EO 4 Ecosystem Accounting 2022

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

K.HAYASHI Nagoya University
H.Okazawa Tokyo University of Agriculture
F. Villa BC3
S. Balbi BC3
K. Zhang Tokyo University of Agriculture

Date EO4EA 30 NOV, 2022

→ THE EUROPEAN SPACE AGENCY

ARIES(Artificial Intelligence for Environment and Sustainability)

https://aries.integratedmodelling.org

Three+ one ARIES/k.LAB interface
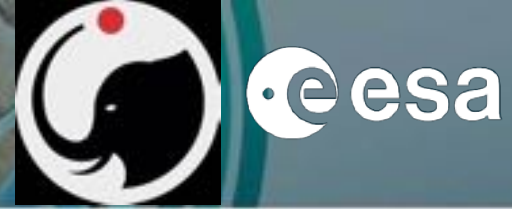
k.Explorer

ARIES-for-SEEA explorer

k.Modeler

→ THE EUROPEAN SPACE AGENCY
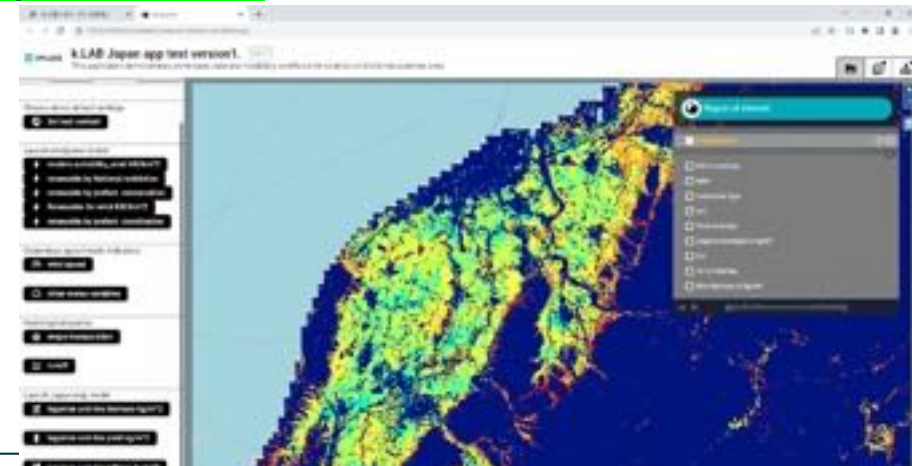
ARIES Global ES model and k.LAB Japan ES model
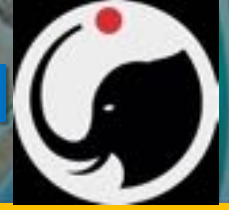
Carbon stock: G-carbon, J-Carbon stock

Climate regulation: J-Forest volume, J-LST

Air regulation: J-NO2, J-SO2, etc.

MAIN EO data used:
- **ALOS by JAXA: images**
- **HRLULC by JAXA: LULC map**
- **AW3D by JAXA, NTT data, RESTEC: Height data**

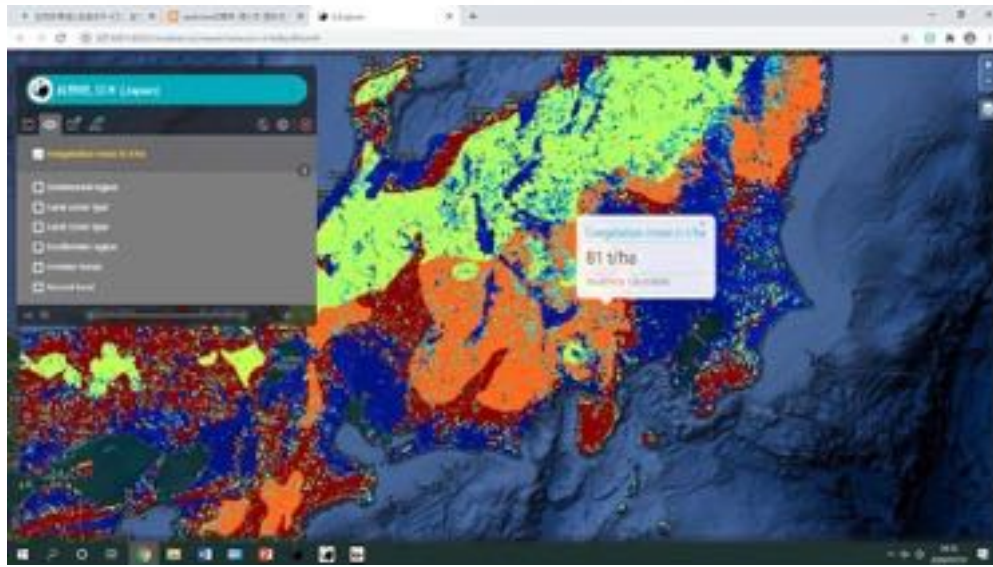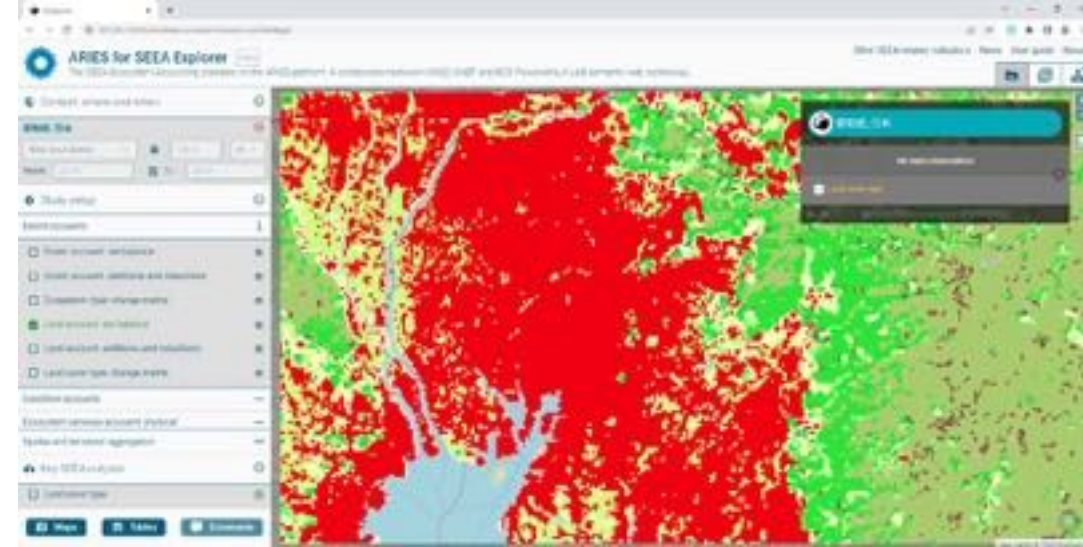Flood regulation: G-flood regulation, *J-Flood Lunation area*

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*

Simplified Crop model based on AquaCrop by FAO

k.LAB Japan model

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

HRLULC(Japan)
HRLULC: High-Resolution Land Use and Land Cover Map by JAXA, 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

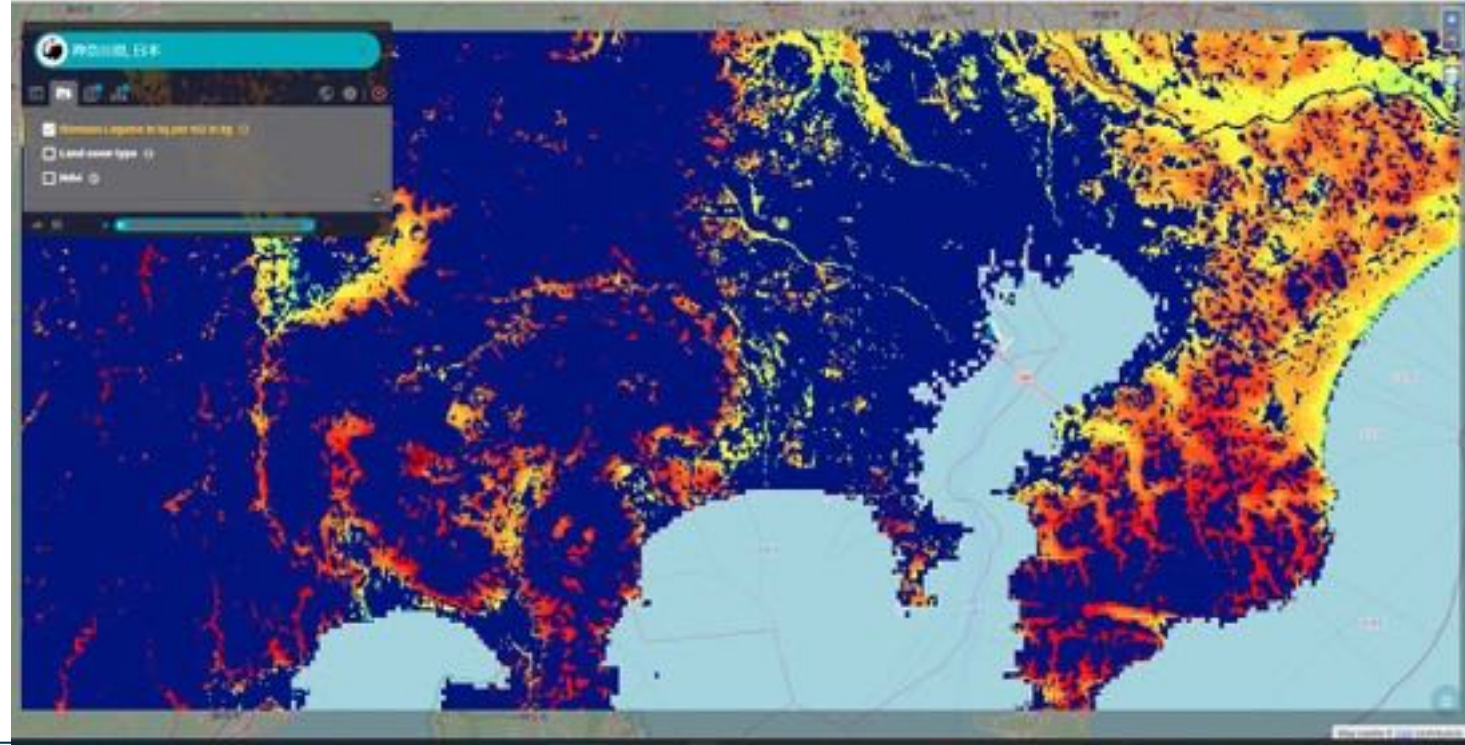*This study is supported by Kakenhi 20K06351, JSPS, Japan.*

Parameters:

Several AquaCrop parameters

Harvest rate, Leftover ratio

Output

- Biomass

- Yield

- Leftover

Simplified Carbon stock model

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
LidAR: by GSI
AE3D by JAXA, NTT data, RESTEC:https://www.aw3d.jp/en/

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

LiDAR data(air plane), AW3D

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

107.671 t/ha

k.LAB Japan model

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

THE EUROPEAN SPACE AGENCY