

# Open Foris Initiative

## Free and Open Source Tools and Methods for Data Collection, Analysis and Reporting

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FAO Forestry



openforis



Collect



Collect  
Mobile



Collect  
Earth

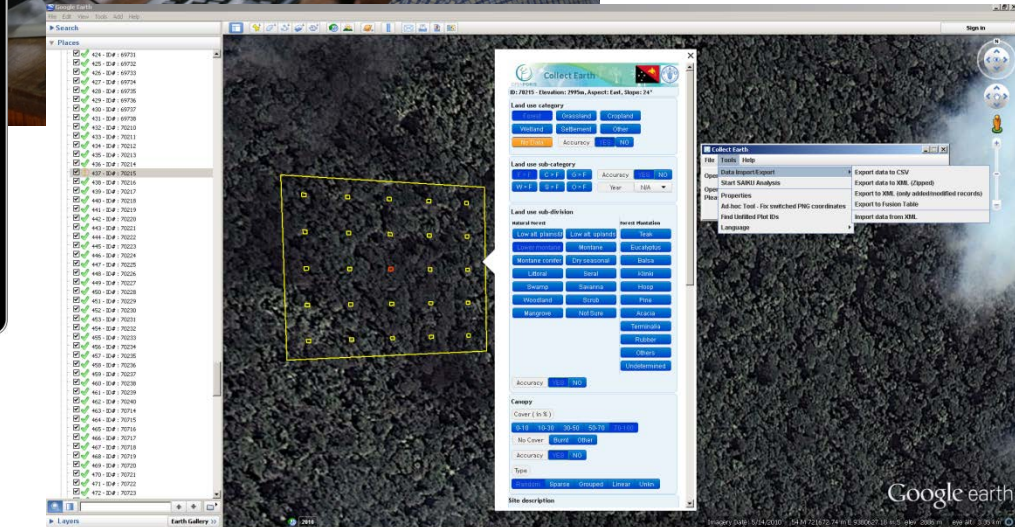
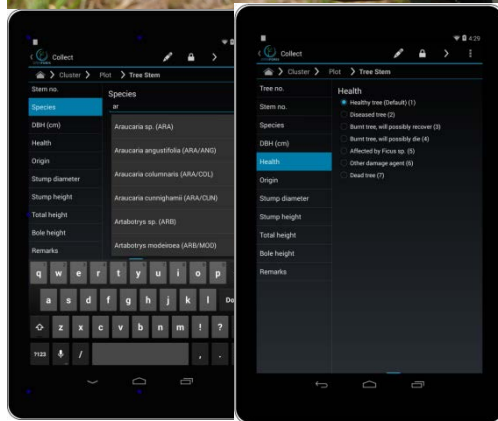
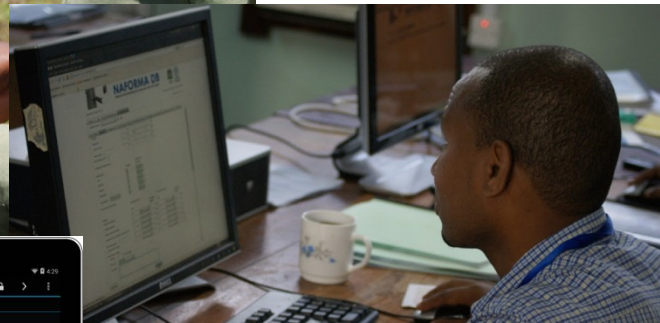


Calc



Geospatial  
Toolkit





### For Office

Collect desktop is a flexible tool for office or field camp based inventory data entry. Customizable validation rules minimize data entry errors and feedback reports help to identify potential problems.



### For Field

Collect Mobile is an easy to use Collect client for mobile Android devices. Entering the data already in the field can significantly improve the quality of the data and reduce time needed for data cleansing.



### For Fast Delivery

Collect Earth is an interactive image interpretation tool which uses Google Earth interface. Collect Earth allows you to collect land cover and land use information in the fastest possible way and with minimum GIS experience.





# Main Features

- Easy-to-use interface for complex surveys
- Survey designer
  - From scratch/using template
  - Validation rules
- Data entry interface generated automatically
- Standard workflow: entry, cleansing, analysis
- Server / desktop



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LC classes, admin regions, main regions, ..  
Species lists % sites



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COLLECT

**Survey Designer**

Survey language: English

Record type: cluster    Form version:    Preview    Export summary

**Definitions**

View mode: Entry Form

- Cluster
  - cluster\_no
  - cluster\_accessibility
  - cluster\_starting\_position
- time\_study
- cluster\_remarks
- Plot

**Number attribute**    Path: /cluster/cluster\_no

**General**

Name: cluster\_no

Is key?:

Type:  Integer  Real

Calculated:

Multiple:

Required:

Relevant expression:    Hide when not relevant:

**Units of measurement:**

Is default?	Unit	Decimal digits

**Labels and description**

Single instance (en): Cluster No.

List heading (en):

Field number (en):

General info



Cluster Plot Informant Interviews Household Surveys QA

Quality assurance field

Task	Person	Date
Form filled out	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/>
Form checked	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/>
Data entered	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/>
Data cleaned	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/>

**Id**

**Wrong Coordinate**

**Measurement**

**Region**

**District**

**Crew no.**

**Map sheet**

**Add**

**Accessibility**





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COLLECT MOBILE





- Field-data collection using Collect survey
- On-the-fly validation
- Export collected data to Collect Desktop
- Android 4+ devices



# Objectives

- Support large, complex, surveys
- Simple and efficient to use
- Optimize for field use
- Use device camera and GPS
- Focus on data quality
- Data safety

- Validation in the field
- Integrated code and species lists
- Easy backups
- No transcription of handwritten forms





Visual interpretation tool for land use/cover classification





Google earth engine  
a google.org project

Google fusion tables  
beta

bing maps

COLLECT EARTH

SAIKU 

CUTTING EDGE OPEN SOURCE ANALYTICS

 PostgreSQL

 SQLite



# Stand-alone or server based

- Stand-alone

- Collect Earth uses a single-file database (SQLite) to store/fetch the data
- The data can be exported into XML
- A user can gather data from several operators (through the XML files) and import it into his Collect Earth instance to combine it

- Server-based

- Collect Earth uses a server database (PostgreSQL)
- All operators connect to the same database
- Collected data available to all operators

Google Earth

File Edit View Tools Add Help

Search

Places

- My Places
- Temporary Places
- Collect Earth Data
  - Ghana lulucf ipcc
    - 8x8\_Ashanti.ced
      - 1 - ID#: 173374
      - 2 - ID#: 177214
      - 3 - ID#: 177222
      - 4 - ID#: 177254
      - 5 - ID#: 177262
      - 6 - ID#: 177286
      - 7 - ID#: 180998
      - 8 - ID#: 181006
      - 9 - ID#: 181014
      - 10 - ID#: 181062
      - 11 - ID#: 181070
      - 12 - ID#: 181078
      - 13 - ID#: 181086
      - 14 - ID#: 181094
      - 15 - ID#: 181102
      - 16 - ID#: 181110
      - 17 - ID#: 181118
      - 18 - ID#: 181126
      - 19 - ID#: 181134
      - 20 - ID#: 184846
      - 21 - ID#: 184854
      - 22 - ID#: 184862
      - 23 - ID#: 184870
      - 24 - ID#: 184894
      - 25 - ID#: 184902
      - 26 - ID#: 184910
      - 27 - ID#: 184918
      - 28 - ID#: 184926



openforis COLLECT EARTH

ID: 173374 - Elevation: 145m, Aspect: 288°, Slope: 0°

Land use category

Forest	Grassland	Cropland
Wetland	Settlement	Other
No Data	Accuracy	YES NO

Land use sub-category

F > F	C > F	Accuracy	YES NO
G > F	W > F	Year	N/A
S > F	O > F		

Land use sub-division

Natural Forest

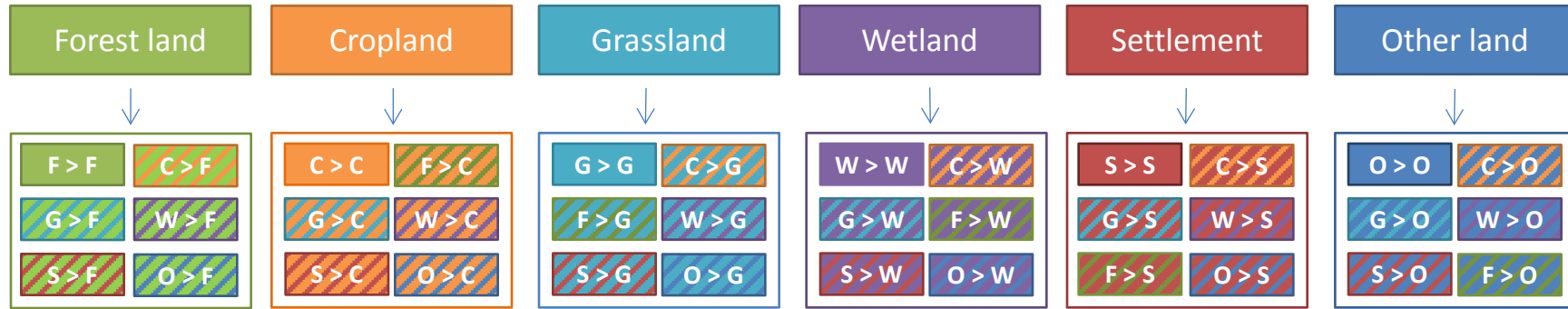
Wet Evergreen	Moist Evergreen
Moist semi-deciduous	Dry semi-deciduous
Upland Evergreen	Southern Marginal



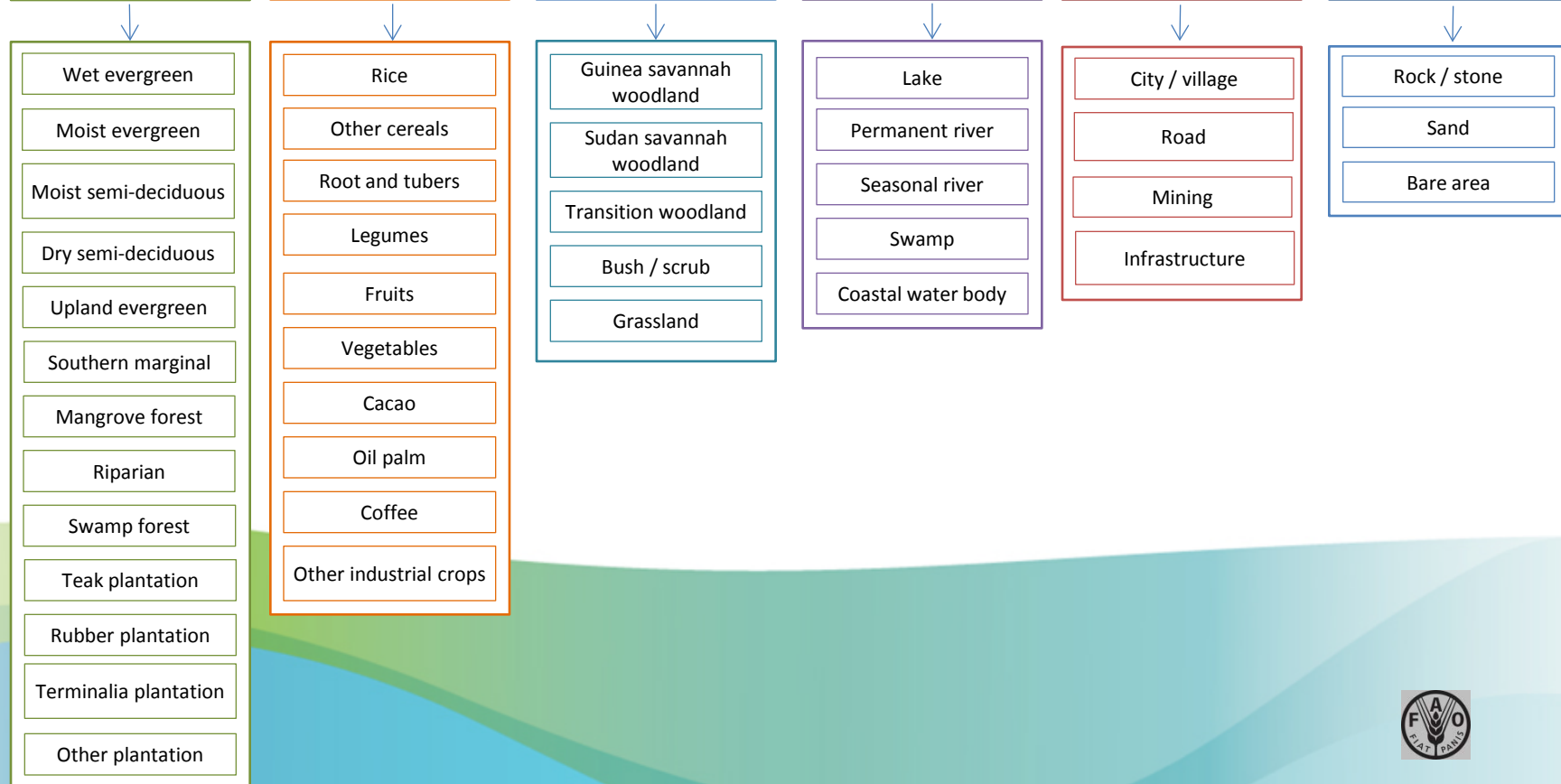
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# Ghana LU scheme

IPCC  
LU

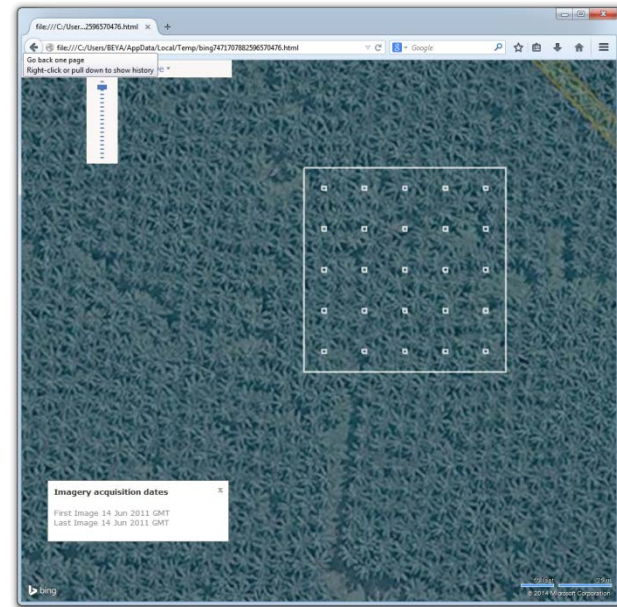
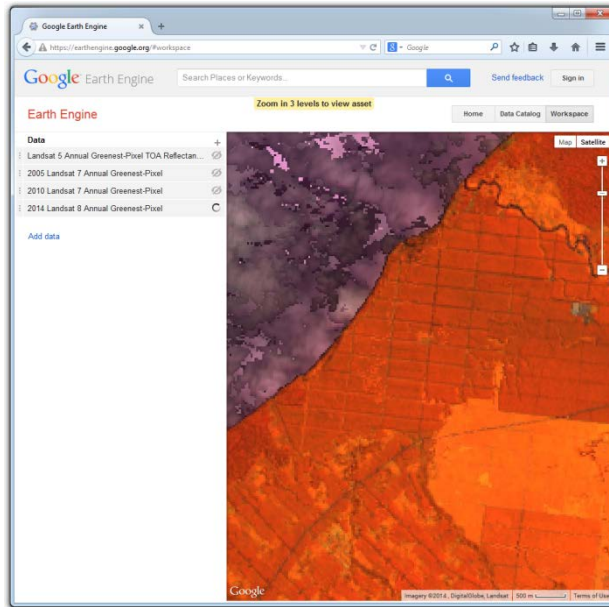
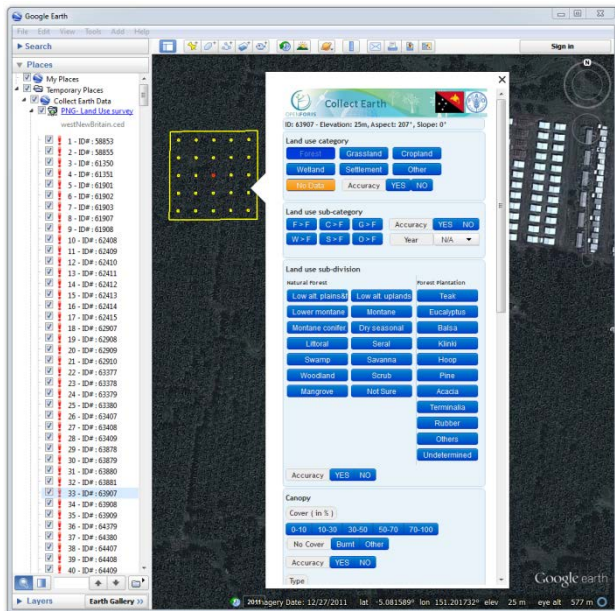


National land use  
sub-divisions





# Geo-synchronized





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# Business intelligence

The screenshot shows the Saiku BI interface with a data table and three donut charts. The table displays data for various regions across different land categories. The donut charts show the percentage distribution of these categories for each region.

Region	Forest	Grassland	Settlement	Other Land	No data	Wet Land	Cropland
CENTRAL	104	19	3	2	1	7	18
CHIMBU	37		1				10
EAST NEW BRITAIN	60	1	2				7
EAST SEPIK							
HLANDS							
MOROBE	237	14	2	2	1		32
NEW IRELAND	34	1			1	1	10
NORTH SOLOMONS	66						8

**Settlement**

Region	Percentage
CENTRAL	30%
CHIMBU	10%
EAST NEW BRITAIN	40%
EAST SEPIK	20%

**Grassland**

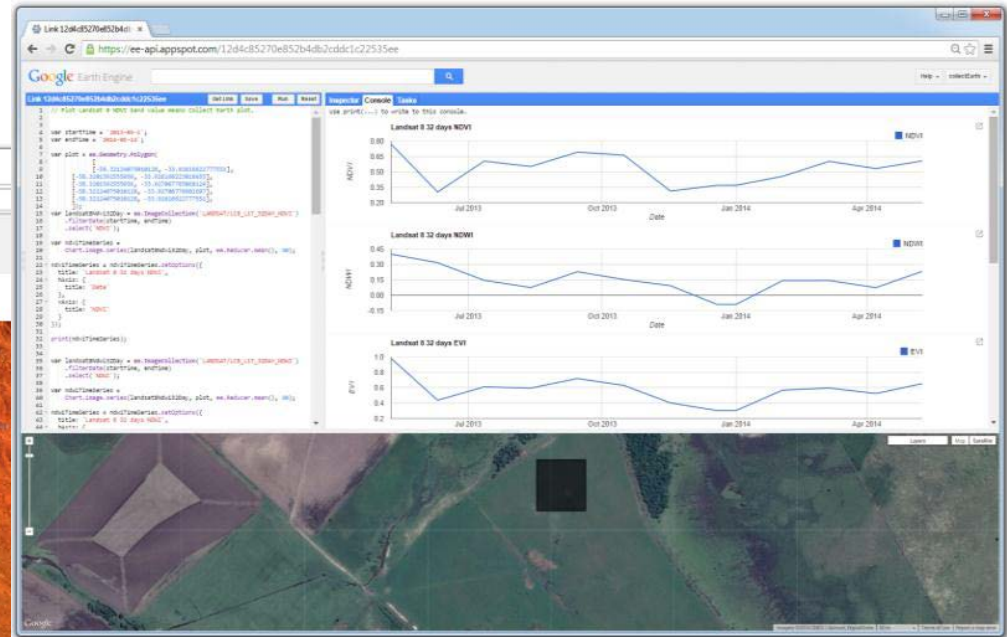
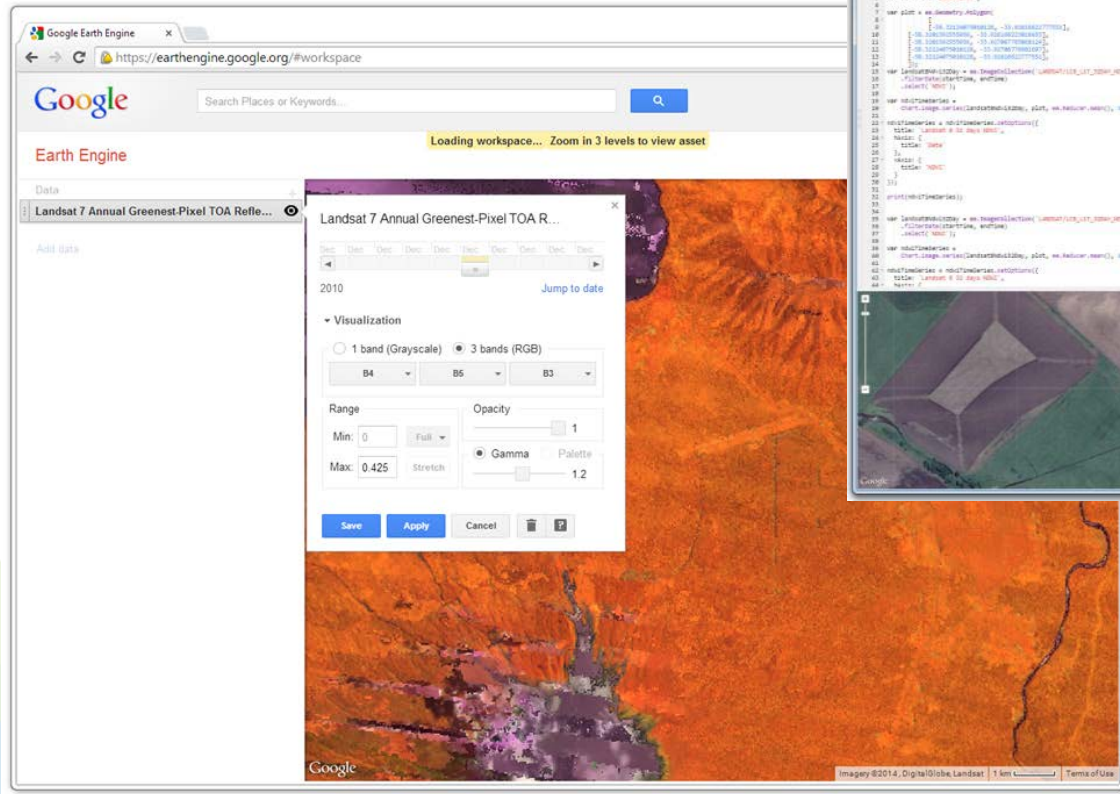
Region	Percentage
CENTRAL	54.3%
CHIMBU	2.9%
EAST NEW BRITAIN	42.9%
EAST SEPIK	0%

**Forest**

Region	Percentage
CENTRAL	33.1%
CHIMBU	11.8%
EAST NEW BRITAIN	36%
EAST SEPIK	19.1%



# Advanced features

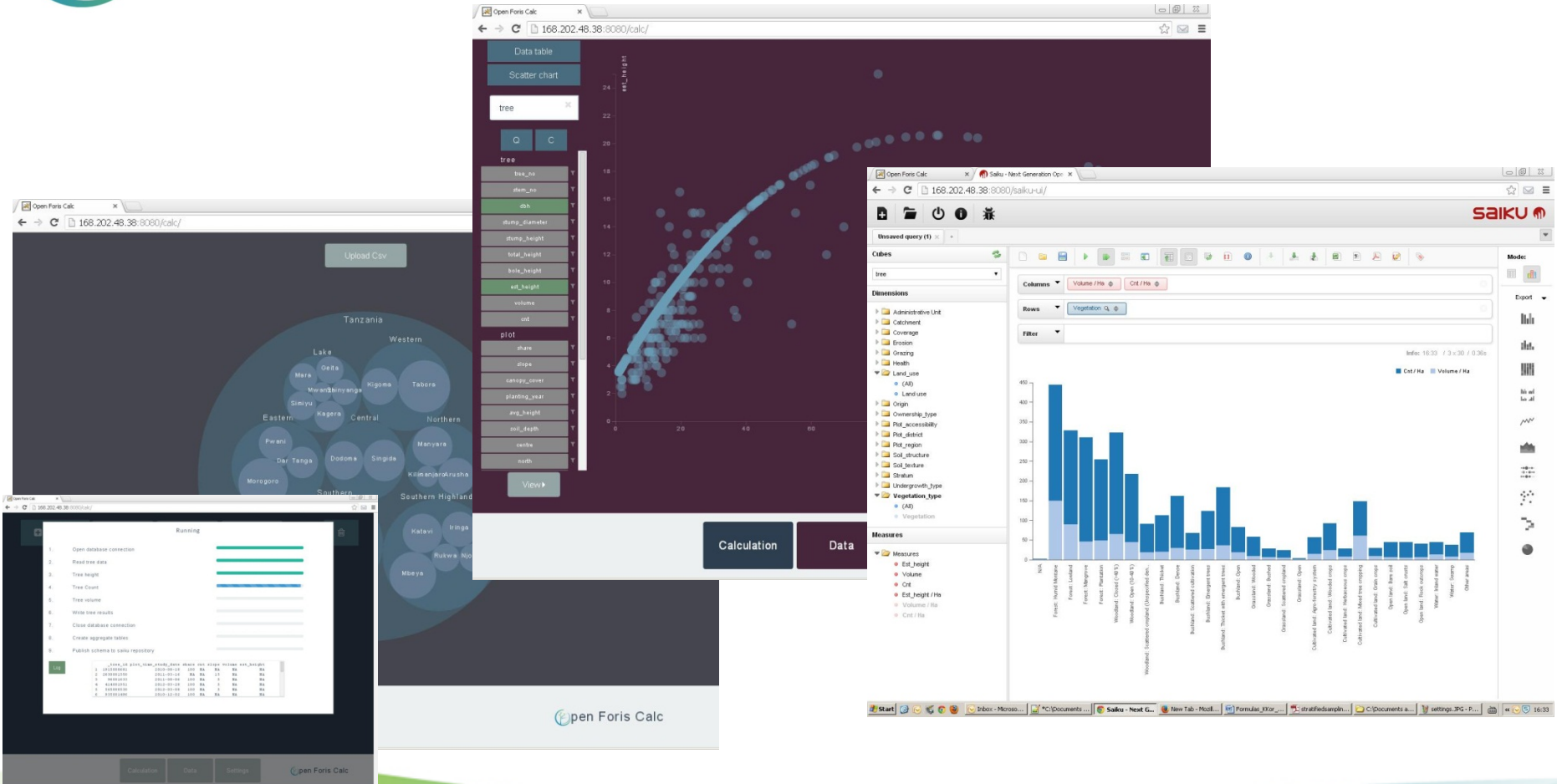


With Google Earth Engine



open**foris**  
CALC

011000101010  
00101000011110101  
111010111001101011010  
011100011010111011  
1010000111101010011  
10101110011101010110101  
110001010101110011110  
00101000011110101001101  
0011010110101001010  
101110001101011  
000011110101  
111010101



The image displays several components of the OpenForis Calc application:

- Map:** A map of Tanzania showing various regions like Laka, Geta, Mara, Morogoro, etc.
- Data Table:** A table with columns for tree attributes such as tree\_no, diam\_cm, dbh, dump\_diameter, dump\_height, total\_height, bole\_height, volume, and plot.
- Scatter Chart:** A plot showing the relationship between diameter (cm) on the x-axis and total height (m) on the y-axis, with a fitted curve.
- Calculation Interface:** A window with 'Calculation' and 'Data' tabs, showing a running status and a table of results.
- Saiku Analytics:** A reporting dashboard showing a bar chart of 'Volume / Ha' across various categories, with a sidebar for dimensions and measures.

➤ **Easy Import**  
Calc is a fully customizable tool for facilitated data analysis. You can import data directly from Collect, import external equations and build complex processing chains.

➤ **For experts and end-users**  
Calc is designed for both experts and end-users. Whereas the experts can build the processing chains, end users can just hit play and repeat the calculation processes.

➤ **Reporting**  
Calc results can be presented using Saiku Analytics. This allows easy reporting and presenting the results in both tabular and graphical form.





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		<input checked="" type="checkbox"/> Stand - Major forest status	<input checked="" type="checkbox"/> Stand - FRA class	<input checked="" type="checkbox"/> Stand - IPCC class
		<input checked="" type="checkbox"/> Tree - Count	<input checked="" type="checkbox"/> Tree - Basal area	<input checked="" type="checkbox"/> Tree - Est. height
<input checked="" type="checkbox"/> Tree - Bole volume	<input checked="" type="checkbox"/> Tree - AG Biomass	<input checked="" type="checkbox"/> Tree - BG Biomass	<input checked="" type="checkbox"/> Tree - Total biomass	
<input checked="" type="checkbox"/> DW - Biomass	<input checked="" type="checkbox"/> DW - Carbon	<input checked="" type="checkbox"/> Stump - Count	<input checked="" type="checkbox"/> Stump - DBH estimate	
<input checked="" type="checkbox"/> Stump - Tree AG biomass	<input checked="" type="checkbox"/> Stump - BG Biomass	<input checked="" type="checkbox"/> Stump - Total biomass	<input checked="" type="checkbox"/> Stump - Removal volume	
<input checked="" type="checkbox"/> Bamboo - BG Biomass	<input checked="" type="checkbox"/> Bamboo - Biomass	<input checked="" type="checkbox"/> Bamboo - Carbon	<input checked="" type="checkbox"/> Liana - Count	





Edit

Test/Execute

Type

R script

External equation

Category

Caption

Tree - Volume

Entity

tree

Variable

tree\_est\_volume

Script

```
1 # Basic volume model, source: CHIDUMAYO 2012, p. 22
2
3 tree$tree_est_volume <- with( tree, 0.67 *pi * (0.01 * tree_dbh / 2)^2 * tree_est_height );
4
```

Aggregate function

— Available only for those entities that won't be aggregated using the sampling design  
— Sum will be applied by default if none of the functions is selected

sum

min

max

avg







count

distinct-count




Open Foris Calc

127.0.0.1:8081/calc/#home

		Stand - Major forest status <input type="checkbox"/>	Stand - FRA class <input type="checkbox"/>	Stand - IPCC class <input type="checkbox"/>	Tree - DBH class (04) <input type="checkbox"/>	Tree - DBH class (20) <input type="checkbox"/>	Plot - Major Forest Status <input type="checkbox"/>	
		Tree - Count <input type="checkbox"/>	Tree - Basal area <input type="checkbox"/>	Tree - Est. height <input type="checkbox"/>	Tree - Height class (02) <input type="checkbox"/>	Tree - Bole height <input type="checkbox"/>	Tree - Volume <input type="checkbox"/>	
Tree - Bole volume <input type="checkbox"/>	Tree - AG Biomass <input type="checkbox"/>	Tree - BG Biomass <input type="checkbox"/>	Tree - Total biomass <input type="checkbox"/>	Tree - AG Carbon <input type="checkbox"/>	Tree - BG Carbon <input type="checkbox"/>	Tree - C,SpAbund.,Graphs <input type="checkbox"/>	DW - Volume <input type="checkbox"/>	
DW - Biomass <input type="checkbox"/>	DW - Carbon <input type="checkbox"/>	Stump - Count <input type="checkbox"/>	Stump - DBH estimate <input type="checkbox"/>	Stump - D0.15 <input type="checkbox"/>	Stump - Volume <input type="checkbox"/>	Stump - AG Biomass <input type="checkbox"/>	Stump - Height before felling <input type="checkbox"/>	
Stump - Tree AG biomass <input type="checkbox"/>	Stump - BG Biomass <input type="checkbox"/>	Stump - Total biomass <input type="checkbox"/>	Stump - Removal volume <input type="checkbox"/>	Stump - Carbon <input type="checkbox"/>	Stump - Removal biomass <input type="checkbox"/>	Bamboo - Count <input type="checkbox"/>	Bamboo - AG Biomass <input type="checkbox"/>	
Bamboo - BG Biomass <input type="checkbox"/>	Bamboo - Biomass <input type="checkbox"/>	Bamboo - Carbon <input type="checkbox"/>	Liana - Count <input type="checkbox"/>	Liana - Volume <input type="checkbox"/>	Liana - Biomass <input type="checkbox"/>	Liana - Carbon <input type="checkbox"/>	Regen - Count total <input type="checkbox"/>	
Regen - Basal area <input type="checkbox"/>	Regen - Volume <input type="checkbox"/>	Regen - AG Biomass <input type="checkbox"/>	Regen - BG Biomass <input type="checkbox"/>	Regen - Biomass <input type="checkbox"/>	Regen - AG Carbon <input type="checkbox"/>	Regen - BG Carbon <input type="checkbox"/>	Regen - Carbon <input type="checkbox"/>	
Plot - Count <input type="checkbox"/>	Plot - Count (Accessible) <input type="checkbox"/>	Plot - Canopy closure <input type="checkbox"/>	Plot - Basal area <input type="checkbox"/>	Plot Volume <input type="checkbox"/>	Plot - Biodiv. Sp. count <input type="checkbox"/>	Plot - Biodiv. Shannon <input type="checkbox"/>	Plot-Biod.Simpson & KML <input type="checkbox"/>	

Calculation      Data      Settings

 CALC  
1.0-04-SNAPSHOT



Open Foris Calc

127.0.0.1:8081/calc/#home

### Running

Task	Progress	Percentage
1. Open database connection	████████████████████	100%
2. Read lvs data	████████████████████	100%
3. Read tree data	████████████████████	100%
4. Read fallen_deadwood data	████████████████████	100%
5. Read stump data	████████████████████	100%
6. Read bamboo data	████████████████████	100%
7. Read plot data	████████████████████	100%
8. Major vegetation type	████████████████████	100%
9. Tree DBH class (05 cm)	████████████████████	100%
10. Tree - Valuable species	██████████████████	~75%
11. Tree - Is valuable species?	████████████████████	0%
12. Tree - Live/Dead	████████████████████	0%
13. Tree - Count	████████████████████	0%

Log

```
Loading required package: DBI
Loading required package: gsubfn
Loading required package: proto
Loading required package: RSQLite
Loading required package: RSQLite.extfuns
sqldf will default to using PostgreSQL
Loading required package: tcltk
```



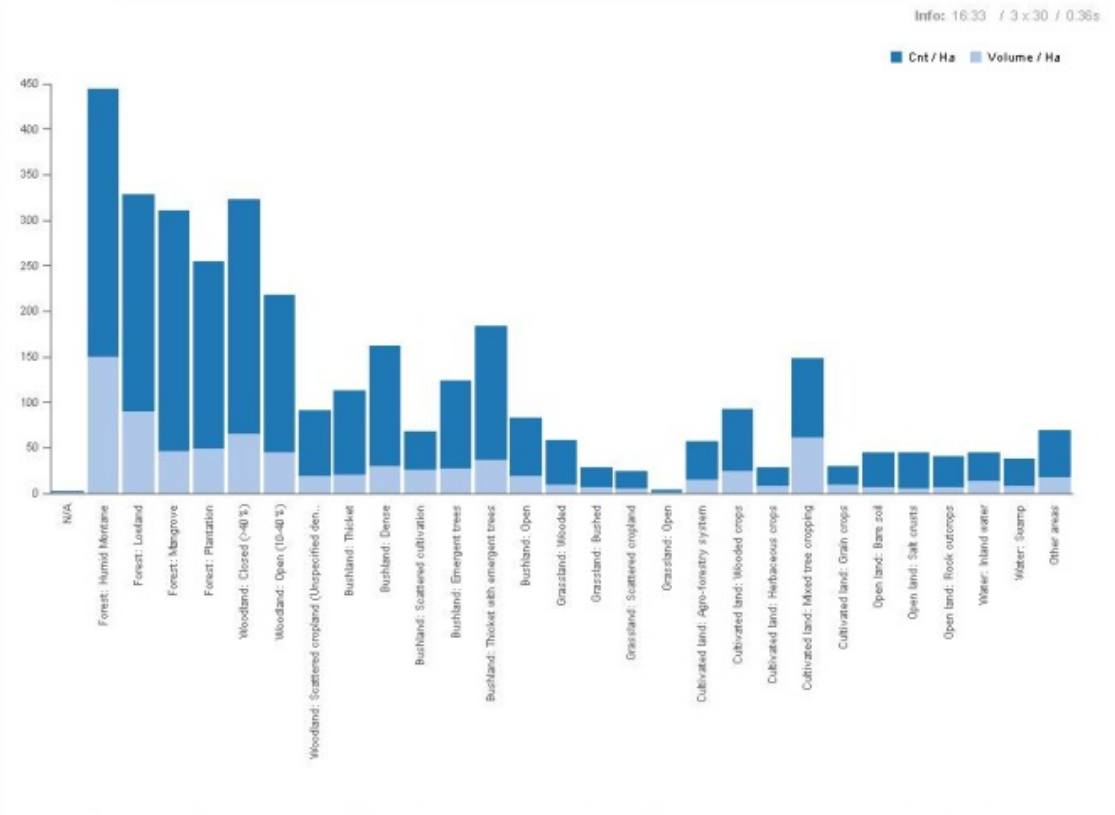
- Cubes**
- tree
- Dimensions**
- Administrative Unit
  - Catchment
  - Coverage
  - Erosion
  - Grazing
  - Health
  - Land\_use
    - (All)
    - Land use
  - Origin
  - Ownership\_type
  - Plot\_accessibility
  - Plot\_district
  - Plot\_region
  - Soil\_structure
  - Soil\_texture
  - Stratum
  - Undergrowth\_type
  - Vegetation\_type
    - (All)
    - Vegetation

- Measures**
- Measures
    - Est\_height
    - Volume
    - Cnt
    - Est\_height / Ha
    - Volume / Ha
    - Cnt / Ha

Columns: Volume / Ha, Cnt / Ha

Rows: Vegetation

Filter:



**Mode:**

Export

- Bar chart
- Line chart
- Table
- Map
- Other visualization options



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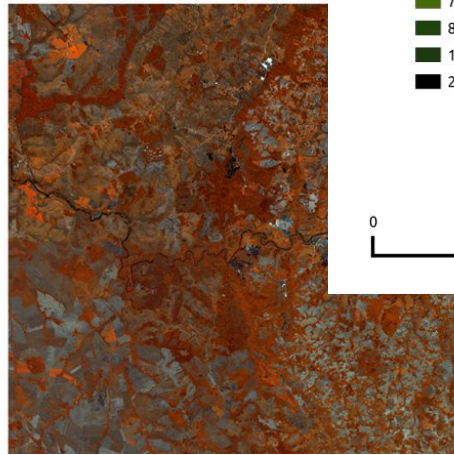
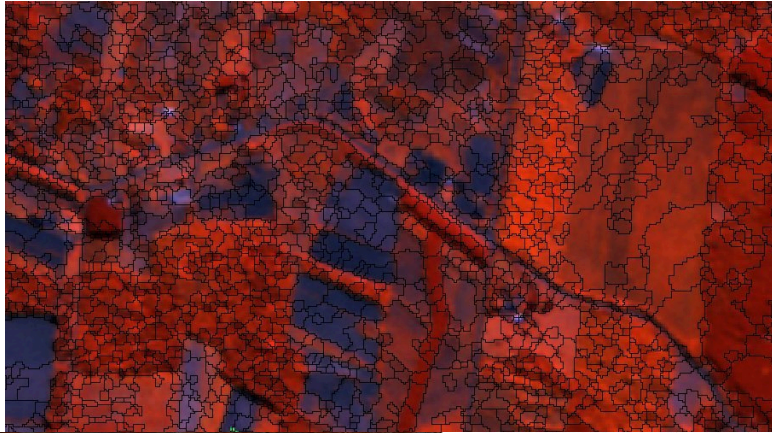


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GEOSPATIAL  
TOOLKIT

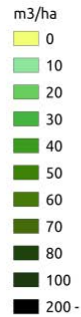


## What is it?

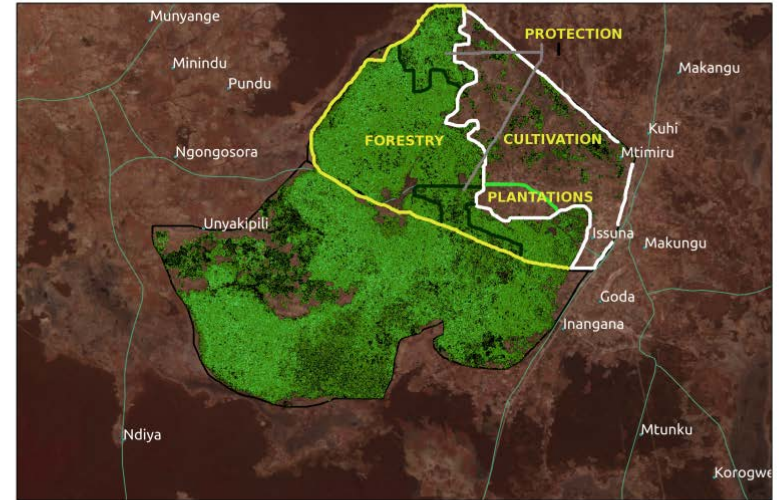
- ~ 70 programs / scripts written in C,C++, awk,bash,perl and python
- Image arithmetics, classification, segmentation, sample generation, raster2vector, histogram, gap-filling, filtering, knn, change detection, pixel value extractor, ...
- for automating processes



NAFORMA



MULTI-SOURCE PILOT - Volume



➤ **Efficient image analysis**  
a collection of professional image processing tools which allow automatic processing of different kinds of images.

➤ **From pre-processing to mapping**  
tools for every image processing phases from pre-processing to calculation of forest resources of given area.

➤ **On low cost-hardware and on the cloud**  
When combined with a cloud computing interface, can be used to process massive amounts of data.



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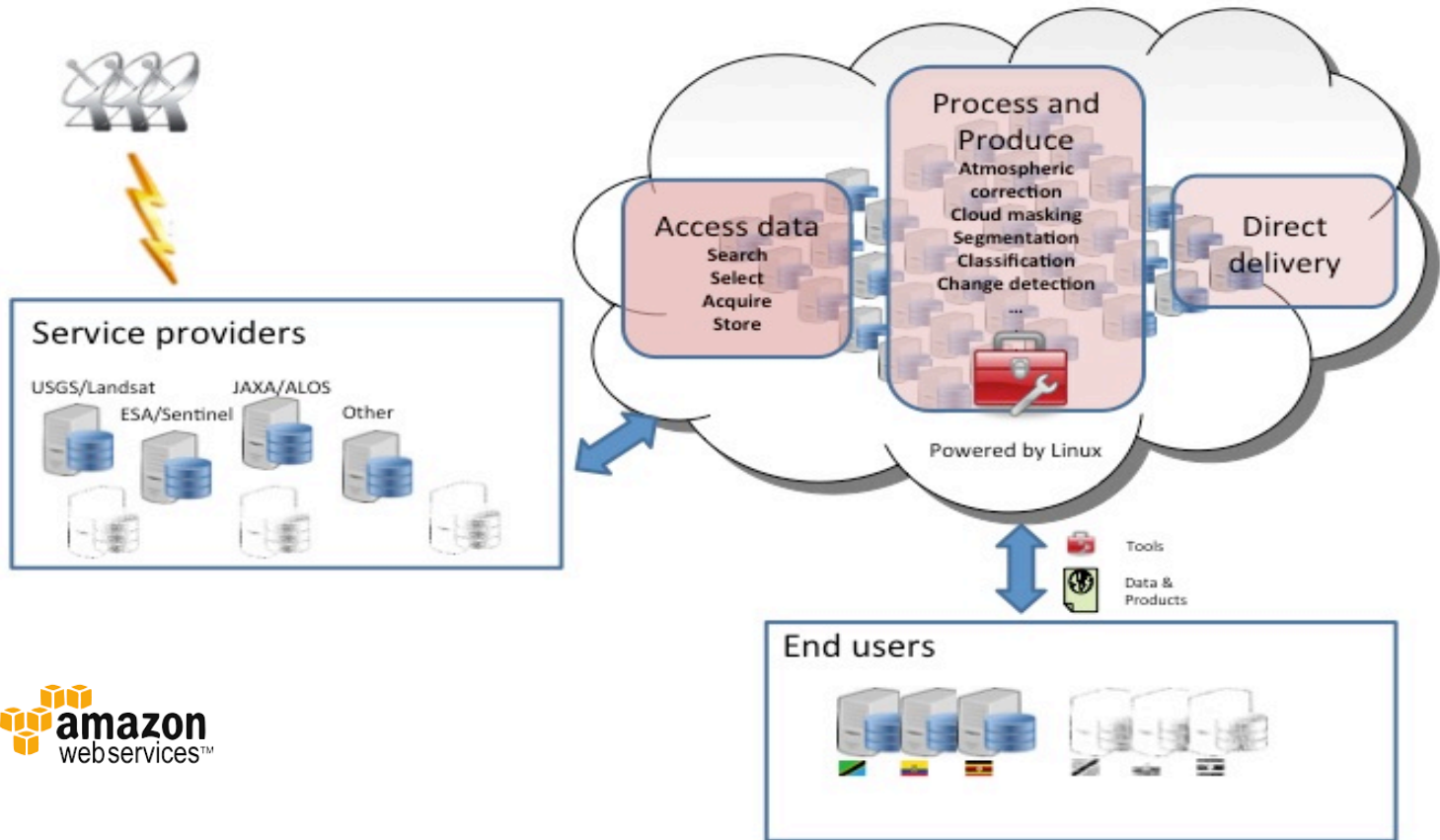


Food and Agriculture Organization of the United Nations



# SEPAL

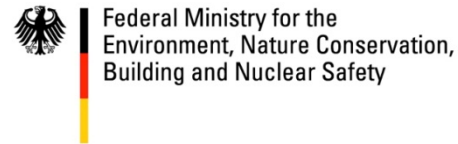
SYSTEM FOR EARTH OBSERVATION DATA ACCESS, PROCESSING & ANALYSIS FOR LAND MONITORING



# Resource partners



Supported by:



based on a decision of the German Bundestag



# Contributors/Users

UN-REDD  
PROGRAMME  
*arbonaut*



environmental affairs  
Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA



agriculture,  
forestry & fisheries  
Department:  
Agriculture, Forestry and Fisheries  
REPUBLIC OF SOUTH AFRICA



Ministerio  
del Ambiente

METLA



ENVIRONMENTAL  
PROTECTION  
AGENCY, GHANA



University of Idaho



# www.openforis.org

The screenshot shows the Open Foris website homepage. At the top, there is a navigation bar with the Open Foris logo and links for Home, Tools, Events, Partnership, and Community Support. The main banner features a lush green forest background with the text "openforis" and "Free open-source solutions for environmental monitoring". A "What is openforis?" button is centered below the banner. Below this, five tool categories are displayed, each with an icon and a brief description:

- Collect**: Easy and flexible survey design and data management
- Collect Mobile**: Intuitive data collection and validation in the field
- Collect Earth**: Innovative land assessment through freely available satellite imagery
- Calc**: Efficient and collaborative data analysis and results dissemination
- Geospatial Toolkit**: Powerful command-line utilities for processing geospatial data

At the bottom, a blue banner asks "What is Open Foris?" and includes a video thumbnail with the text "FREE FORESTRY SOFTWARE IN THE BATTLE AGAINST CLIMATE CHANGE".



**THANK YOU!**

