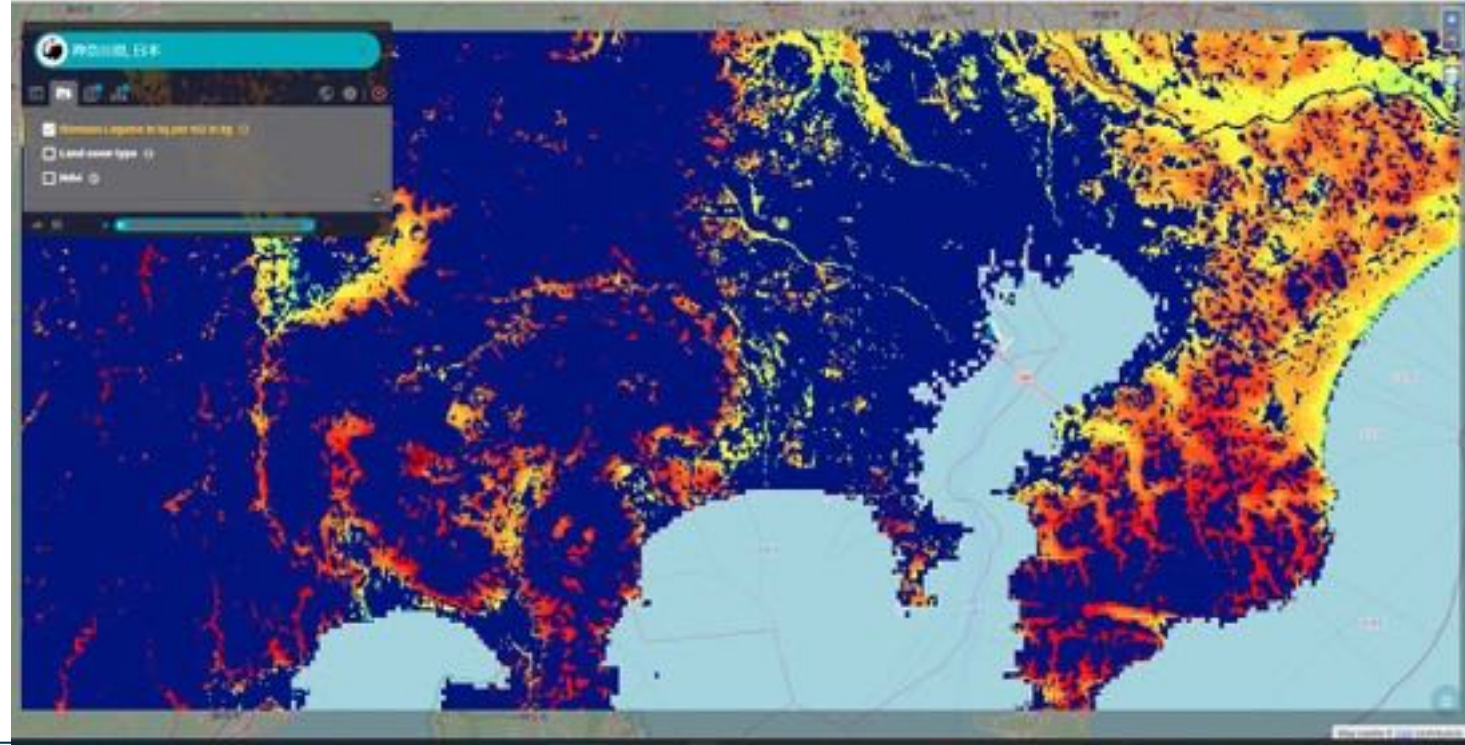
Parameters:

Several AquaCrop parameters

Harvest rate, Leftover ratio

Output

- Biomass
- Yield
- Leftover



# Simplified Carbon stock model



k.LAB Japan model

Relation between HRLULC(Japan) and forest canopy(LiDAR and AW3D)volume and **carbon stock(Field survey)**

HRLULC: High-Resolution Land Use and Land Cover Map by JAXA, [https://www.eorc.jaxa.jp/ALOS/en/dataset/lulc\\_e.htm](https://www.eorc.jaxa.jp/ALOS/en/dataset/lulc_e.htm)  
LiDAR: by GSI  
AE3D by JAXA, NTT data, RESTEC:<https://www.aw3d.jp/en/>

LiDAR data(air plane), AW3D

- DSM(digital surface model):
  - LiDAR 1-2m-grid, AW3D 2.5-5m, 30m
- HRLULC: 10m-grid

*This study is supported by Collaboration Research Program of IDEAS, Chubu University, Japan.*





# EO challenges, opportunities and recommendations



EO is useful for ES assessment.

Processed data: Small grid scale:

10m, 2.5m~

- Height data
- Land use and land cover data
- Image, NDVI, Evapotranspiration

Combination with field measurement  
results