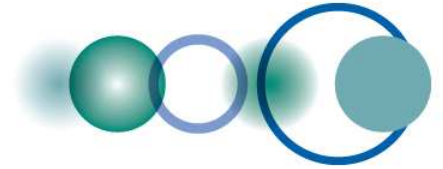


GEOSS Forest Monitoring System Purpose

Provide basic information to support Countries and International Organizations in decision making on national and international forest related matters.

To be developed in order to serve the cross cutting nature of Forest monitoring, addressing all the involved User Communities



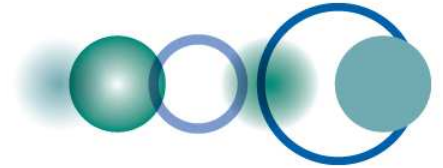
GEOSS Forest Monitoring System

What information should produce ?

Where is forest ?

Where forest, a number of key characteristics (including changes and trends) such as:

- Classification
- Inventory
- Carbon stocks
-

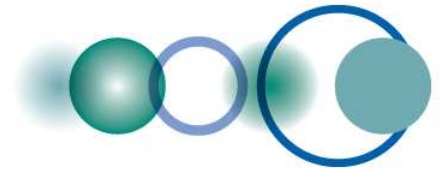


GEOSS Forest Monitoring System

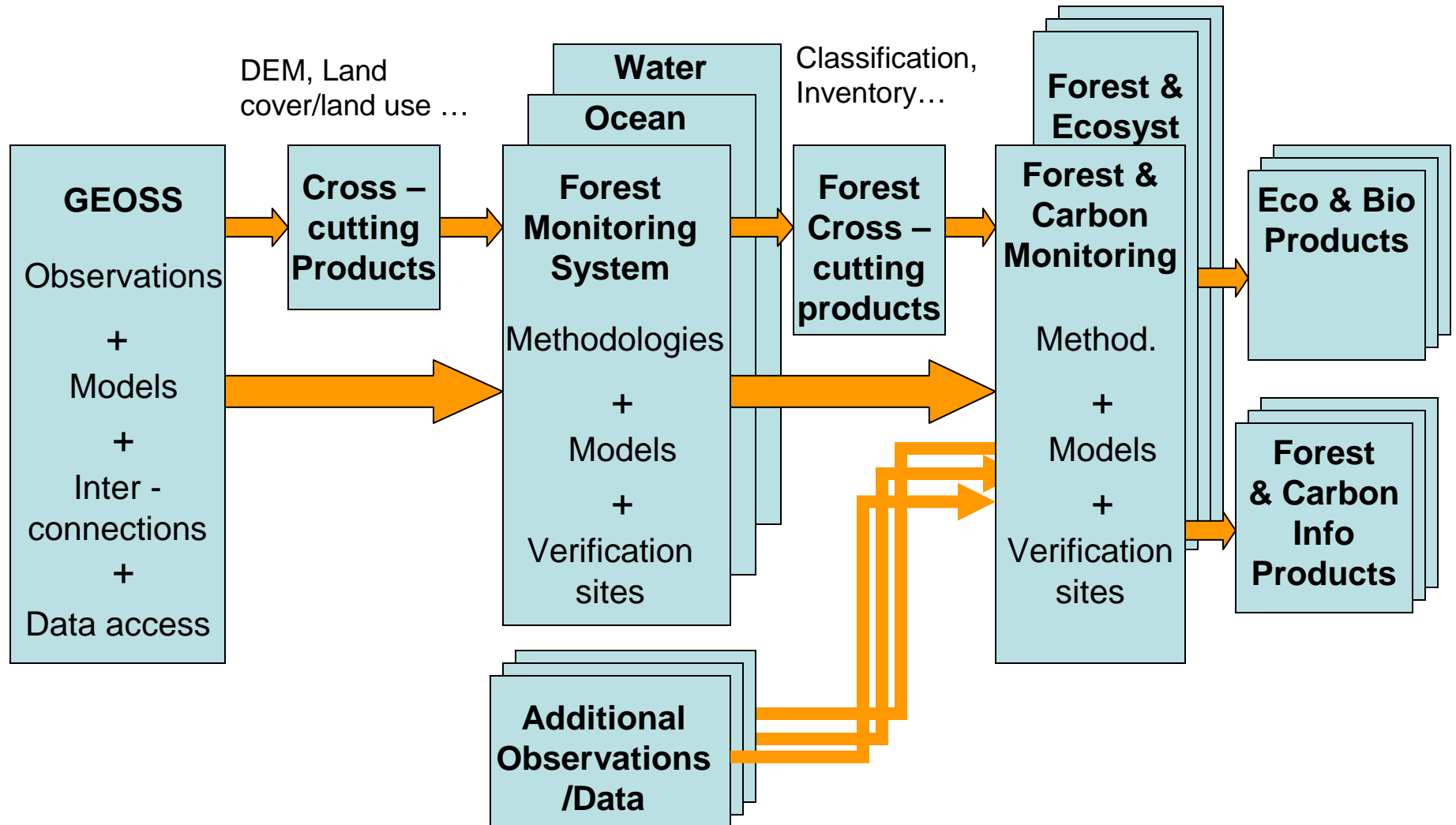
Key features

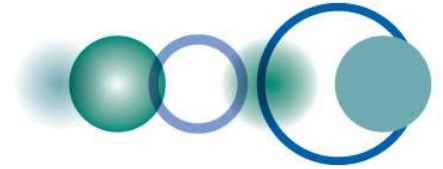
- Systematic observations
- Global Information Products
 - Common Multiuser Products
 - Basic User-related products
- User support tools and methodologies

Note that, in several cases, final users products may require additional observations, data and processing

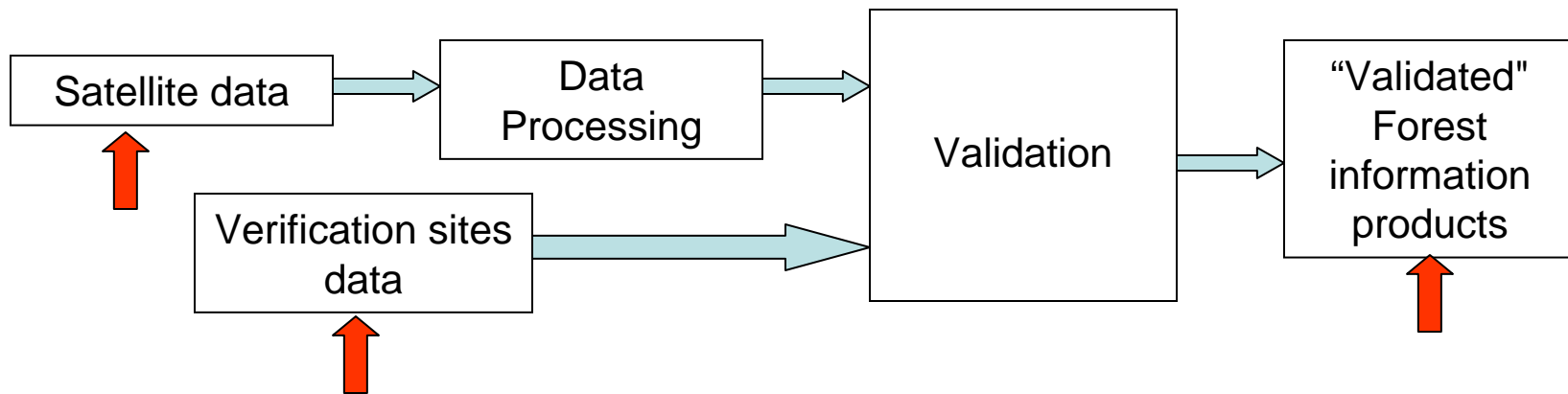


GEOSS and its Forest Monitoring System

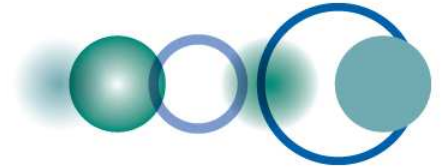




GEOSS Forest monitoring system Simplified Operational flow



 User access



Main System Components

End-to-end components

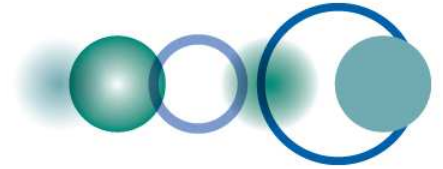
•Satellite observations

- Multi-spectral optical (25 medium resolution)
- Mid-resolution SAR (L-, C-, X-band)
- Common algorithms to be agreed and updated on a regular basis (science teams. Eg GOFC-GOLD) – base-processing and thematic processing (eg forest, non-forest), compare algorithms/products to produce the final products/accuracy (eg GOFC-GOLD approach)
 - Possibly use an ‘agreed’ single algorithm for Level-0 forest, non-forest products, but have continuous improvement program
- Spaceborne Lidar – eg GLAS (may need operationalisation?)

•HI-res Remote Sensing: eg Lidar, for in-situ measurement/validation sites; timing is important

•In-situ Measurements:

- Links to ongoing national forest inventory activities and Permanent validation/test sites
 - Eg seedling, sapling,,tree – DBH, height, species, soils, (all 5 carbon pools; eg peat). allometric relationships to height, biomass, in some areas soil carbon – standards still needed among countries
- Opportunities to use semi-automated automated sensing (Pre-operational?)-eg stem diameter
- Standard measurements (eg ICRAF rapid carbon stock assessment)



Main System Components

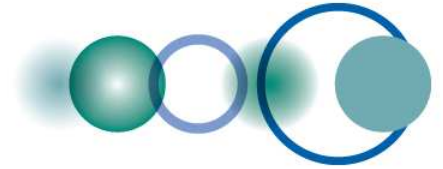
- Regional/National representative ecosystem sites for phase 2
- GEOSS cross-cutting datasets
- Ancillary Data Inputs to Carbon Models are also critical (requirement for GEOSS)
- Carbon Models
- Information products and associated product validation tools and methodologies
- Data management and User access to data and products

Capacity-Building

- Transition from 'Régional Hubs' to country-level production system
- Assistance in establishment of mesurent sites (n some cases)

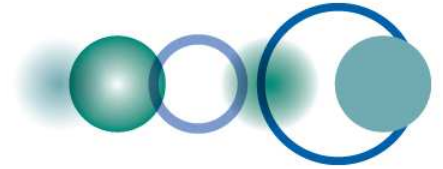
Policies and Interoperability standards

- Data policy
- Technical standards
- Need more clarity on IPCC/UNFCCC guidelines



Satellite observations

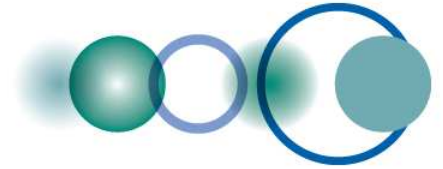
- Reconstruction of an Historical archive of consistent satellite images
- National: Wall to wall coverage (at least on yearly basis) - moderate resolution (Landsat type) through coordinated, systematic observation plans of several Optical and SAR sensors
- Global: Wall to wall coverage (daily to monthly - low resolution (MODIS/MERIS/ScanSAR type or better)
- Local: High and Very High resolution data over selected validation sites (monthly coverage)
- Data Management Approach Processing Options – “Regional Hubs”
- Consistency across remote sensing scales/products



In-situ Forest Measurement Sites

Permanent Validation- Verification sites

- In coordination to FAO FRA in-situ sites (tbd), as well as independent national assessments in the NDs
- Establishment of Regional Reference Test Sites, collectively representing the variety of forests being monitored
- Statistically separate calibration from validation sites
- Select a number of global (~15?) high-intensity measurement sites ~ 2 per each National Demonstrator (to improve/calibrate) carbon models?
- List key measurements for each site (link to Fluxnet); canopy cover/LAI/Fpar/%cover/separarate canopy and understory (w. Lidar?)
- Coherent Plan of activities implemented at each site
- Ground Measurements, Aerial observations and satellite data (higher resolution/higher frequency), in the appropriate mix, planned at each site
- Main output: time series in-situ datasets and products for use in linking to remote sensing area estimates, model parameterisation, and periodic calibration and validation of RS Information addressing all users coverage)

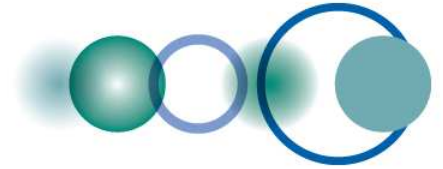


GEOSS cross-cutting datasets and products

Datasets of crosscutting nature (from other GEO tasks including 'GCOS Essential Climate Variables-ECVs') serving more than one monitoring "purpose".

Typical examples could be (spatially explicit):

- Topographic data (DEM's)
- Solar radiation 'surfaces'
- Soil Moisture
- Temperature
- Soil types (incl. soil C ?)
- Meteorological data and other specific datasets (eg ECVs ?)
- Forest type (GEO)- consistent classification ?
- Land-use history (incl. fire history)



Generic Forest Information Products (of general use)

They will be directly derived from integration of satellite RS data and in-situ data; and will undergo, a yearly calibration and validation, by using verification/test sites data and appropriate tools and methodologies.

Two types of products are foreseen:

- Forest cross cutting products

- Horizon-1: Annual Forest, Non-Forest changes & trends and associated accuracy metrics (preferably from a 1990 baseline)
- Horizon-2: Distinguish Forest Degradation [shifting cultivation; forest fire, pests etc.] (& trends)
- Land-use (e.g. agriculture,, plantations, native forest), Forest class: secondary forest (eg after fire or after agriculture); Softwood, hardwood, native, Plantation type mapping pre- and post-1990 (or as available for each country)
- Sparse woody perennial cover Forest type/cover

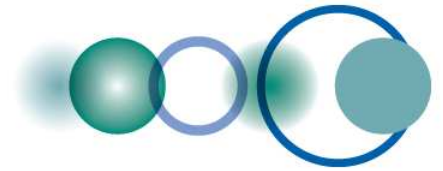
User dedicated basic products

- Forest carbon stock and pools

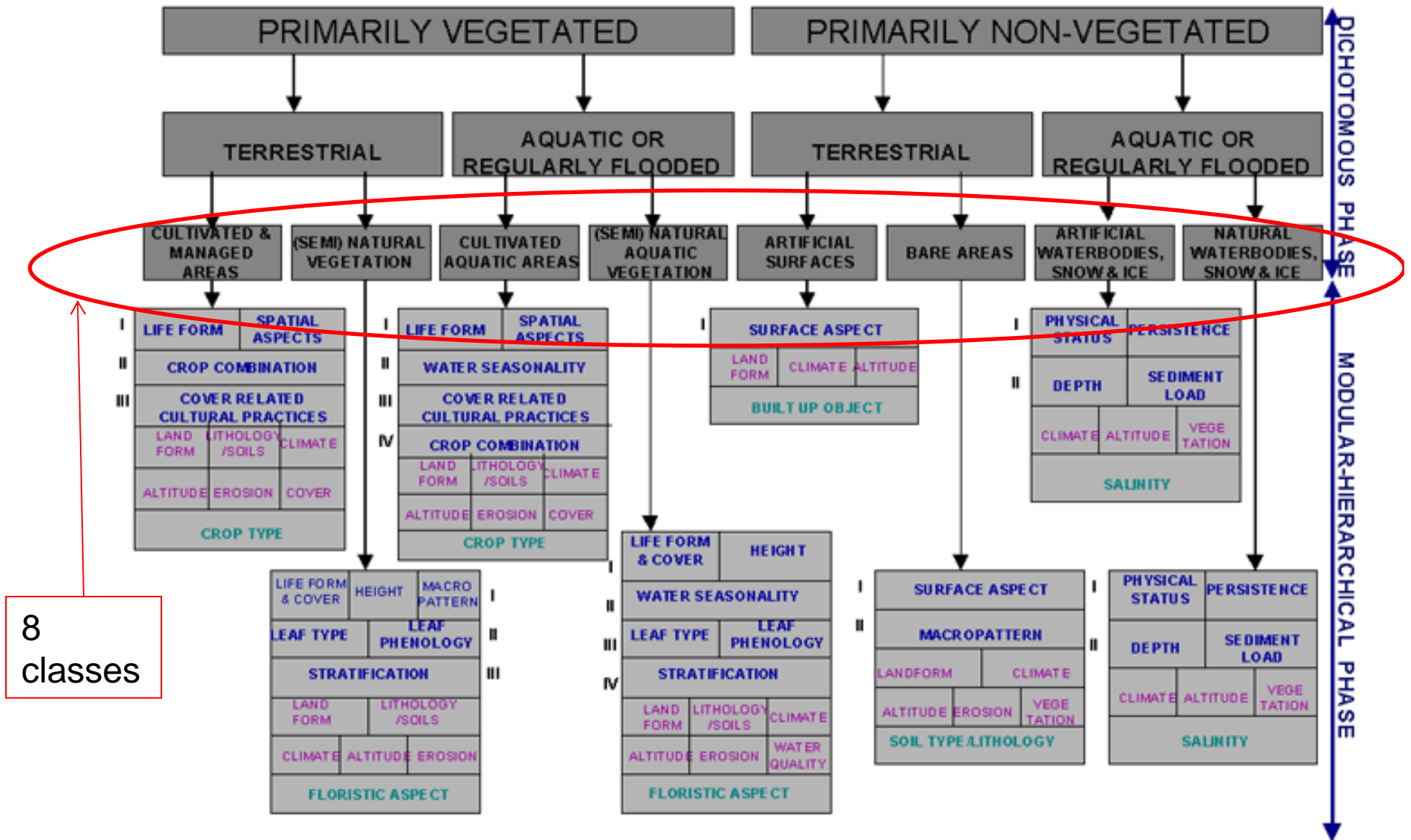


Data management and User access to data and products

Distribution of system functions
Distribution and type of archives
User access points
Etc....



LCCS classifiers

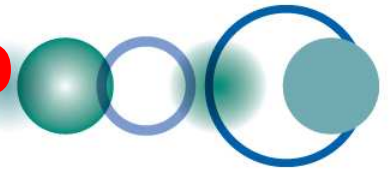




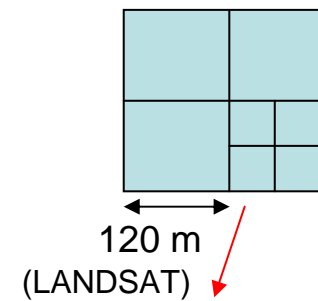
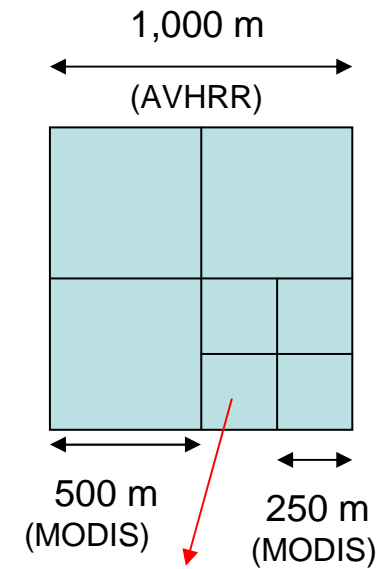
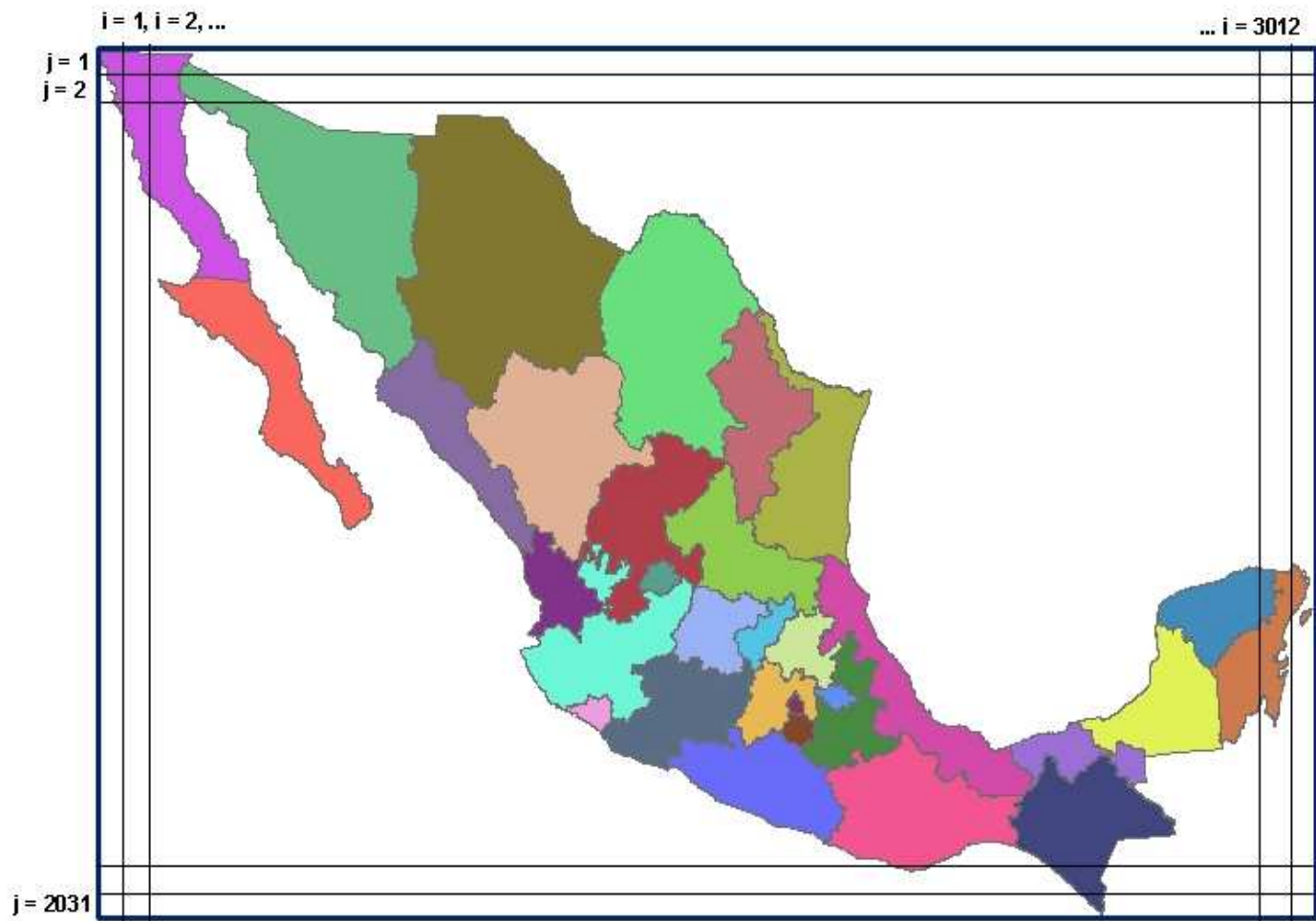
Policies and Interoperability standards

- Data policy
 - Open access to observations, datasets and products
 - Free of charge or minimum cost (this may vary with respect to different user requests)
 - Sufficient quality data will be provided by the system, so that countries can choose whether they want to report as Tier-1 or Tier-3 countries to the UNFCCC.
 - Data assembled for this effort will be initially held by the 'processing hubs', and made available freely to individual countries which wish to use it for internal purposes.
- Technical standards
 - Forest definition
 - Interoperability of different RS data in generating same information
 - Geometrical comparability and consistence of products

NATIONAL INTEGRATED MULTI-SCALE SYSTEM

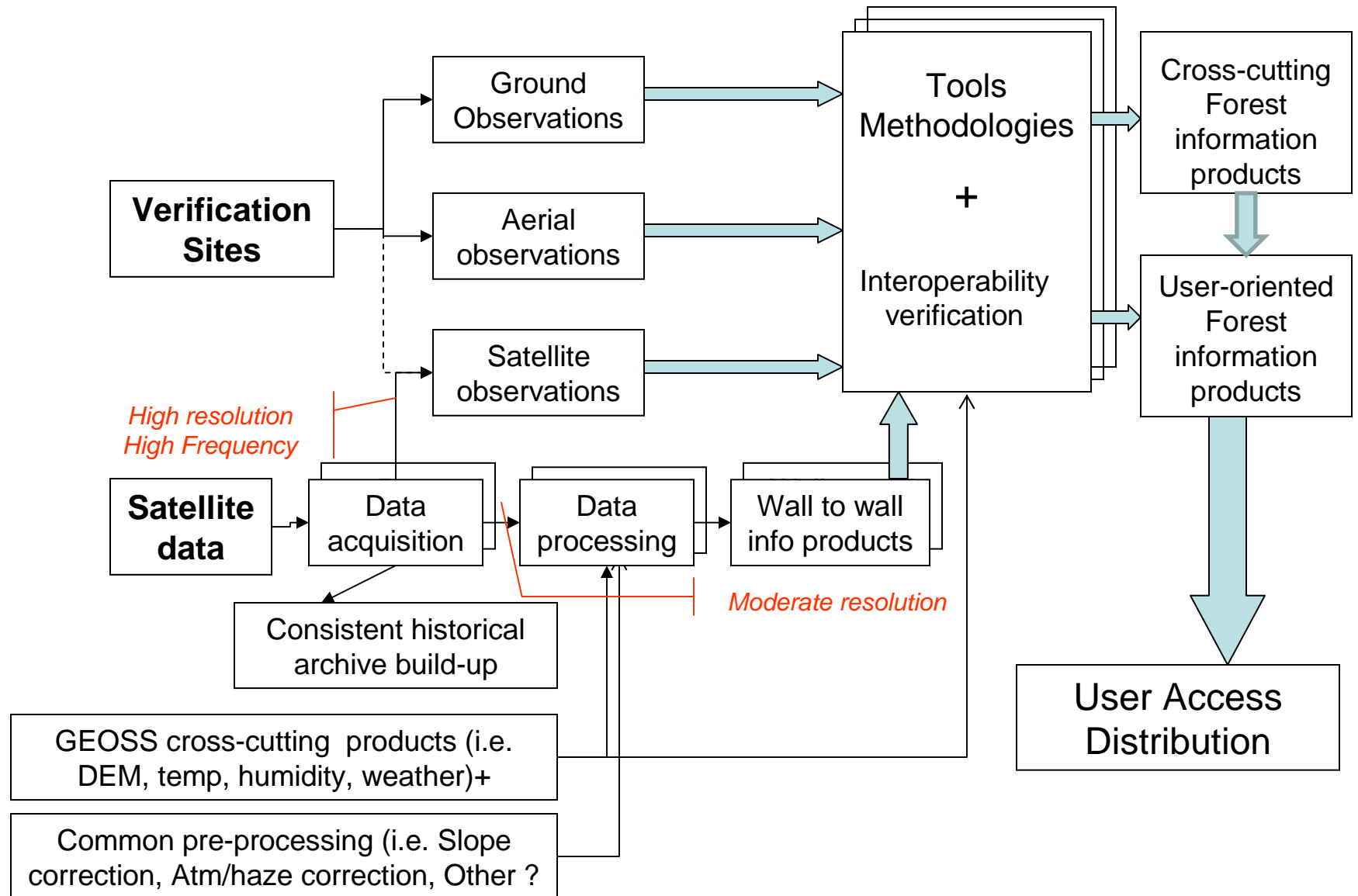
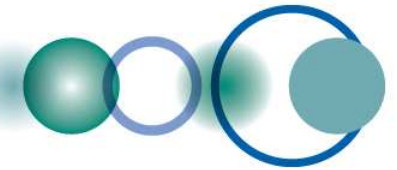


(REMOTE SENSING AND *IN SITU* SAMPLING NETWORK)



and so on till
2.5 m (SPOT)

GEOSS Forest Monitoring operational flow (notional)

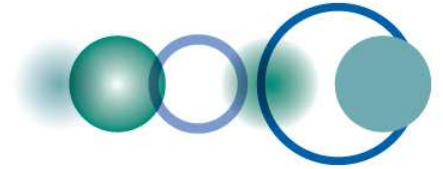




What is requested to each Breakout Groups

- Comment the proposed approach
- Characterize and identify, from each user community point of view, the main components of the OSS Monitoring System, starting from the definition of the final products
- Include these “customized” components in the proposed operational flow of the system
- Consider two types of Users (one Country and one International Organization) and develop the scenarios on how they will make use of the system (what data and products will they use), completing the simplified diagram with additional input data and final user products

The two last actions should result in a operational flow « tailored » to each User Group.



GEOS Forest monitoring system

Simplified Operational flow

User involvement

