

K&C Phase 3 – Brief project essentials

Land Cover and Carbon stock Mapping of Sulawesi Using Alos Palsar in Sulawesi

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Science Team meeting #16 – Phase 3 Kick-off
JAXA TKSC/RESTEC HQ, Tsukuba/Tokyo, November 7-9 2012

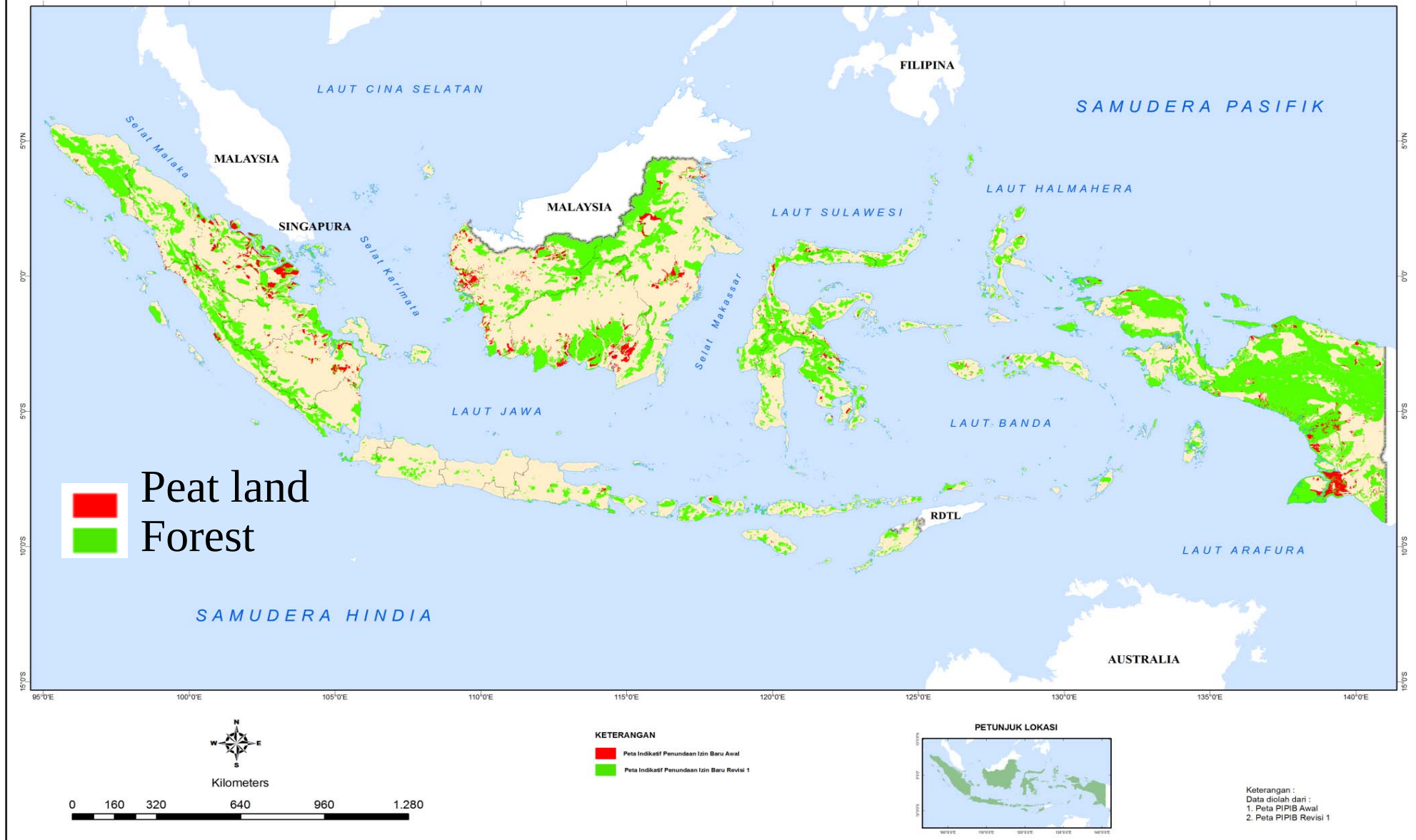
Objective of the Project

1. To demonstrate the ability of ALOS PALSAR for land cover and landcover change mapping of Sulawesi Island → explore methodology
2. To map biomas and carbon stock of Sulawesi Island using ALOS Palsar

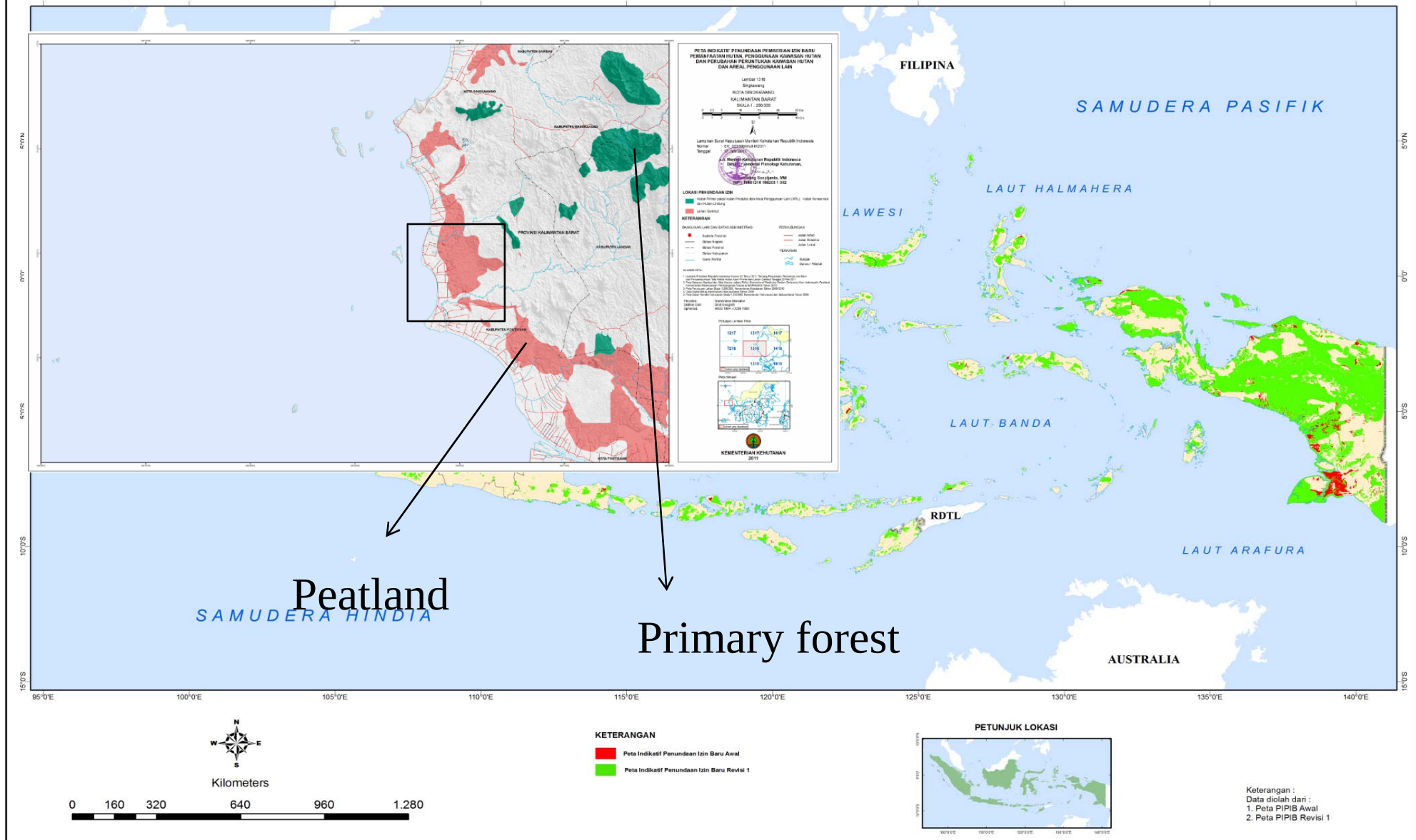
Project Support for Environment Protection

- In long term the availability of landcover map periodically will support international conservation through presenting of dynamic change of landcover.
- The availability of biomass and carbon stock map are required for supporting the Indonesian gov policy in REDD and Climate change action. → understanding carbon cycle from landcover is needed
- Recently Landcover and landcover change have been used to update indicative map for moratoring new consession in Peat and Forest Area (PIPIB) → every 6 month have to update. This PIPIB map goal is to protect primary forest and peat land ecosystem

indicative map for moratoring new consession in Peat and Forest Area (PIPIB)



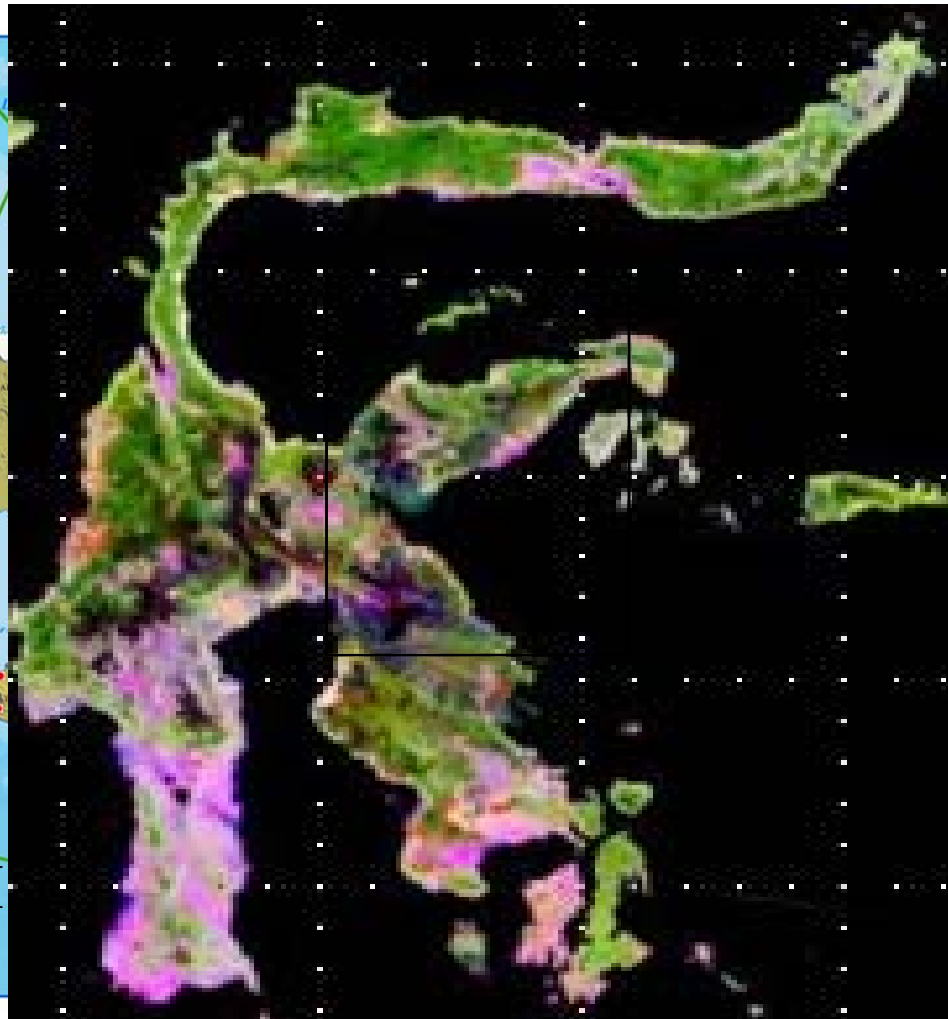
indicative map for moratorium new concession in Peat and Forest Area (PIPIB)



ALOS

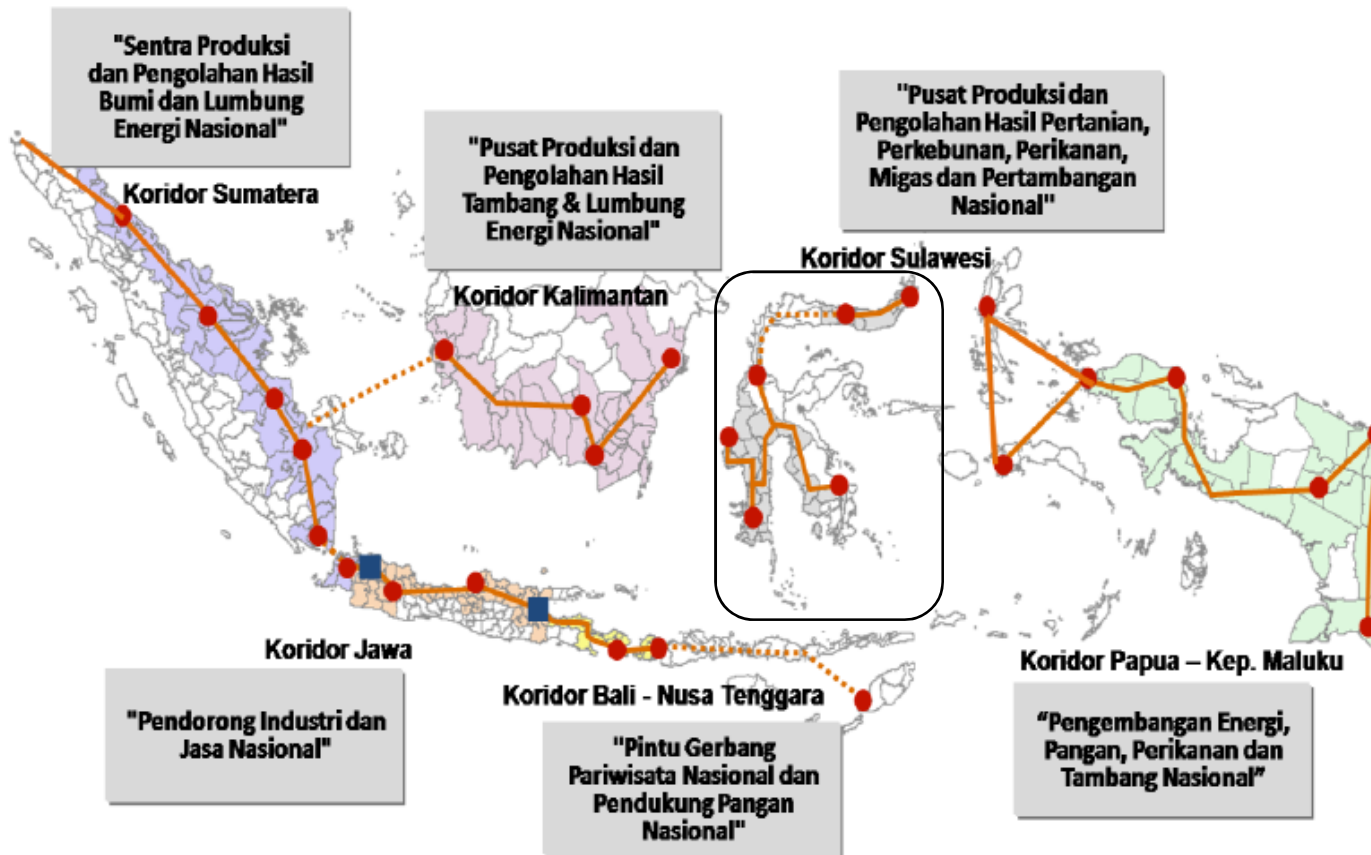
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Project area : Sulawesi

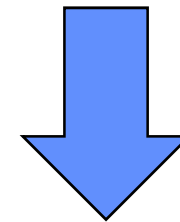


One of Largest island
Fairly Population density
One of six corridor of MP3EI

Sulawesi include in one of six corridor for the MP3EI (Masterplan for Accelerating and Extending Development of Indonesia Economic) program



Central production
for agriculture post
production,
plantation, fishing,
gas and charcoal



requires some
thematic map such
as landcover and
carbon stock as
well

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Primary forest

Secondary
forest/plantation

Mix crop/plan crop

Agriculture &
settlement

Secondary forest or plantation /oil palm



Mix crop

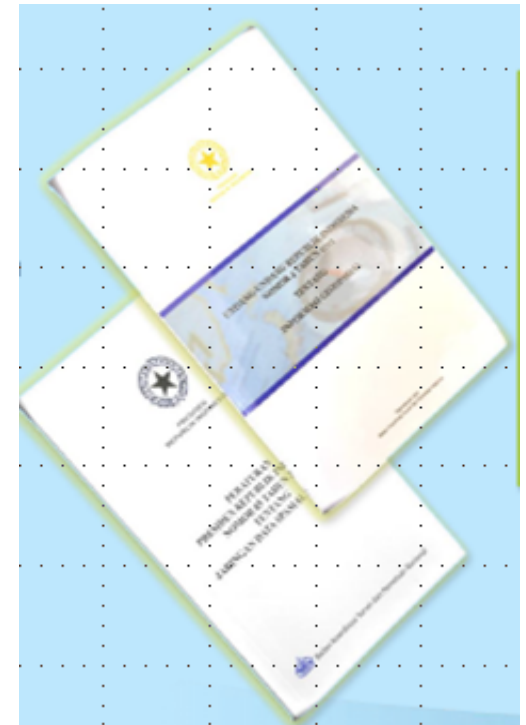


Paddy field



Landcover issue in Indonesia

- Land cover mapping for Bakosurtanal (Geospasial Information Agency of Indonesia - GIA) is very important as one of topomap layer → Mandate of GOI Law no 4/2012 about Geospasial Information : GIA is the authority for basic geospasial information
- Basic Geospasial information consist of :
 - Topographic map
 - Vertical and horizontal control point (geodetic control point)

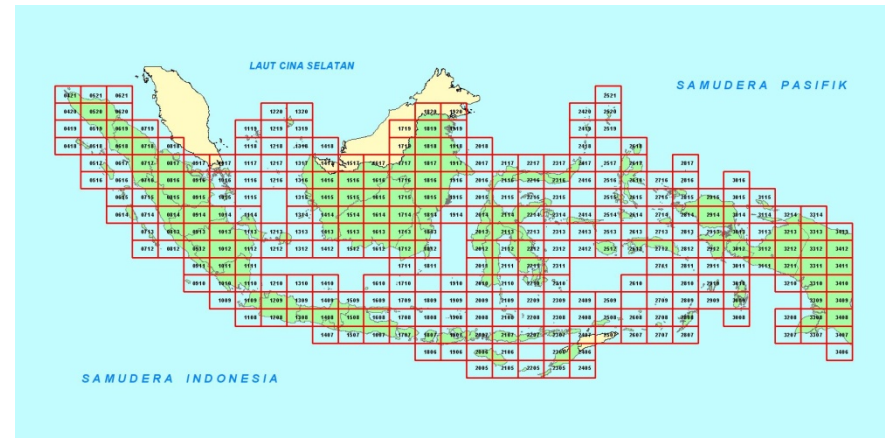
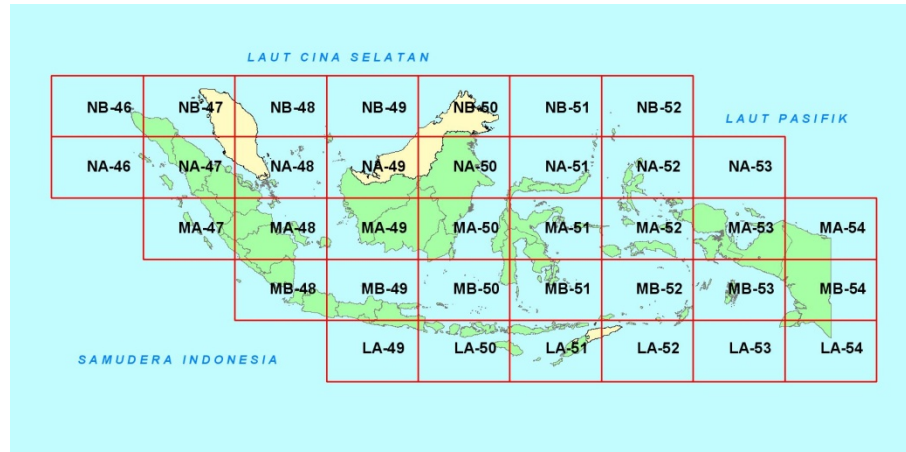


ALOS

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Index of Scale 1 : 1.000.000 – 36 sheets

Index of Scale 1 : 250.000 – 314 sheets



SYSTEMATICAL MAPPING SCALES OF TOPOMAPS

Index of Scale 1 : 50.000 – 3861 sheets

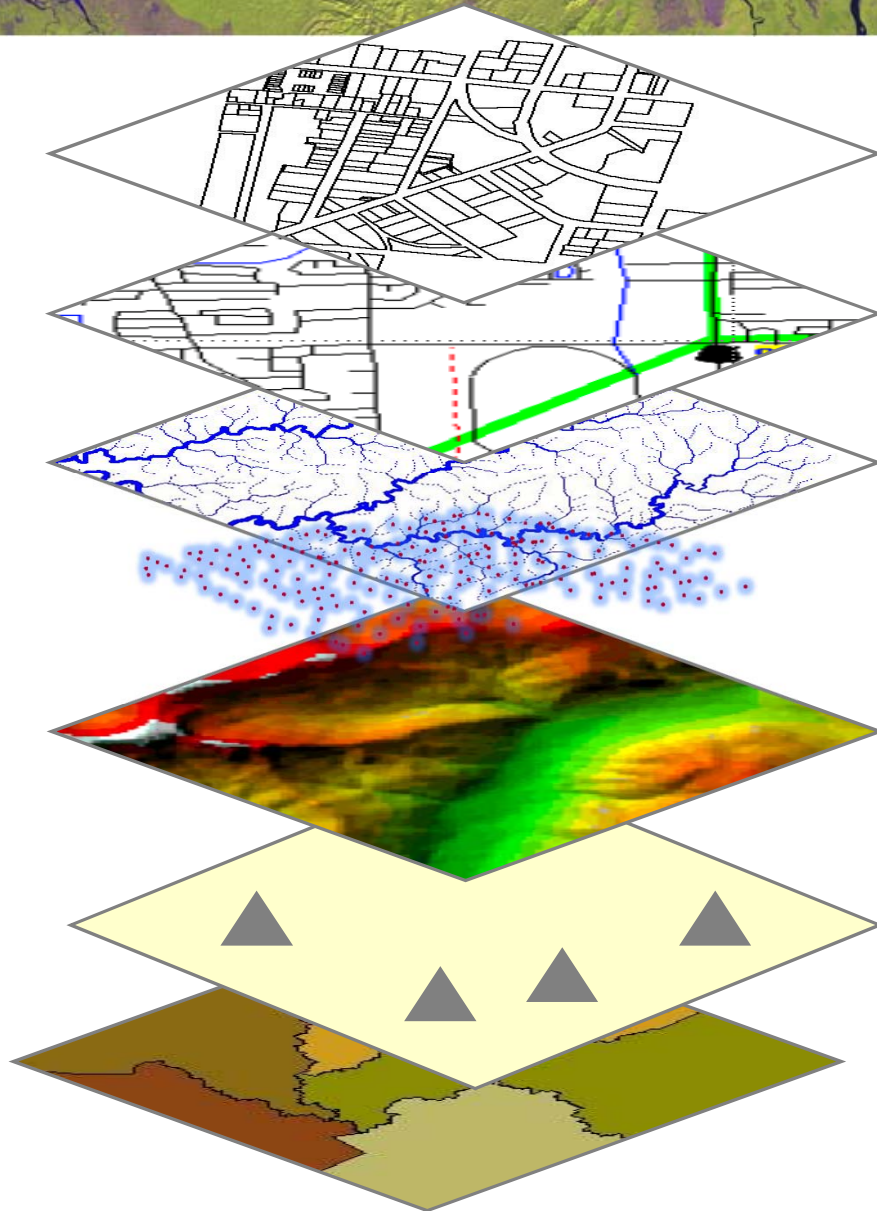
Index of Scale 1 : 25.000 – 1734 sheets



ALOS

An international

Layer of topographic maps



Infrastructure: houses, building, etc

Administratif boundary

Coastal and hidrology line

Toponame

Hypsography (Contour & bathymetri)

Geodetic Heigh point

Landcover

Thematic Mapping

- Landcover mapping has been performed periodically for thematic mapping at various scale and various theme.

Main task in Thematic Mapping

1. To integrate more than one theme of thematic map produced by stakeholder
2. To integrate thematic map produced others government agency/ regional government become new theme of thematic map.
3. Filling the gap of thematic map which has not produced by other agency.



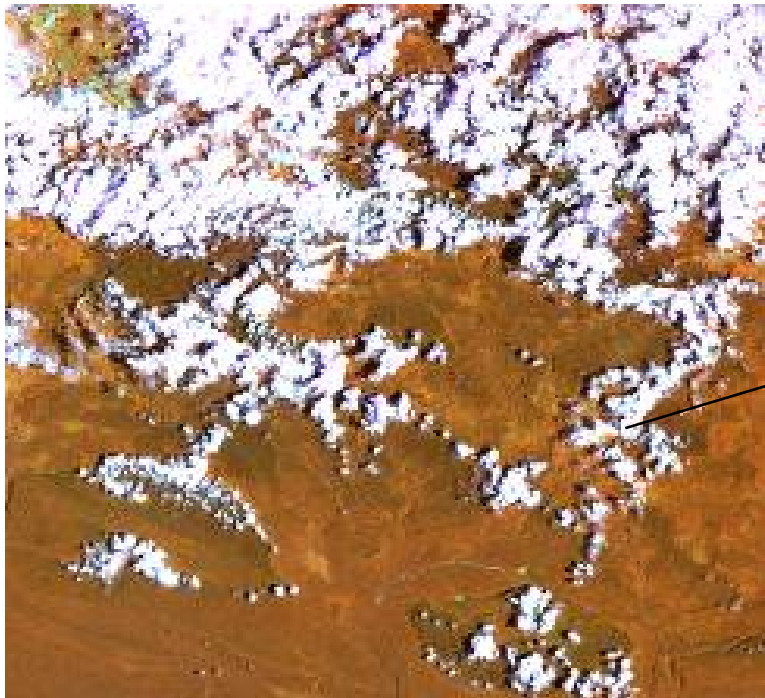
LANDCOVER MAP



The PALSAR is the Challenge for Landcover mapping

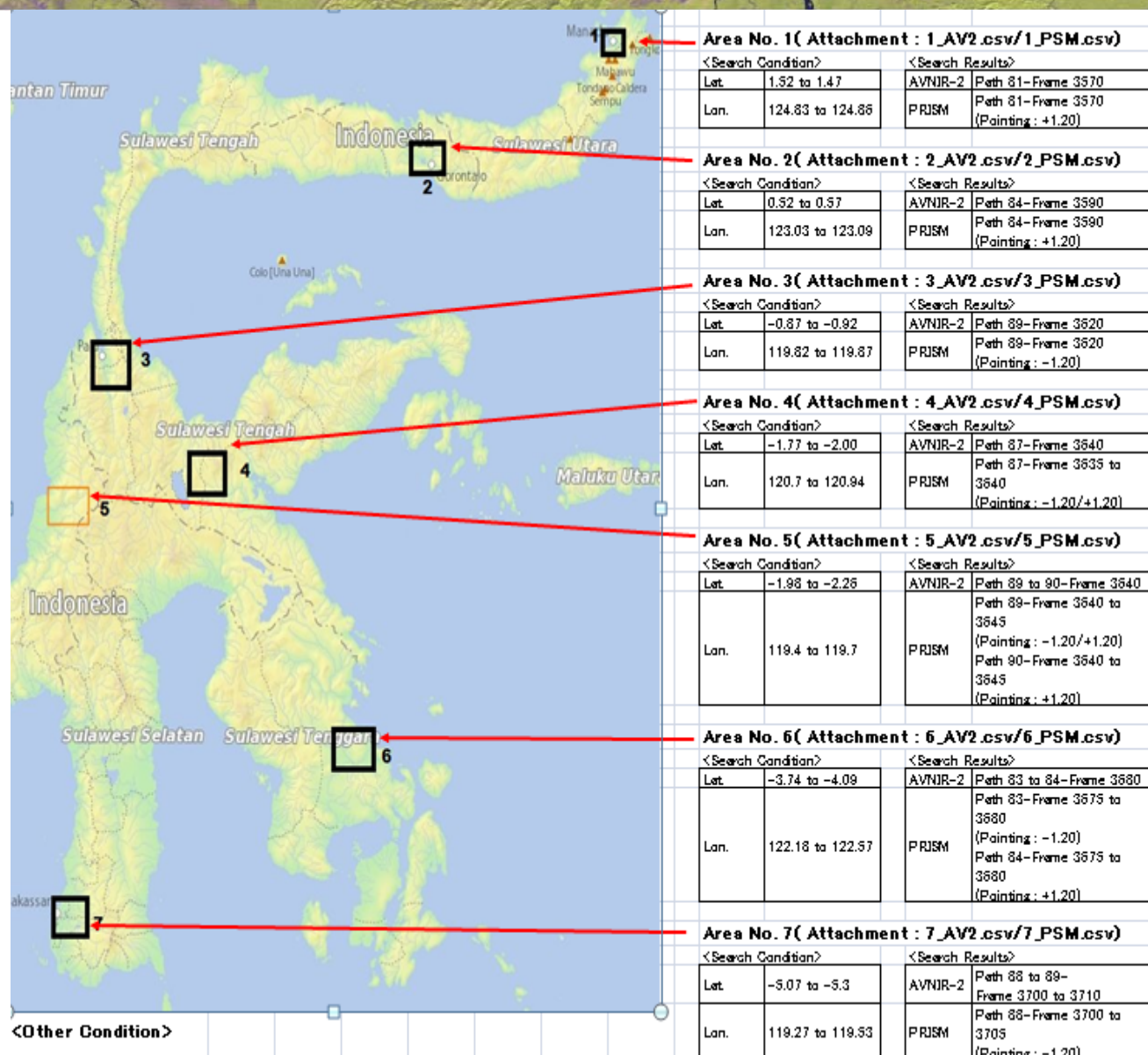
Asia International Science Collaboration led by JAXA

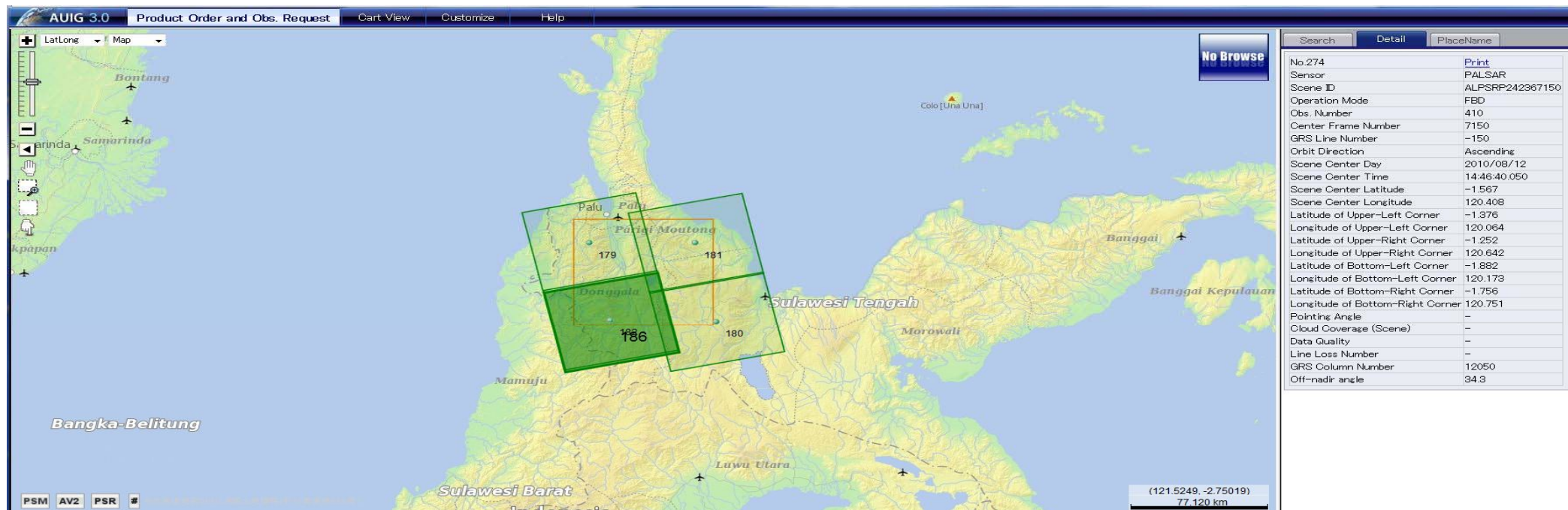
- Land cover mapping in Indonesia mainly use Optical remote sensing data. However due to geographical position of Indonesia the application of optical remote sensing for land cover mapping is hampering by cloud cover.
- The availability of ALOS which carries three on-board sensors including the Phased Array type L-band Synthetic Aperture Radar (PALSAR) is the challenge to aim at day-and-night and all-weather observation for landcover mapping.



Data type	Status data	Progress work	Note
ALOS PALSAR Mosaic 25 M (2007, 2008, 2009, 2010)	Under request	After receive proceed with analisis segmentation	end 2012 or end march 2013 landcover finish
Jers -1 SAR mosaic at 25 m (mid 1990s)	In prepare for request	Will use for change detection	landcover change i n schedule end 2013
ALOS PALSAR (HH) mosaic 100 m	In prepare for request		For landcover change end 2013
AVINIR, PRIMS and PALSAR FBD	50 data downloaded from 100 data (see index) from AUIG	Disply and identification to support visual interpretation	End march 2013 available for 100 data
Landsat Data	Available and downloaded	Have been Interpreted for landcover	Desember 2012 landcover available
Topomap	available		

Progress work : data Aquisition





Confirm	No.		Cancel Observation Request + Product	Product	Beginning Processed	Receipt Number (Receipt day)	Request Type	Require	Status	Obs. Request ID	Scene ID	Process management Number	Sensor Obs. Mode	Obs. day	Center Lat. Center Lon.	Processing level	Shipping schedule day
Confirm	19N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN112323640	A1200984-003	PRISM OB1	2008/03/04	-2.007 120.954	1B2	2012/08/03
Confirm	20N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN058643635	A1200984-004	PRISM OB1	2007/03/02	-1.767 121.002	1B2	2012/08/03
Confirm	21N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN058643630	A1200984-005	PRISM OB1	2007/03/02	-1.518 121.055	1B2	2012/08/03
Confirm	22N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN058643640	A1200984-006	PRISM OB1	2007/03/02	-2.016 120.949	1B2	2012/08/03
Confirm	23N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN076293630	A1200984-007	PRISM OB1	2007/07/01	-1.462 121.336	1B2	2012/08/03
Confirm	24N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN076293635	A1200984-008	PRISM OB1	2007/07/01	-1.711 121.283	1B2	2012/08/03
Confirm	25N	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSMN076293640	A1200984-009	PRISM OB1	2007/07/01	-1.960 121.230	1B2	2012/08/03
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Confirm	27	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALAV2A065353630	A1200984-011	AVNIR-2 OBS	2007/04/17	-1.493 120.930	1B2	2012/08/03
Confirm	28	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALAV2A065353640	A1200984-012	AVNIR-2 OBS	2007/04/17	-1.991 120.825	1B2	2012/08/03
Confirm	29	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALAV2A072063650	A1200984-013	AVNIR-2 OBS	2007/06/02	-2.491 120.712	1B2	2012/08/03
Confirm	30	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALAV2A163523650	A1200984-014	AVNIR-2 OBS	2009/02/18	-2.464 121.258	1B2	2012/08/03
Confirm	31	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALAV2A210493640	A1200984-015	AVNIR-2 OBS	2010/01/06	-1.960 121.365	1B2	2012/08/03
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Confirm	33	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSRS172273650	A1200984-017	PALSAR WB1	2009/04/19	-1.771 123.276	1.5	2012/08/03
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Confirm	35	☐	-	-	-	120731000014 (2012/07/31)	Archives	Principal	Downloading	-	ALPSRS173733650	A1200984-019	PALSAR WB1	2009/04/29	-1.743 120.062	1.5	2012/08/03

PALSAR IDENTIFICATION

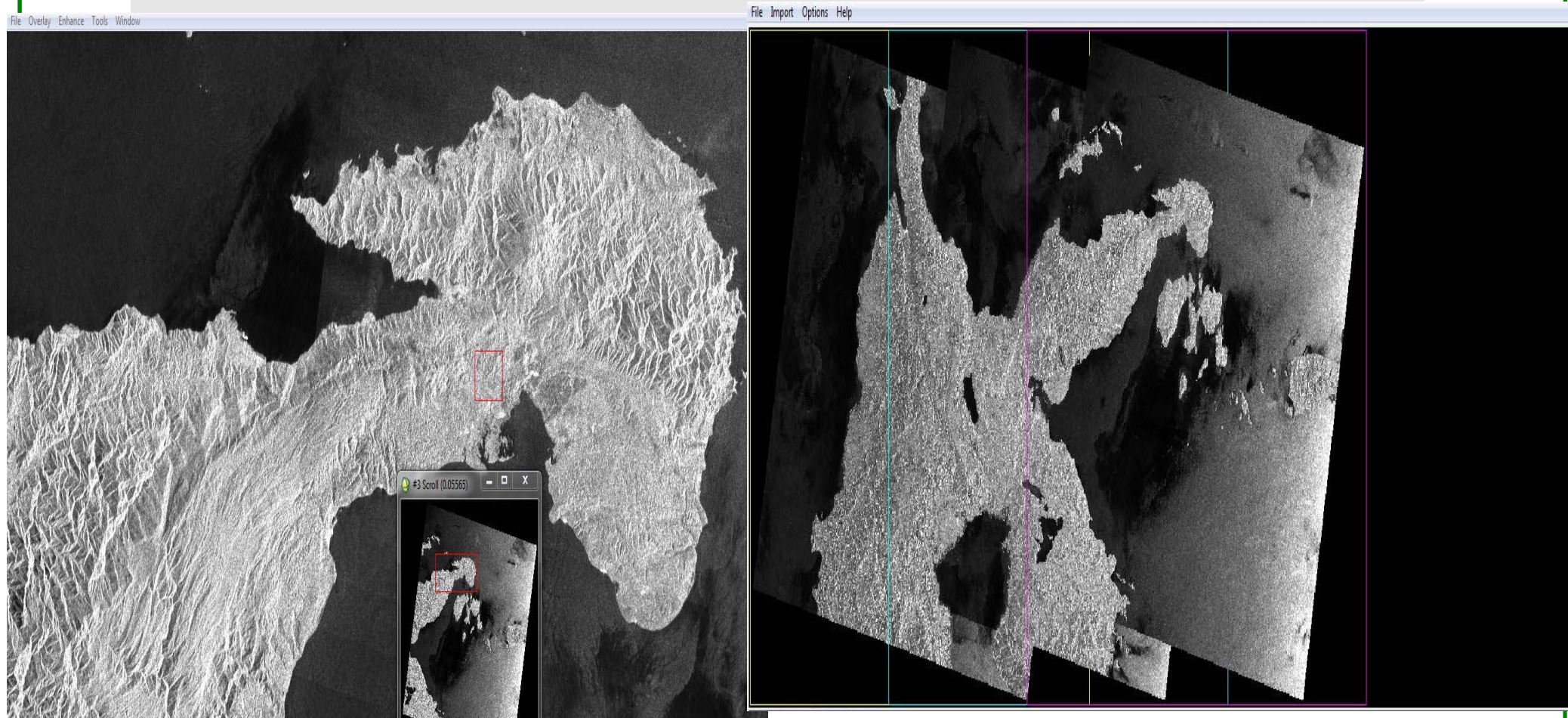
To Interpret PALSAR dual polarization, there are several key interpretations needed to be observed (Tone, Color, Pattern, Shape, Texture)

To identify landcover : vegetation, settlement, paddy field, open space, and cultivated land; the suitable Palsar band Combination HH,HV,(HH/HV) or HH,HV,(HH+HV)



ALOS : FBD, Mozaic and ScanSAR : Multi and single Polarization

by JAXA

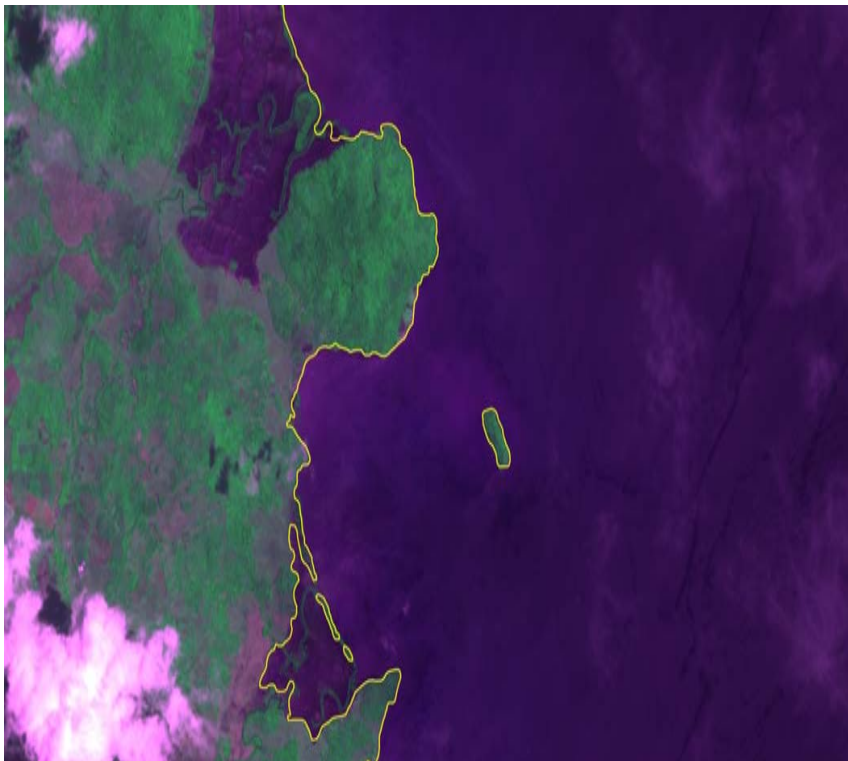


Single polarization HH

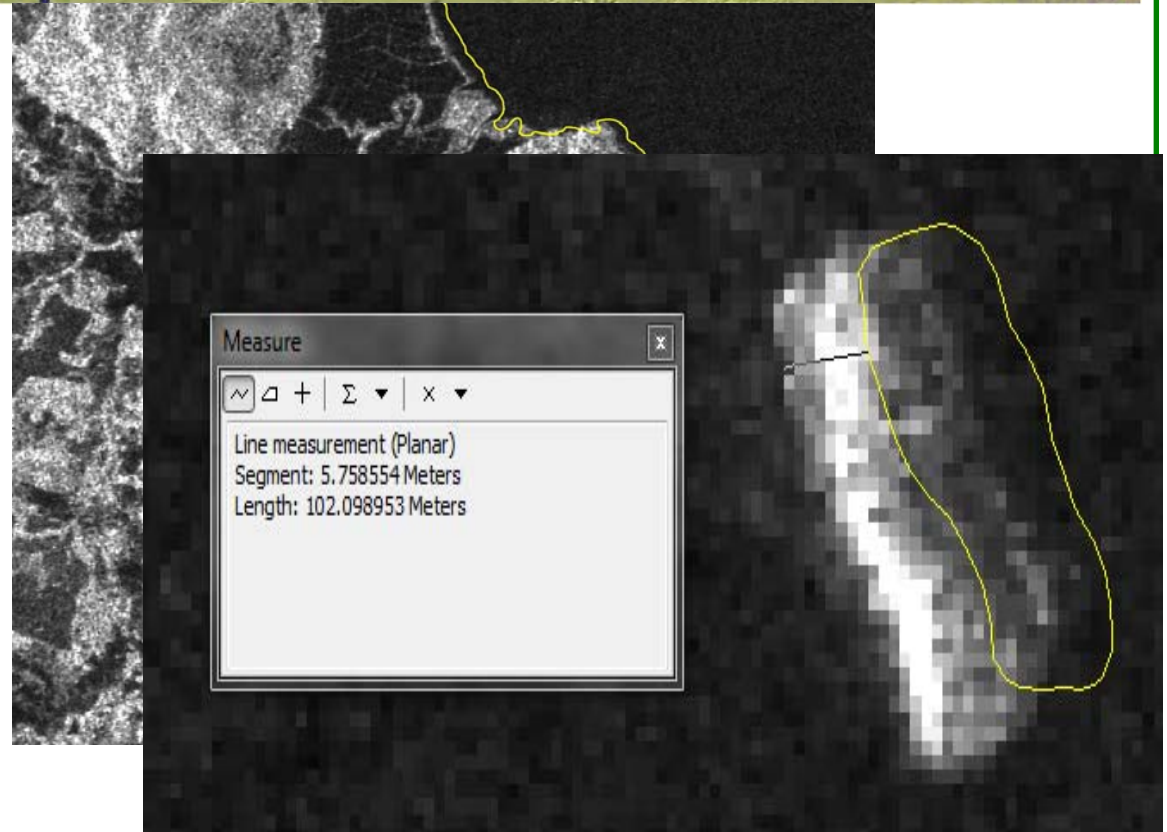
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Projection Problem

by JAXA



ALOS AVINIR

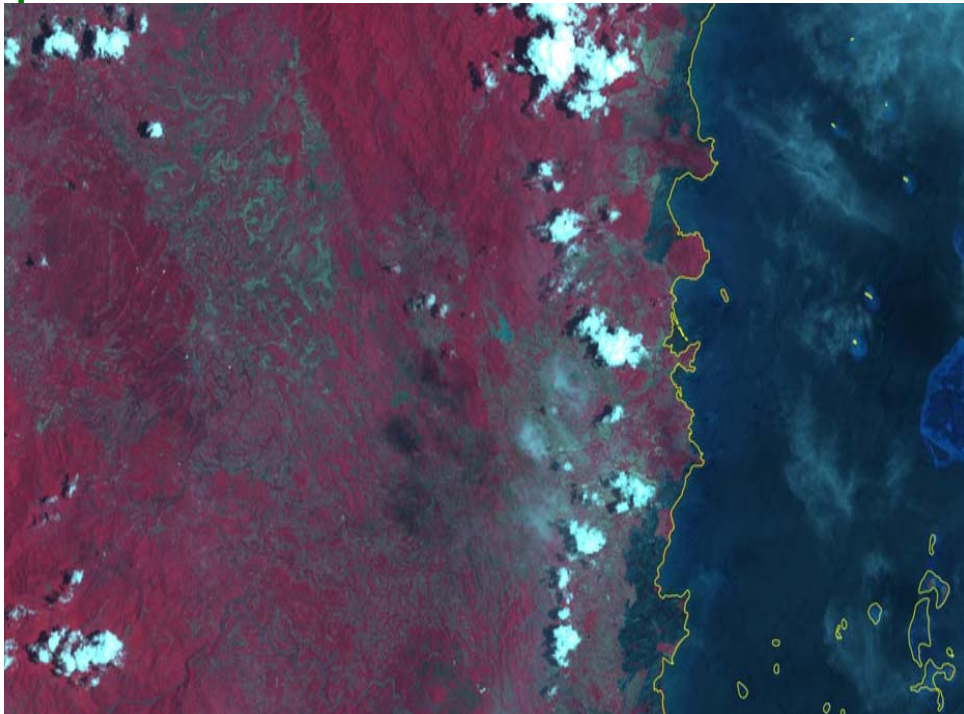


ALOS PALSAR HH

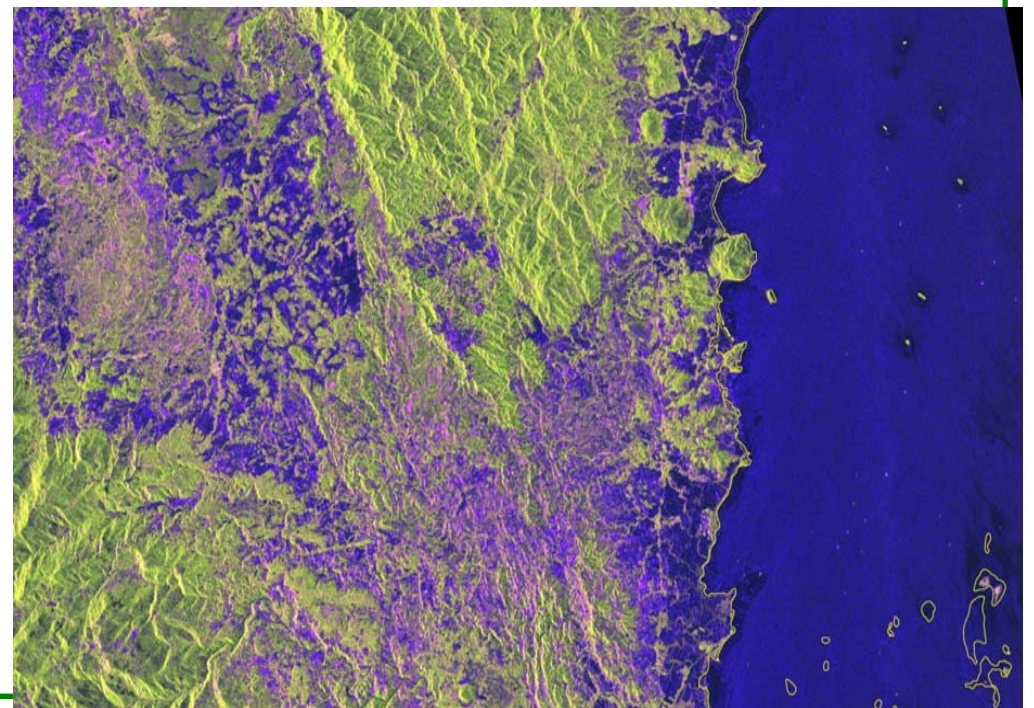
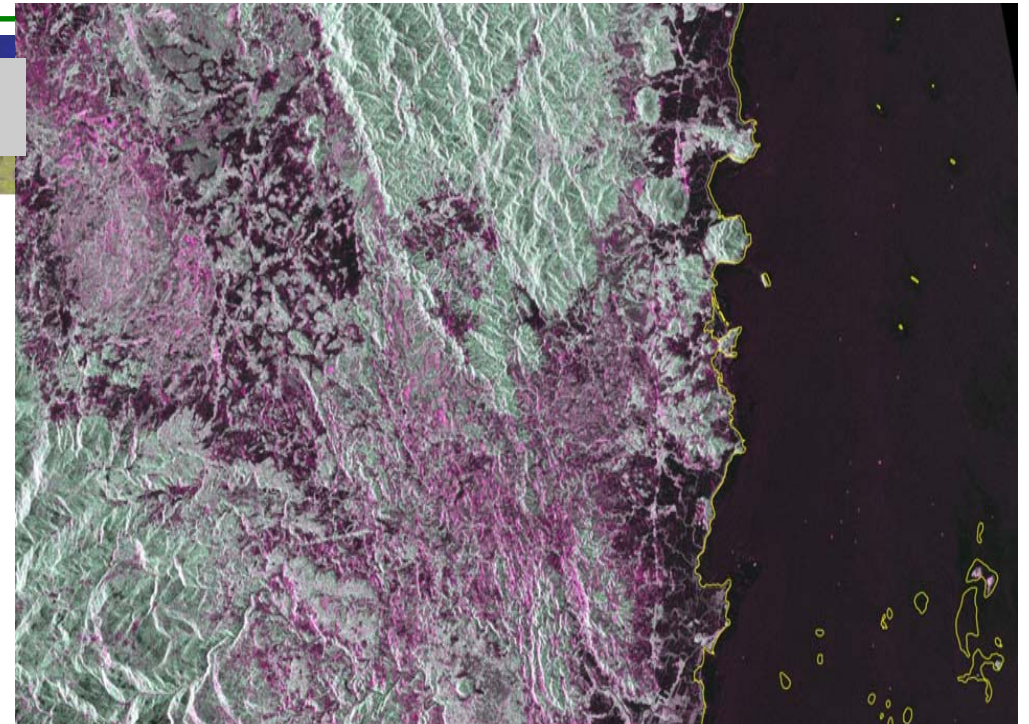
ALOS

HH,HV,(HH+HV)

AVNIR



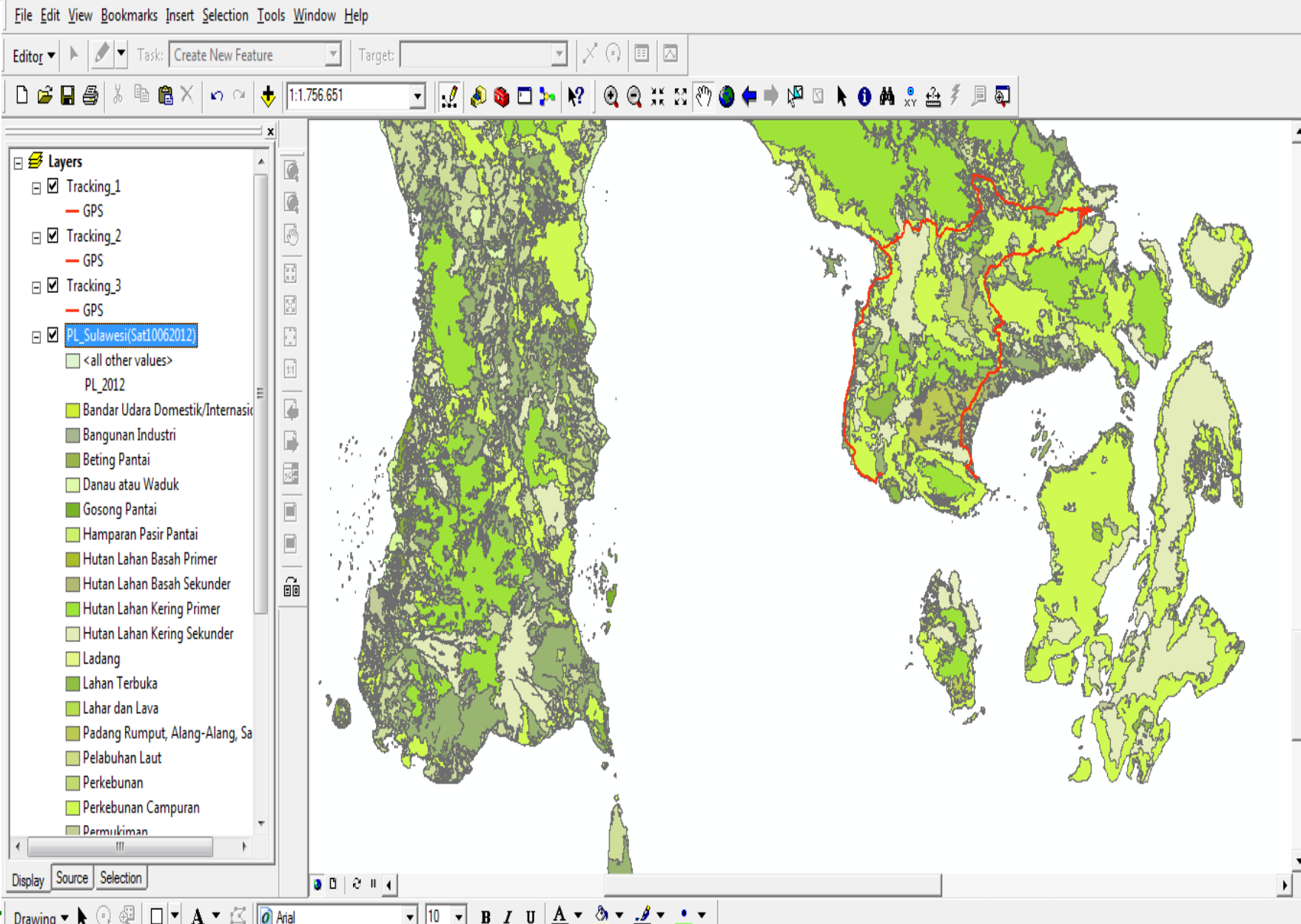
HH,HV,(HH/HV)

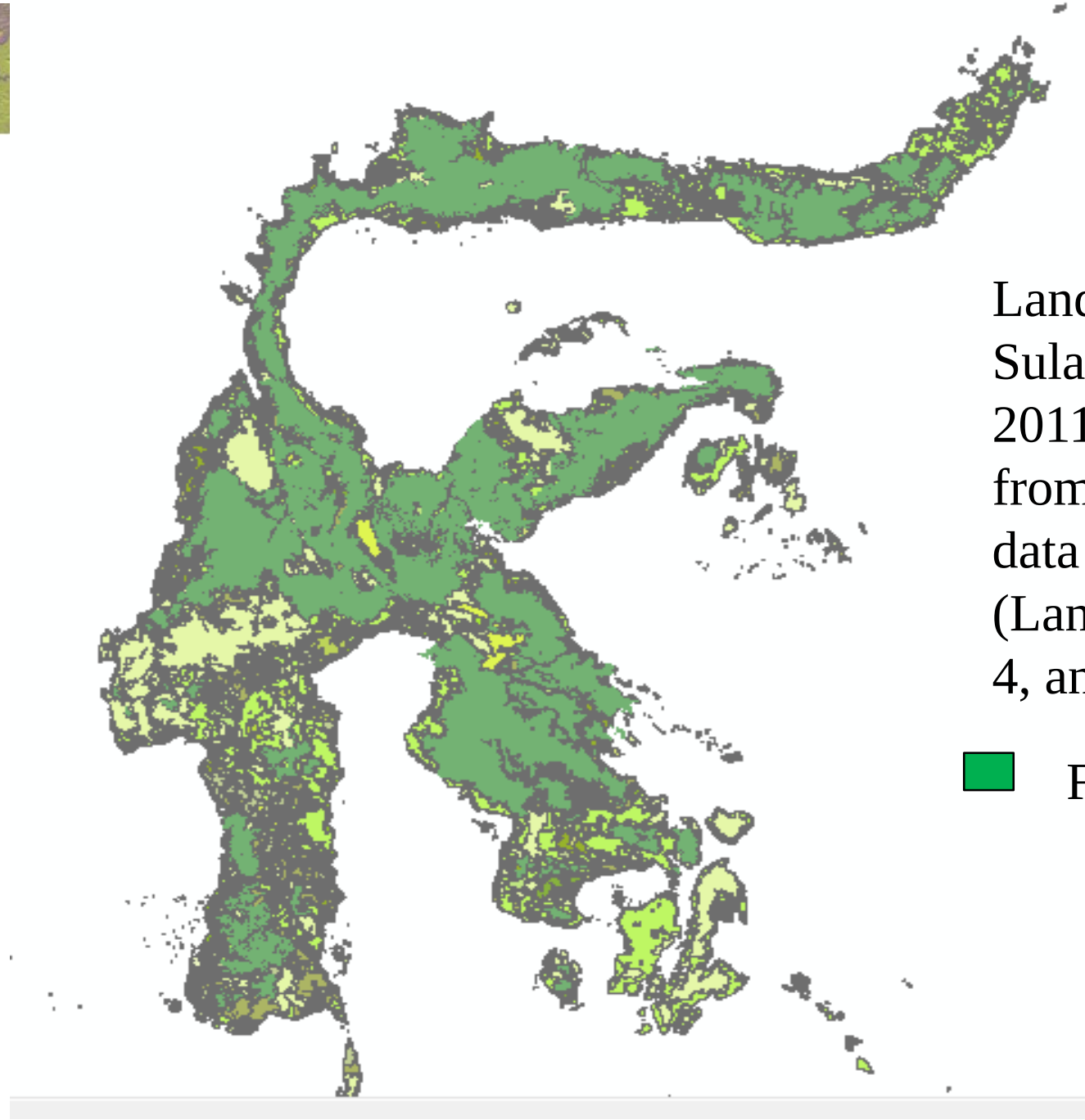




Landcover Interpretation from Landsat

y JAXA



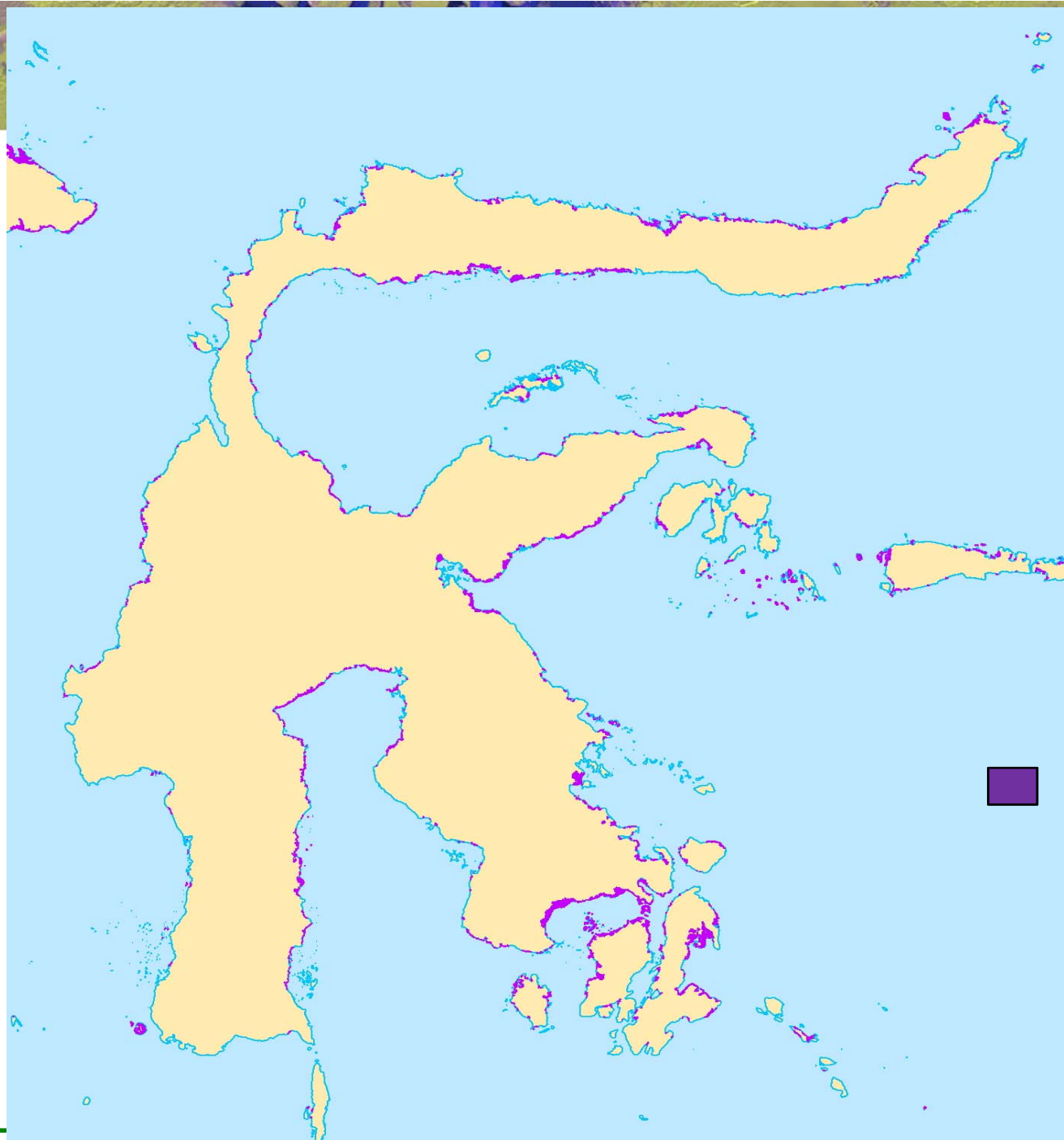


Landcover of
Sulawesi
2011 interpreted
from optical
data mainly
(Landsat, spot
4, and Alos)

 Forest

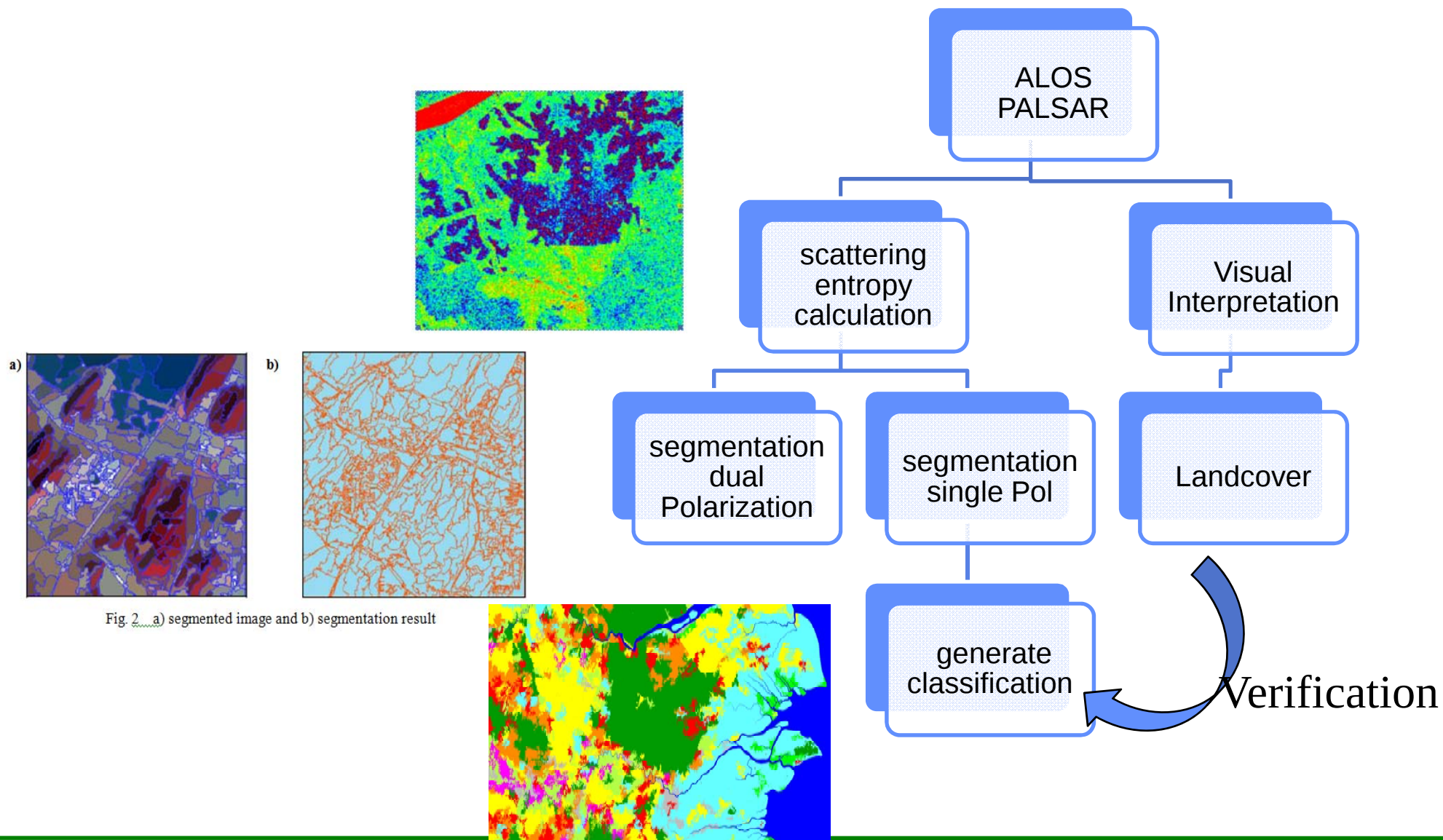
ALOS

ative
oration led by JAXA

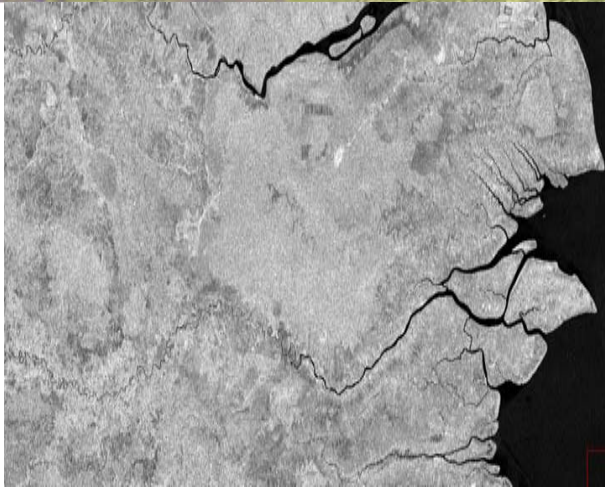


Mangrove

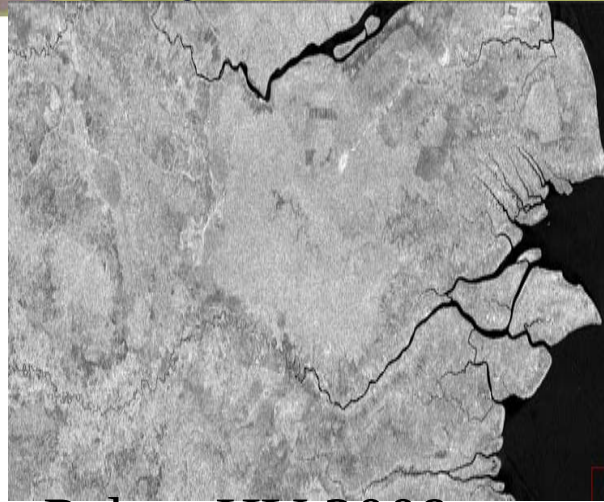
Further Flow works



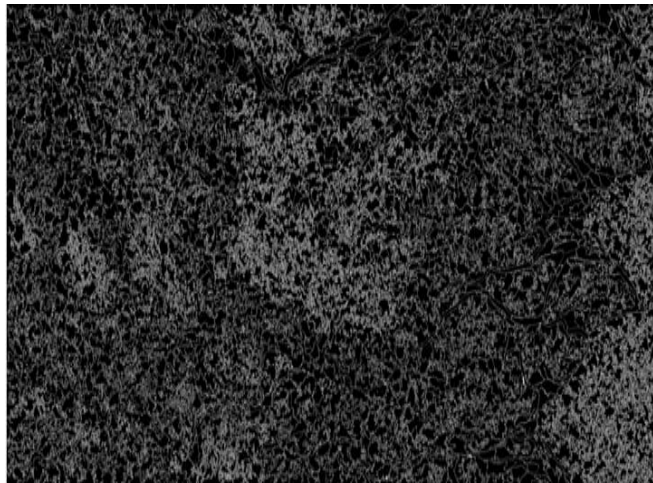
Fragmentasi → classification with Gamma0



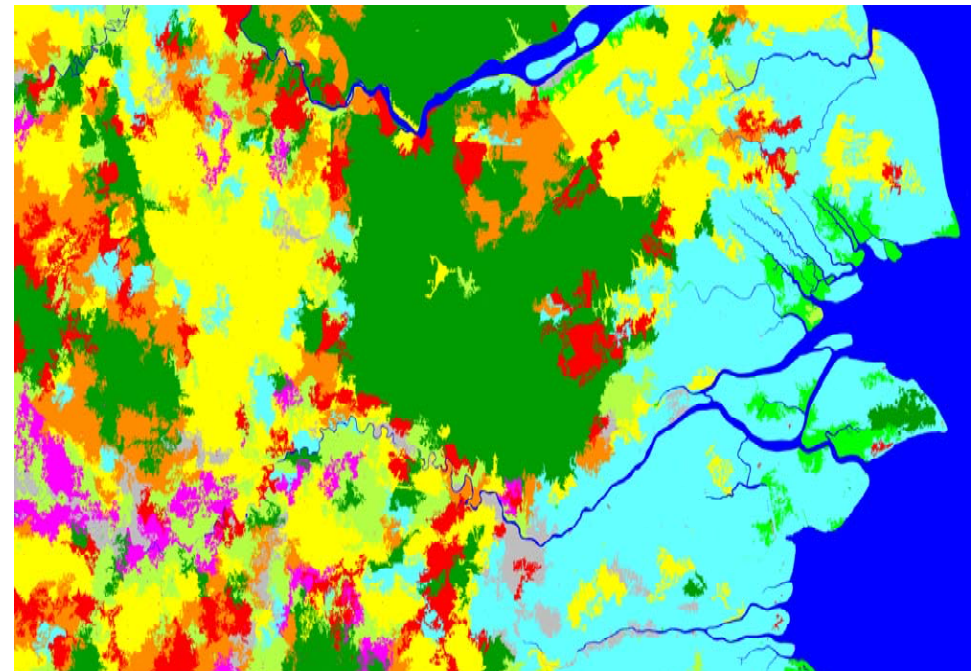
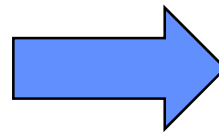
Palsar HH-2009

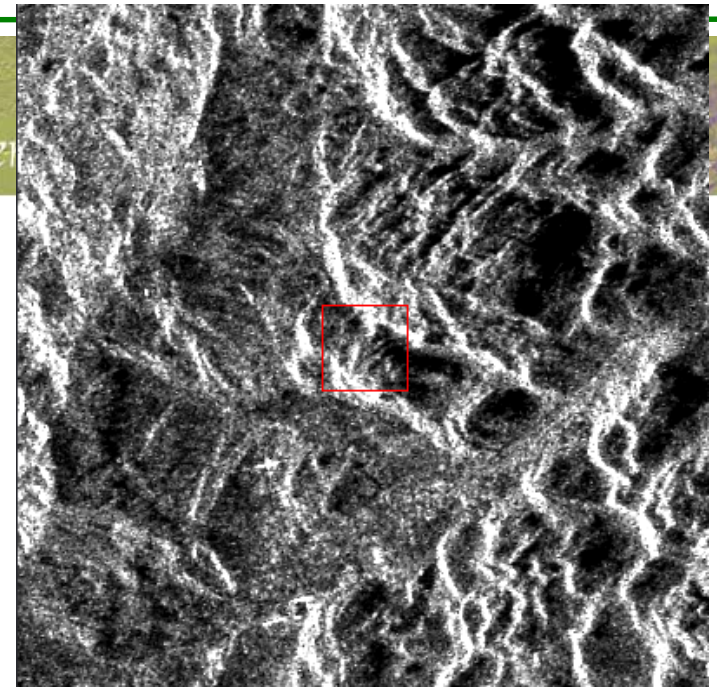
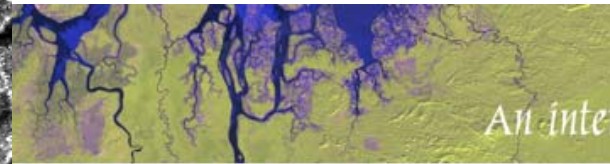
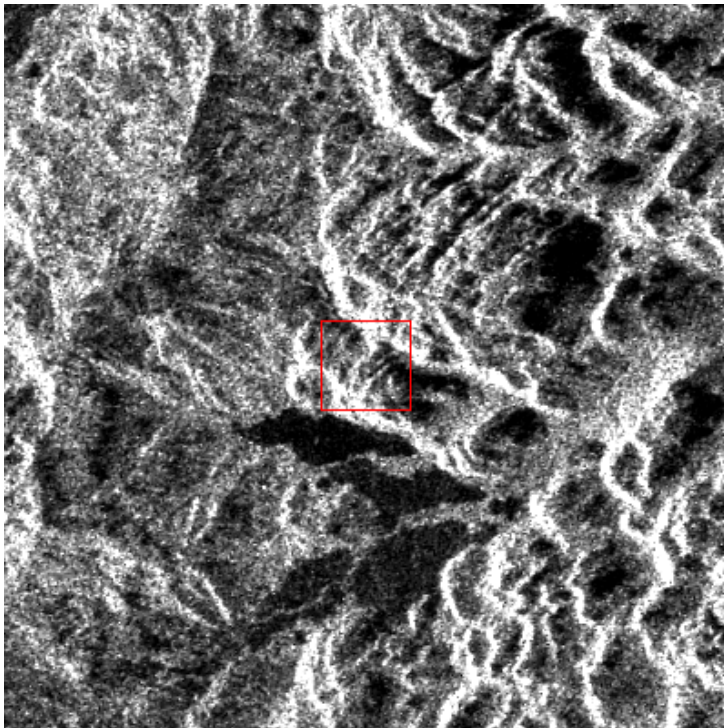


Palsar HV-2009



Segmentasi Palsar HH, HV





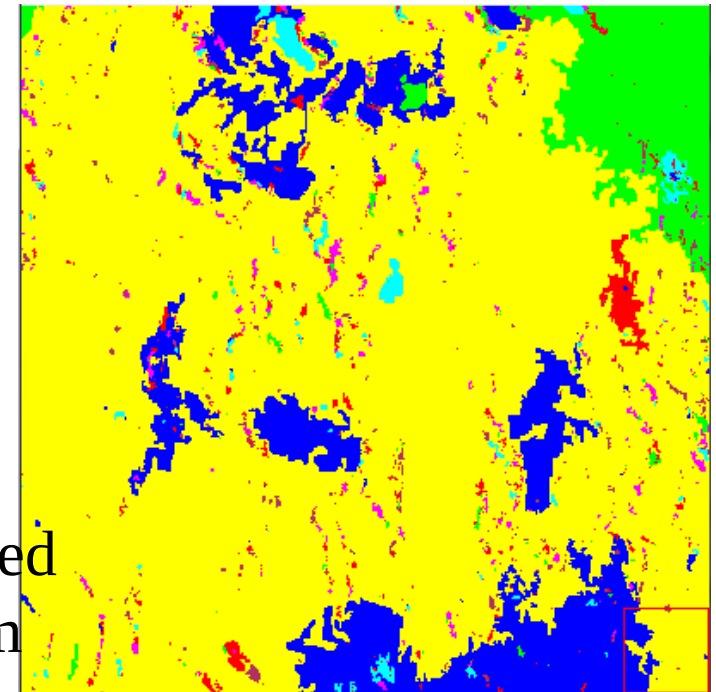
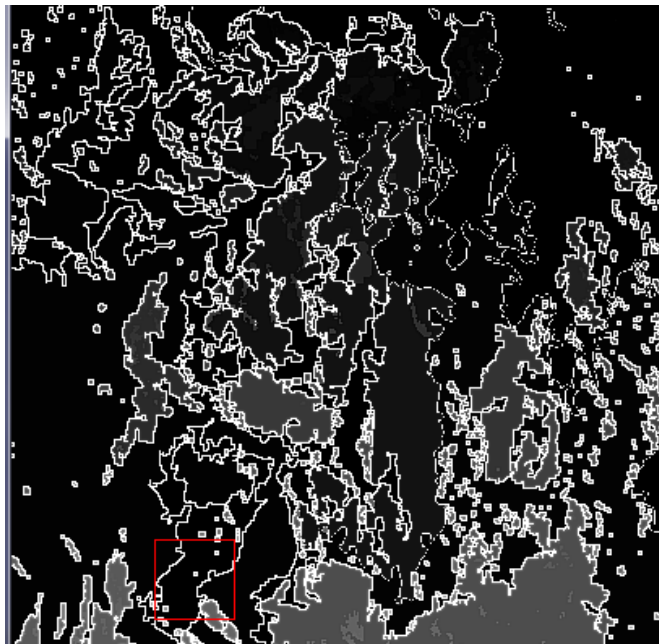
Palsar
HV

Palsar
HH

Segmentation

Classification
result

Not terrain corrected
Geometric problem



Project Deliverable

1. Progress report of the methodology for land cover mapping and land cover change
2. Map product consist of:
 - land cover map using palsar → end 2012 or March 2013
 - landcover change map map using palsar → end of 2013
 - Report on biomas/carbon map of sulawesi → end 2014 *

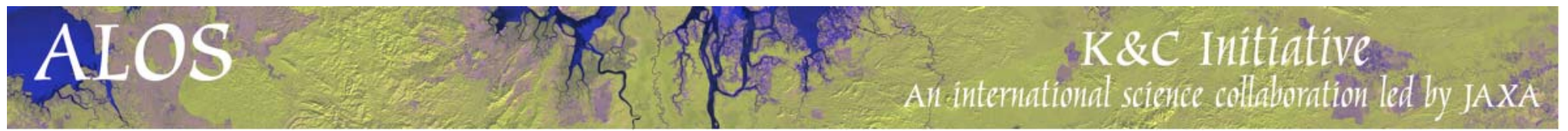
Project Schedule from 2012-2014

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Year	Products	Methods	Data	Area of Interest
2012	Mapping of land and forest Cover			
	Land and forest cover map of Sulawesi Island	1) scattering entropy calculation, by using decomposition of covarian matrix; 2) multilayer segmentation (HH, VV, and scattering entropy) by using region growing segmentation algorithm; 3) Generate classification of segmented polygon by Battacharya Classification algorithm; 4) Ground truth investigation and accuracy assessment.	ALOS PALSAR FBD, Scan mosaick, WB etc	Sulawesi island
2013	Landcover and land use change			
	LULUCF 2000-2010	Change detection will be carried out by using postclassification change detection. In prior analysis Landsat data or ALOS AVINIR will be applied as referenced for general change pattern.	JERS (FBS/2000) ALOS PALSAR (FBS/2010)	Sulawesi island

**Sub-space and gamma0
methods applied to
palsar dual-pol mosaic**

BIOMAS and NPP estimation for priority area in Coastal wetland Ecosystem				
2013	Biomass Map	Above ground biomass and stem volume prediction will be estimate by field observation and backscattering value on ALOS PALSAR image. The field observation will using some sample plots which will be used to generate the stem volume model using basal area (BA) as the predictor. The tree basal area was estimated and up scaled into per hectare measure. The stem volume estimation will be based on the allometric equation developed from the dataset. Above ground biomass was estimated applying diameter at breast height (dbh) – dry weight AGB equation	The 50-m resolution orthorectified mosaic ALOS PALSAR	Sulawesi Island
2014	Estimation of Net Primary Production for carbon calculation of the annual C balance for sulawesi forests.	The approach for estimation NPP is conducted using NASA-CASA model. This model is based on the relationship of monthly production of plant biomass is estimated as a product of time-varying surface solar irradiance (S_f) from MODIS and NDVI from the ALOS satellite, plus a constant light utilization efficiency term ($gmax$) that is modified by time-varying stress scalar terms for temperature (T) and moisture (W) effects.	ALOS AVNIR-2/ MODIS	Sulawesi island



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Arigato Gozaimasu