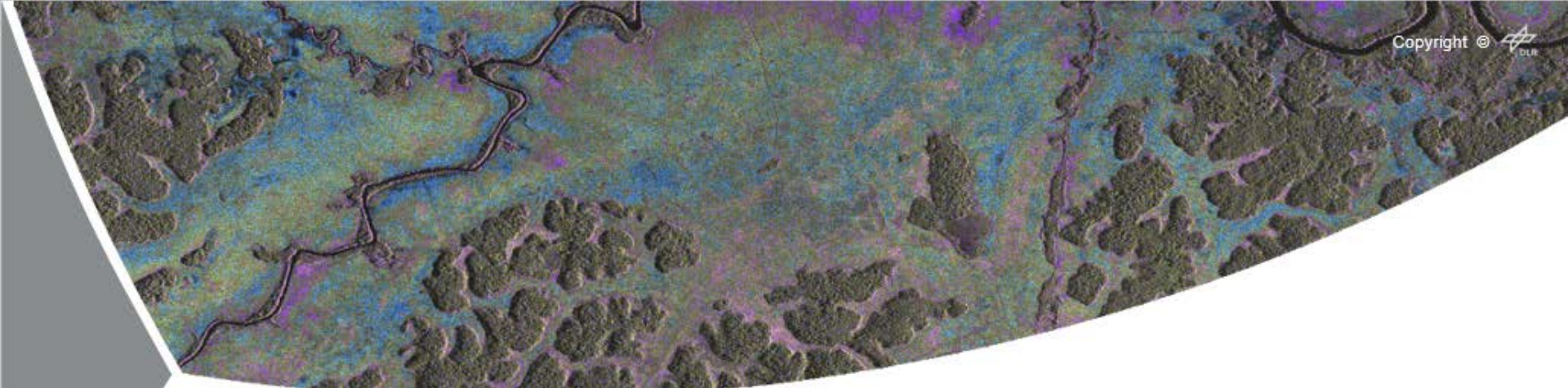


# Forest SAR & Coherence

## (Practical Session 1)

**Erxue Chen      Lei Zhao**

**Chinese Academy of forestry**



# Forest cover (change) mapping using ALOS PALSAR mosaics

**Mikhail Urbazaev**

**Christian Thiel**

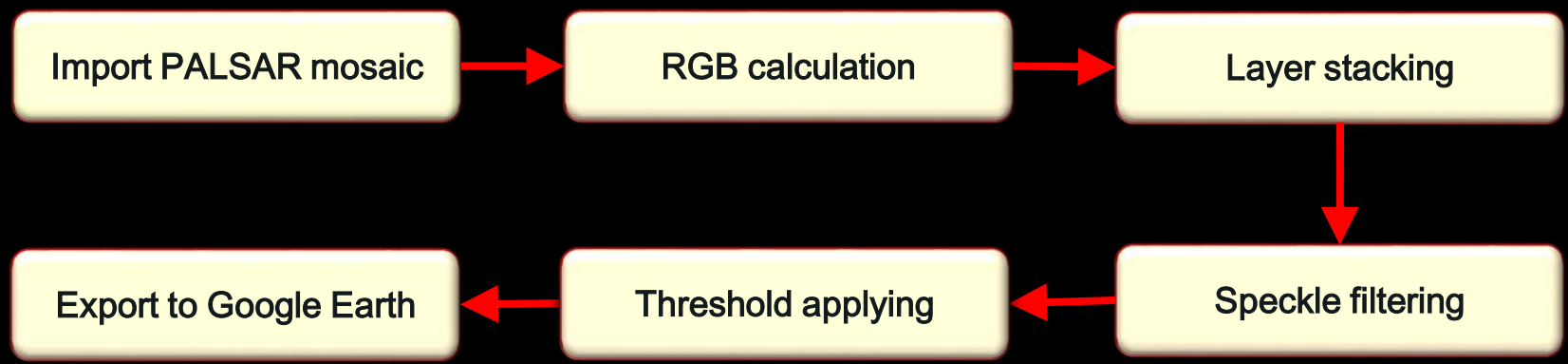
**Christiane Schmullius**

**Robert Eckardt**

Friedrich-Schiller-University Jena Department  
for Earth Observation  
Jena, Germany



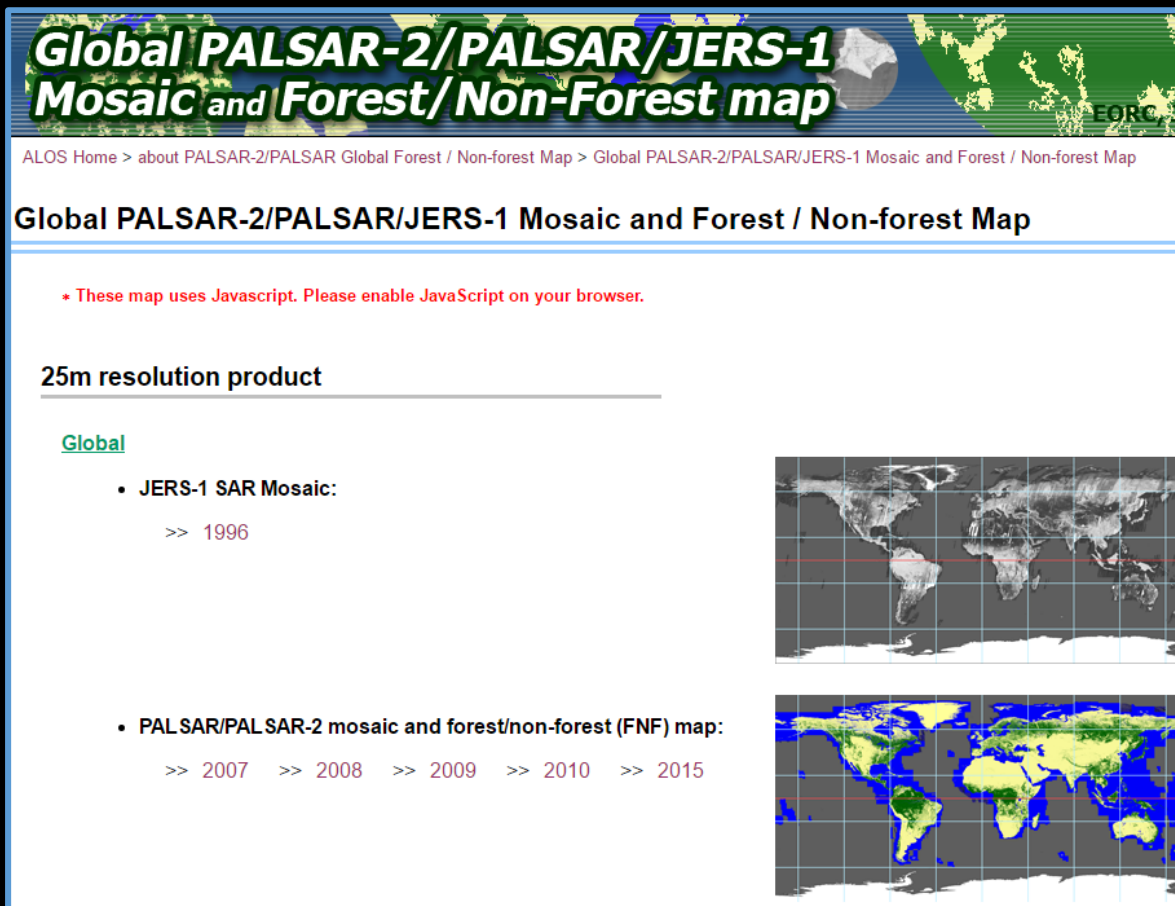
- **Import ALOS PALSAR mosaics in SNAP**
- **Processing of PALSAR mosaics (layer stacking, RGB, speckle filter)**
- **Forest mapping for  $t1$  and  $t2$  based on backscatter threshold**
- **Forest cover change mapping**



## ALOS PALSAR and ALOS-2 PALSAR-2 L-band SAR backscatter mosaics

Free and open access (25m)

Registration: [http://www.eorc.jaxa.jp/ALOS/en/palsar\\_fnf/data/index.htm](http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/data/index.htm)



**Global PALSAR-2/PALSAR/JERS-1 Mosaic and Forest/Non-Forest map**

ALOS Home > about PALSAR-2/PALSAR Global Forest / Non-forest Map > Global PALSAR-2/PALSAR/JERS-1 Mosaic and Forest / Non-forest Map

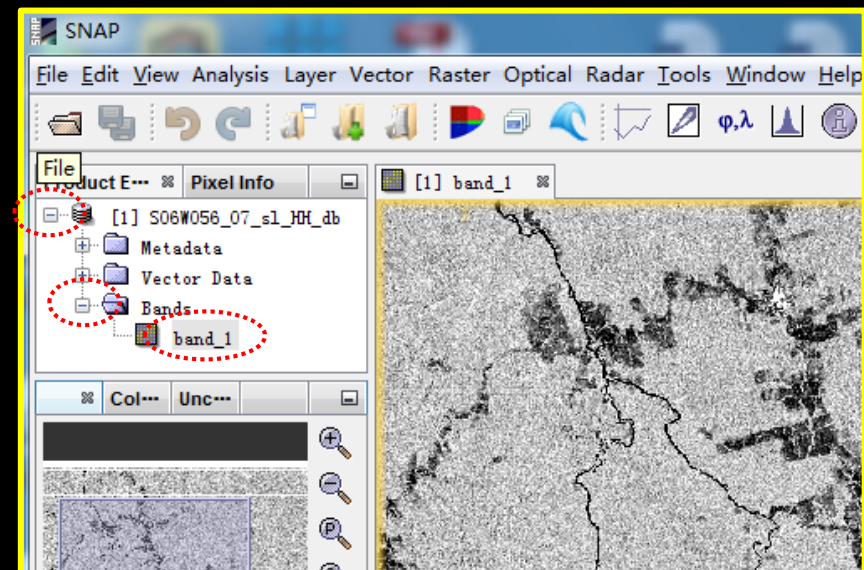
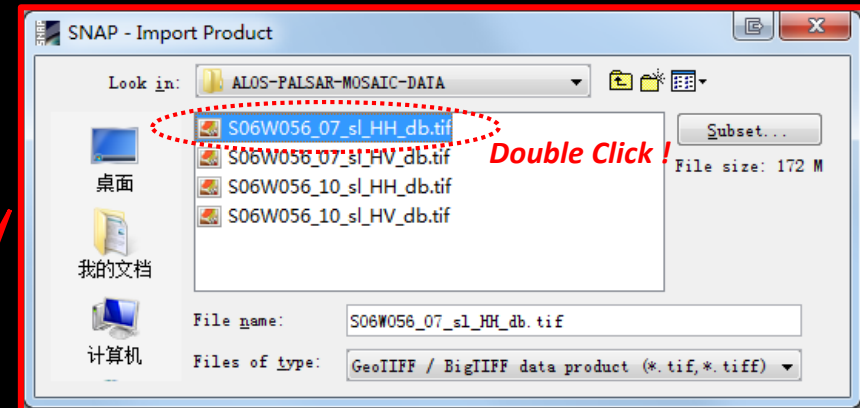
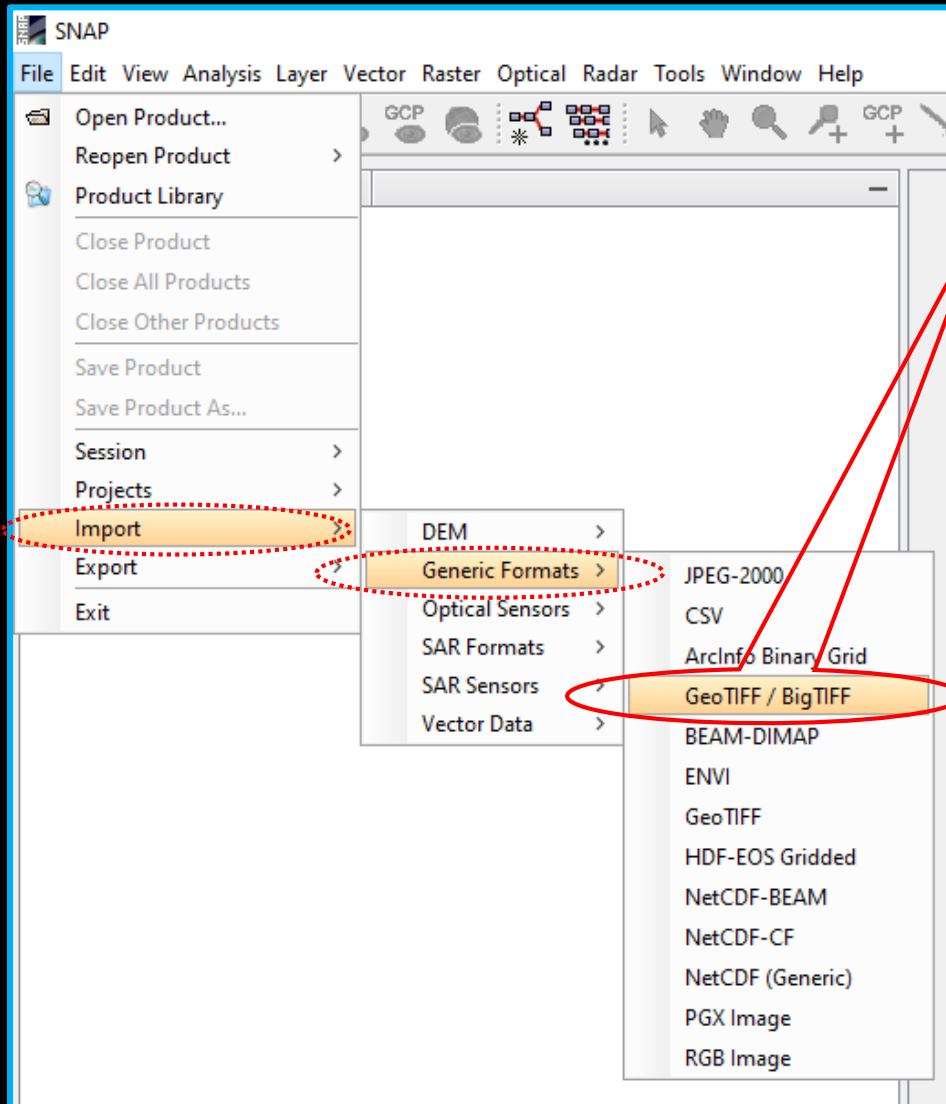
**Global PALSAR-2/PALSAR/JERS-1 Mosaic and Forest / Non-forest Map**

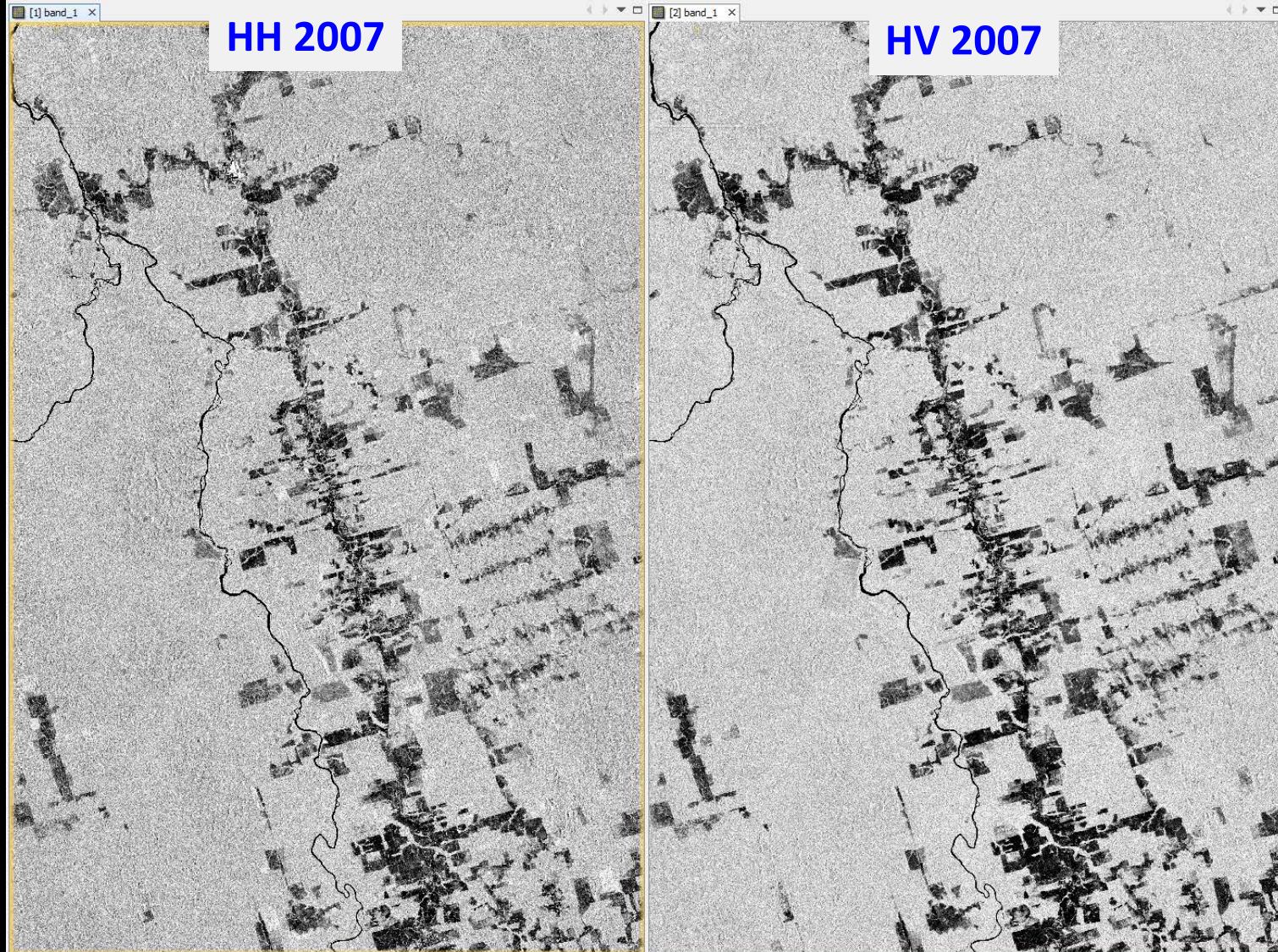
\* These map uses Javascript. Please enable JavaScript on your browser.

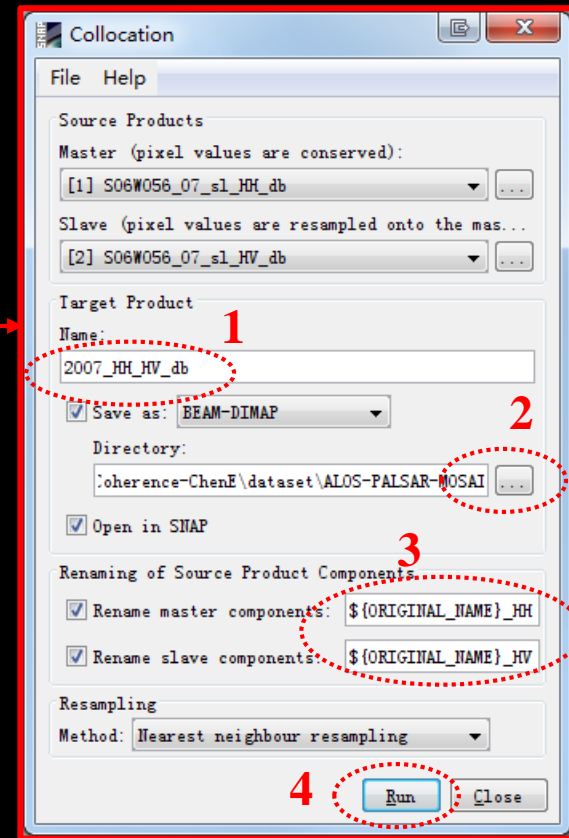
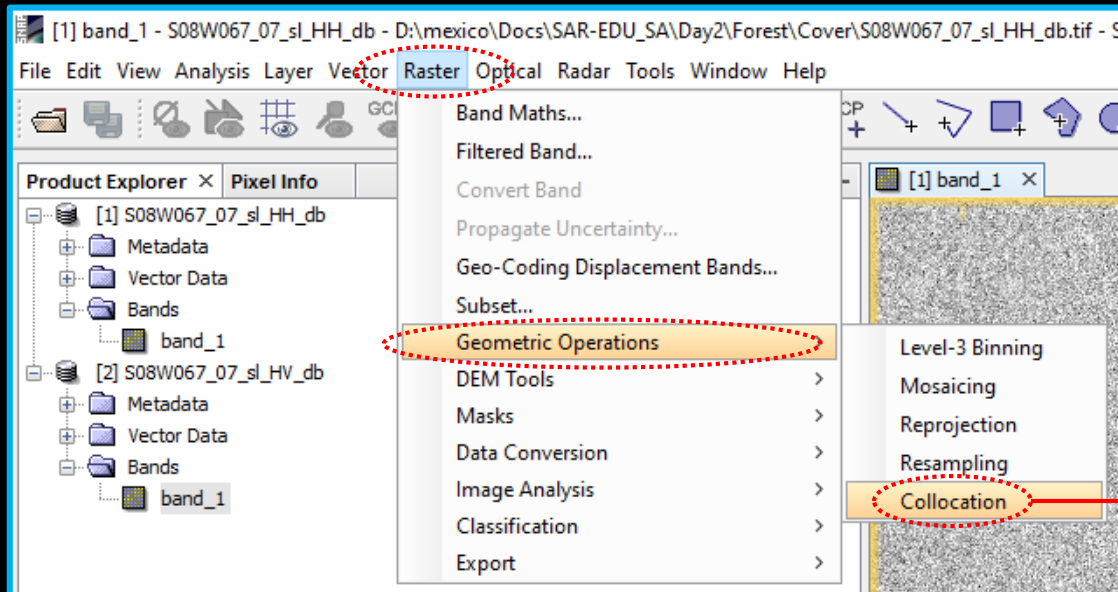
**25m resolution product**

Global

- JERS-1 SAR Mosaic:
  - >> 1996
- PALSAR/PALSAR-2 mosaic and forest/non-forest (FNF) map:
  - >> 2007 >> 2008 >> 2009 >> 2010 >> 2015

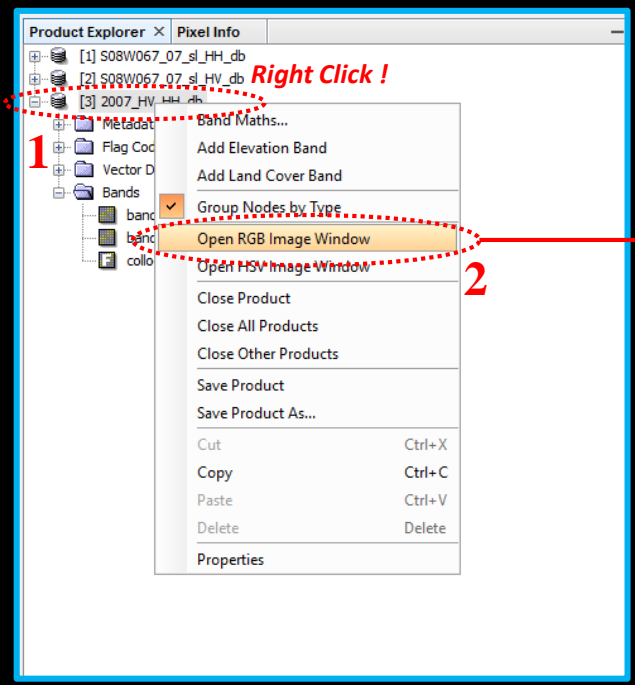






1. Fill in the output file name.
2. Select the output path.
3. Modify the suffix of the band name.
4. Run.





Product Explorer × Pixel Info

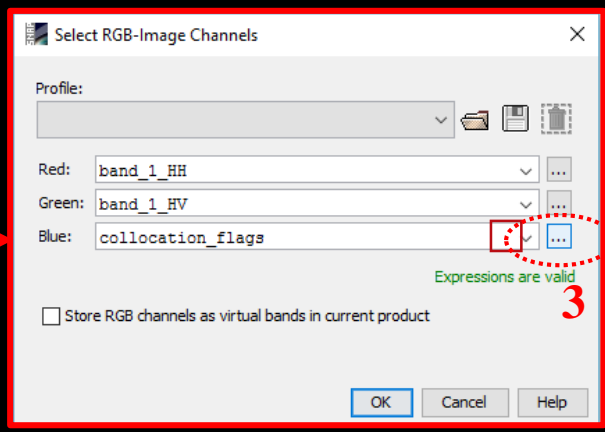
[1] S08W067\_07\_sl\_HH\_db  
[2] S08W067\_07\_sl\_HV\_db  
[3] 2007\_HV\_HH\_db

Right Click !

1

2

- Band Maths...
- Add Elevation Band
- Add Land Cover Band
- Group Nodes by Type
- Open RGB Image Window**
- Open HSV Image Window
- Close Product
- Close All Products
- Close Other Products
- Save Product
- Save Product As...
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Delete Delete
- Properties



Select RGB-Image Channels

Profile:

Red: band\_1\_HH

Green: band\_1\_HV

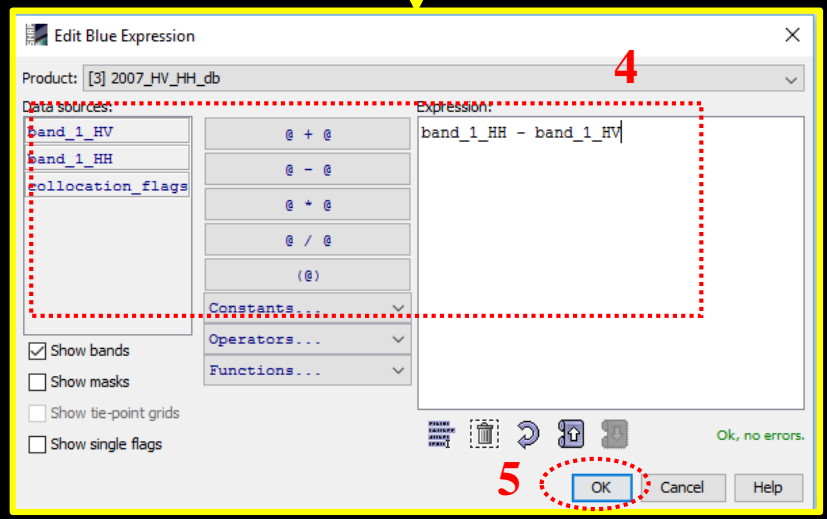
Blue: collocation\_flags

Expressions are valid

Store RGB channels as virtual bands in current product

OK Cancel Help

3



Edit Blue Expression

Product: [3] 2007\_HV\_HH\_db

Data sources:

- band\_1\_HV
- band\_1\_HH
- collocation\_flags

Expression:

band\_1\_HH - band\_1\_HV

Constants... Operators... Functions...

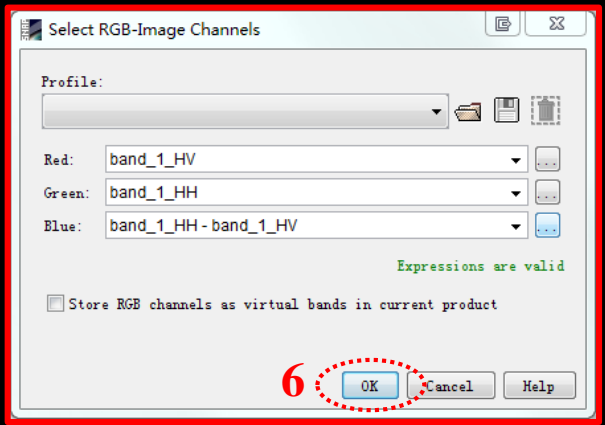
Show bands  
 Show masks  
 Show tie-point grids  
 Show single flags

Ok, no errors.

5

OK Cancel Help

4



Select RGB-Image Channels

Profile:

Red: band\_1\_HV

Green: band\_1\_HH

Blue: band\_1\_HH - band\_1\_HV

Expressions are valid

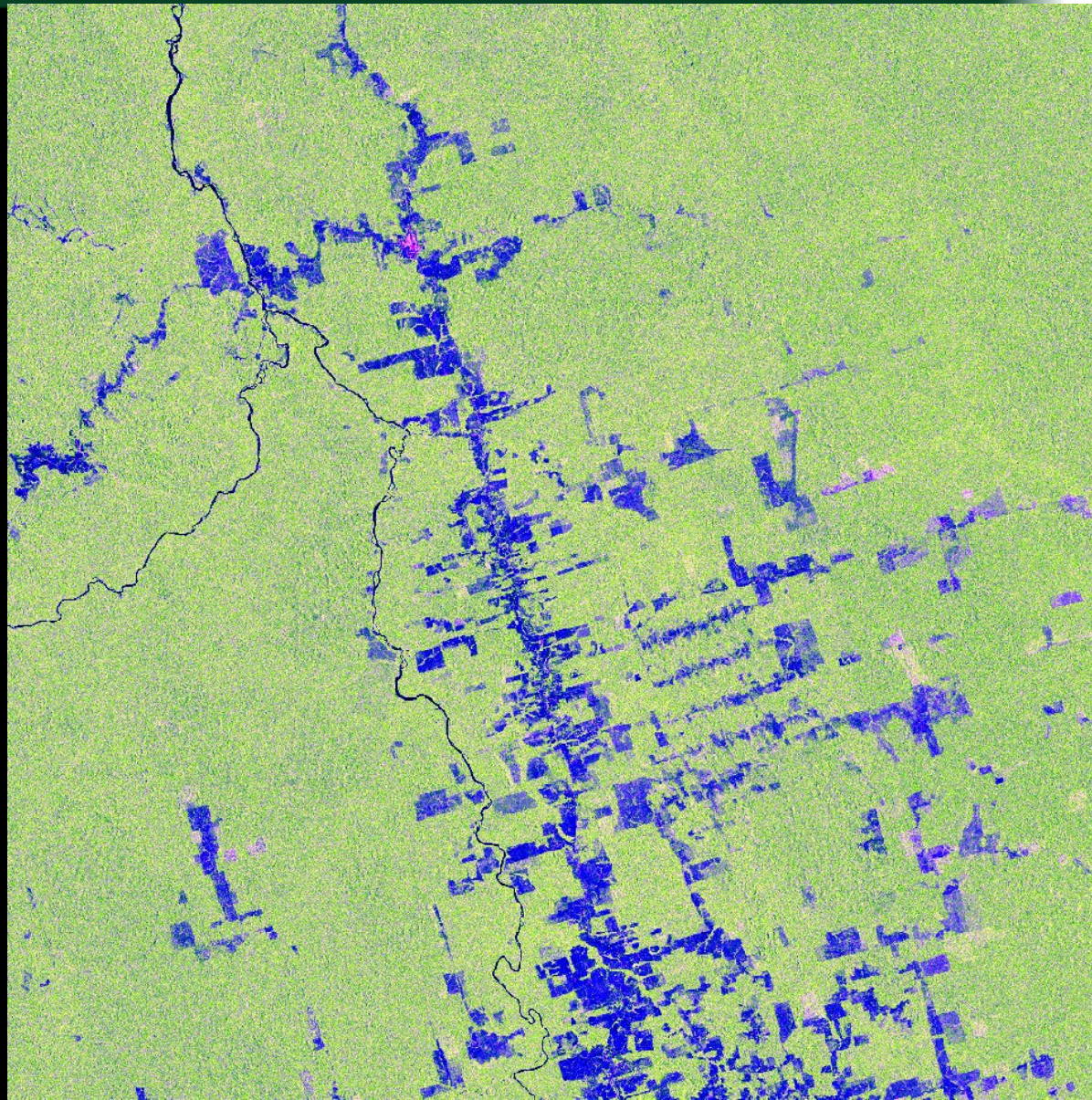
Store RGB channels as virtual bands in current product

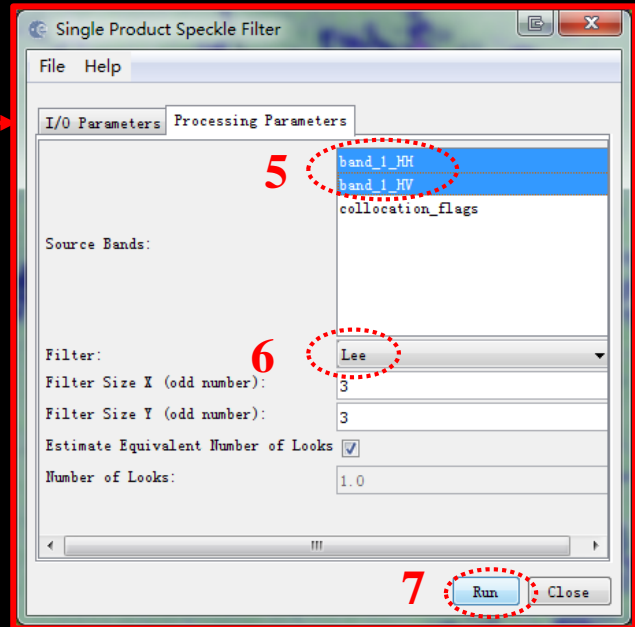
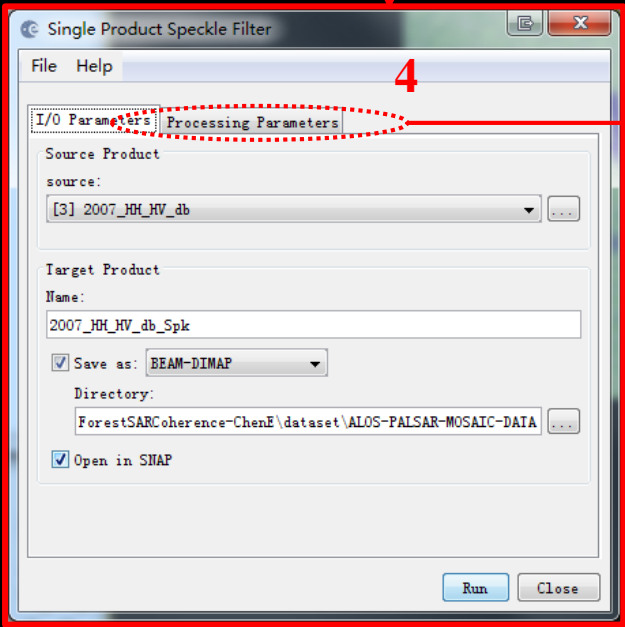
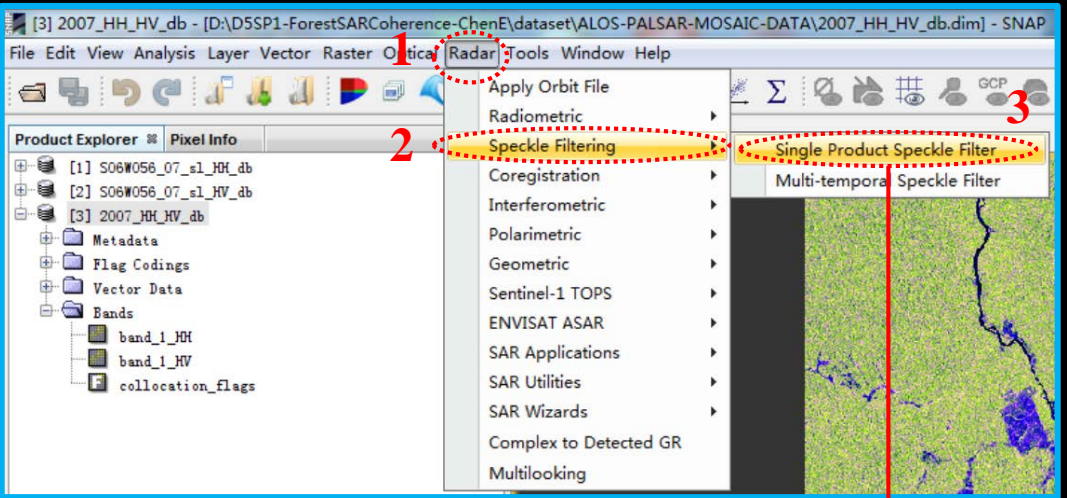
6

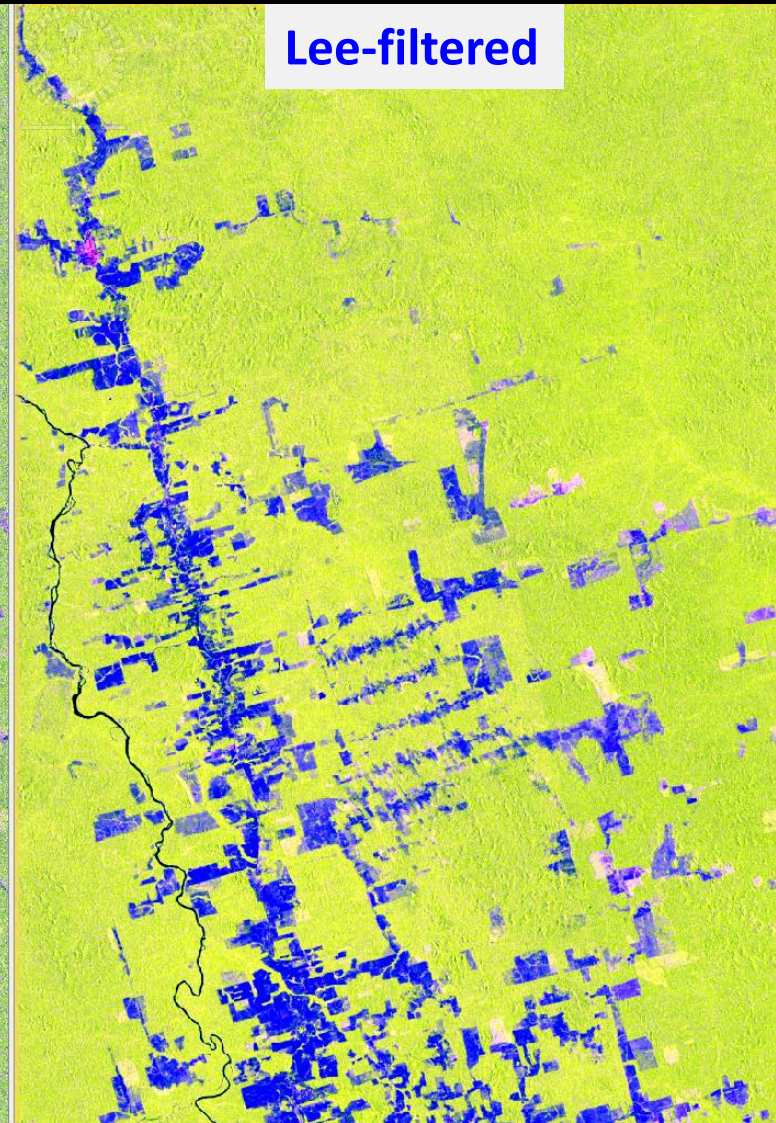
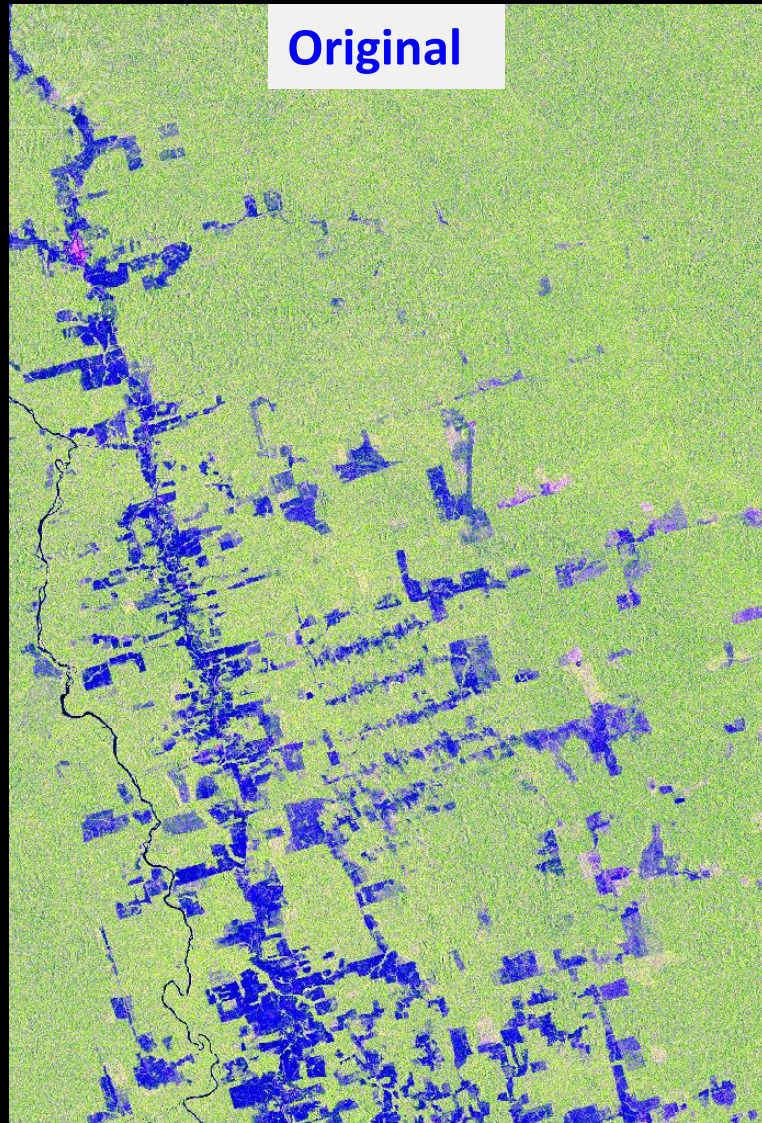
OK Cancel Help

R: HH  
G: HV  
B: HH-HV

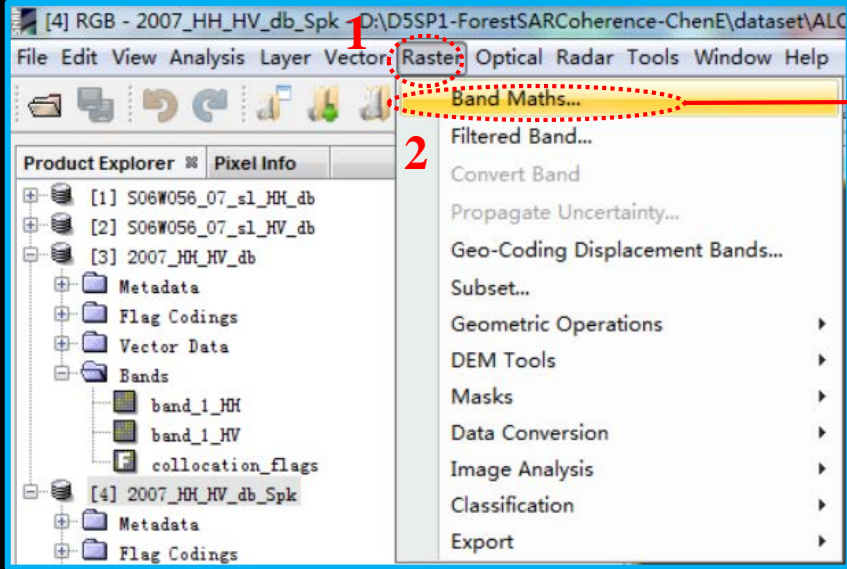
Histogram  
Stretch 95%







# Forest mapping



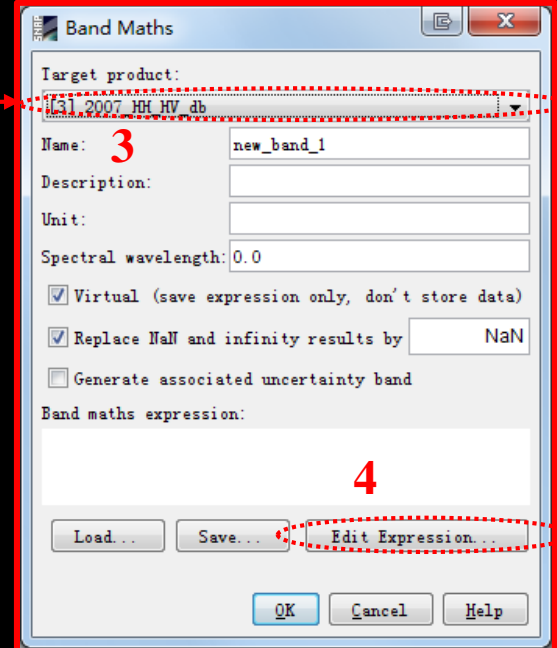
[4] RGB - 2007\_HH\_HV\_db\_Spk 1 D:\D5SP1-ForestSARCoherence-ChenE\dataset\ALC

File Edit View Analysis Layer Vector Raster Optical Radar Tools Window Help

Band Maths... 1

Product Explorer 2 Pixel Info

- [1] S06W056\_07\_sl\_HH\_db
- [2] S06W056\_07\_sl\_HV\_db
- [3] 2007\_HH\_HV\_db
- Metadata
- Flag Codings
- Vector Data
- Bands
  - band\_1\_HH
  - band\_1\_HV
  - collocation\_flags
- [4] 2007\_HH\_HV\_db\_Spk
- Metadata
- Flag Codings



Band Maths

Target product: [3] 2007\_HH\_HV\_db 1

Name: new\_band\_1 3

Description:

Unit:

Spectral wavelength: 0.0

Virtual (save expression only, don't store data)

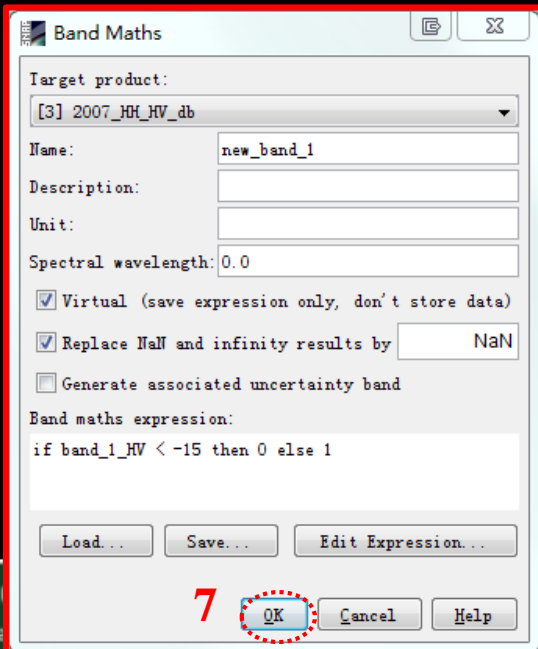
Replace NaN and infinity results by NaN

Generate associated uncertainty band

Band maths expression:

Load... Save... Edit Expression... 4

OK Cancel Help



Band Maths

Target product: [3] 2007\_HH\_HV\_db

Name: new\_band\_1

Description:

Unit:

Spectral wavelength: 0.0

Virtual (save expression only, don't store data)

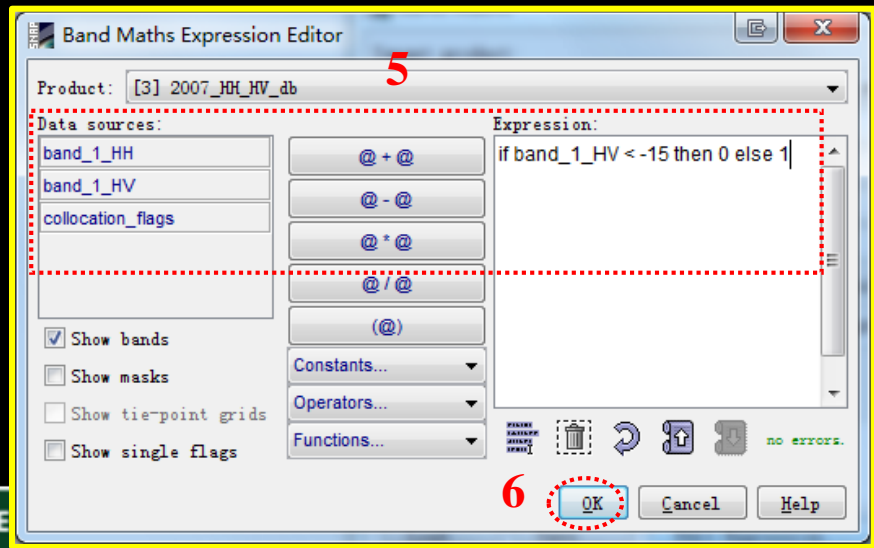
Replace NaN and infinity results by NaN

Generate associated uncertainty band

Band maths expression: if band\_1\_HV < -15 then 0 else 1

Load... Save... Edit Expression...

OK 7 Cancel Help



Band Maths Expression Editor

Product: [3] 2007\_HH\_HV\_db 5

Data sources:

- band\_1\_HH
- band\_1\_HV
- collocation\_flags

Expression: if band\_1\_HV < -15 then 0 else 1

Show bands

Show masks

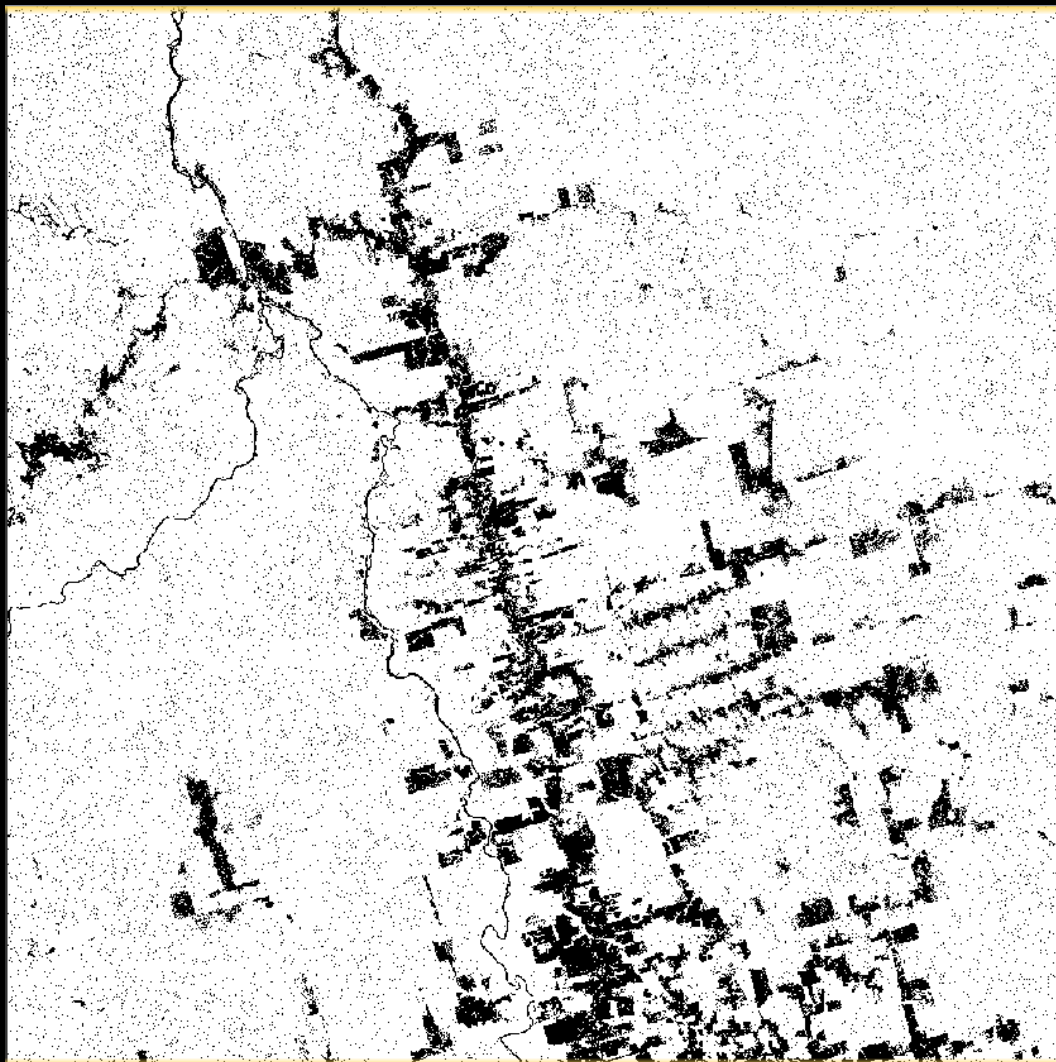
Show tie-point grids

Show single flags

Constants... Operators... Functions...

OK 6 Cancel Help

## Forest mapping result based on Original data



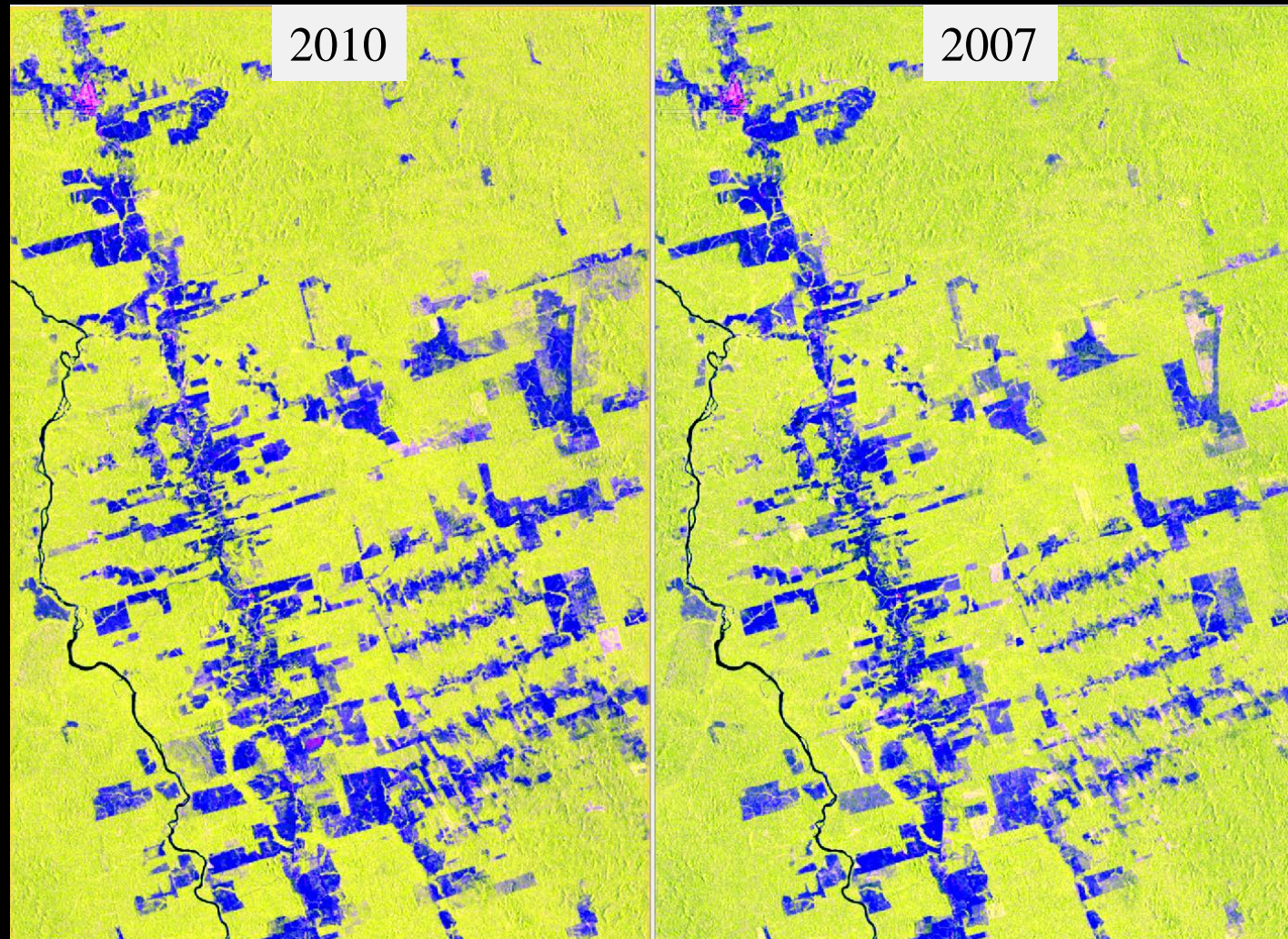
**Do it yourself:**

Repeat the steps for the  
Lee-filtered data.

# Forest mapping



**Do it yourself:** Repeat the steps for the ALOS PALSAR backscatter from 2010

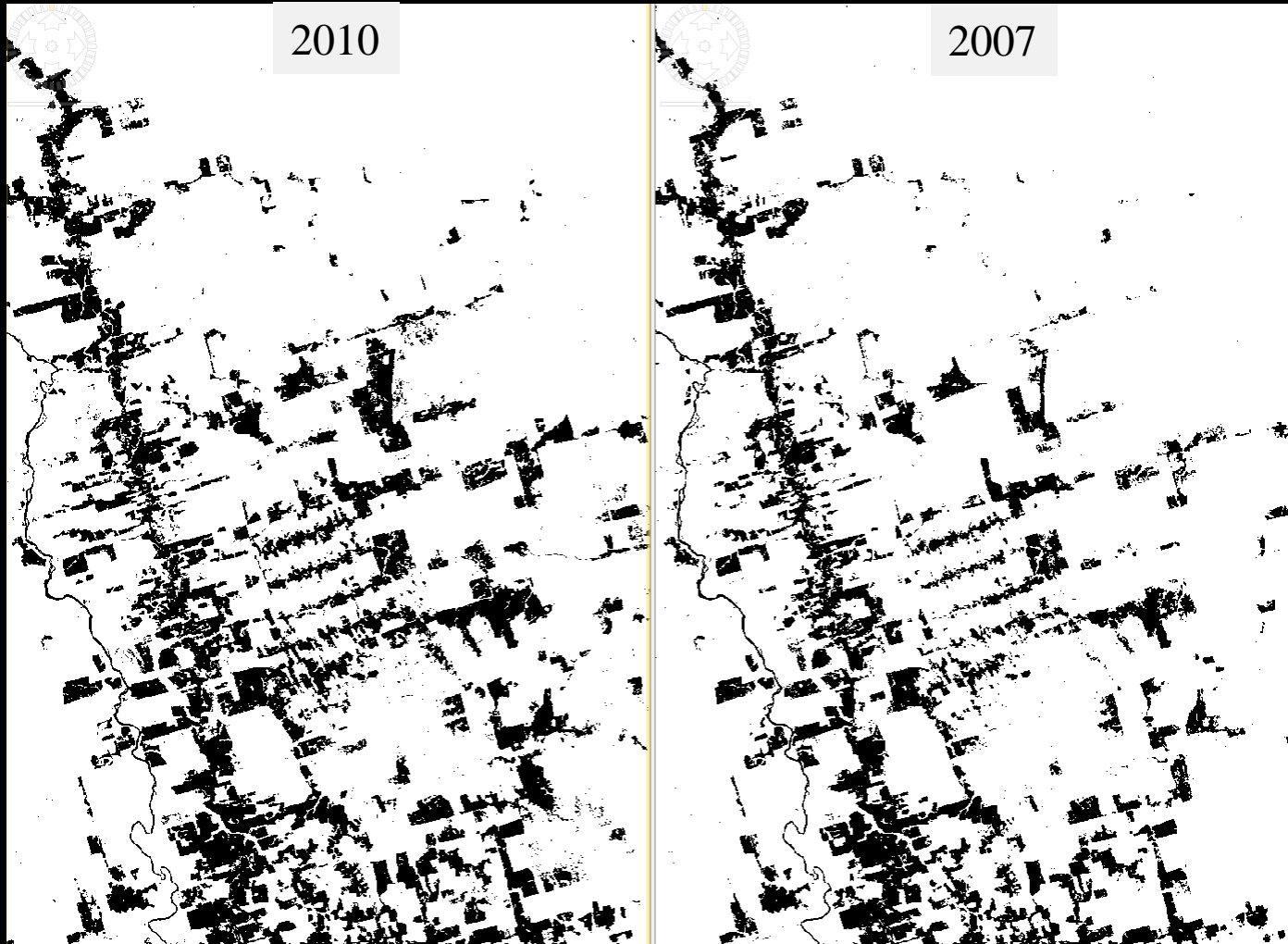


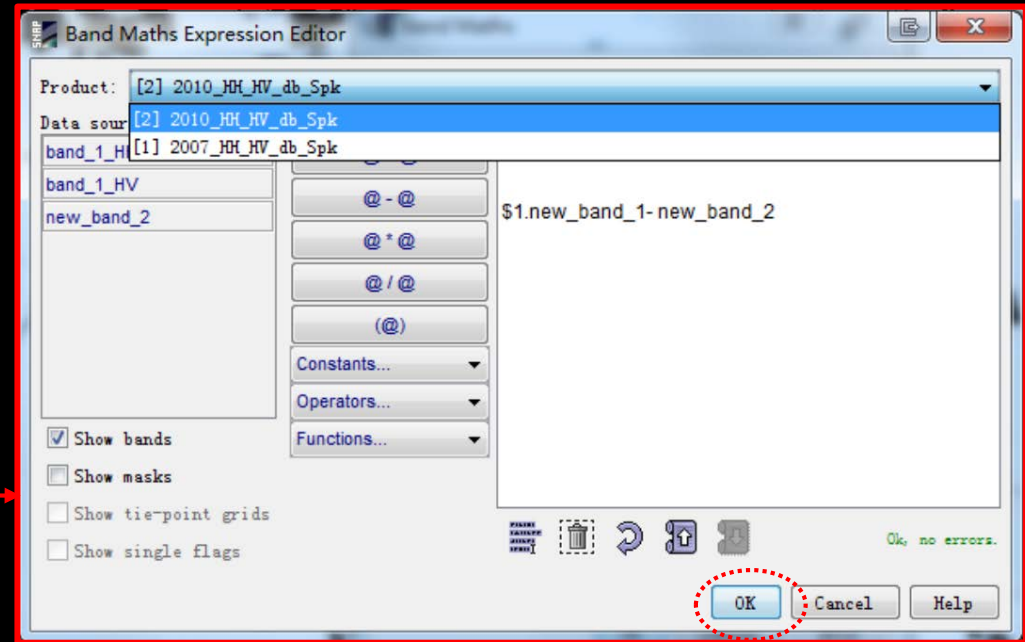
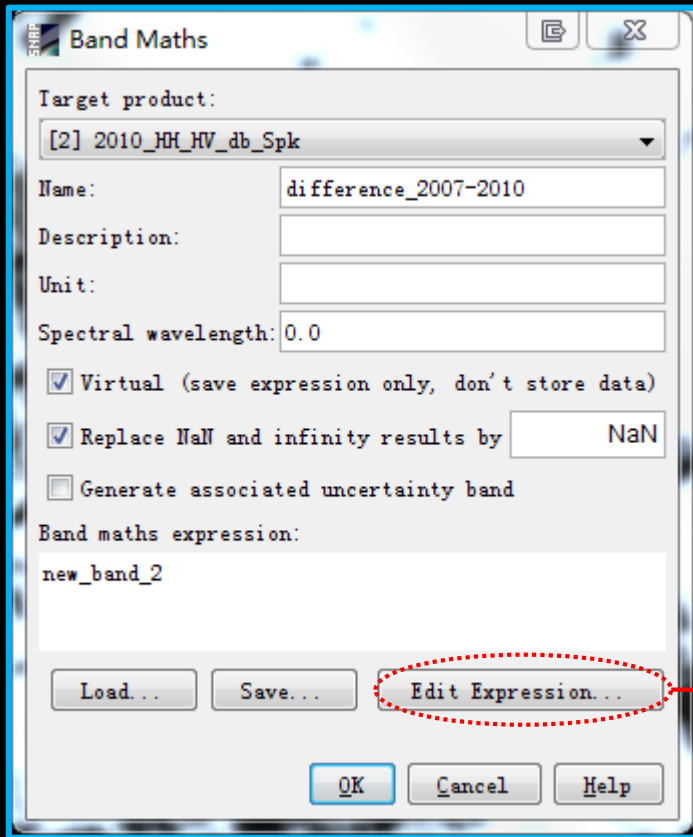
R: HH  
G: HV  
B: HH-HV

Histogram  
Stretch 95%

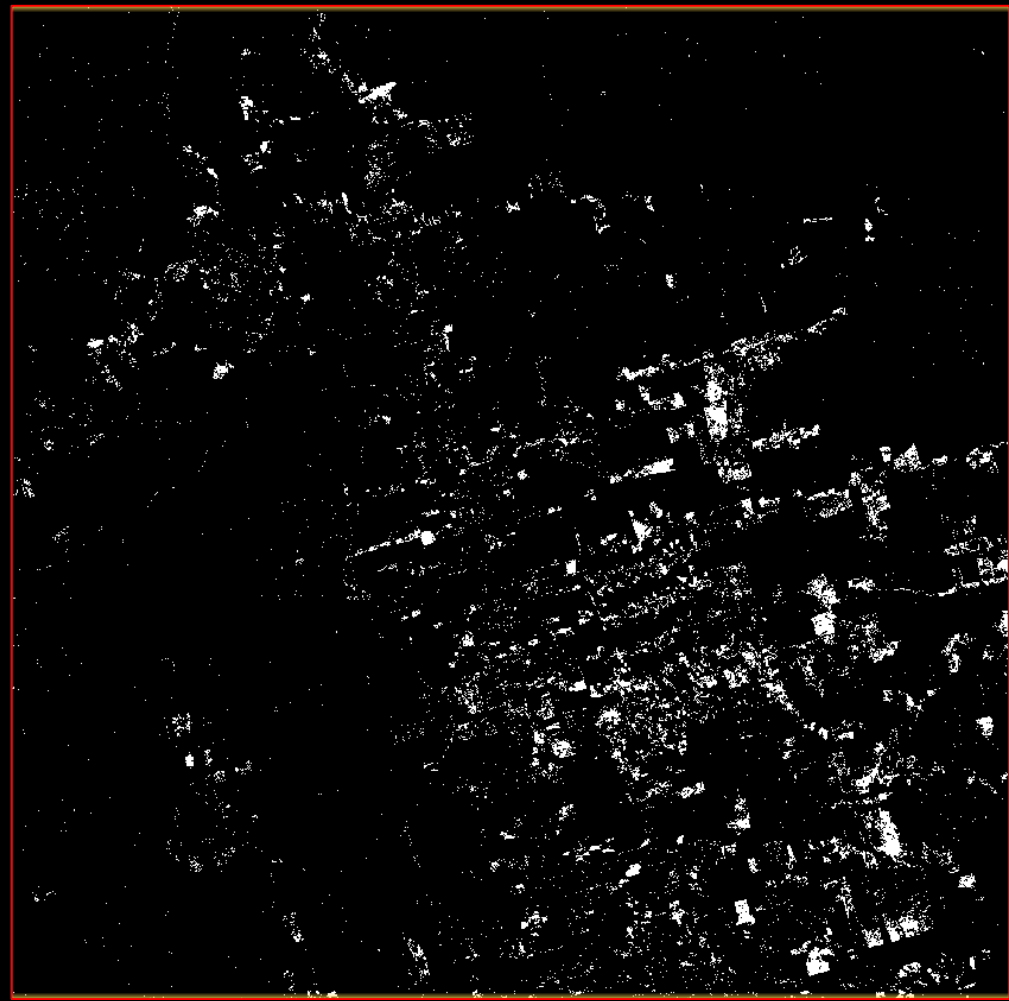


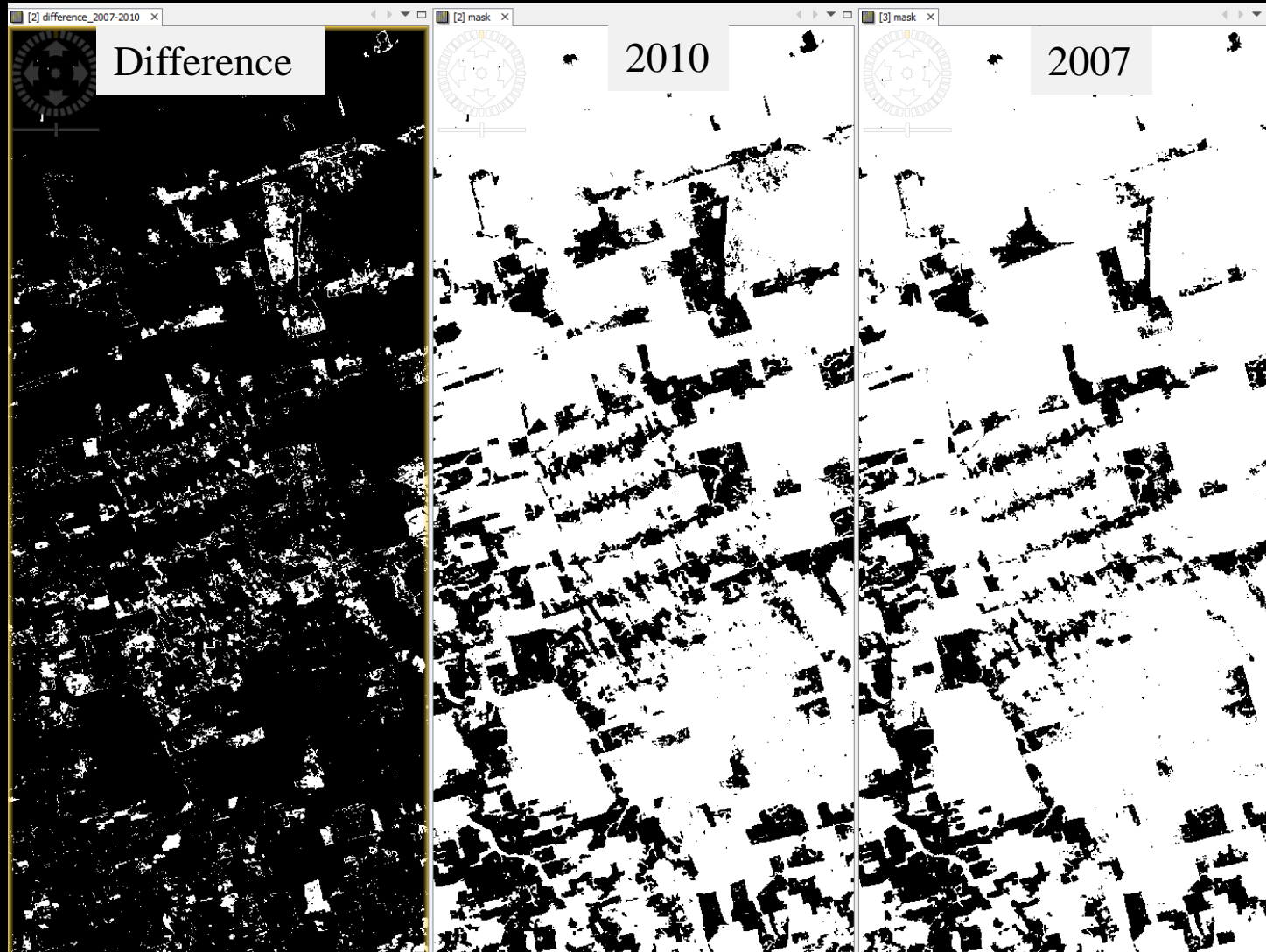
**Do it yourself:** Repeat the steps for the ALOS PALSAR backscatter from 2010

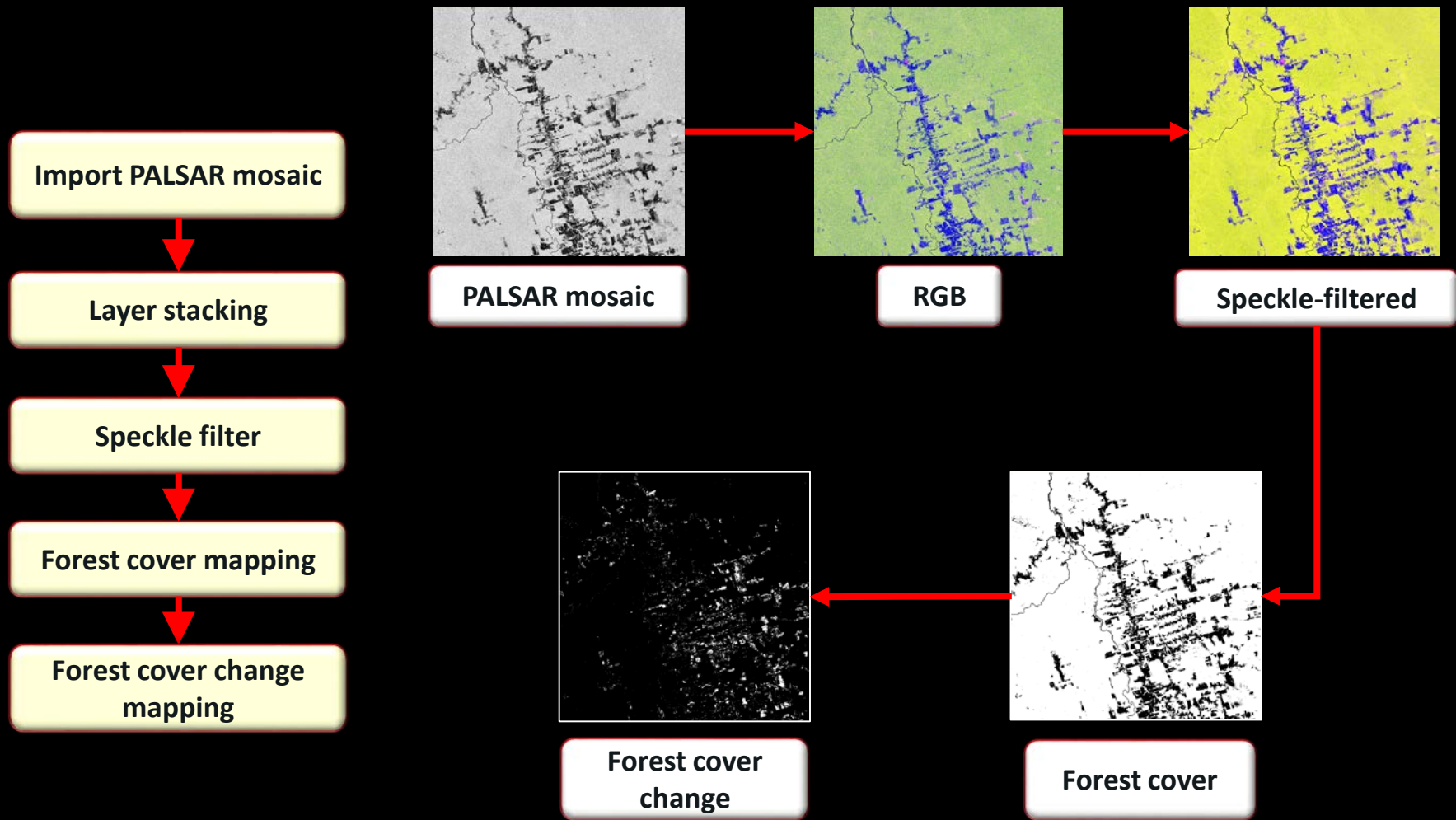




## Forest cover change mapping result:







# SAR-EDU – SAR Remote Sensing Educational Initiative

<https://saredu.dlr.de/>

Supported by:



Federal Ministry  
of Economics  
and Technology

on the basis of a decision  
by the German Bundestag