



Introduction to PolSARpro v6.0 Biomass Edition



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19 / 11 / 2019

ESA–MOST China Dragon 4 Cooperation

2019 ADVANCED INTERNATIONAL TRAINING COURSE IN LAND REMOTE SENSING

中欧科技合作“龙计划”第四期 2019年陆地遥感高级培训班

18 to 23 November 2019 | Chongqing University, P.R. China



培训时间: 2019年11月18日-23日 主办方: 重庆大学



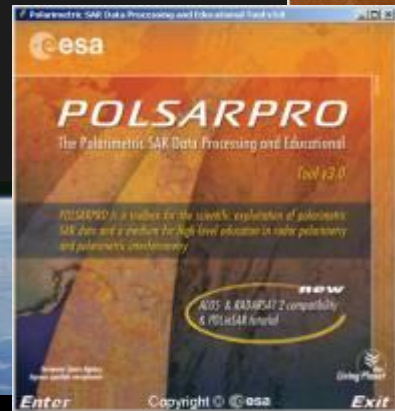
2003



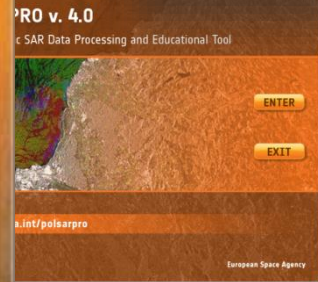
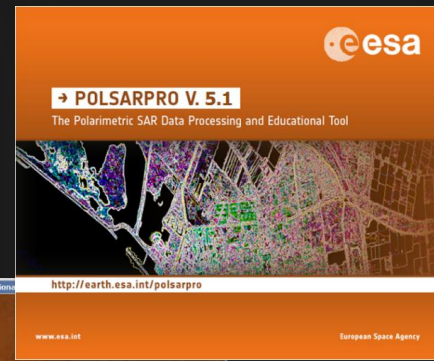
2004



2005



2009



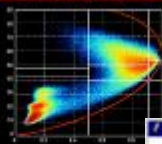
2009

2013 (5.0) to 2018 (5.2)



The initiative development of **PolSARpro Software** is a direct result of recommendations made during the **POLinSAR 2003 Workshop** held at ESA-ESRIN in January 2003.

DATA PROCESSOR



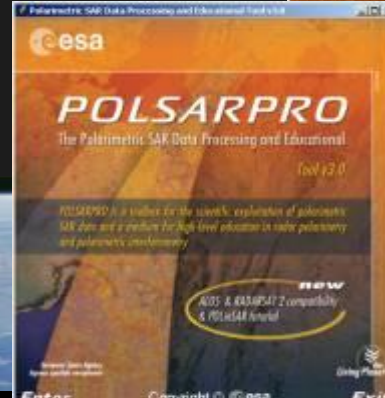
2003



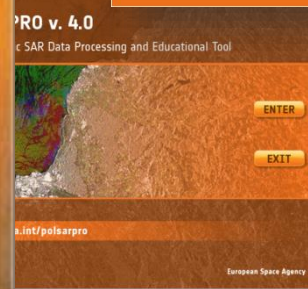
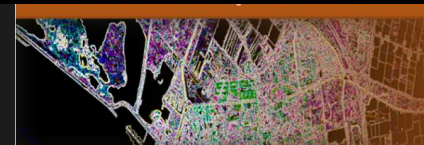
2004



2005



2009



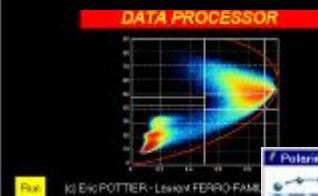
2009

2013 (5.0) to 2018 (5.2)



The initiative development of **POLinSAR Pro Software** is a direct result of recommendations issued during the **POLinSAR 2003 Workshop** held at ESA-ESRIN in Frascati, Italy, in January 2003.

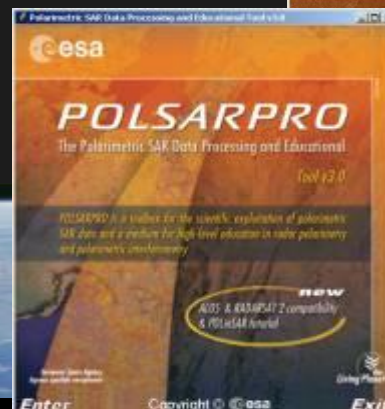
16 YEARS OF DEVELOPMENT



2003



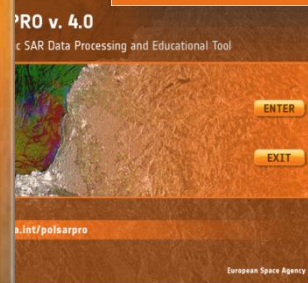
2004



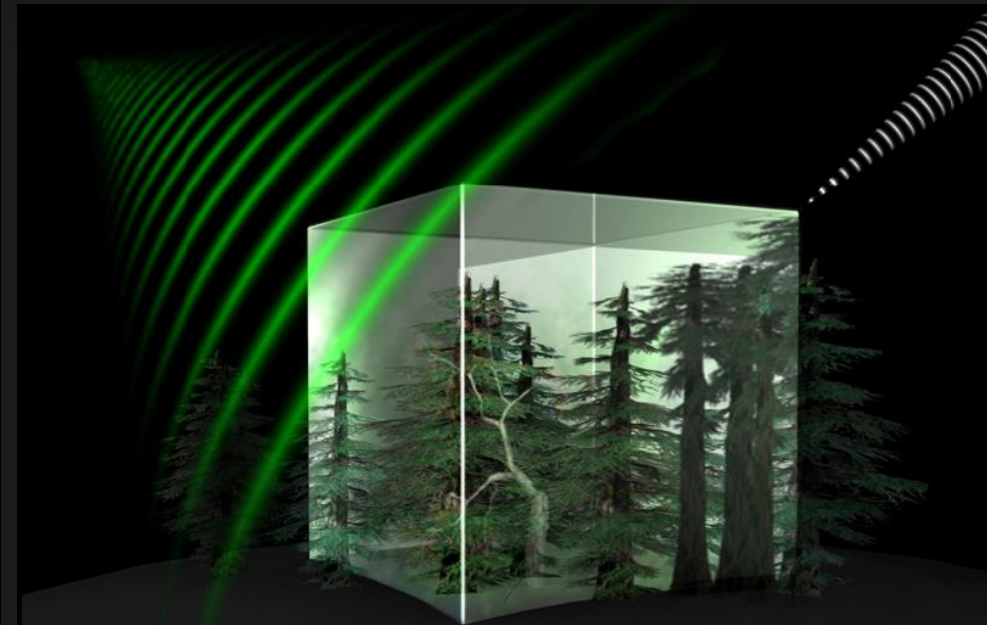
2009



2013 (5.0) to 2018 (5.2)



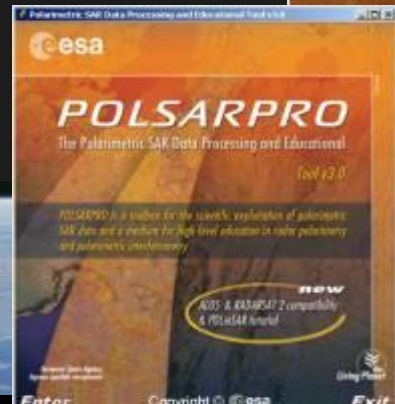
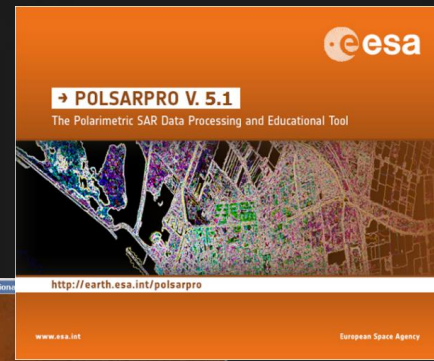
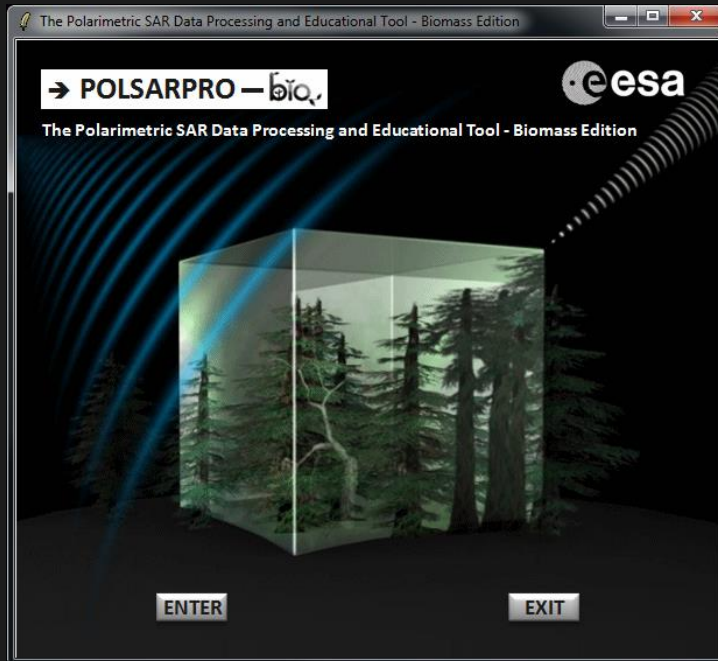
BIOMASS mission : 7th ESA Earth Explorer (2022)



Biomass will provide **global maps** of the amount of **carbon stored** in the world's forests and how this **changes** over time.

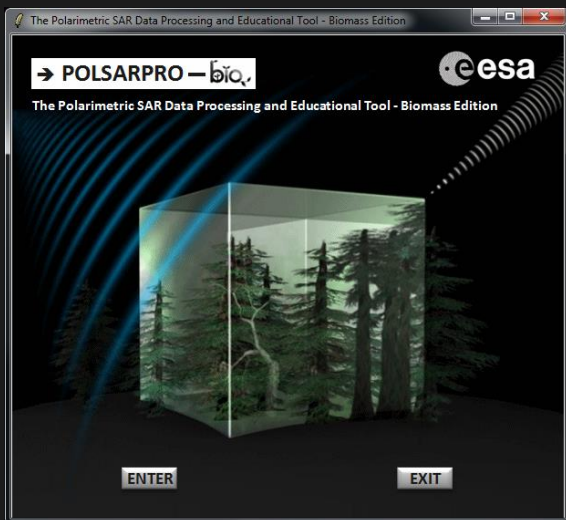
Further our **knowledge** of the role **forests** play in the **carbon cycle**.

P-Band Pol-TomoSAR spaceborne mission



2013 (5.0) to 2018 (5.2)

2009

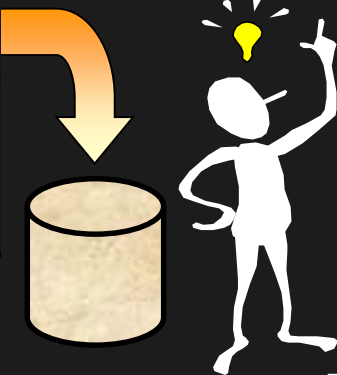


Toolbox specifically designed to handle : **Pol-SAR, Pol-InSAR, Pol-TimeSAR** and now **Pol-TomoSAR** data.

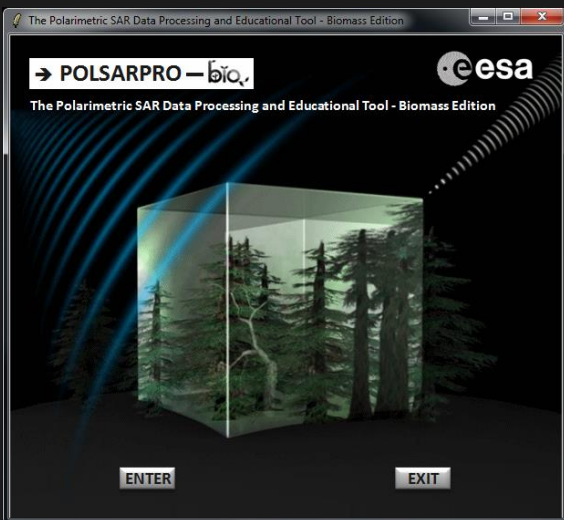
Educational Software offering a tool for **self-education** in the field of **Polarimetric SAR** data processing and analysis.

Developed to be **accessible** to : a wide range of users from **novices** to **experts** in the field of **Pol-SAR, Pol-InSAR, Pol-TomoSAR, Pol-TimeSAR**....

Around **1800** different Pol-SAR, Pol-InSAR, Pol-TimeSAR and now Pol-TomoSAR **functionalities**.



Each element of the Software (**a function**) can be **extracted** and **incorporated** individually into **users'** own processing software.



PolSARpro v6.0 (Biomass Edition) Software is made available following the: **Open Source Software Development (OSSD)** approach, and follows the: **GNU General Public License v2 – June 1991**.

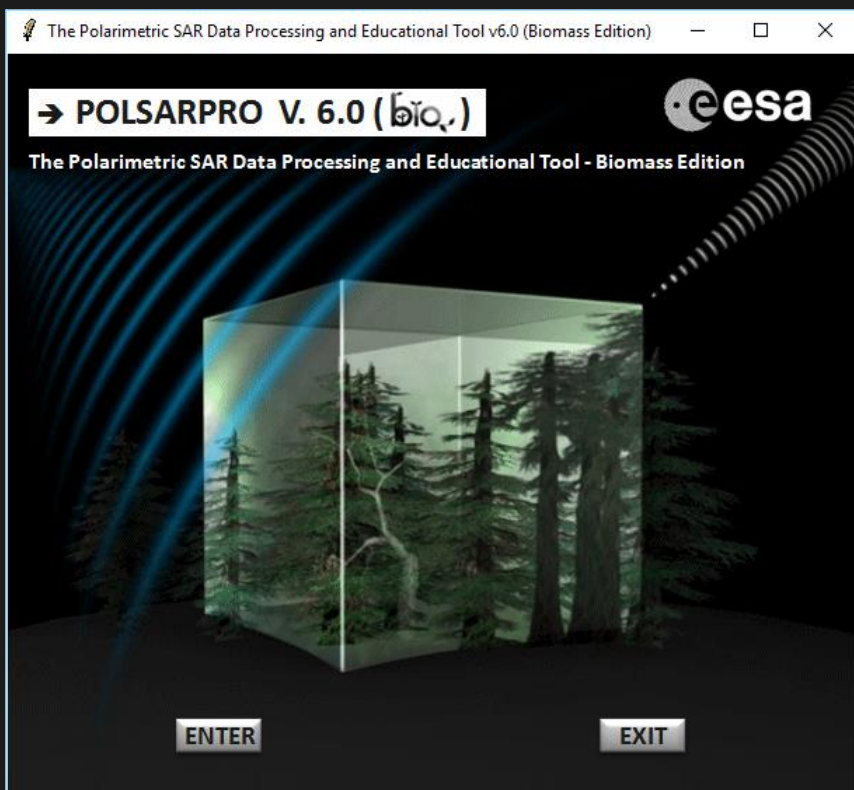


since **2003**

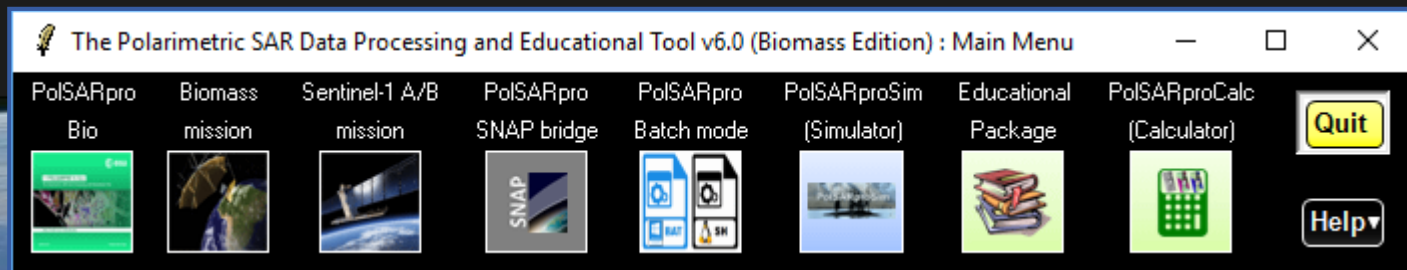
- **+3000** registered users
- **+70** foreign countries

International Collaborative Project (4 Agencies, 19 Research Centres, 21 Universities)

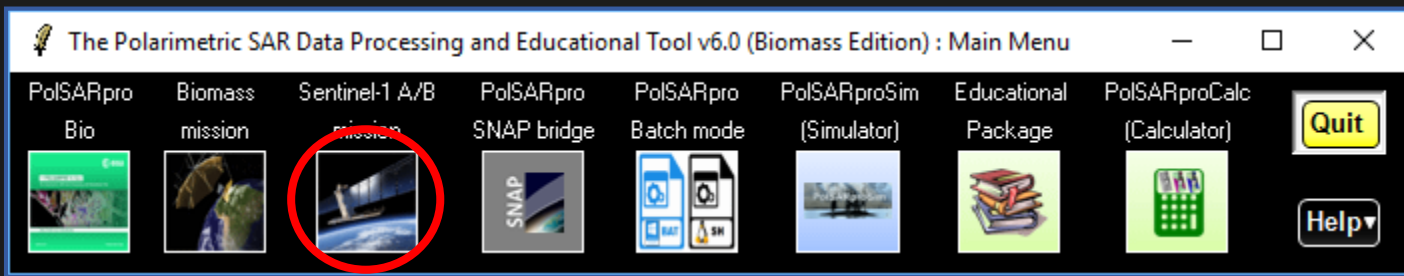




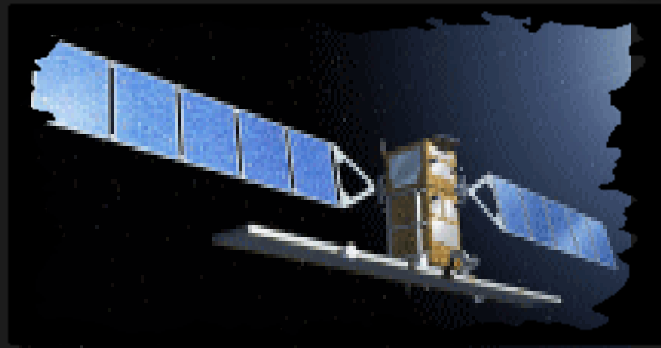
ENTRY SCREEN

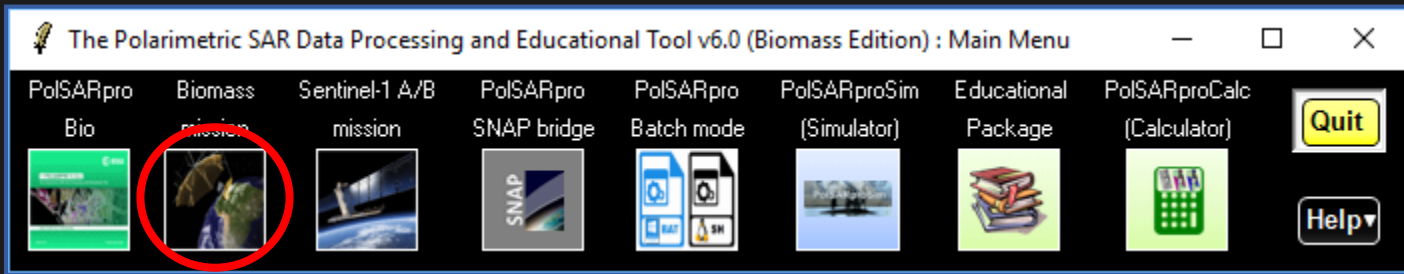


MAIN WINDOW

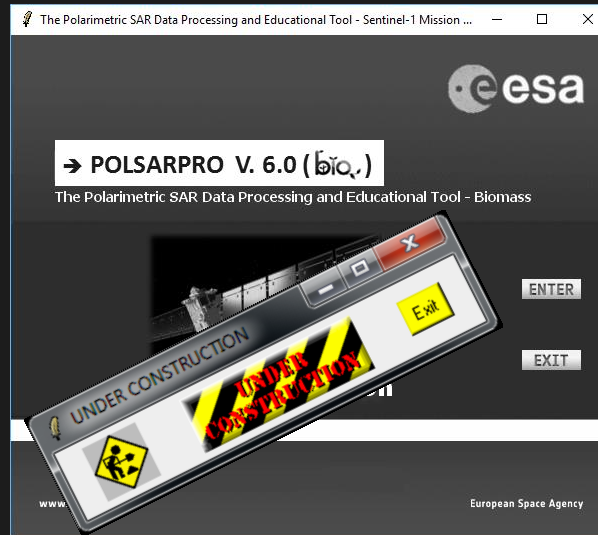
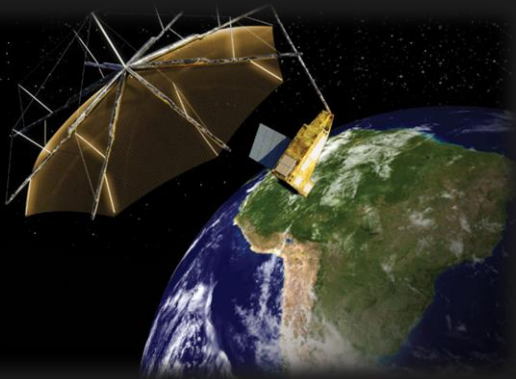


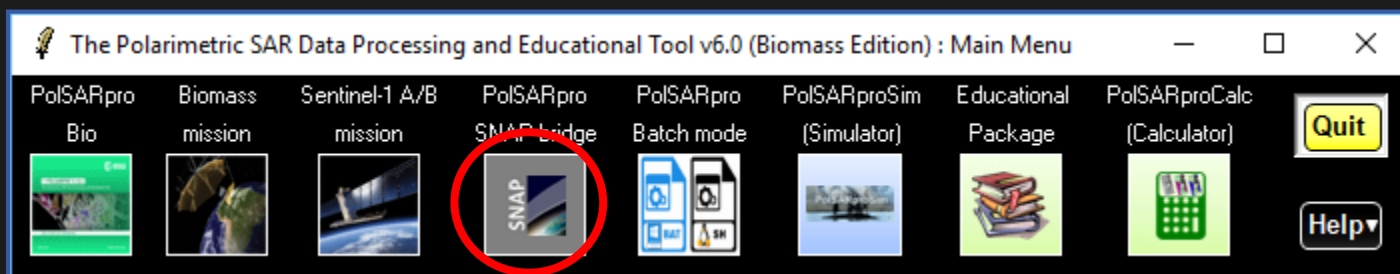
SENTINEL 1A / 1B



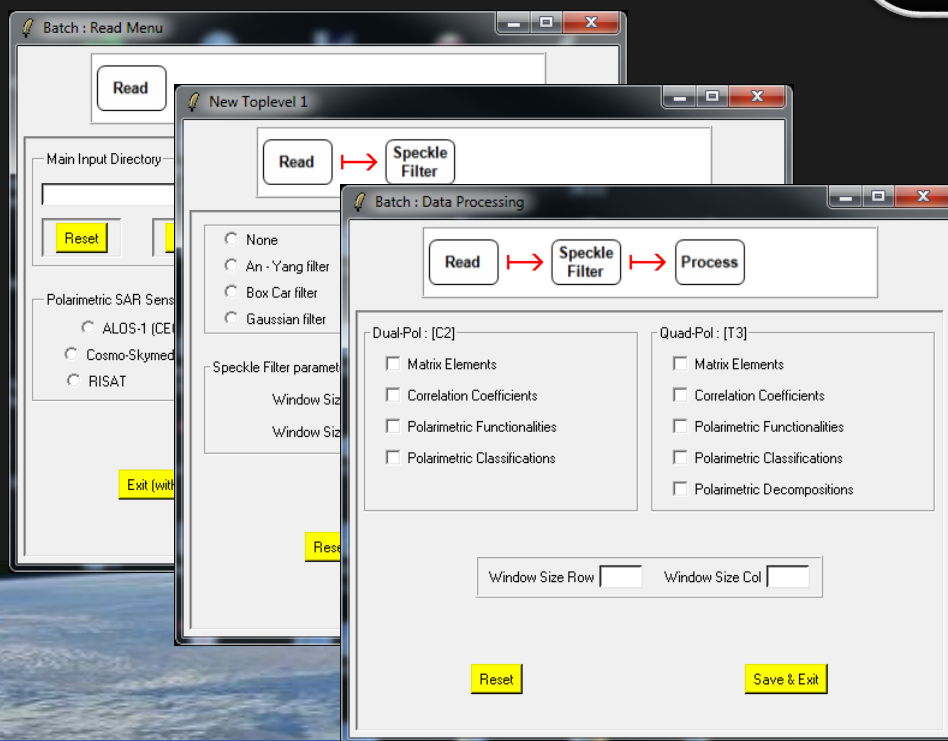
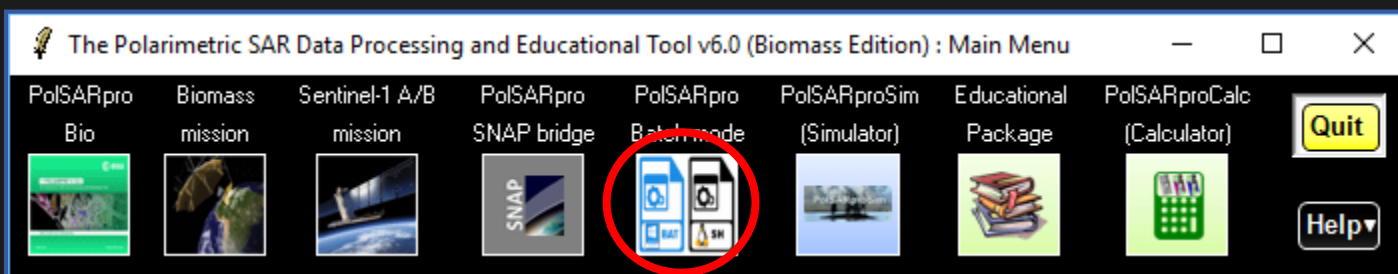


BIOMASS



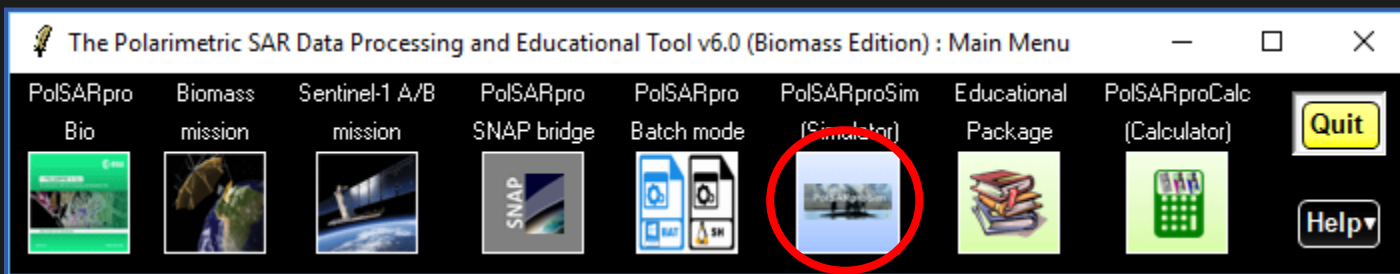


- **S1 toolbox**
(split, deburst, merge ...)
- **Geocoding toolbox**
- **Terrain correction**
- **Interferometric toolbox**
(co-registration, flat Earth estimation ...)



PosARpro Batch Mode

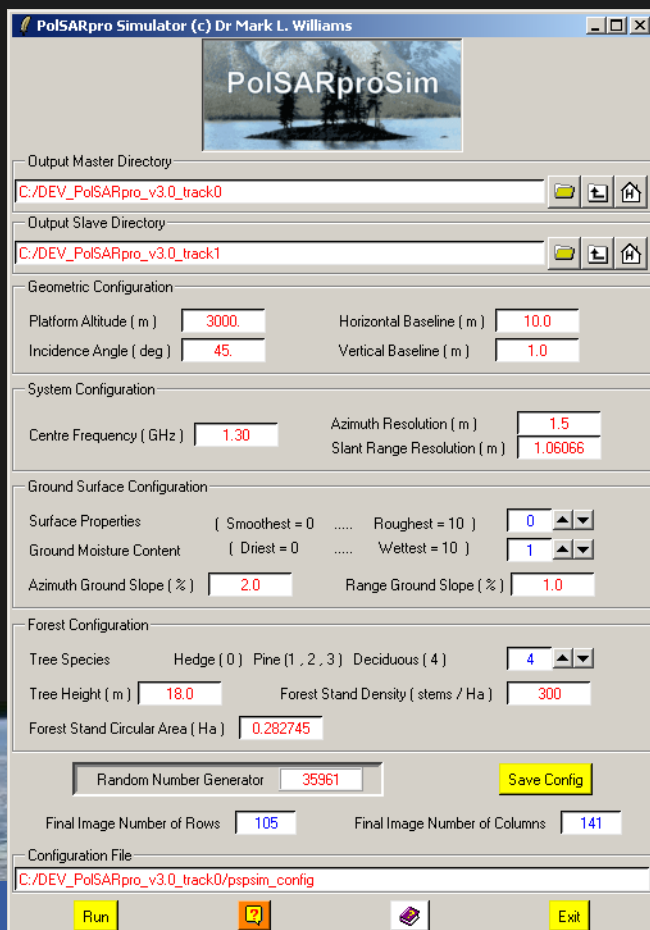
Create a bat (windows) or a sh (linux) file to run different polarimetric data processes in a batch processing mode.

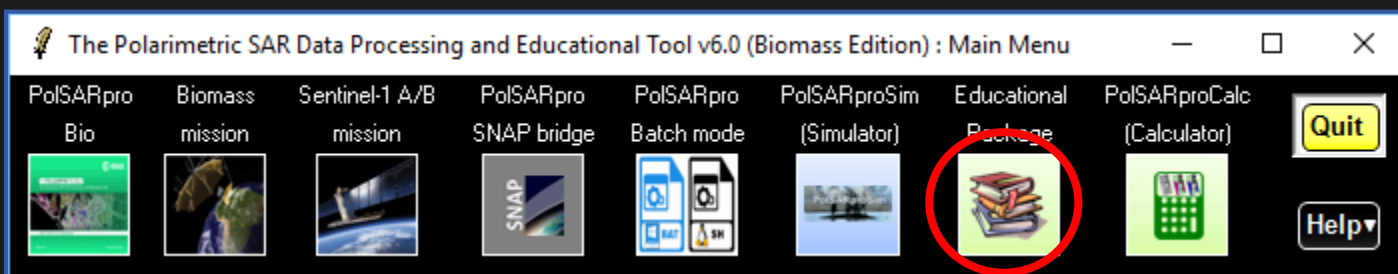


PoSARpro - Sim

This educational tool creates and provides simulated test data of sufficient fidelity to be used to illustrate the concepts of Pol-InSAR when applied on ground surface, ground surface covered with low vegetation or forest stands.

This simulator is developed by Mark Williams ©



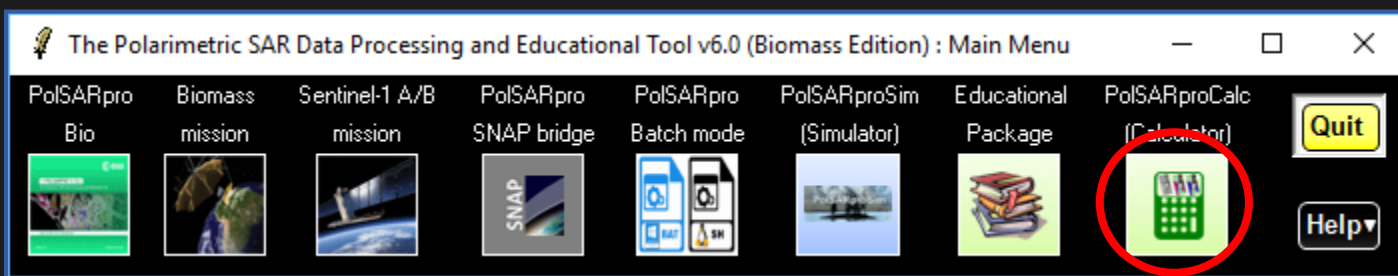


PolSARpro – Biomass Edition web site

- *On-line tutorials*
- *On-line self training packages*
- *Video / Quizz*
- *Blog / Forum*

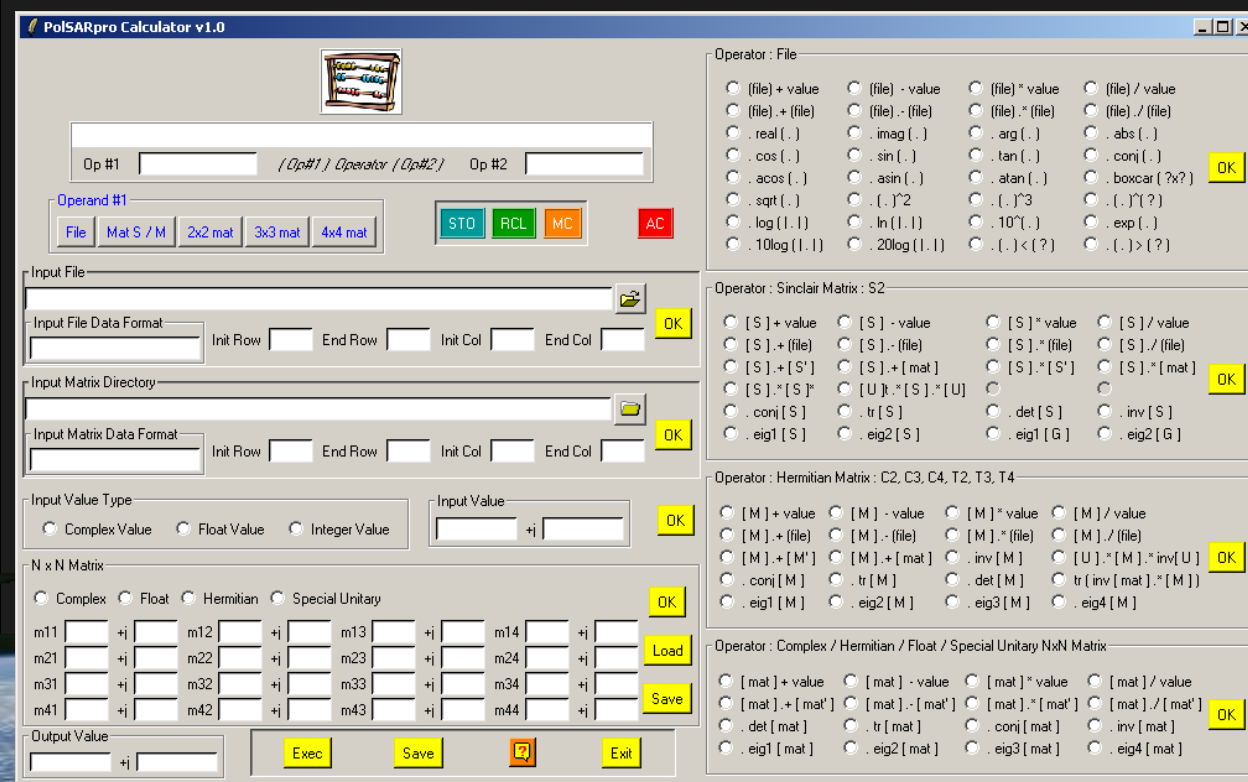
New lecture course
New topics
Re-design of the *Do It Yourself*

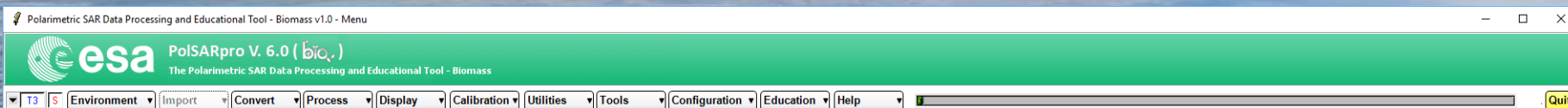
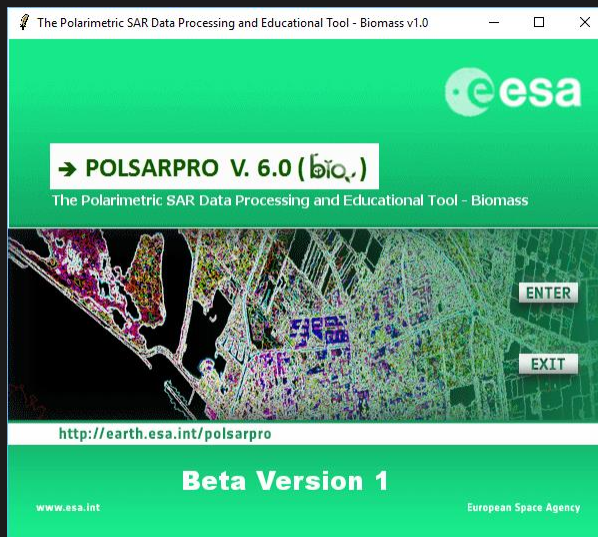
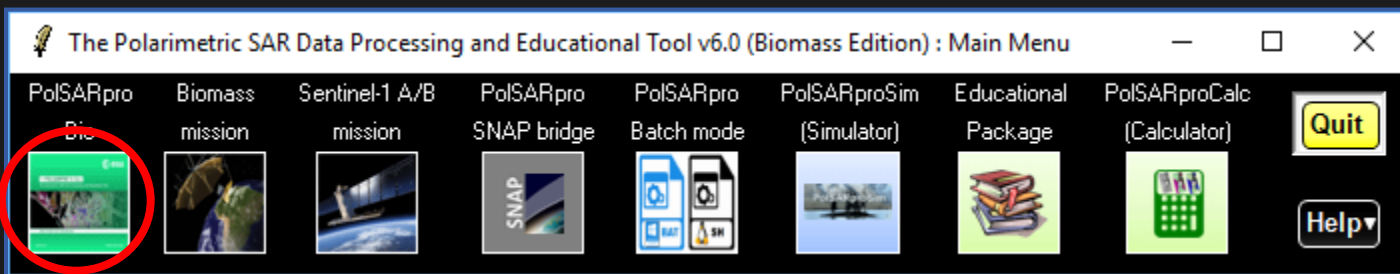




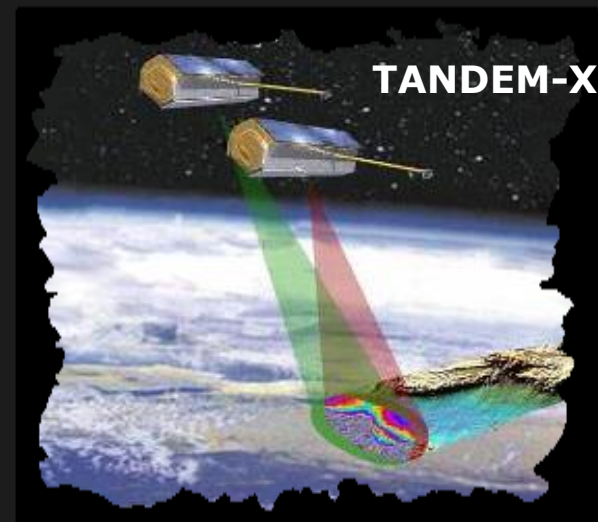
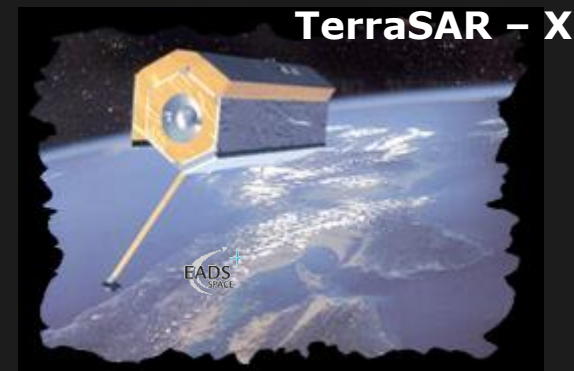
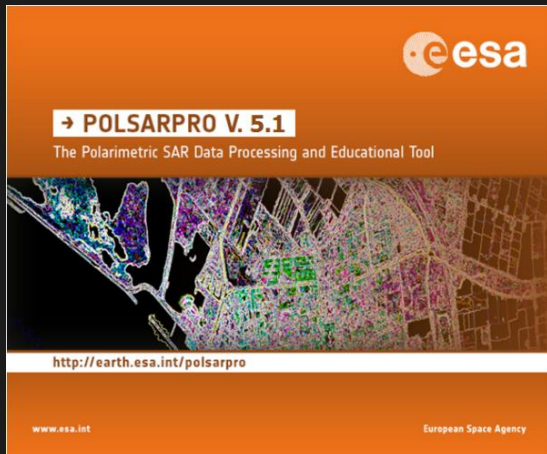
PolSARpro - Calc

This tool proposes a **Polarimetric Pocket Calculator** offering basic processing functionalities which are applied on a set of SAR Polarimetric datasets.





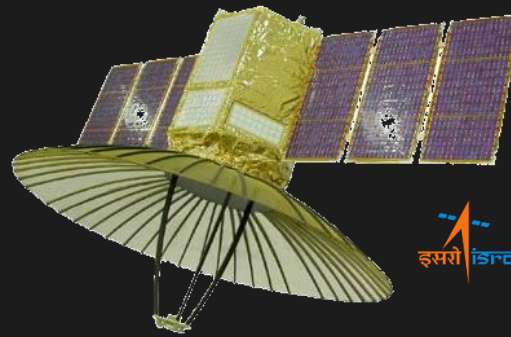
**PoISARpro v6.0
(Biomass Edition)
SOFTWARE**



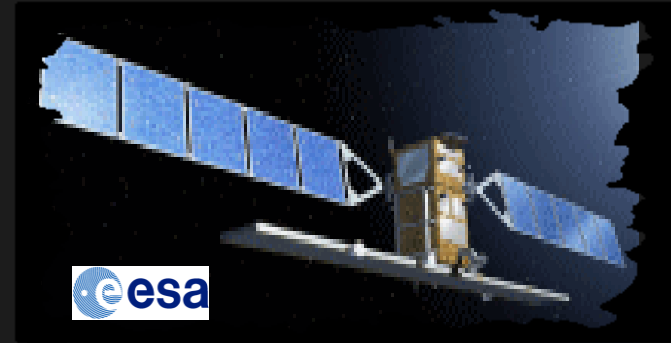
CURRENT

PoISARpro v5.2 Software offers the possibility to handle and convert polarimetric data from a range of well established **CURRENT** polarimetric spaceborne platforms.

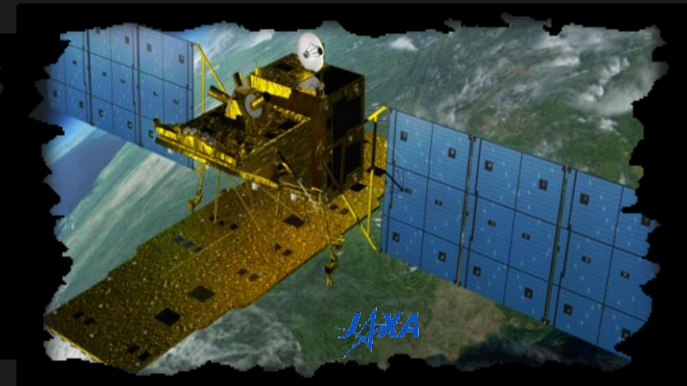
RISAT



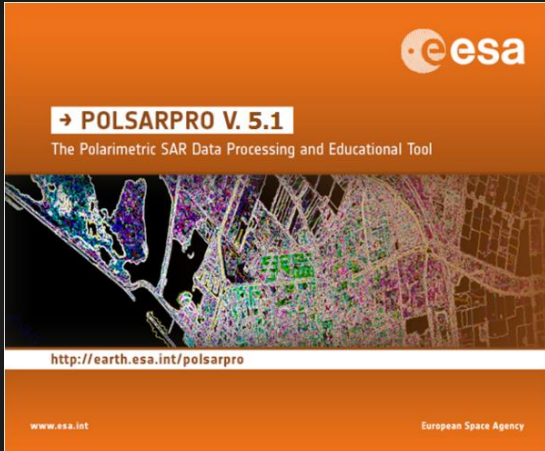
SENTINEL 1A / 1B



ALOS-2 – PALSAR-2



GaoFen 3 (GF3)

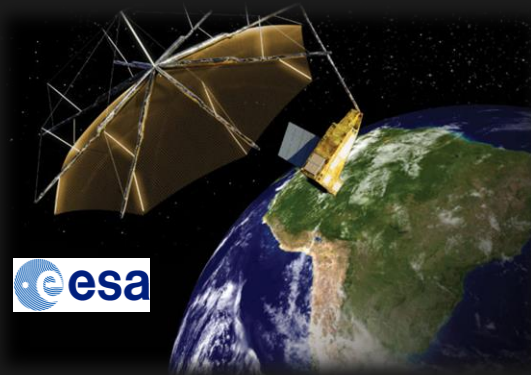
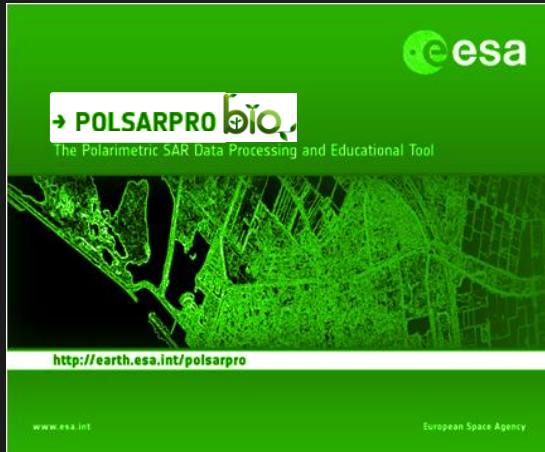


CURRENT

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BIOMASS

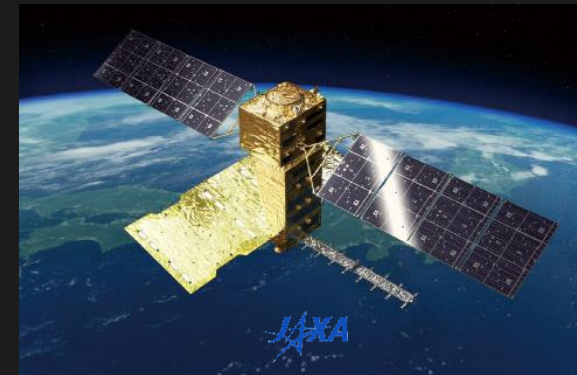
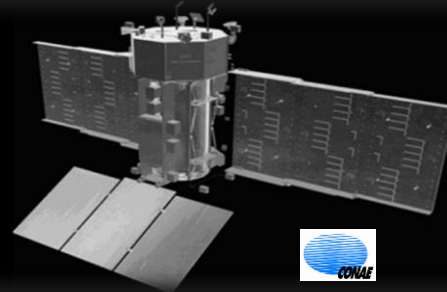
Radarsat Constellation Mission (RCM)



ALOS-4- PALSAR-3

SAOCOM

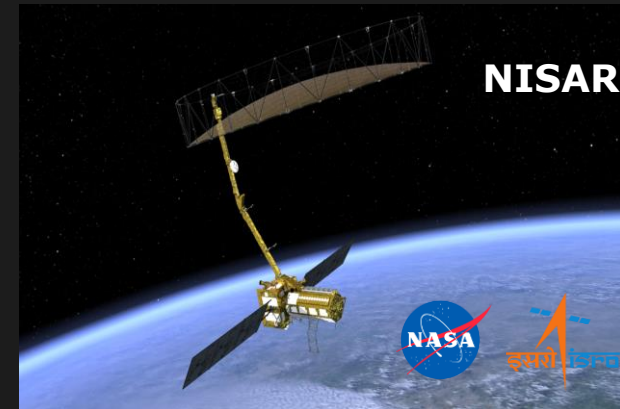
FUTURE



PoLSARpro - Bio will offer the possibility to handle and convert polarimetric data of **FUTURE polarimetric spaceborne platforms**.

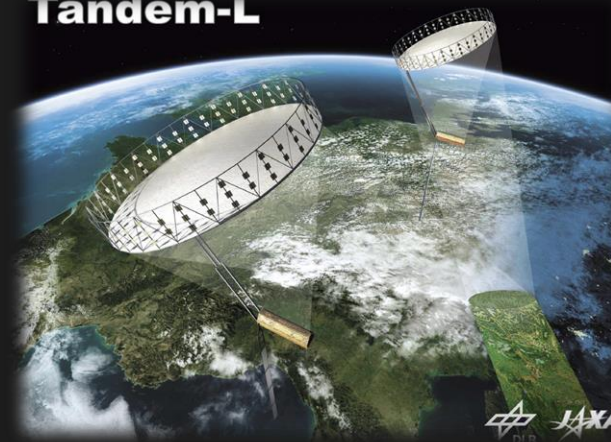


NovaSAR - S



NISAR

Tandem-L



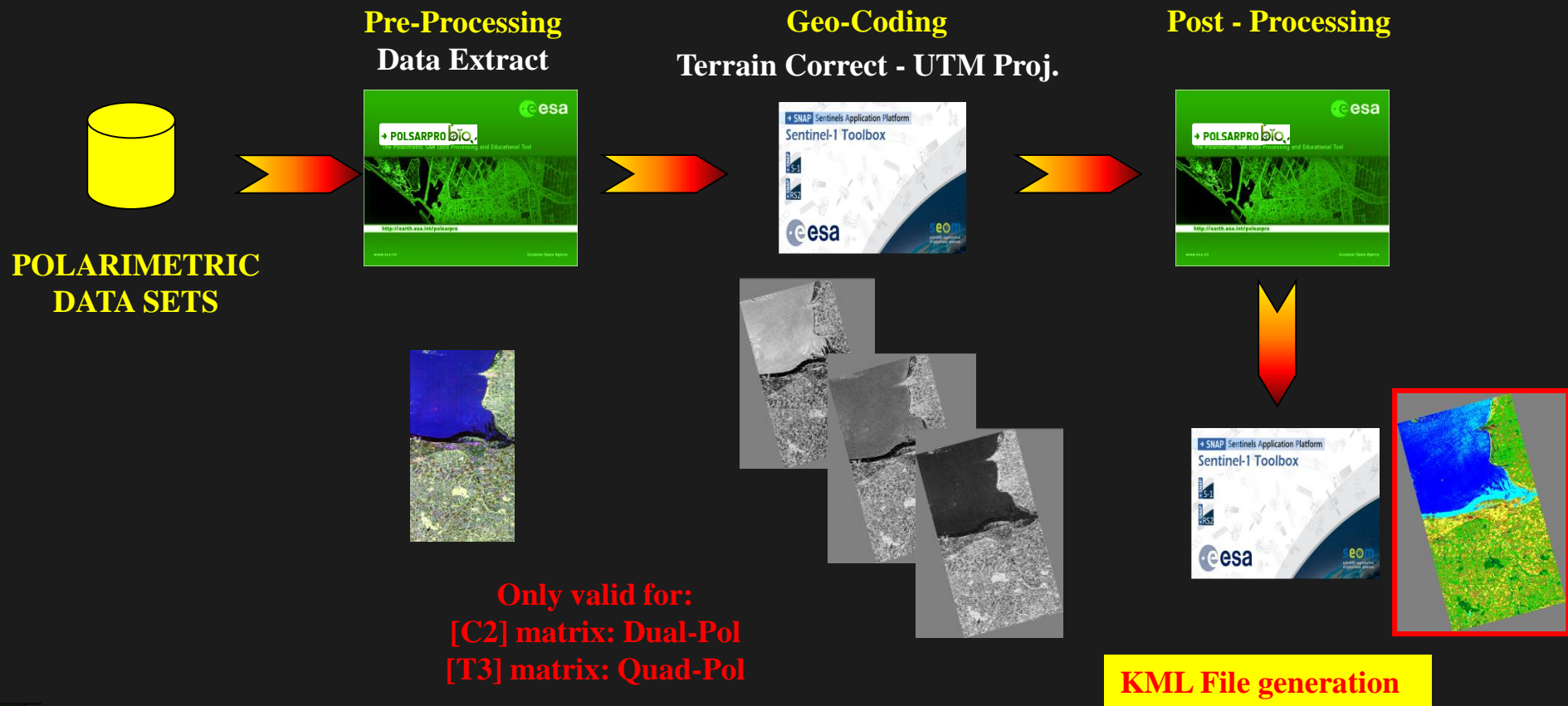
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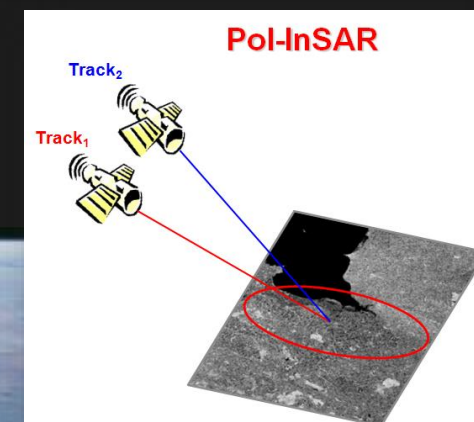
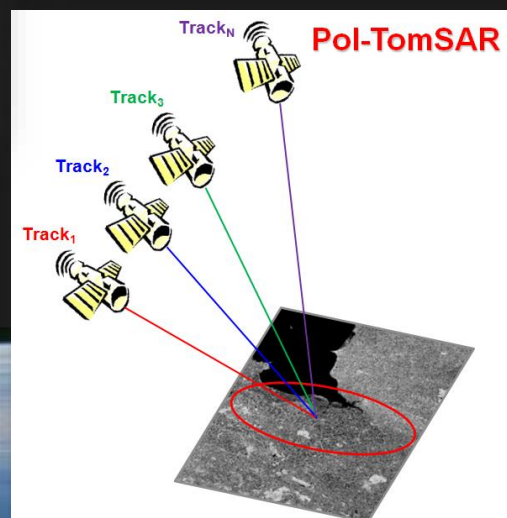
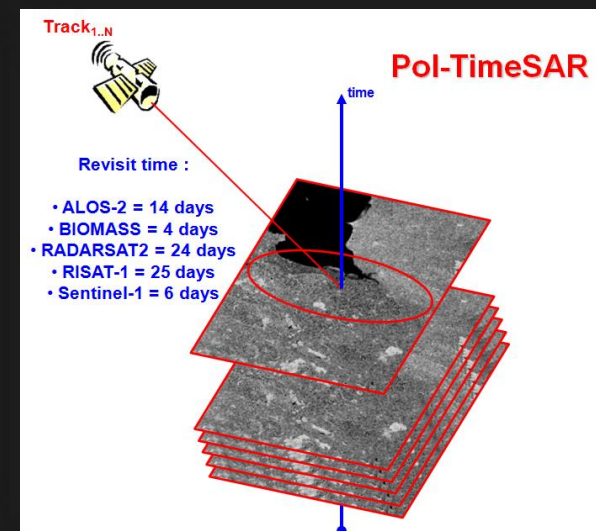
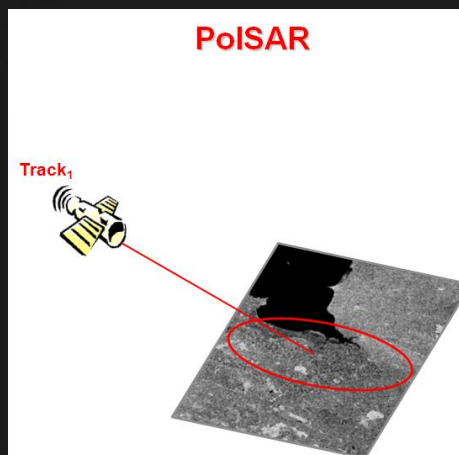
External Softwares



ESA - SNAP



New functionalities



Polarimetric SAR Data Processing and Educational Tool - Biomass v1.0 - Menu

esa PoISARpro-bio
The Polarimetric SAR Data Processing and Educational Tool - Biomass

Environment Import Convert **Process** Display Calibration Utilities

Linear (+45 / -45)
Circular (L / R)
Elliptical (phi, tau)

Matrix Elements
Correlation Coefficients
Elliptical Basis Change
Polarimetric Speckle Filter
H / A / Alpha Decomposition
Polarimetric Decompositions
Polarimetric Functionalities - 1
Polarimetric Functionalities - 2
Polarimetric Segmentation
Polarimetric Data Analysis
Polarimetric Data Clustering
Batch Process

An-Yang Filter
Box Car Filter
Box Car - Edge Filter
Gaussian Filter
IDAN Filter
Lee Refined Filter **New!**
Lee Sigma Filter
Lopez Filter
Mean-Shift Filter
Non Local Means Filter
Scattering Model Based Filter
P.W.F Filter
SIRV Model Estimation

Decomposition Parameters
Eigenvector Set Parameters
Eigenvalue Set Parameters

H / A / Alpha Classification
H / u / v Classification (Xu & Jin)
H / A / Alpha - Wishart Classification
Scattering Model Based - Wishart Classification
Unified Huynen Classification
Fuzzy - H / Alpha Classification **New!**
Wishart Supervised Classification
G.P.F. Supervised Classification
Rule-Based Hierarchical Classification
Basic Scattering Mechanism Identification
SVM Supervised Classification

Faraday Rotation Estimation
Conformity Coefficient
Scattering Predominance
Scattering Diversity
Degree of Purity
Depolarisation Index
Alpha Approximation (Praks & Colin)
Entropy Approximation (Praks & Colin)
Scattering Mechanism Entropy (Freeman)
Scattering Mechanism Entropy (Van Zyl)
Kozlov Anisotropy
Lueneburg Anisotropy
Polarized Point Scatterer Detection
Reflectivity Ratio
Differential Reflectivity (ZDR)

KRO : Krogager Decomposition
CAM : Cameron Decomposition
HAA : H / A / Alpha Decomposition
JRH : Huynen Decomposition
RMB1 : Barnes 1 Decomposition **New!**
RMB2 : Barnes 2 Decomposition
SRC : Cloude Decomposition
UHDx : Unified Huynen Decomposition
WAH1 : Holm 1 Decomposition
WAH2 : Holm 2 Decomposition
AN3 : An & Yang 3 Component Decomposition
AN4 : An & Yang 4 Component Decomposition
BF4 : Bhattacharya & Frey 4 Component Decomposition
FRE2 : Freeman 2 Component Decomposition
FRE3 : Freeman 3 Component Decomposition
NEU : Neumann 2 Component Decomposition
NNED : Ariei 3 Component Decomposition
ANNED : Ariei 3 Component Decomposition
VZ3 : Van Zyl (1992) Component Decomposition
SIN4 : Singh 4 Component Decomposition
YAM3 : Yamaguchi 3 Component Decomposition
YAM4 : Yamaguchi 4 Component Decomposition
L. Zhang 5 Component Decomposition
Fuzzy Decomposition
Lee Decomposition
Freeman Decomposition
Compact Polarimetric Decomposition

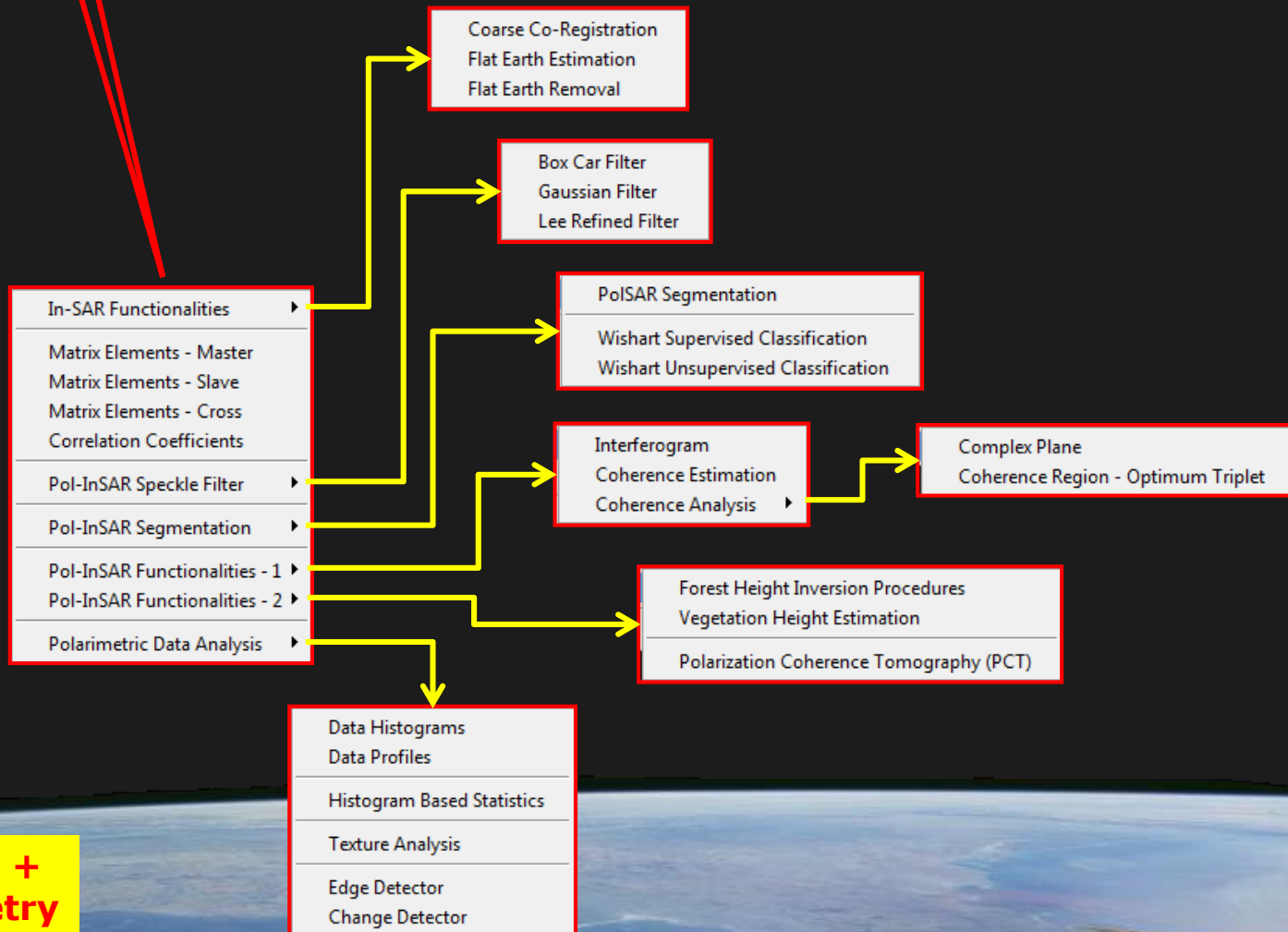
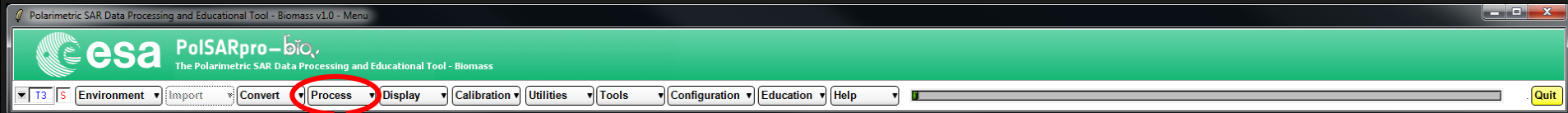
Polarisation Synthesis
Polarimetric Signature
Stokes Parameters
Compact Polarimetric Mode
Compact Decomposition
Compact Classification
O.P.C.E
R.C.S Max
Surface Inversion
Roughness - Soil Inversion
RVOG PoISAR Inversion
Sub-Aperture Analysis
DEM Estimation
Polarisation Orientation Compensation

Decomposition Applications

Dual - PoISAR (Spp, C2)

Quad - PoISAR (S2, C3, C4, T3, T4)

© E. Pottier - PoISARpro v6 (Biomass Edition)



**Polarimetry +
Interferometry**

Pol-InSAR

Pol-TomoSAR processor

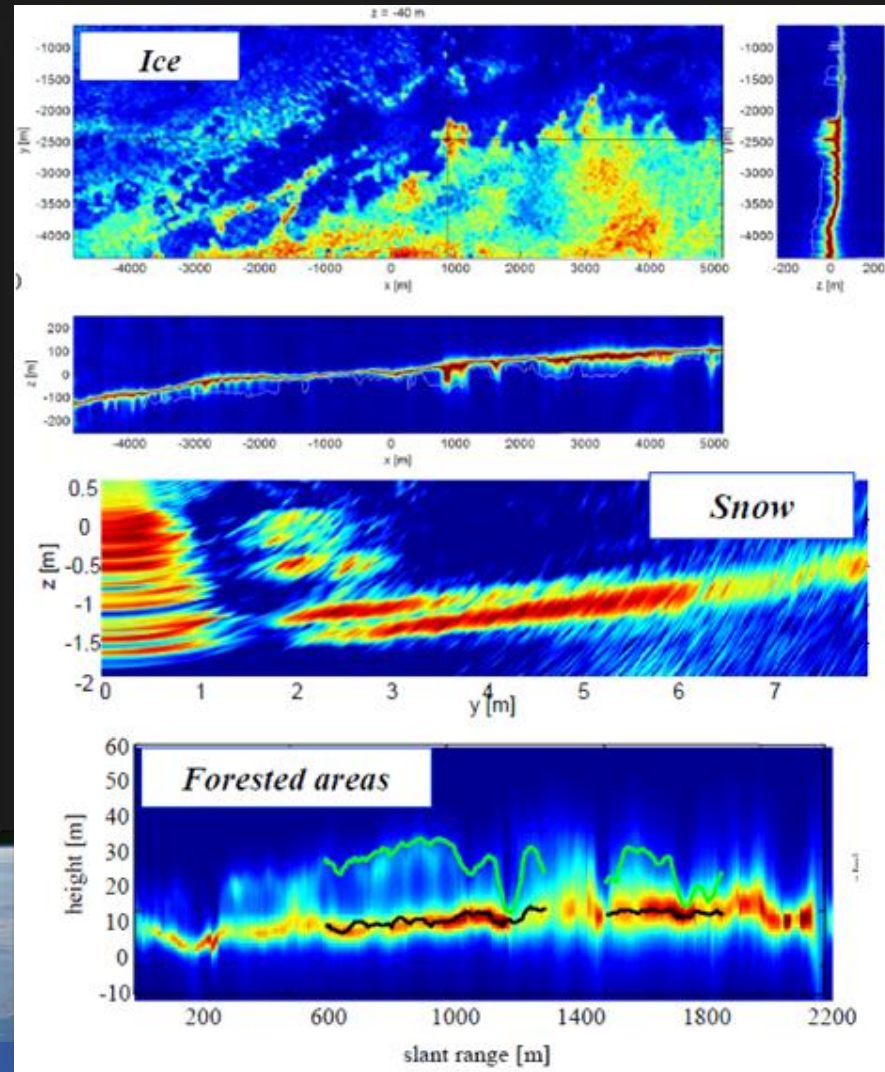
esa

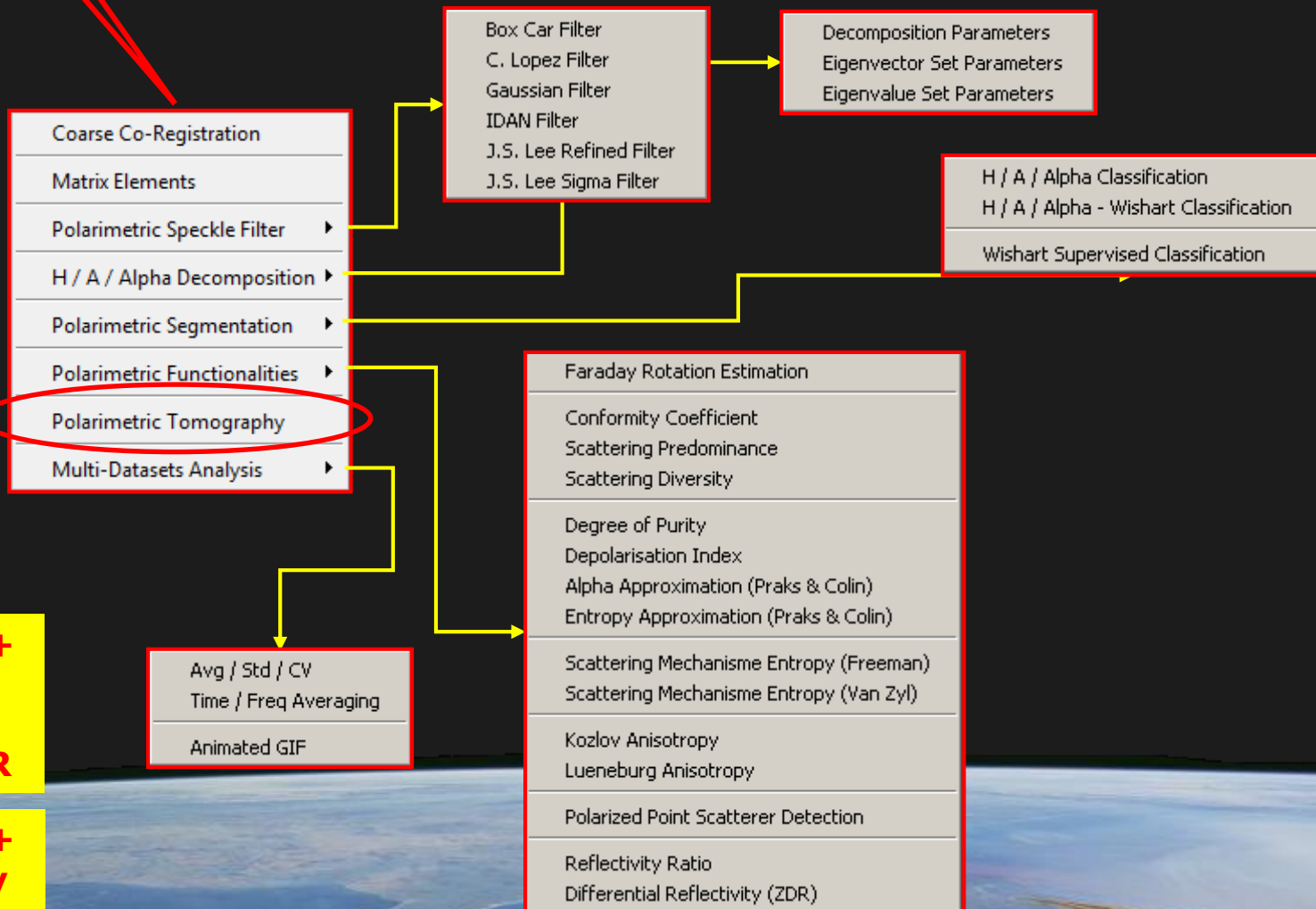
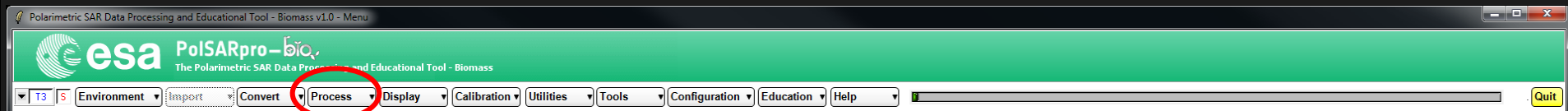
→ POLSARPRO bio

The Polarimetric SAR Data Processing and Educational Tool

<http://earth.esa.int/polsarpro>

www.esa.int European Space Agency





Polarimetry + Time series
Pol-TimeSAR

Polarimetry + Tomography
Pol-TomoSAR

SARSIM / SARSIM+ Data Bases

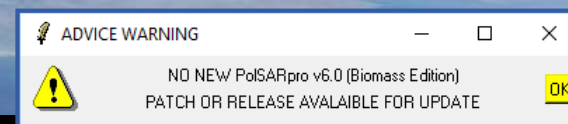
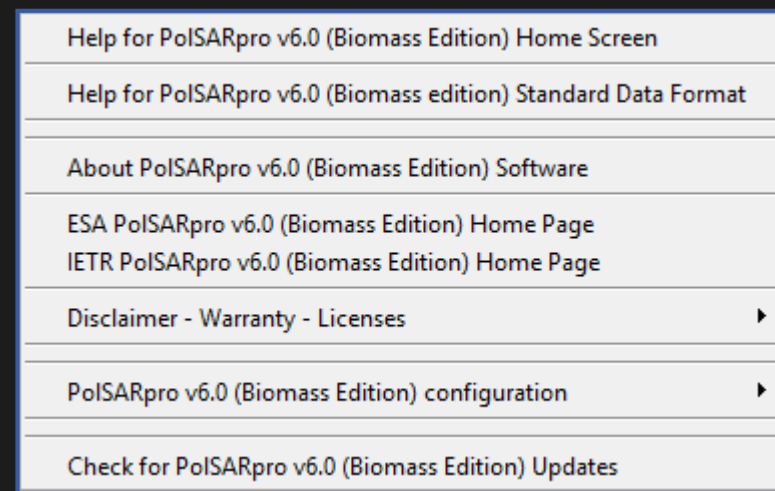
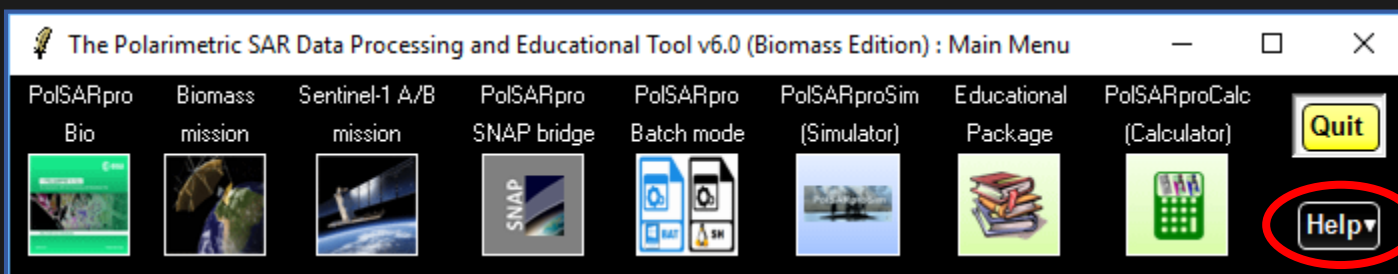
ESA study : L- and P-band SAR Tomography Synergies Consolidation Study

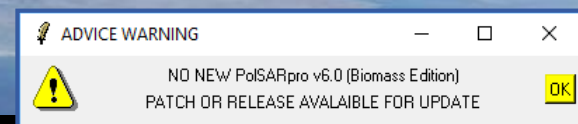
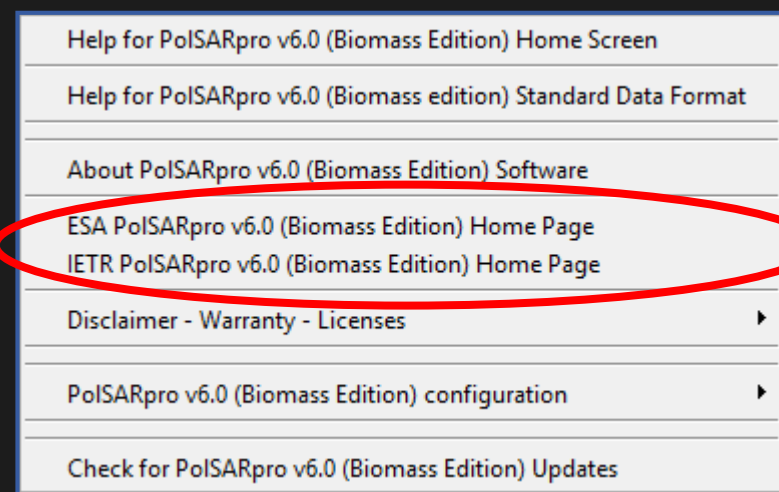
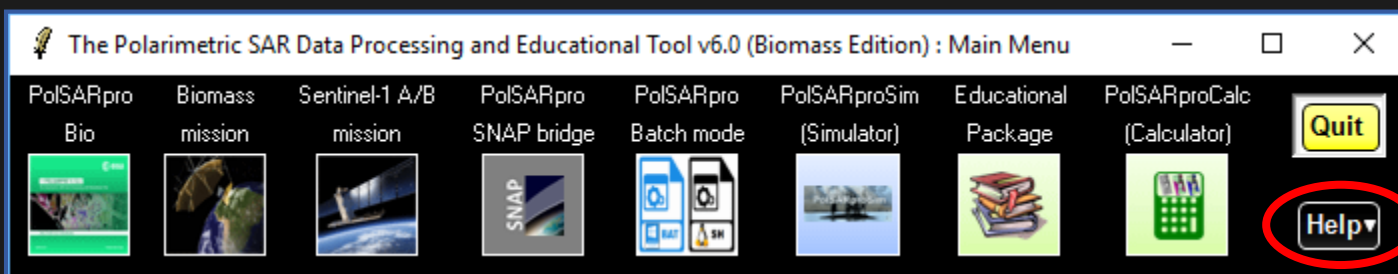


Goal : *Build a reference dataset for current and future researches on the application of SAR Tomography for the RS of boreal, temperate and tropical forests at P- and L-Band.*

Includes : *Stack of SLC SAR images (coregistered, phase calibrated and flattened) + ancillary data (kz maps, DTM ...) – ESA campaigns (afrisar, biosar)*







The screenshot shows the homepage of the STEP (Science Toolbox Exploitation Platform) website. The header includes the ESA logo and navigation tabs for ESA, STEP, TOOLBOXES, DOWNLOAD, GALLERY, DOCUMENTATION, COMMUNITY, and THIRD PARTY PLUGINS. A search bar is located in the top right. The left sidebar contains a list of toolboxes and a 'SNAP SURVEY' link. The main content area features a banner for 'multimission scientific toolboxes' and a paragraph explaining that ESA is developing free open source toolboxes for the scientific exploitation of Earth Observation missions under the SEOM programme. Below this is a grid of eight icons representing different services: SNAP Features, Download, Tutorials, Community, Documentation, Developers, Gallery, and Blog. At the bottom of the main content, it states: 'The following results have been obtained thanks to the Sentinel Toolboxes :'. On the right side, there are promotional banners for 'seom scientific exploitation of operational missions' and '2018 EO Open Science' events.

step science toolbox exploitation platform

ESA STEP **TOOLBOXES** DOWNLOAD GALLERY DOCUMENTATION COMMUNITY THIRD PARTY PLUGINS

SNAP
Sentinel 1 Toolbox
Sentinel 2 Toolbox
Sentinel-3 Toolbox
SMOS Toolbox
Proba-V Toolbox
PoSARpro
Download
Community
Useful Links

→ SNAP SURVEY

step.esa.int/main/toolboxes/polsarpro-v6-0-biomass-...

Rechercher

Home > Toolboxes > PoSARpro v6.0 (Biomass Edition) Toolbox

PoSARpro v6.0 (Biomass Edition) Toolbox

Search...

seom scientific exploitation of operational missions

2018

Mapping Urban Areas from Space (MUAS 2018)

THE ESA EARTH OBSERVATION ©-WEEK
EO Open Science and FutureEO
17-18 November 2018 ESA-ESRIN (Frascati, Rome, Italy)

EO Open Science 2018

8th Advanced Land Training Course

2017

EO OPEN SCIENCE 2017

EO Open Science 2017

POLARSARPRO V. 6.0 (Bio.)
The Polarimetric SAR Data Processing and Educational Tool - Biomass Edition

The ESA PoSARpro v6.0 (Biomass Edition) Software is the new version of the ESA PoSARpro Toolbox (The Polarimetric SAR data Processing and Educational Toolbox) which has been developed since 2003 under continuous ESA-ESRIN contracts by different consortiums led by the Institute of Electronics and Telecommunications of Rennes (IETR - UMR CNRS 6164) of the University of Rennes, France.

The objective of this project is to provide an Educational Software that offers a tool for self-education in the field of Polarimetric SAR data analysis and a comprehensive suite of functions for the scientific exploitation of fully and partially polarimetric data sets. The PoSARpro v6.0 (Biomass Edition) Software proposes a great collection of well-known algorithms and tools and establishes a foundation for the exploitation of polarimetric techniques for scientific developments and stimulates research and applications developments using Pol-SAR, Pol-InSAR, Pol-TomoSAR and Pol-TimeSAR data.

The PoSARpro v6.0 (Biomass Edition) Software specific interface performs complete end-to-end processing without the need for other software and is selectable from the main menu. In order to take advantage of specific functionalities offered in the Sentinel-1 Toolbox, a dedicated bridge has been built between the two softwares.

The PoSARpro v6.0 (Biomass Edition) Software offers the possibility to handle and convert polarimetric data from a range of well established polarimetric spaceborne

step
science toolbox exploitation platform

esa

ESA STEP TOOLBOXES **DOWNLOAD** GALLERY DOCUMENTATION COMMUNITY THIRD PARTY PLUGINS

SNAP
Sentinel 1 Toolbox
Sentinel 2 Toolbox
Sentinel-3 Toolbox
SMOS Toolbox
Proba-V Toolbox
PoSARpro
Download
Community
Useful Links

→ SNAP
SURVEY

step.esa.int/main/download/polsarpro-v6-0-biomass-edition

Rechercher

Home > Download > PoSARpro v6.0 (Biomass Edition) Toolbox Download

PoSARpro v6.0 (Biomass Edition) Toolbox Download

seom
scientific exploitation
of operational missions

2018

Mapping Urban Areas from Space
(MUAS 2018)

EO Open Science 2018

EO Open Science 2017

PoSARPRO V. 6.0 (Bio.)
The Polarimetric SAR Data Processing and Educational Tool - Biomass Edition

esa

PoSARpro v6.0 (Biomass Edition) Download :

Both Windows (64 bits) and Linux versions can be downloaded from the website :
<https://www.ietr.fr/polsarpro-bio/>

This current version is a beta version and will be improved and upgraded gradually over time.

To be informed of future new releases and/or patches of the PoSARpro v6.0 (Biomass Edition) Software , user has to click on the "Help" button of the Main Menu window and run the "check" functionality.

PoSARpro v6.0 (Biomass Edition) General Presentation

PoSARpro v6.0 (Biomass Edition) Main Menu Presentation

ESA PolSARpro v6.0 (Biomass Edition) Software

Version 6.0.1 released (2019/04/01)

The **ESA PolSARpro v6.0 (Biomass Edition) Software** is the new version of the **ESA PolSARpro Toolbox** (*The Polarimetric SAR data Processing and Educational Toolbox*) which has been developed since 2003 under different ESA-ESRIN contracts.

Download Windows 64 bits Version (Read-me first)	License
Download Linux Version (Read-me first)	Legal
	Credits

Visit the PolSARpro v6.0 (Biomass Edition) **FORUM** at the **ESA STEP** website

For any help / request / comment, please contact : polsarpro.team@yahoo.com (c) E. Pottier (2019)
PIWIK Analytics

Do not to forget to visit the [GaoFen-3 \(GF-3\)](#) and the [San Francisco](#) webpages.

San Francisco | Institut d'Electroniq X +

https://www.ietr.fr/polsarpro-bio/san-francisco/

Rechercher

San Francisco Polarimetric SAR Datasets

	AIRSAR		ALOS-1 / PALSAR-1
	ALOS-2 / PALSAR-2		GAOFEN-3
	RADARSAT-2		RISAT
	SENTINEL-1A (2018/01/25)		SENTINEL-1B (2018/01/02)

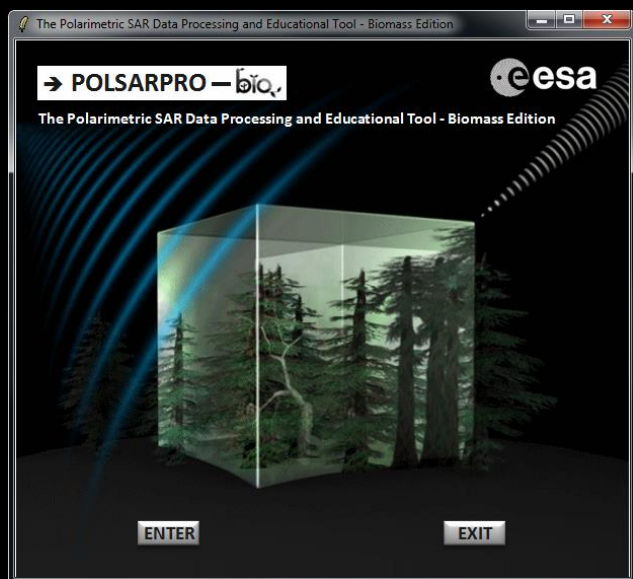
Courtesy of CNSA, CSA, ESA, IECAS, ISRO, JAXA, MDA, NASA-JPL, NSOAS

(c) E. POTTIER (2019)
PIWIK Analytics



Questions ?

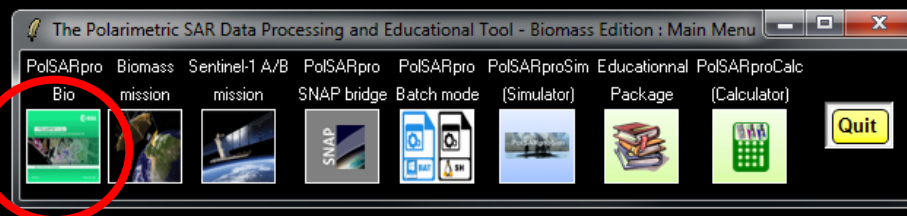




ENTRY SCREEN



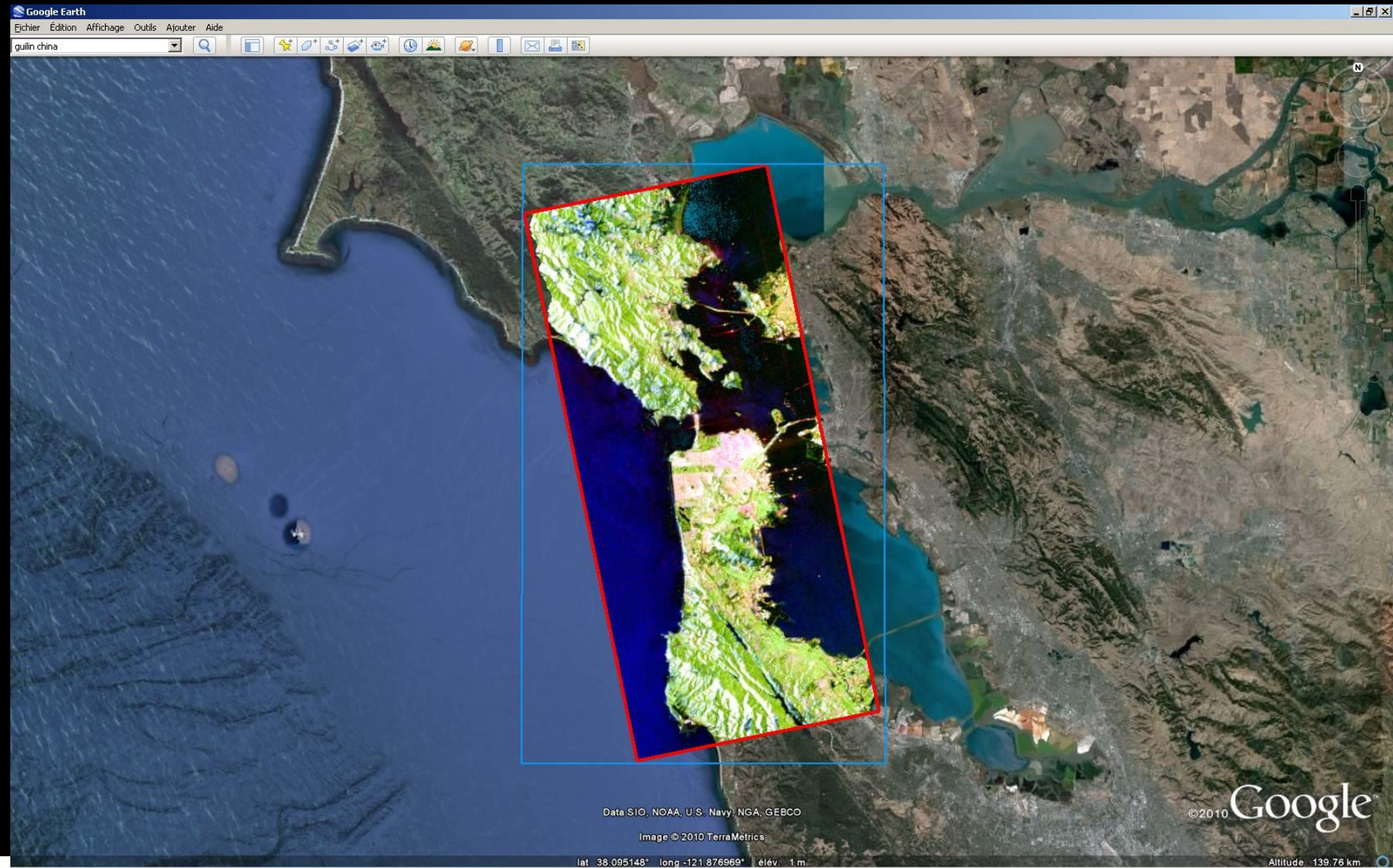
MAIN WINDOW





ALOS : Advanced Land Observing Satellite
PALSAR : Phase Array L-Band SAR

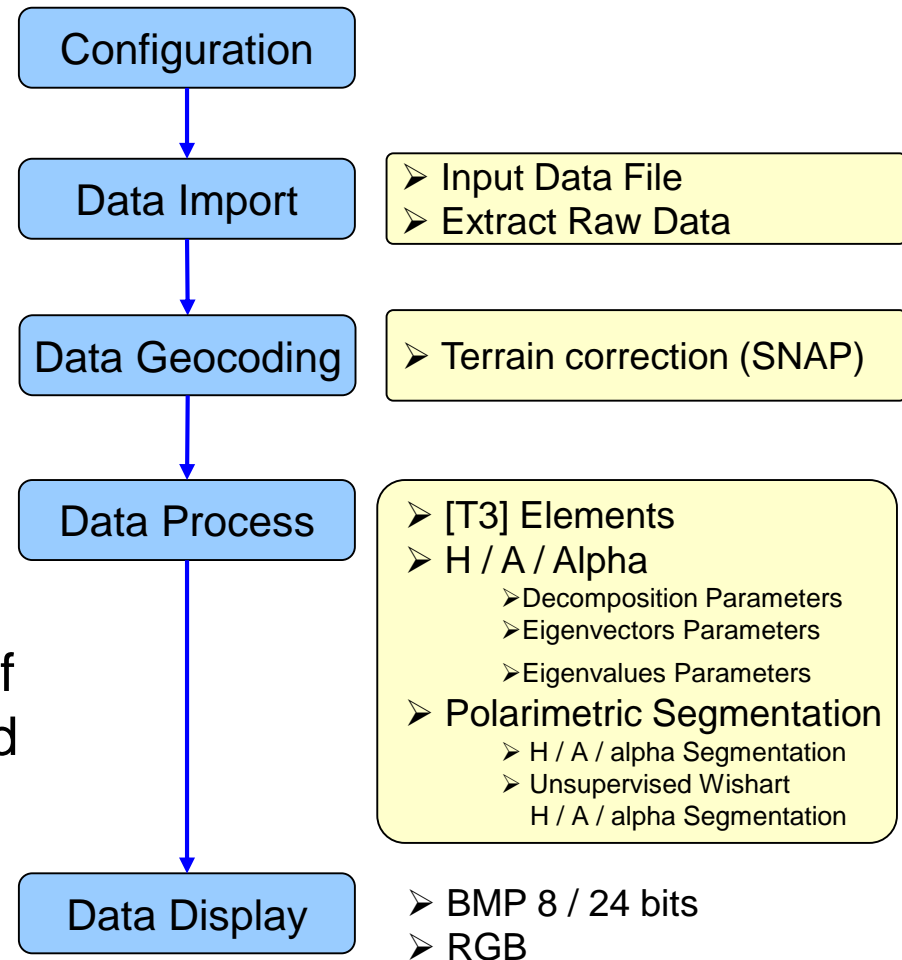


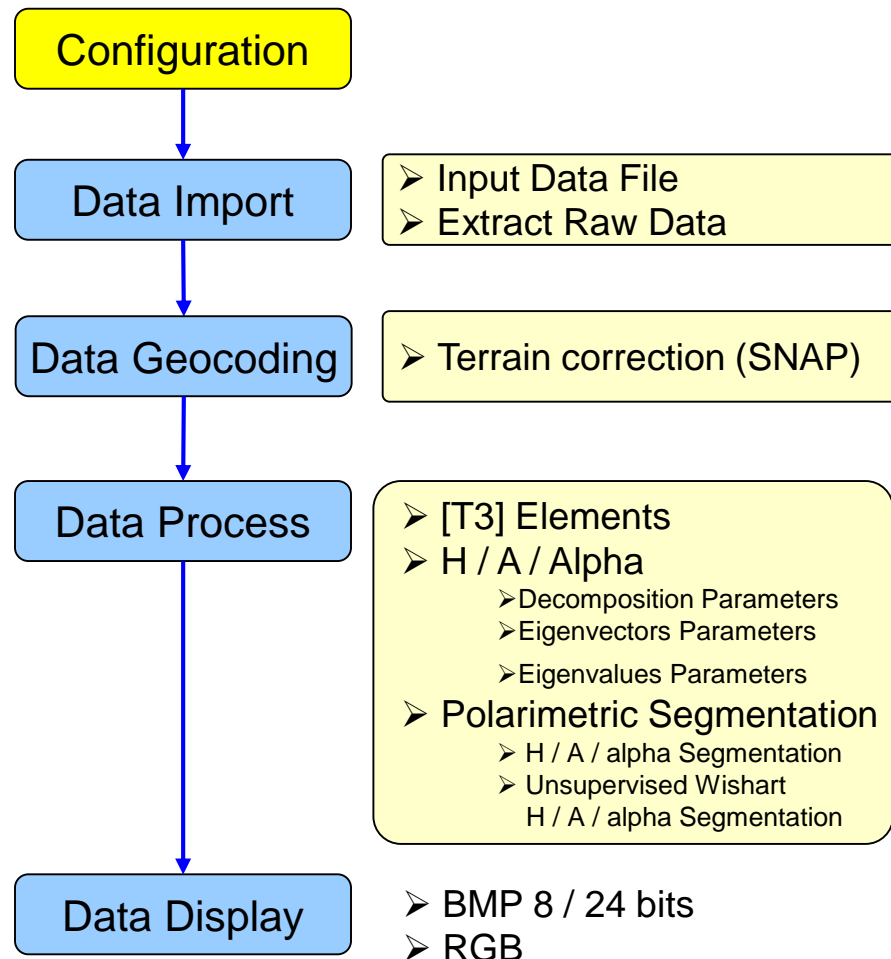


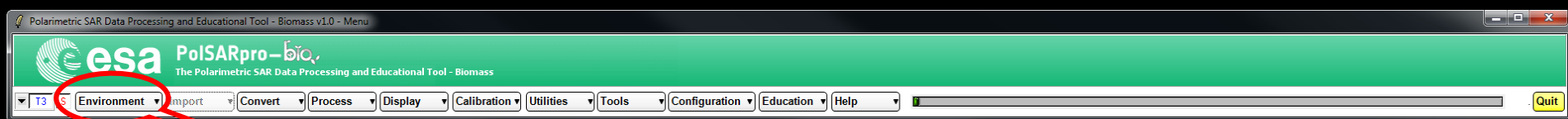
PolSARpro - Bio Software
 performs complete **end-to-end processing** without the need for
 any other software.

Data Processing Approach
 along a '**recommended**'
 and easy processing chain

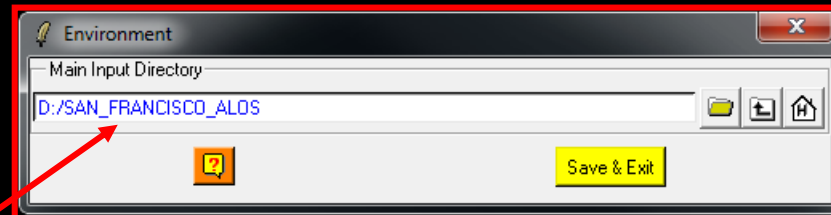
Provide a **First Qualitative Analysis** of
 the fully polarimetric data set processed







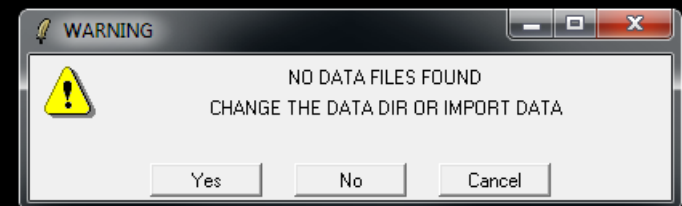
- Single Data Set (Pol-SAR)
- Dual Data Sets (Single Baseline Pol-InSAR)
- Multi Data Sets (Time series / Pol-TomSAR)

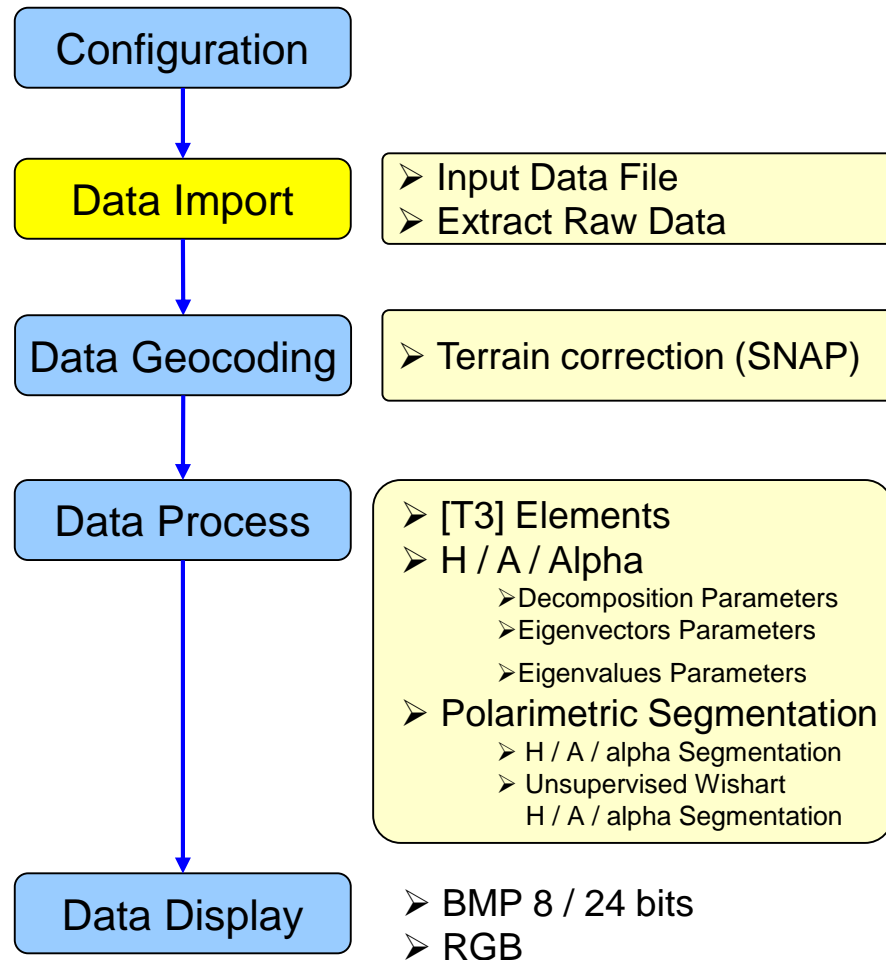


Configure Data Main Directory location

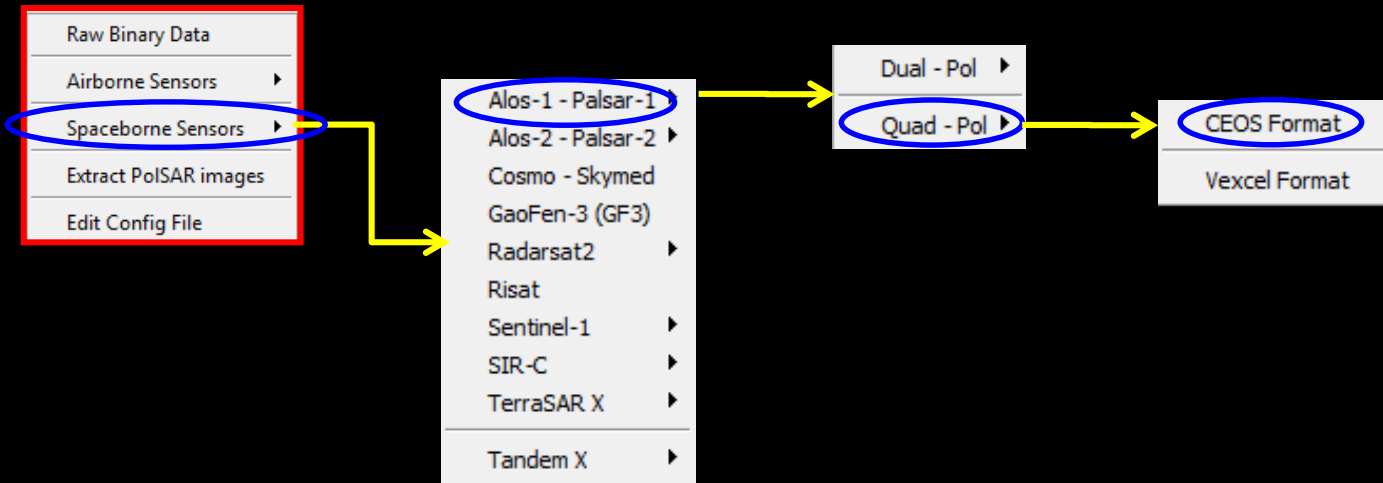
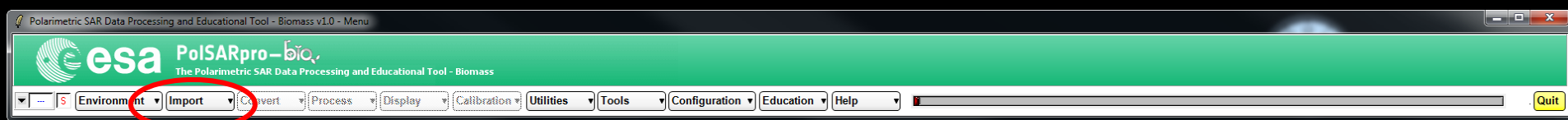
Input Data Directory :

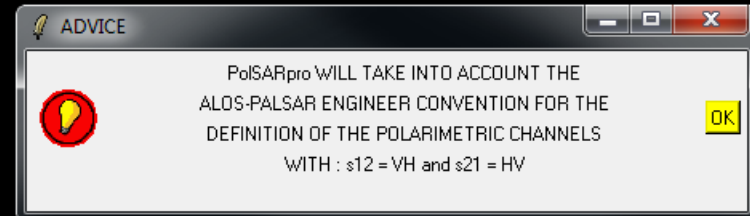
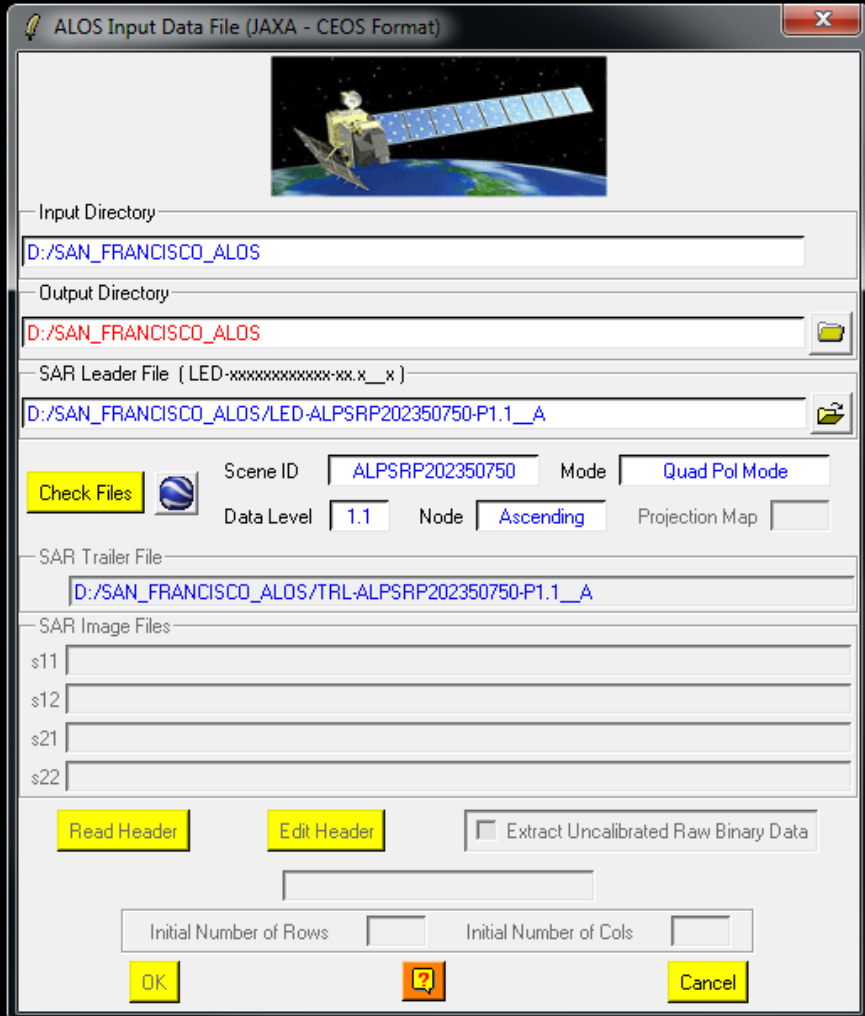
C:/ ... / SAN_FRANCISCO_ALOS-1





PoISARpro - Bio SOFTWARE

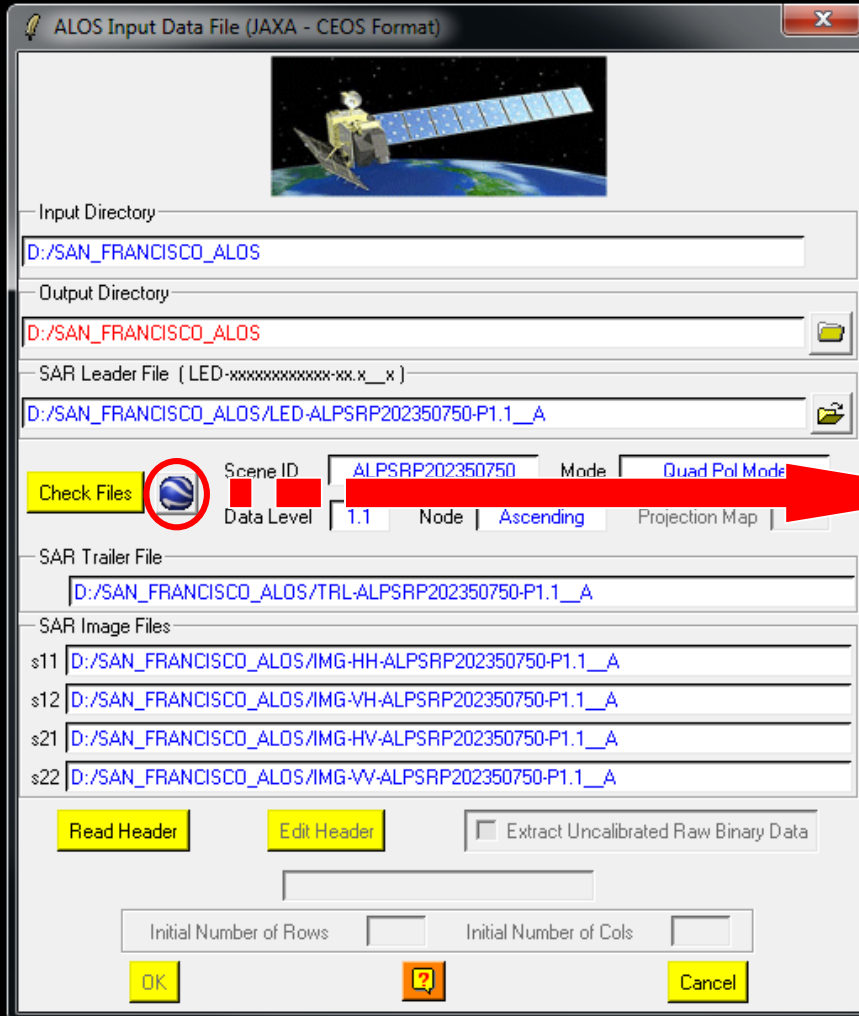


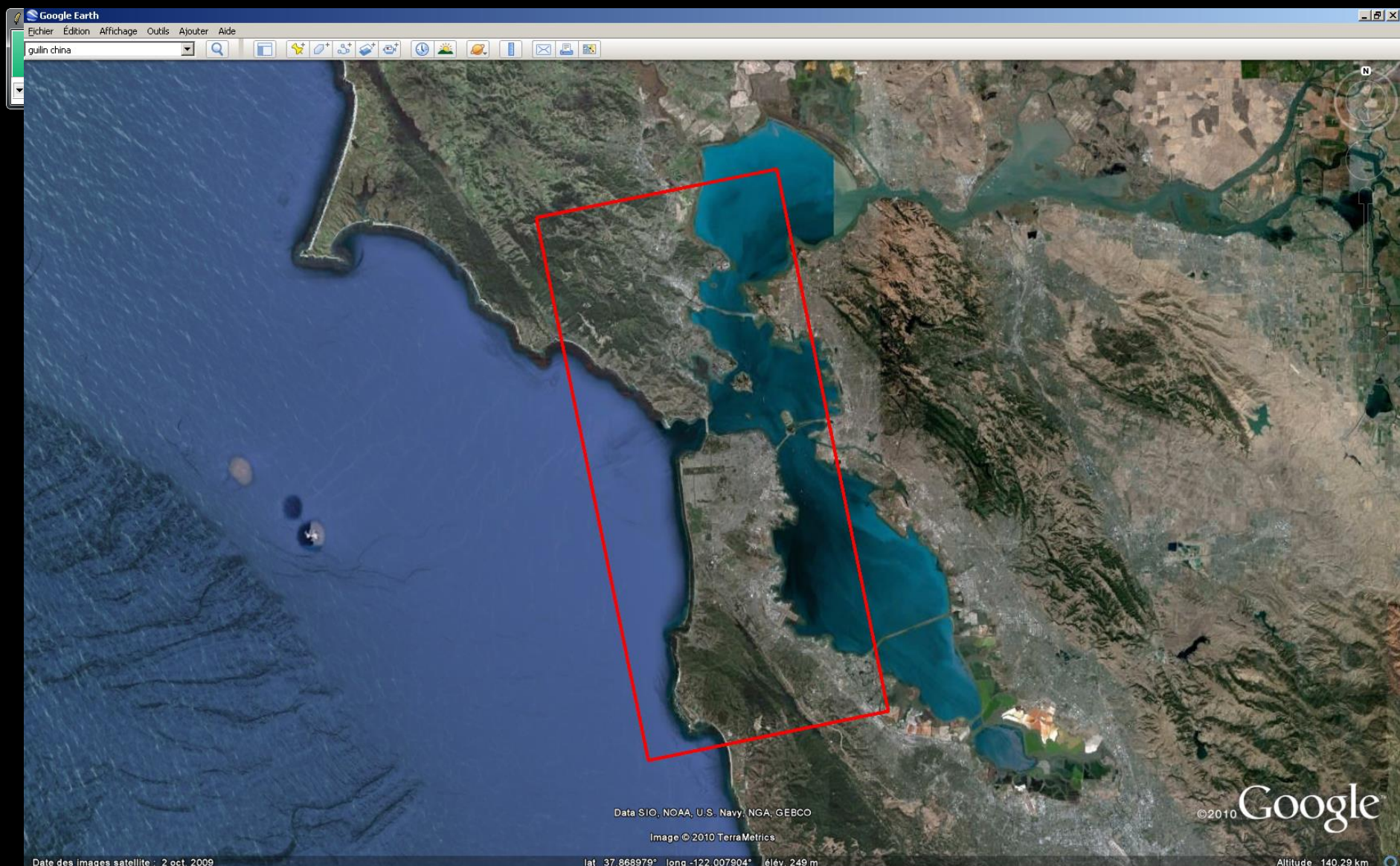


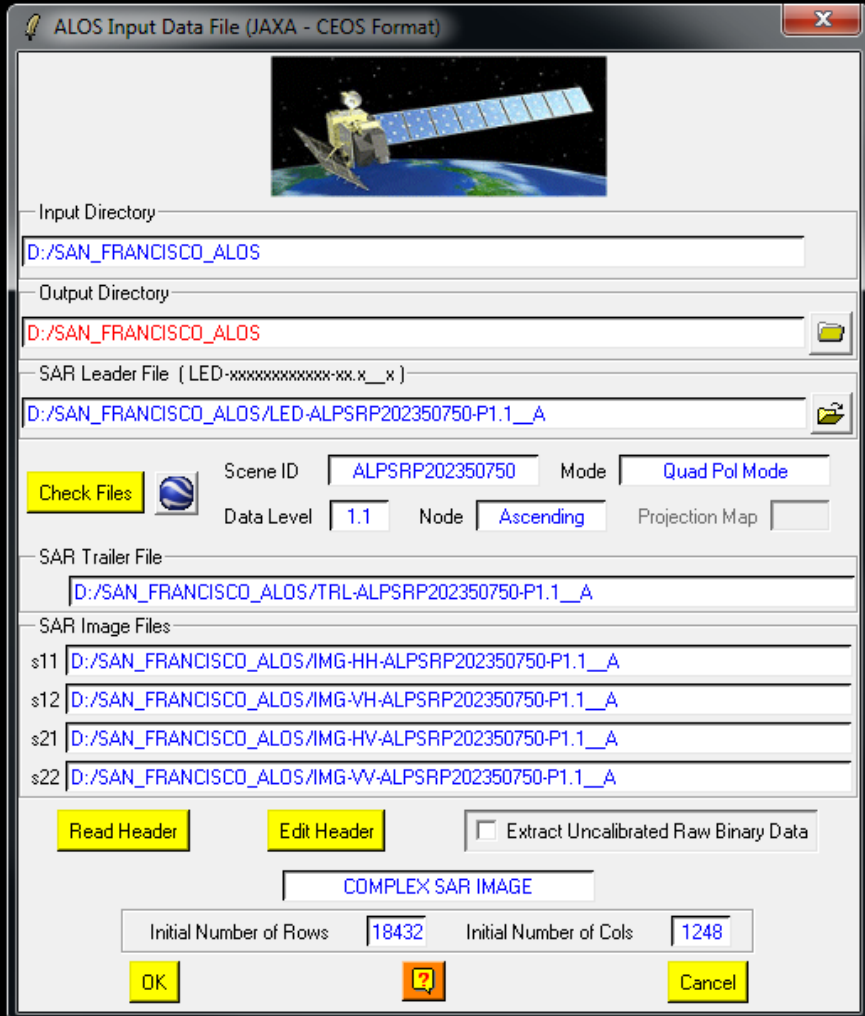
Do it Yourself:

Enter SAR Leader File
Check File

Data IMPORT – Input Data File

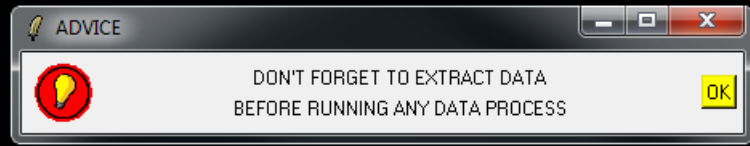


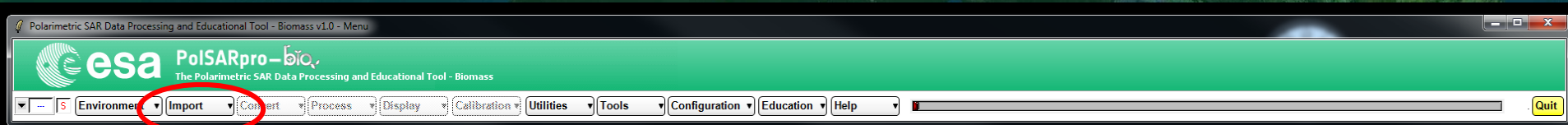




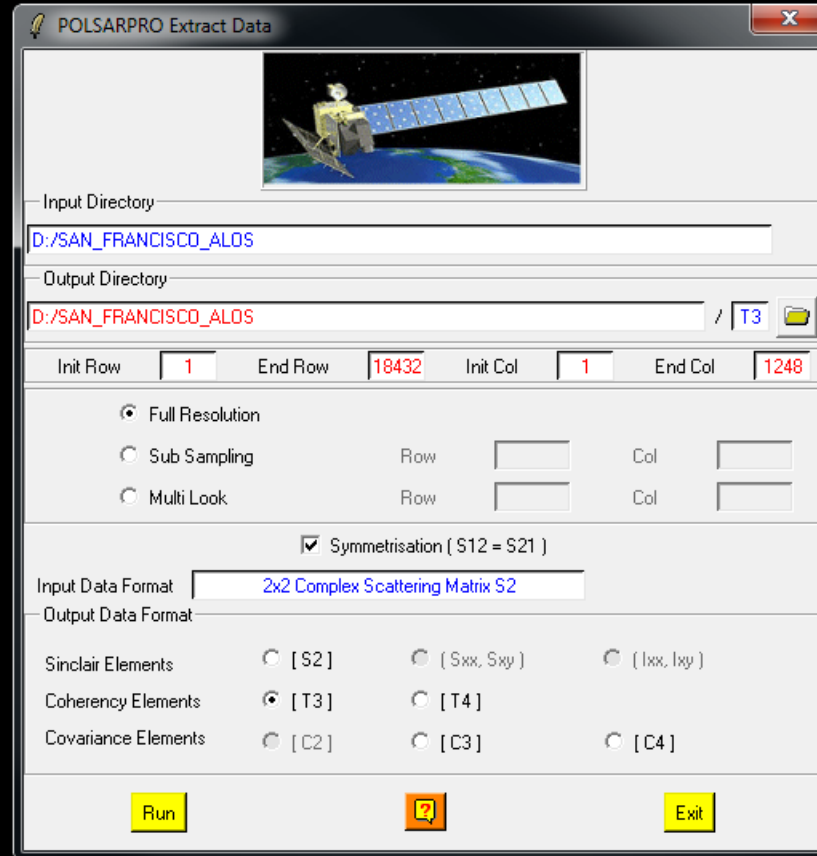
Do it Yourself:

Enter SAR Leader File
Read Header
OK

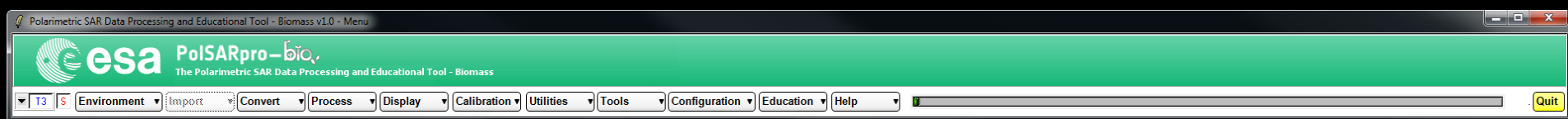




- Raw Binary Data
- Airborne Sensors ▶
- Spaceborne Sensors ▶
- Extract PolSAR images
- Edit Config File

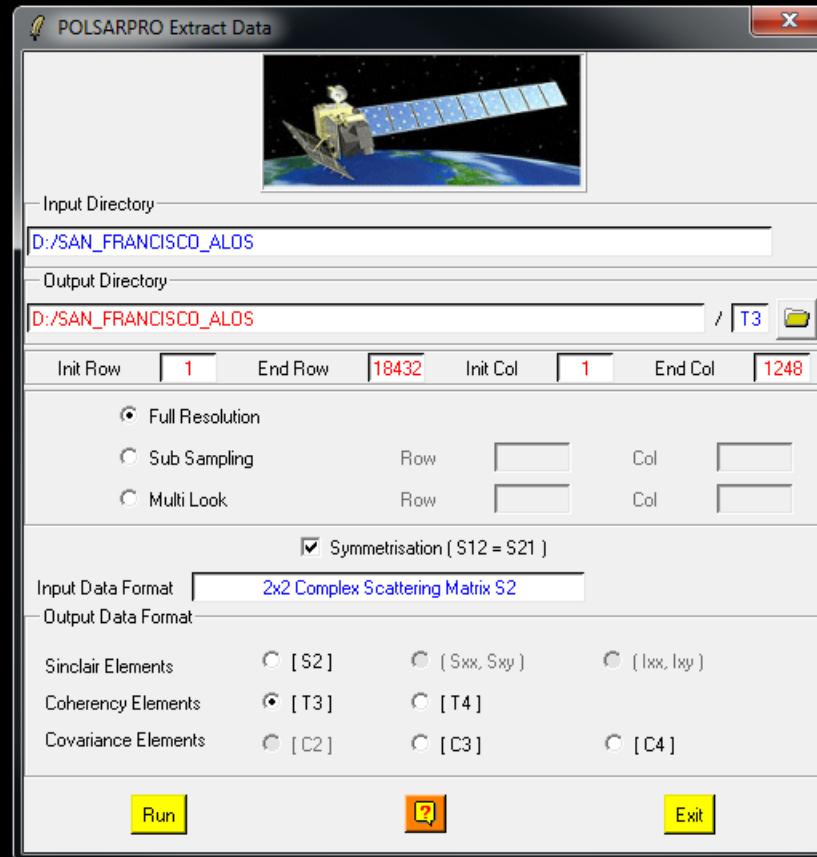


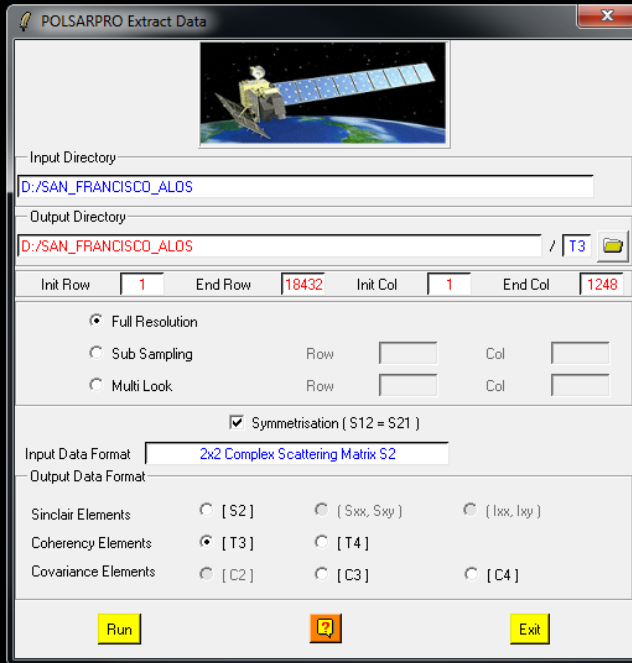
Data IMPORT – Extract Binary



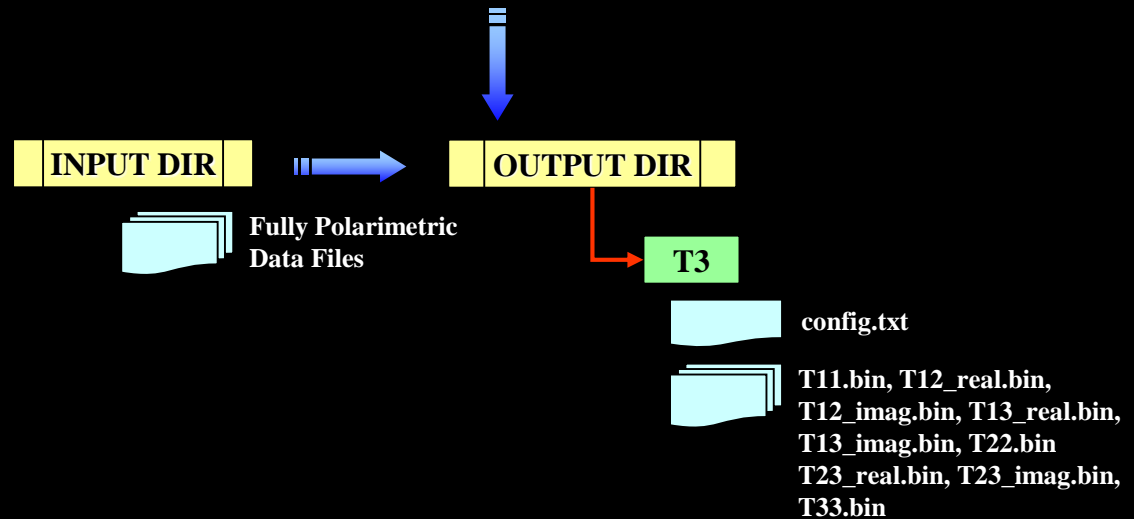
Do it Yourself:

**Full Resolution
Output Data Format = [T3]
Run**





Convert ALOS Fully Polarimetric Data Files to Complex (3x3) Coherency Matrix [T3]



Do it Yourself:

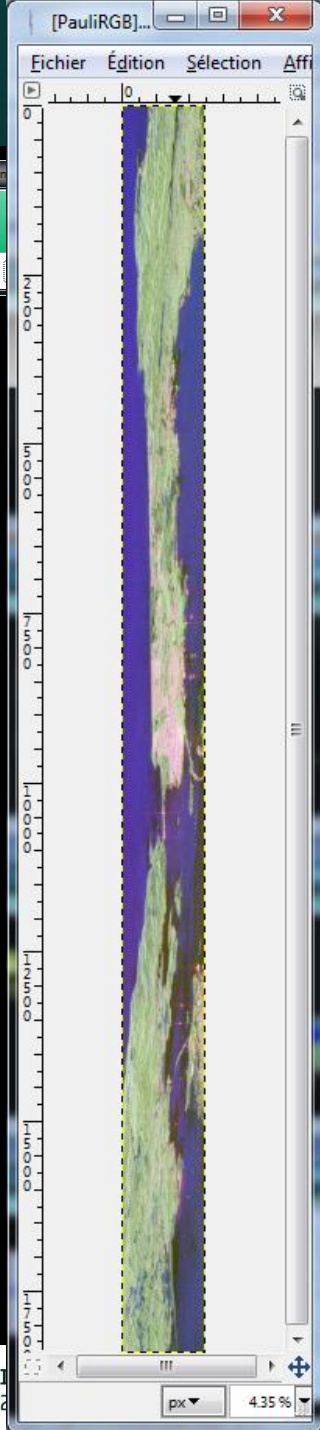
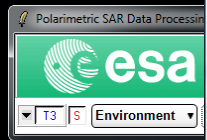
Full Resolution
Output Data Format = [T3]
Run

$$\underline{k}_{3P} = \frac{1}{\sqrt{2}} \begin{bmatrix} S_{11} + S_{22} & S_{11} - S_{22} & S_{12} + S_{21} \end{bmatrix}$$

$$\Rightarrow [T_3] = \langle \underline{k}_{3P} \cdot \underline{k}_{3P}^\dagger \rangle$$

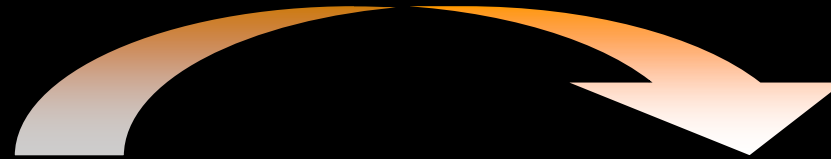
$$[T_3] = \begin{bmatrix} T_{11} & T_{12} & T_{13} \\ T_{12}^* & T_{22} & T_{23} \\ T_{13}^* & T_{23}^* & T_{33} \end{bmatrix}$$

Display Pauli-RGB Image



After
multi-looking
7 x 1



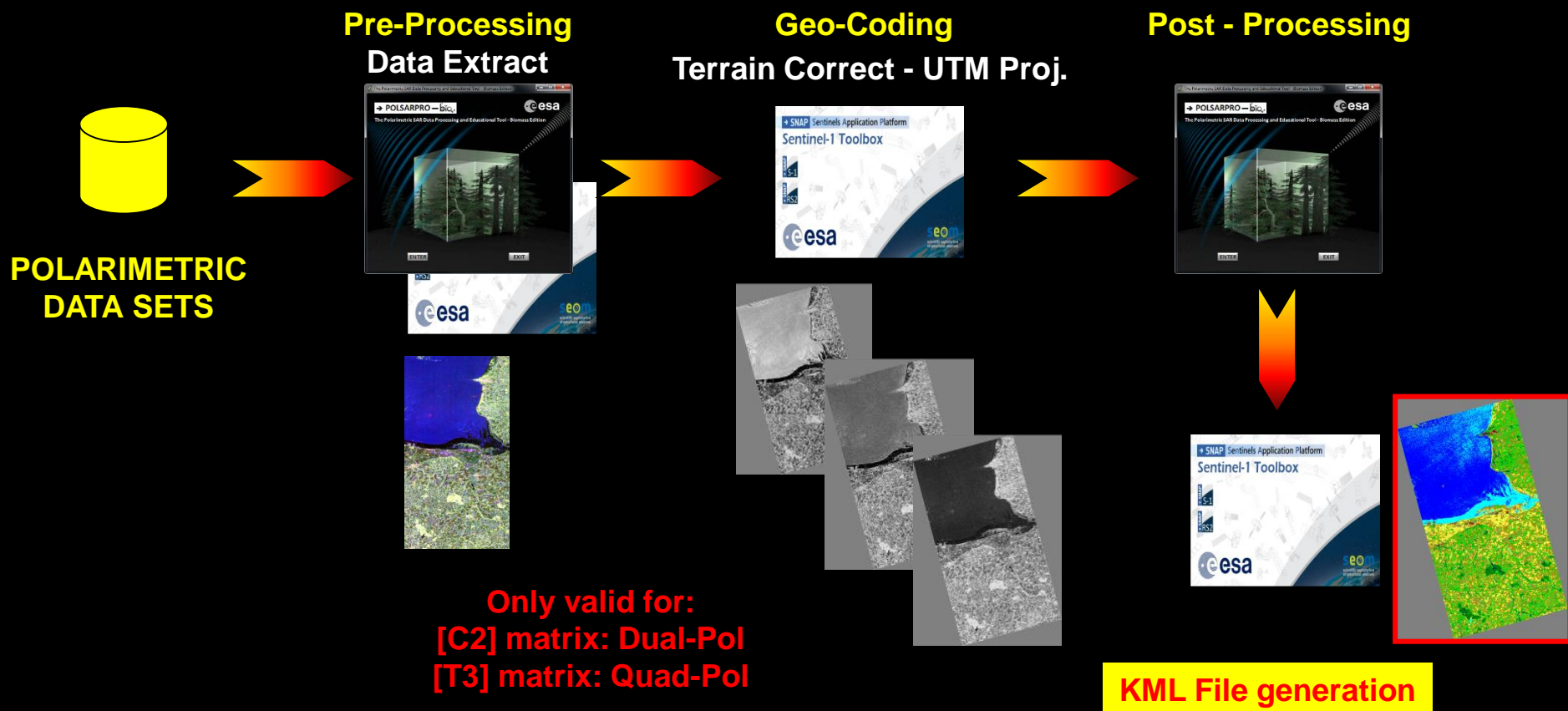


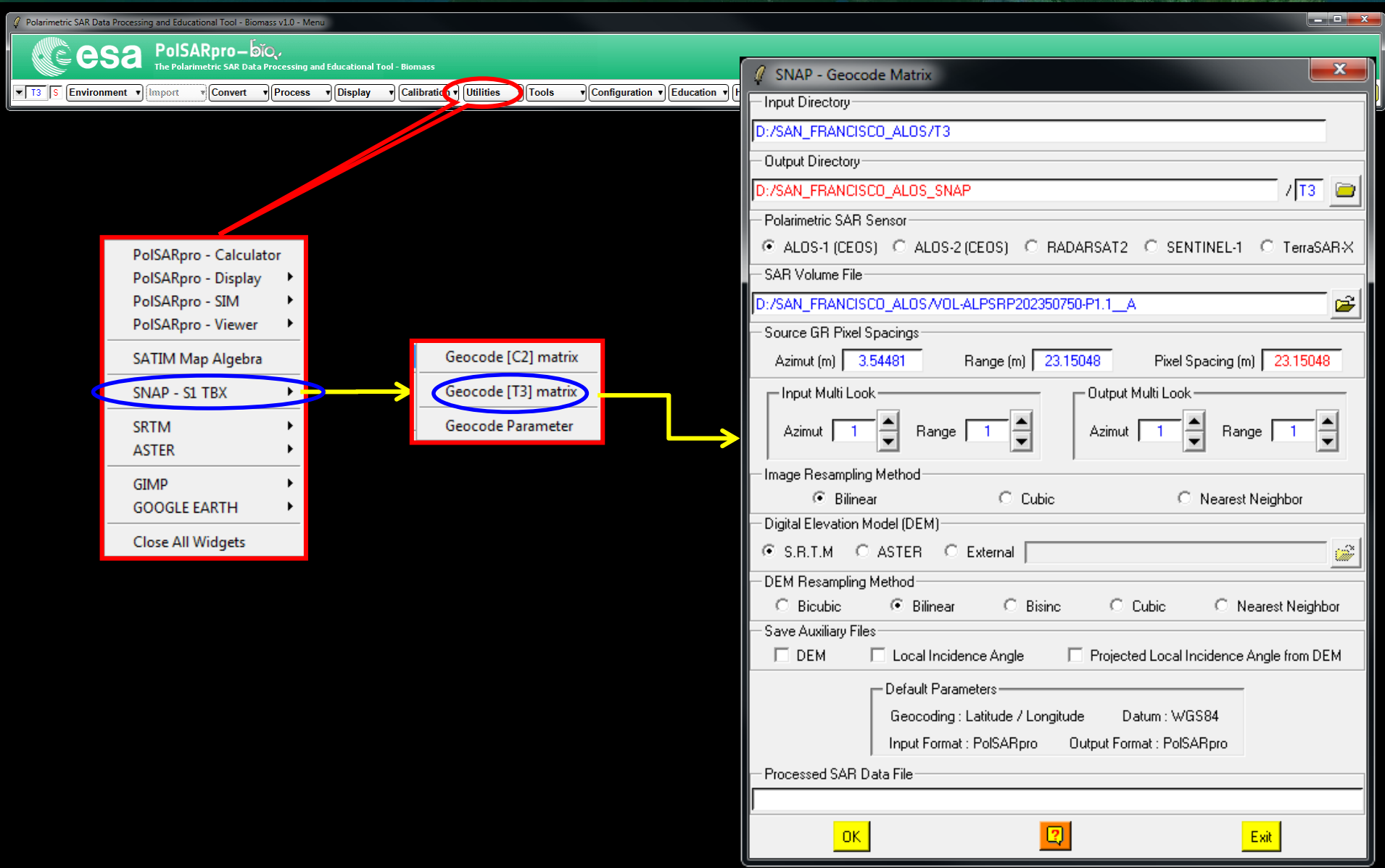
Polarimetric Data Processing



- S1 toolbox (split, deburst, merge ...)
- Geocoding toolbox
- Interferometric toolbox (co-registration, flat Earth estimation ...)

ESA - SNAP






The screenshot shows the PoISARpro software interface. The main menu bar includes: Environment, Import, Convert, Process, Display, Calibratic, Utilities, Tools, Configuration, Education. The Utilities menu is open, showing options: PoISARpro - Calculator, PoISARpro - Display, PoISARpro - SIM, PoISARpro - Viewer, SATIM Map Algebra, SNAP - SI TBX, SRTM, ASTER, GIMP, GOOGLE EARTH, and Close All Widgets. The SNAP - Geocode Matrix dialog box is open, showing the following settings:

- Input Directory: D:/SAN_FRANCISCO_ALOS/T3
- Output Directory: D:/SAN_FRANCISCO_ALOS_SNAP / T3
- Polarimetric SAR Sensor: ALOS-1 (CEOS) ALOS-2 (CEOS) RADARSAT2 SENTINEL-1 TerraSAR-X
- SAR Volume File: D:/SAN_FRANCISCO_ALOS/VOL-ALPSRP202350750-P1.1_A
- Source GR Pixel Spacings: Azimut (m) 3.54481, Range (m) 23.15048, Pixel Spacing (m) 23.15048
- Input Multi Look: Azimut 1, Range 1
- Output Multi Look: Azimut 1, Range 1
- Image Resampling Method: Bilinear Cubic Nearest Neighbor
- Digital Elevation Model (DEM): S.R.T.M ASTER External
- DEM Resampling Method: Bicubic Bilinear Bisinc Cubic Nearest Neighbor
- Save Auxiliary Files: DEM Local Incidence Angle Projected Local Incidence Angle from DEM
- Default Parameters: Geocoding: Latitude / Longitude Datum: WGS84, Input Format: PolSARpro Output Format: PolSARpro
- Processed SAR Data File: (empty)



Display Pauli-RGB Image

Polarimetric SAR Data Processing and Educational Tool - Biomass v1.0 - Menu

 **PoISARpro-bio**
The Polarimetric SAR Data Processing and Education

T3 | S Environment | Import | Convert | Process | Display

[PauliRGB] (importée)-16.0 (Couleur RVB, 1 calque) 2269x3010 - GIMP

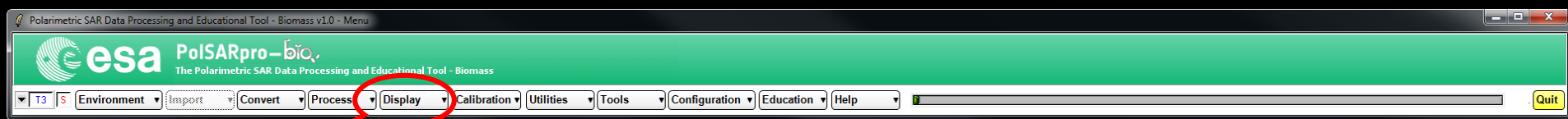
Fichier Édition Sélection Affichage Image Calque Couleurs Outils Filtres Fenêtres Aide



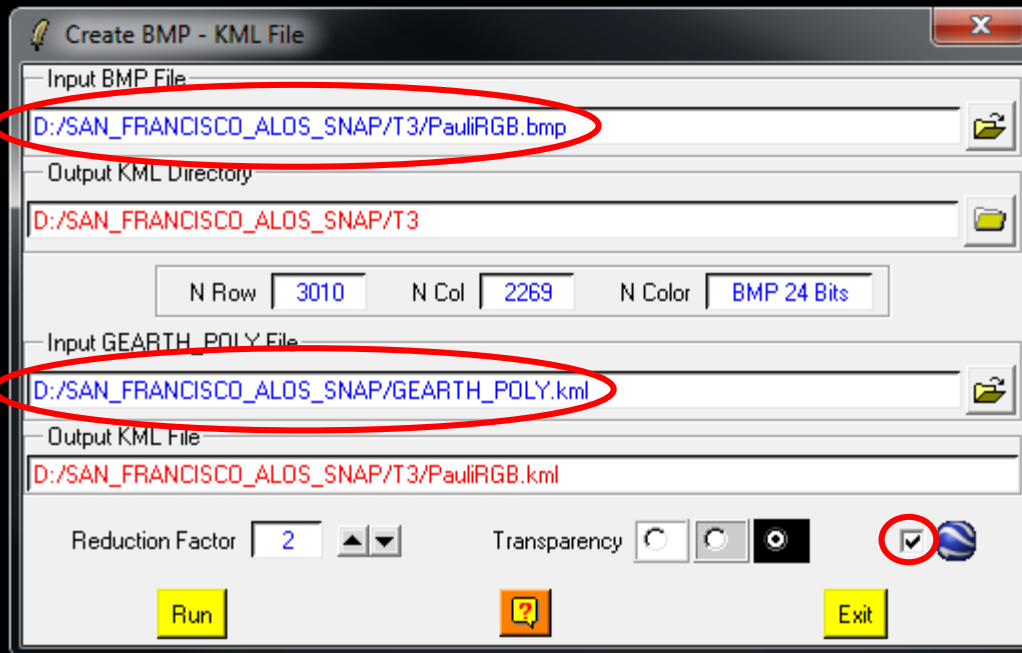
px 25% PauliRGB.bmp (65.6 Mo)

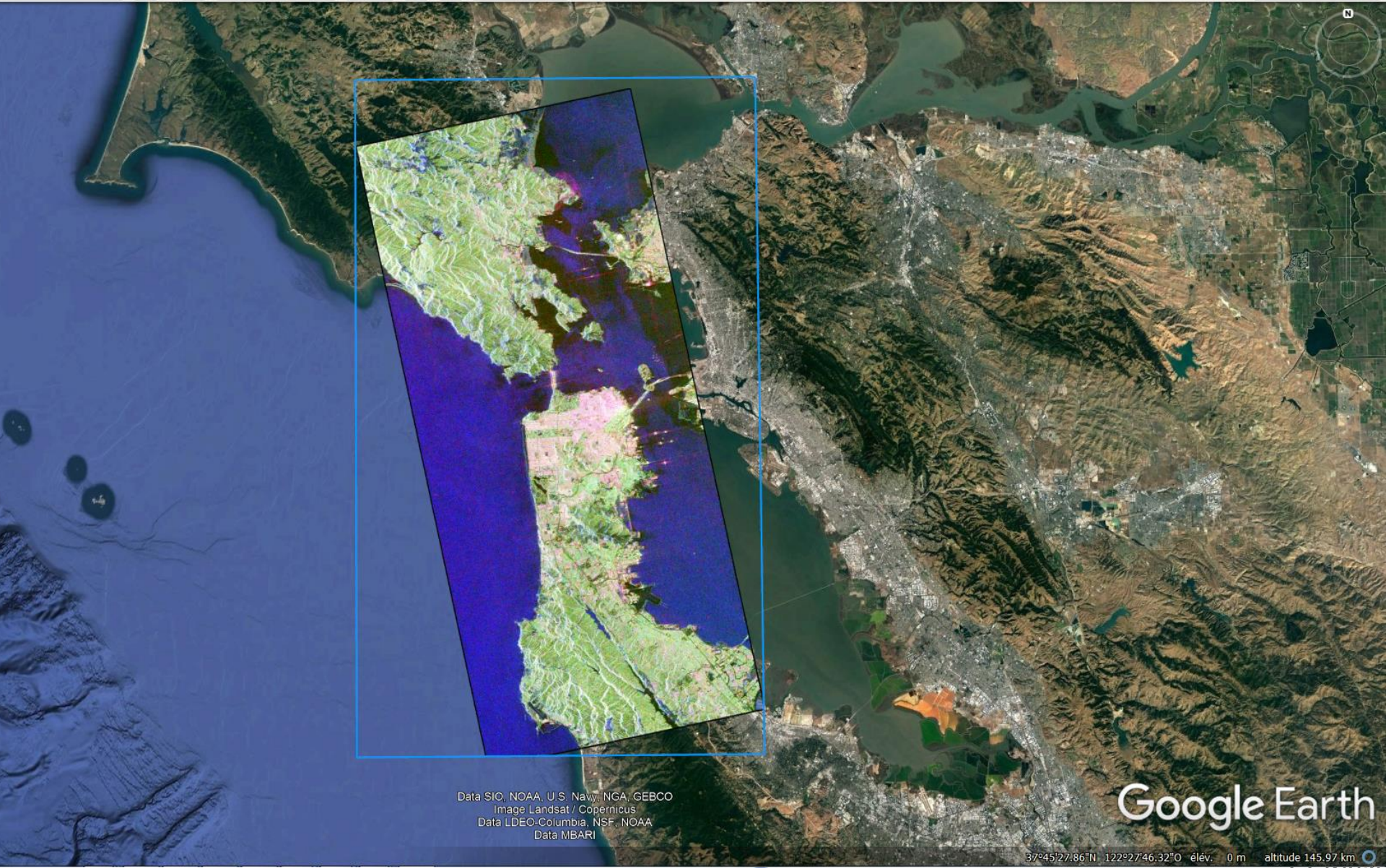


Display Main Menu



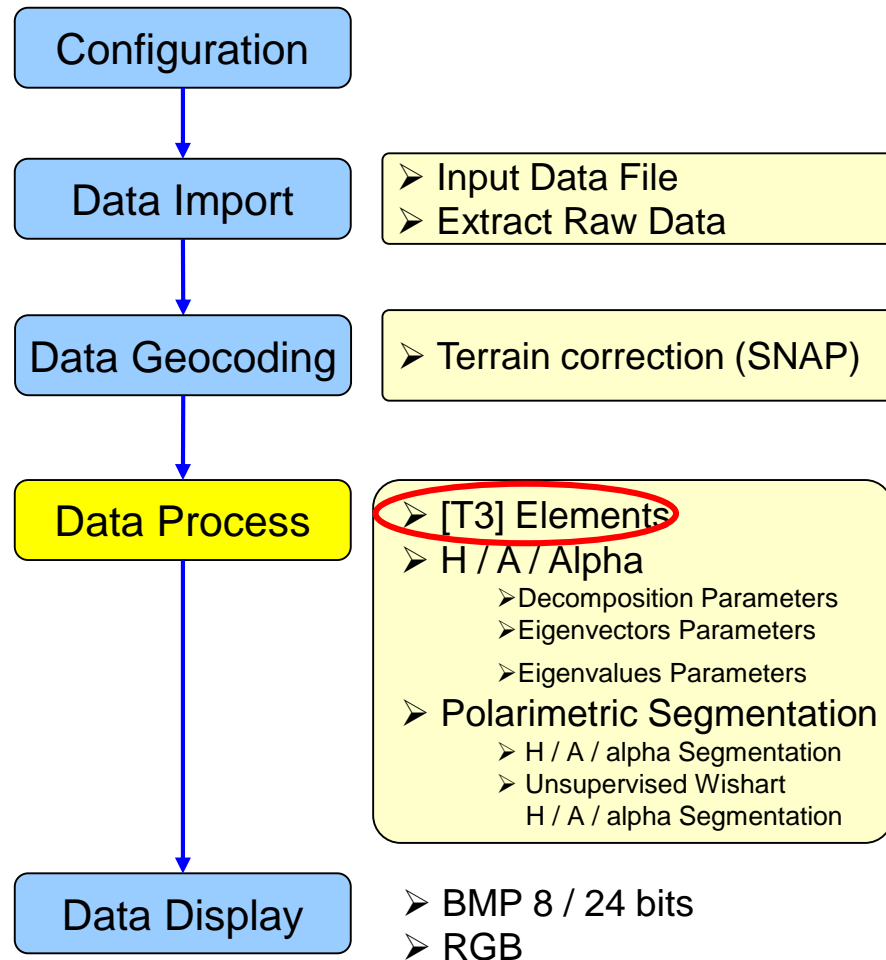
Create Pauli-RGB to KML Image



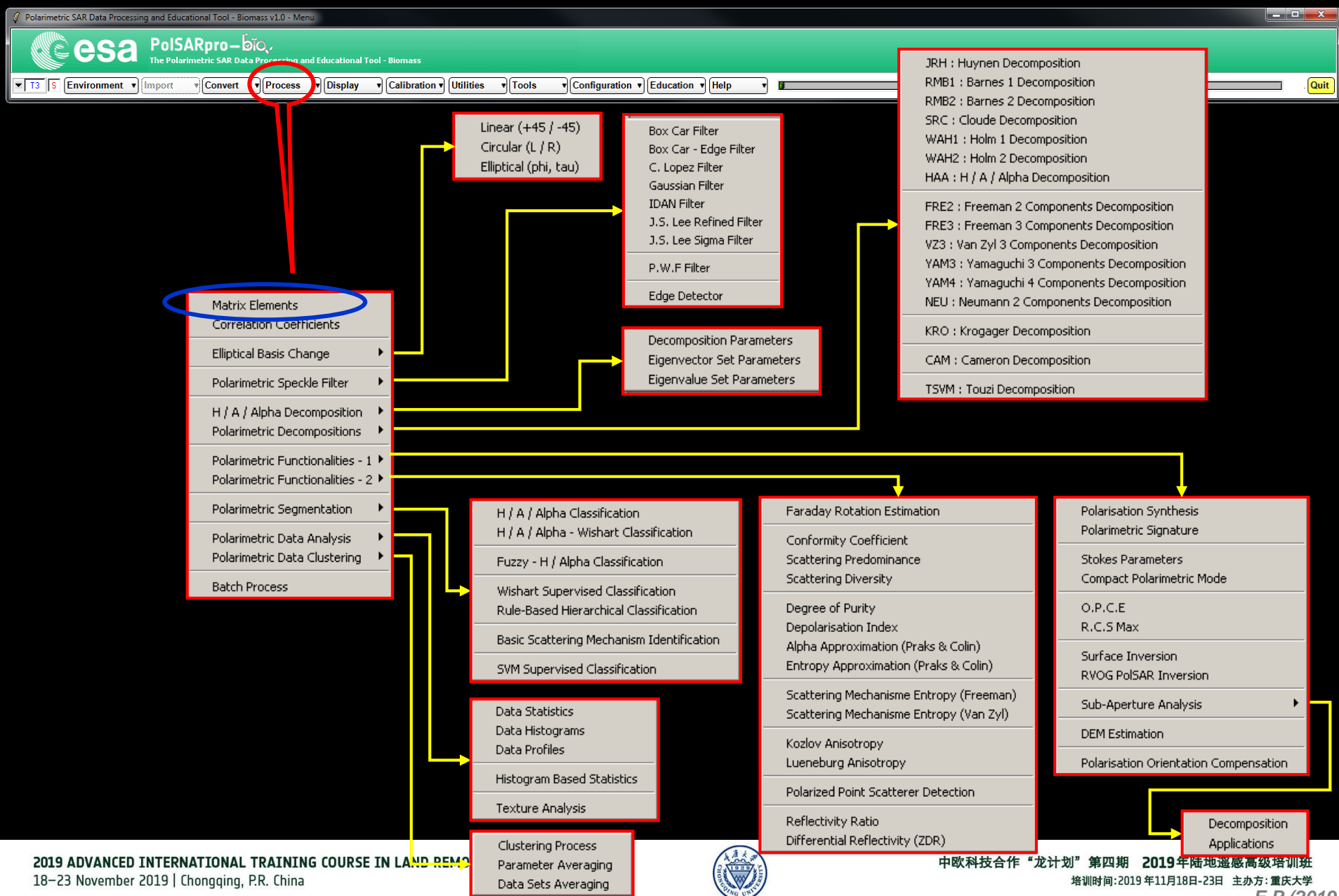


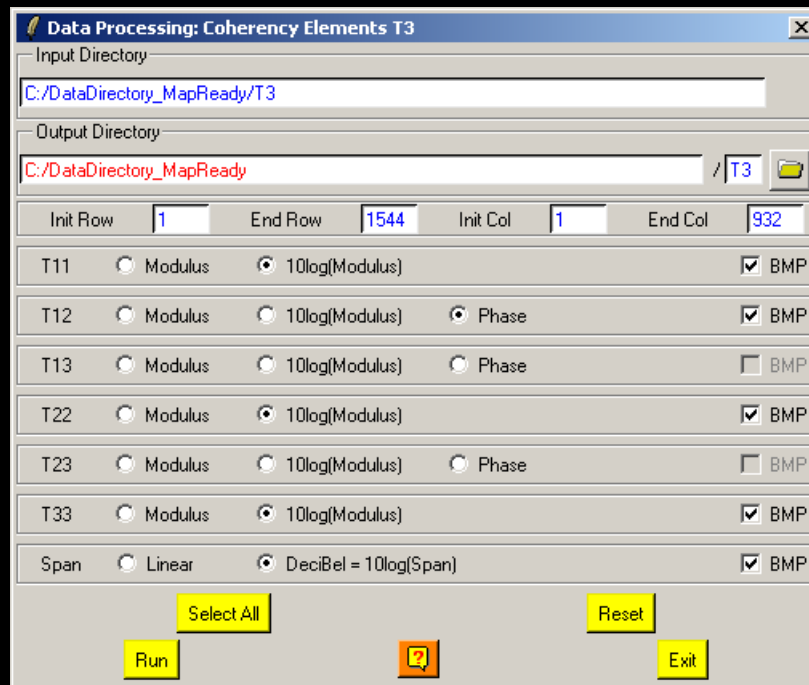
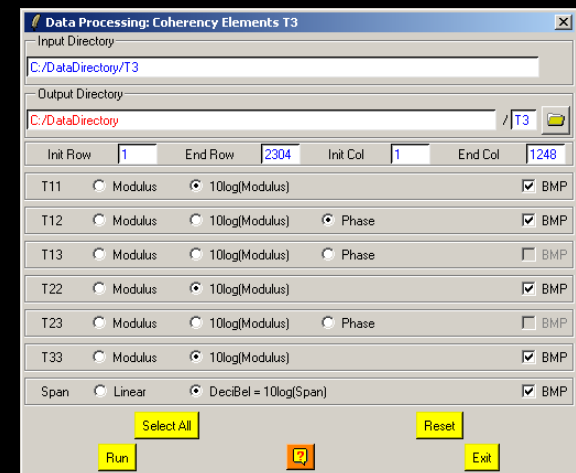
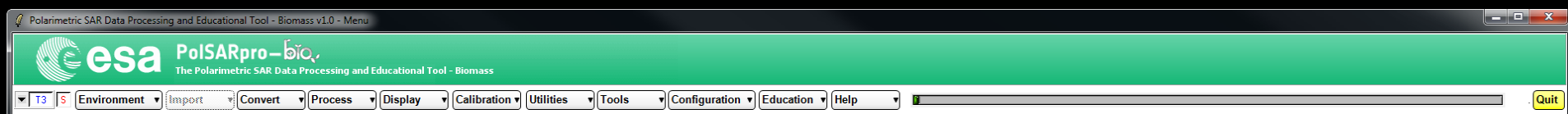
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA
Data MBARI

Google Earth



PoSARpro - Bio SOFTWARE





DATADIR

T3

config.txt
[T3x3] Elements

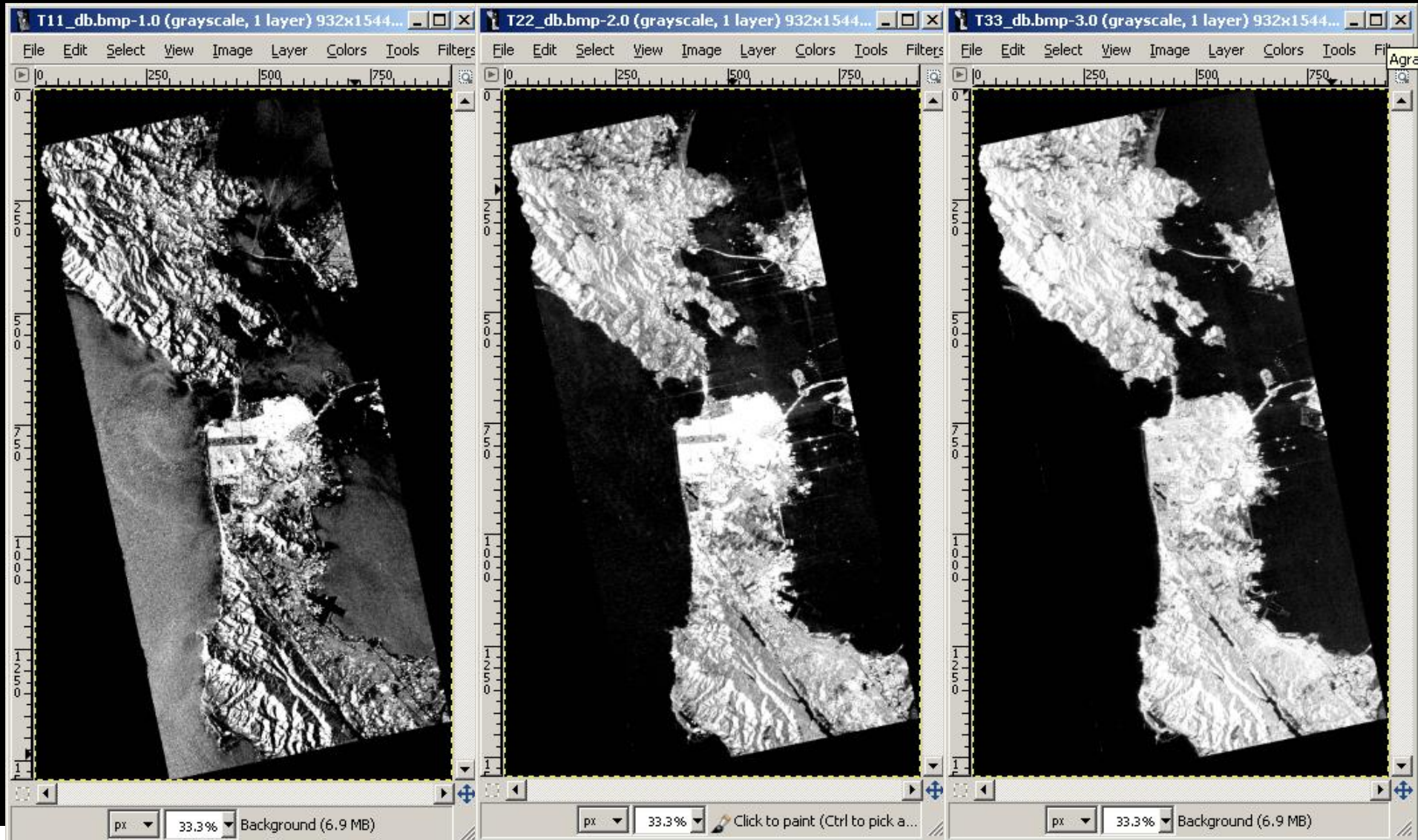
Txy_mod.bin
Txy_db.bin
Txy pha.bin
Txy_mod.bmp
Txy_db.bmp
Txy pha.bmp

Do it Yourself:
Select some elements, set the parameters and view the corresponding BMP files (select BMP).

T11_dB

T22_dB

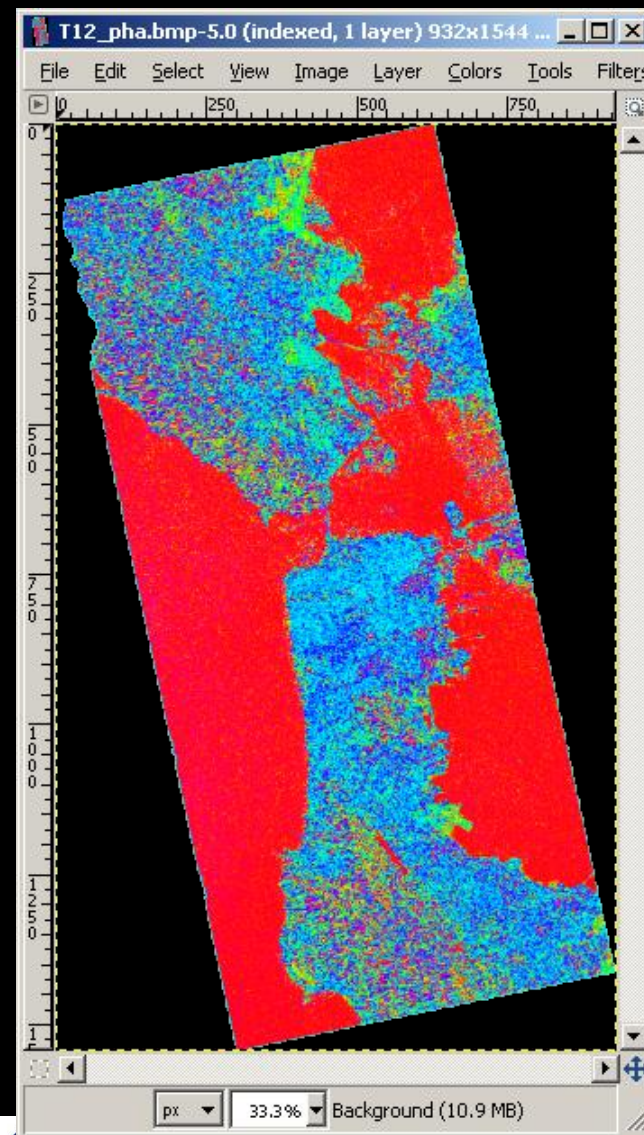
T33_dB

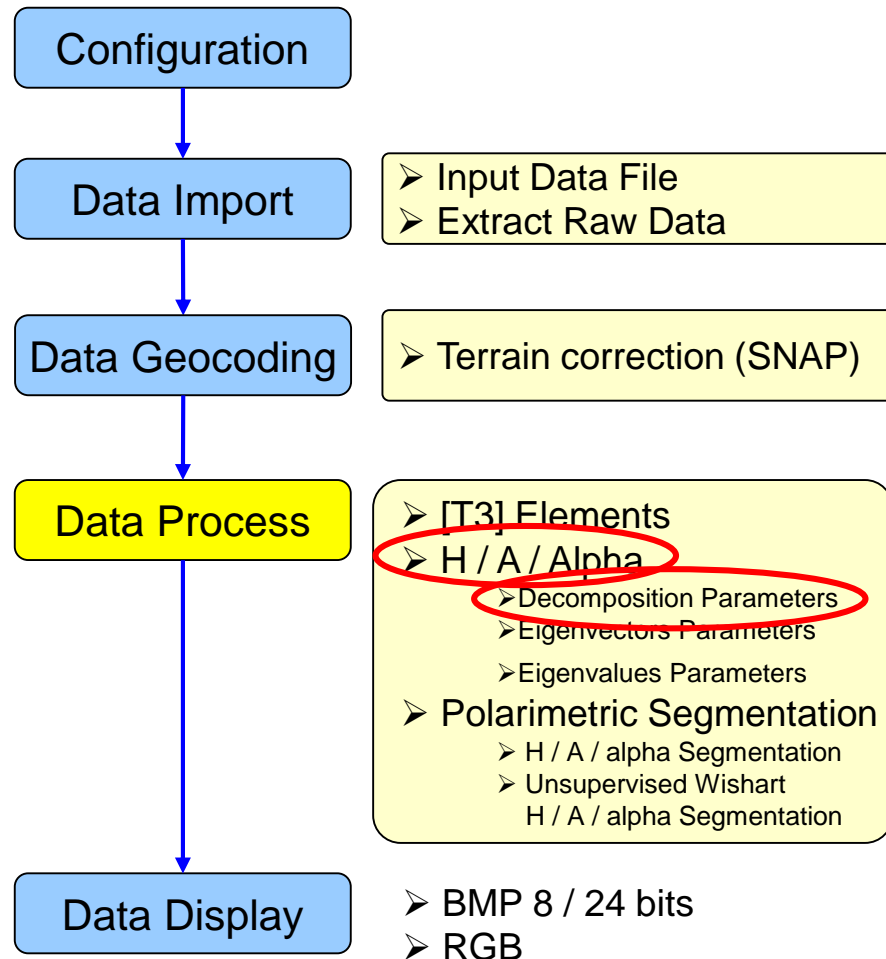


span_db

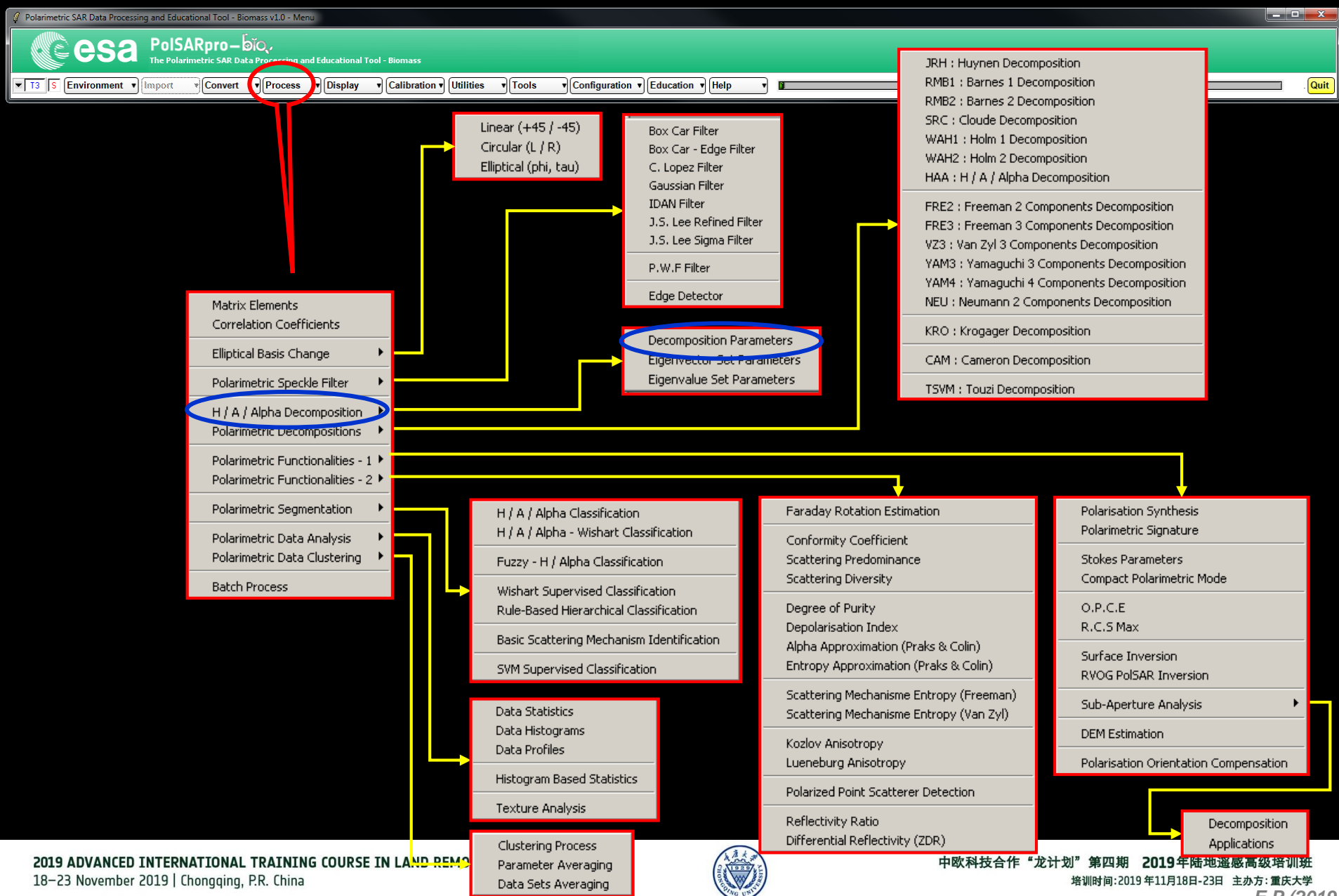


T12 pha





PoISARpro - Bio SOFTWARE





Do it Yourself:
 Select some elements, set the parameters (**Nwin = 3**) and view the corresponding BMP files (**select BMP**).

Data Processing: H / A / Alpha Decomposition Parameters

Input Directory:

Output Directory: / T3

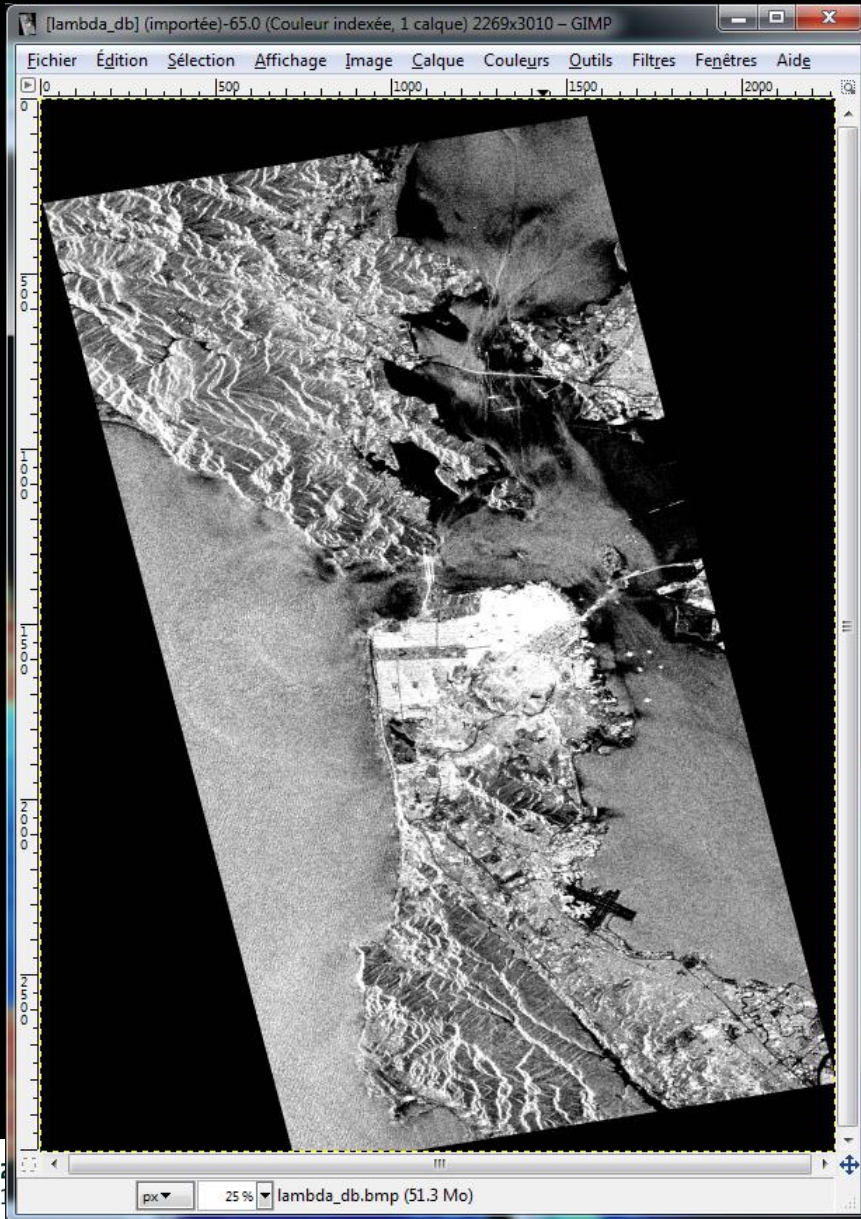
Init Row: End Row: Init Col: End Col:

<input checked="" type="checkbox"/> Alpha, Beta, Delta, Gamma, Lambda	<input checked="" type="checkbox"/> BMP
<input checked="" type="checkbox"/> Lambda	<input checked="" type="checkbox"/> BMP
<input checked="" type="checkbox"/> Alpha	<input checked="" type="checkbox"/> BMP
<input checked="" type="checkbox"/> Entropy [H]	<input checked="" type="checkbox"/> BMP
<input checked="" type="checkbox"/> Anisotropy [A]	<input checked="" type="checkbox"/> BMP
<input checked="" type="checkbox"/> Combinations [H , A]	<input checked="" type="checkbox"/> H A <input checked="" type="checkbox"/> (1 - H) A <input checked="" type="checkbox"/> H (1 - A) <input checked="" type="checkbox"/> (1 - H) (1 - A)

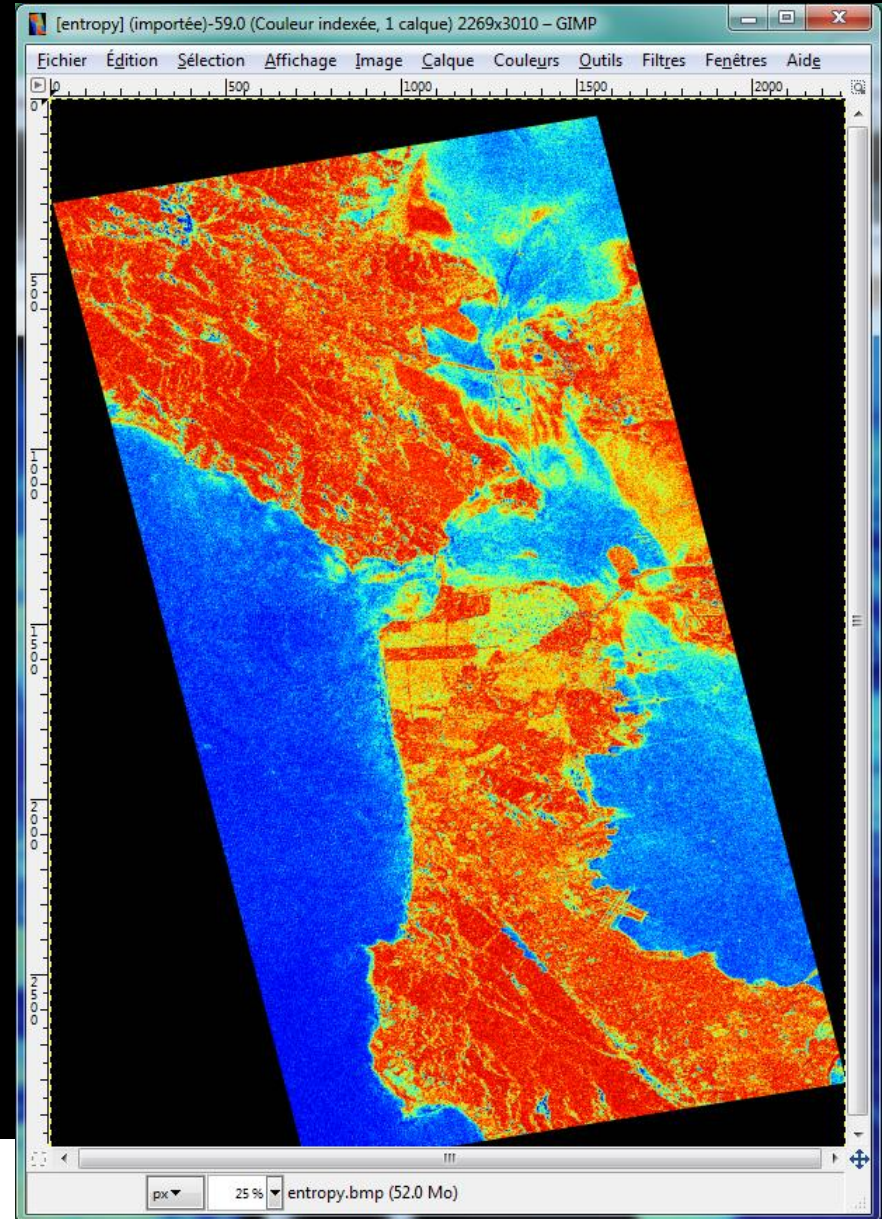
Window Size Row: Window Size Col:

Equivalence between [T] and [C] eigen-decompositions.

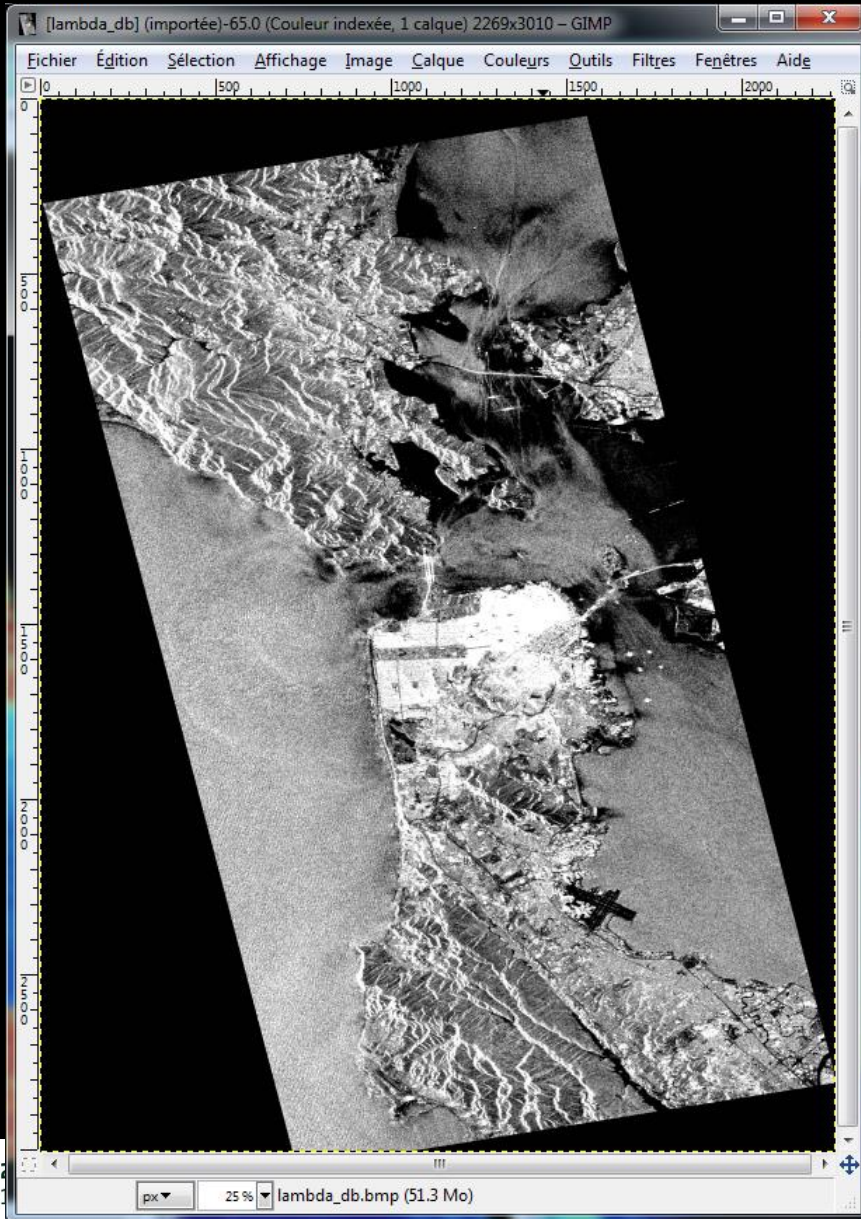
Lambda



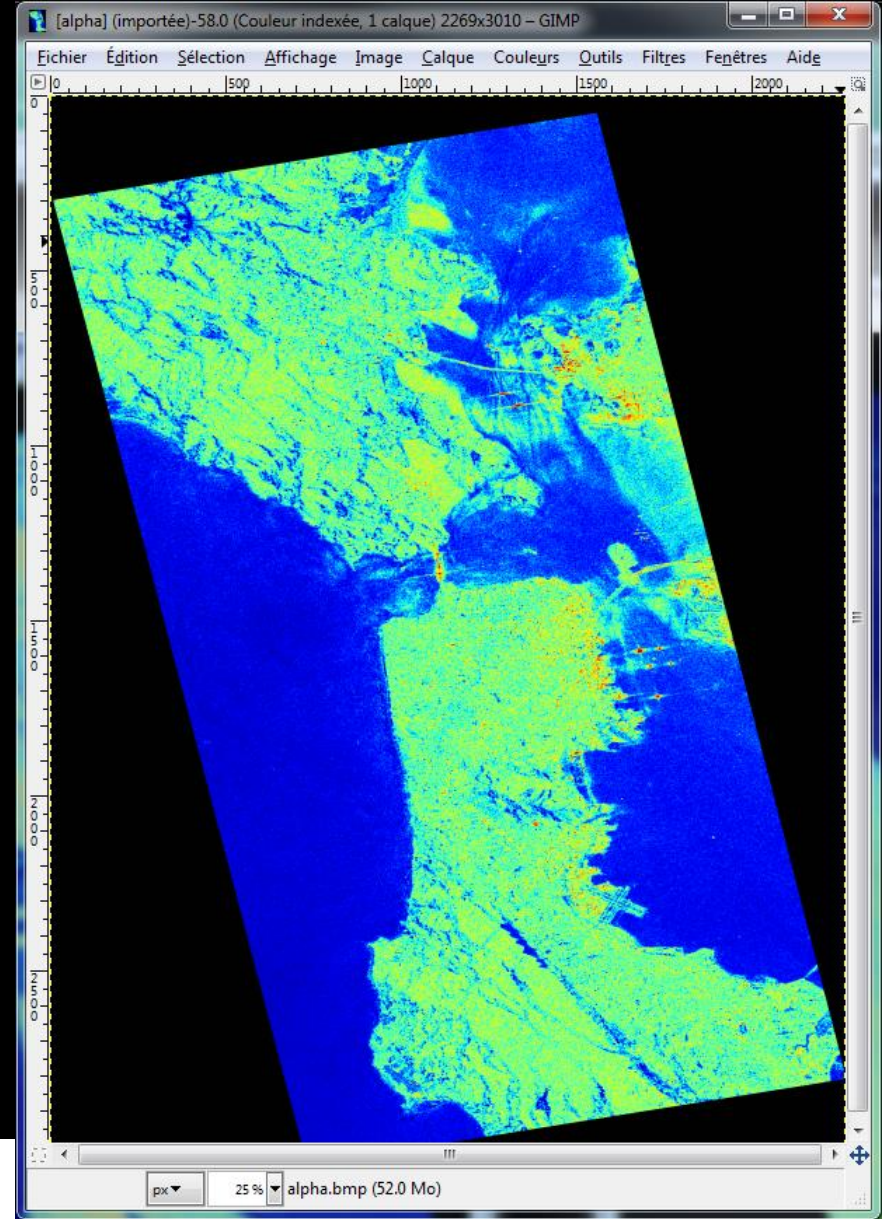
Entropy



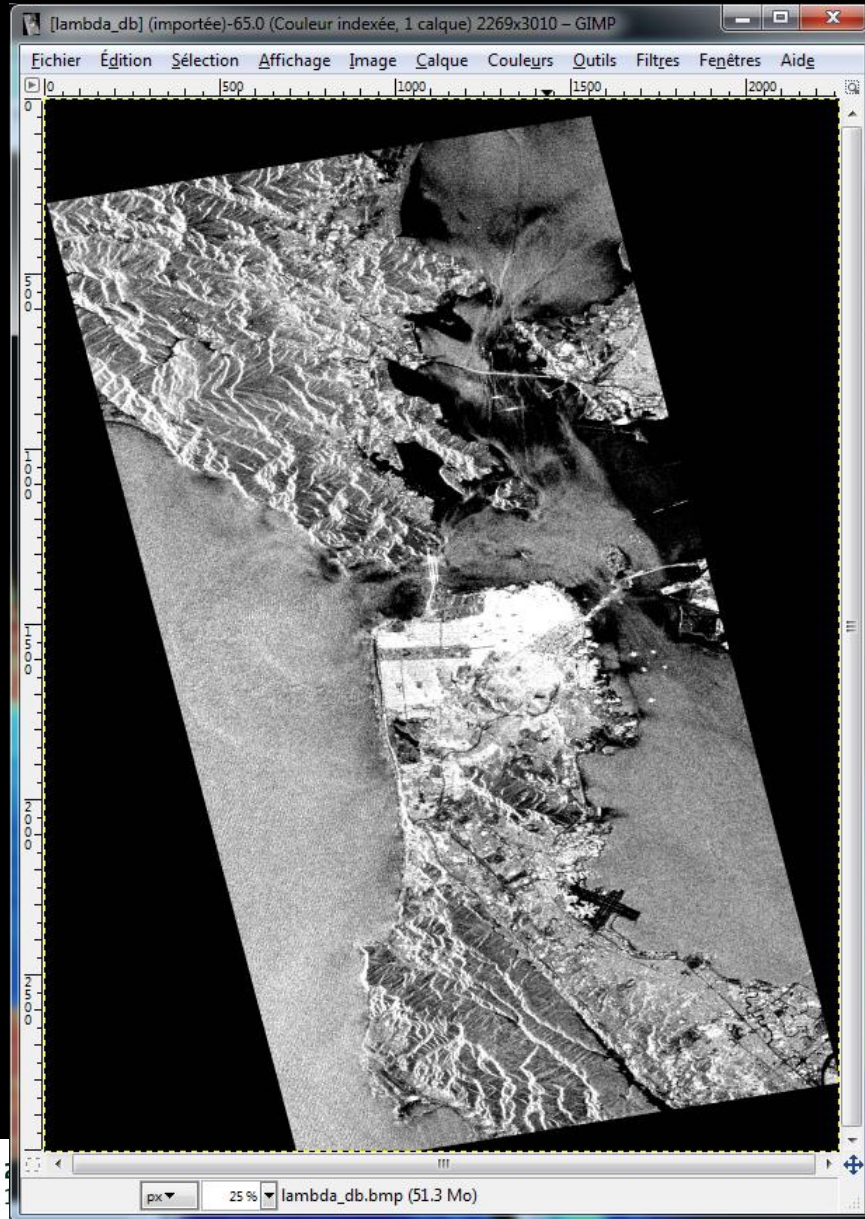
Lambda



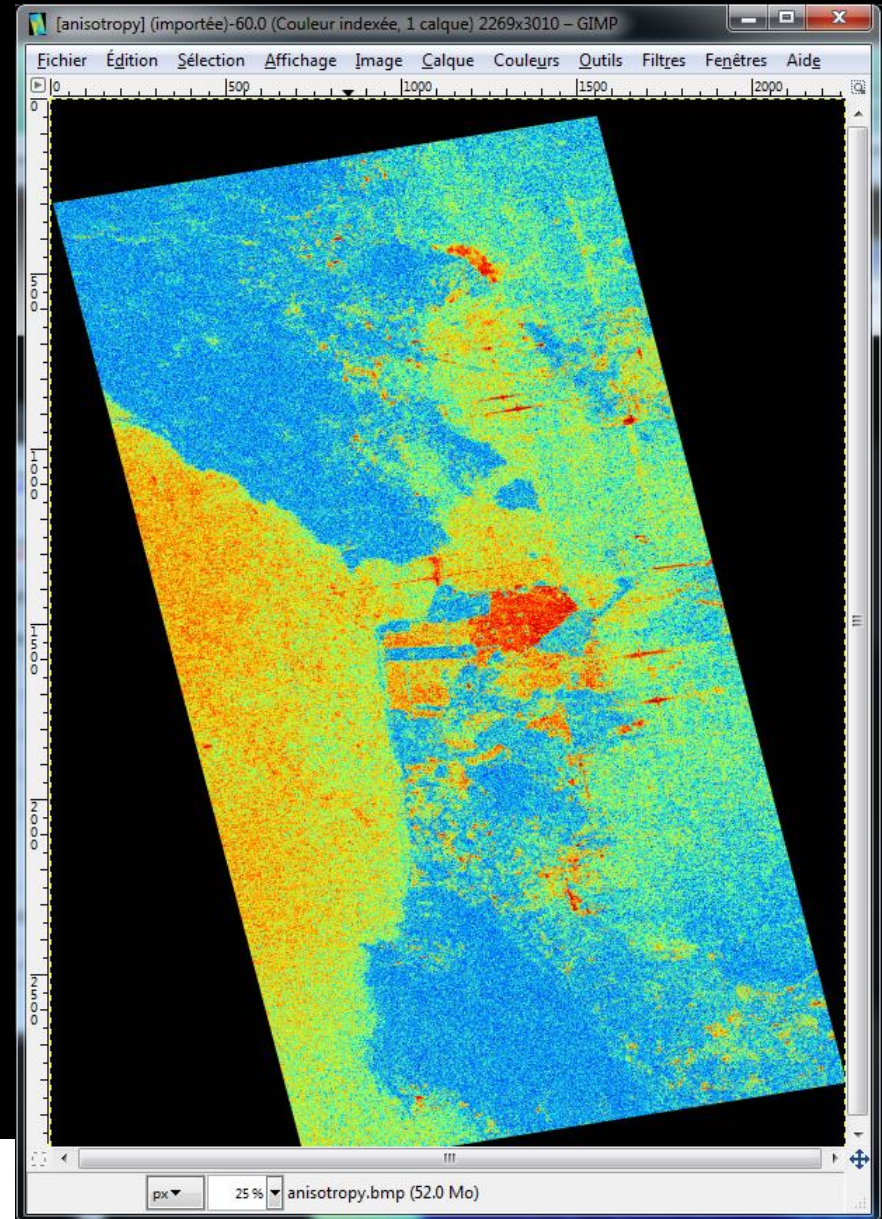
Alpha



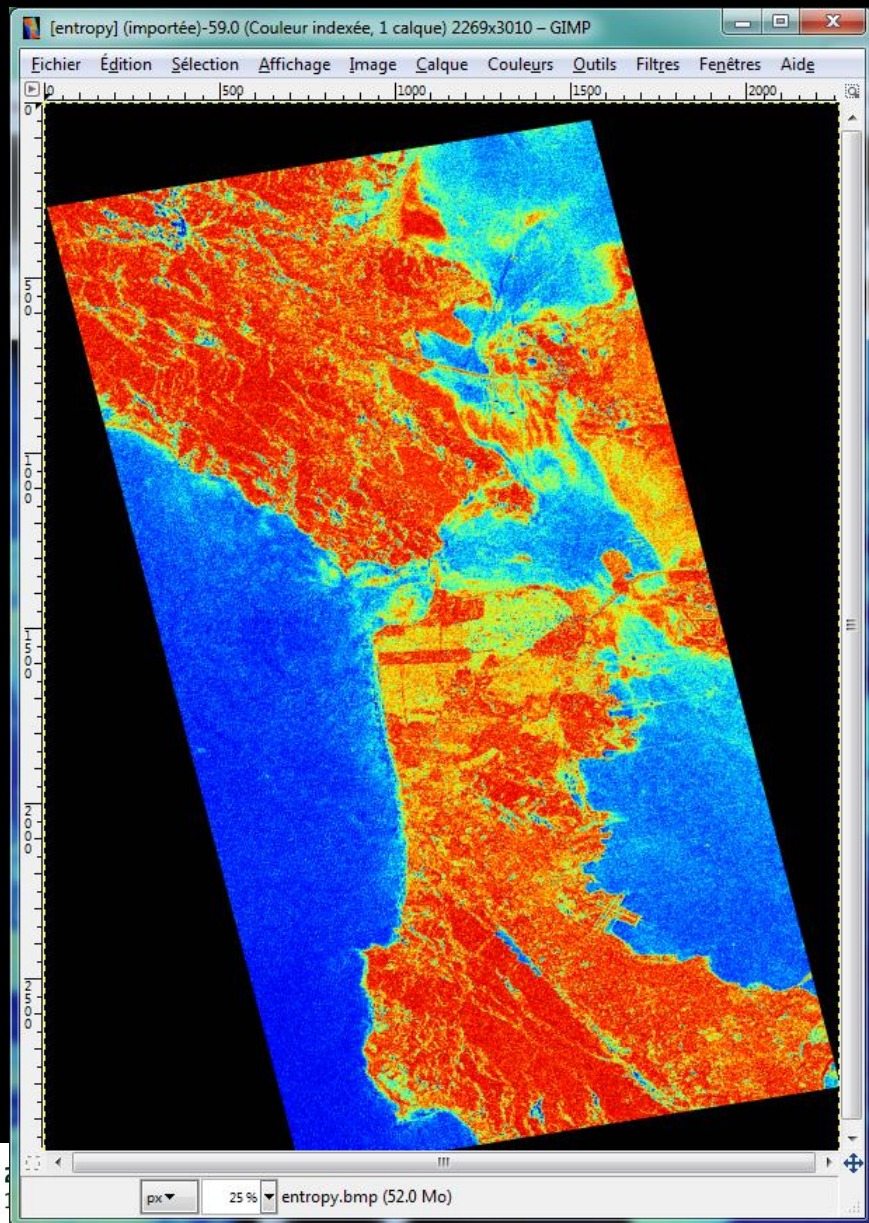
Lambda



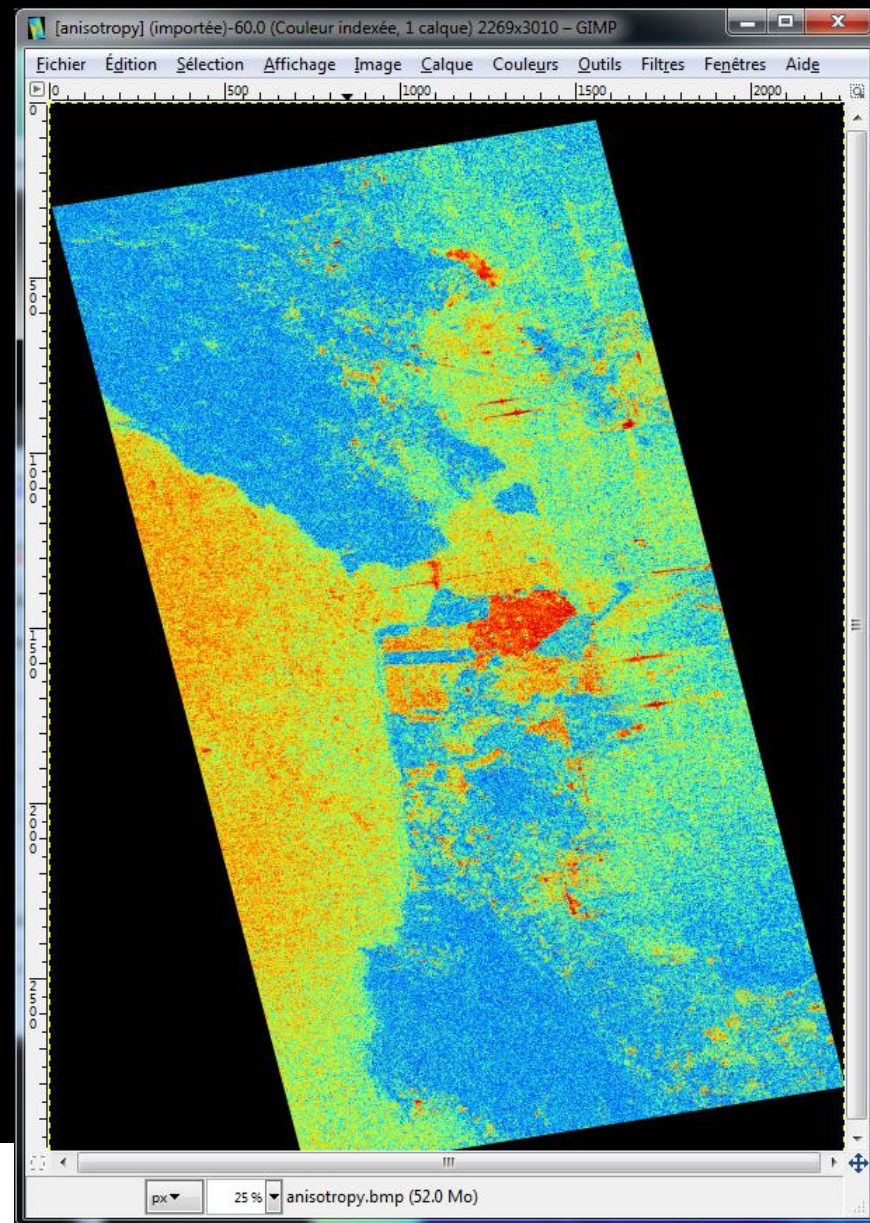
Anisotropy



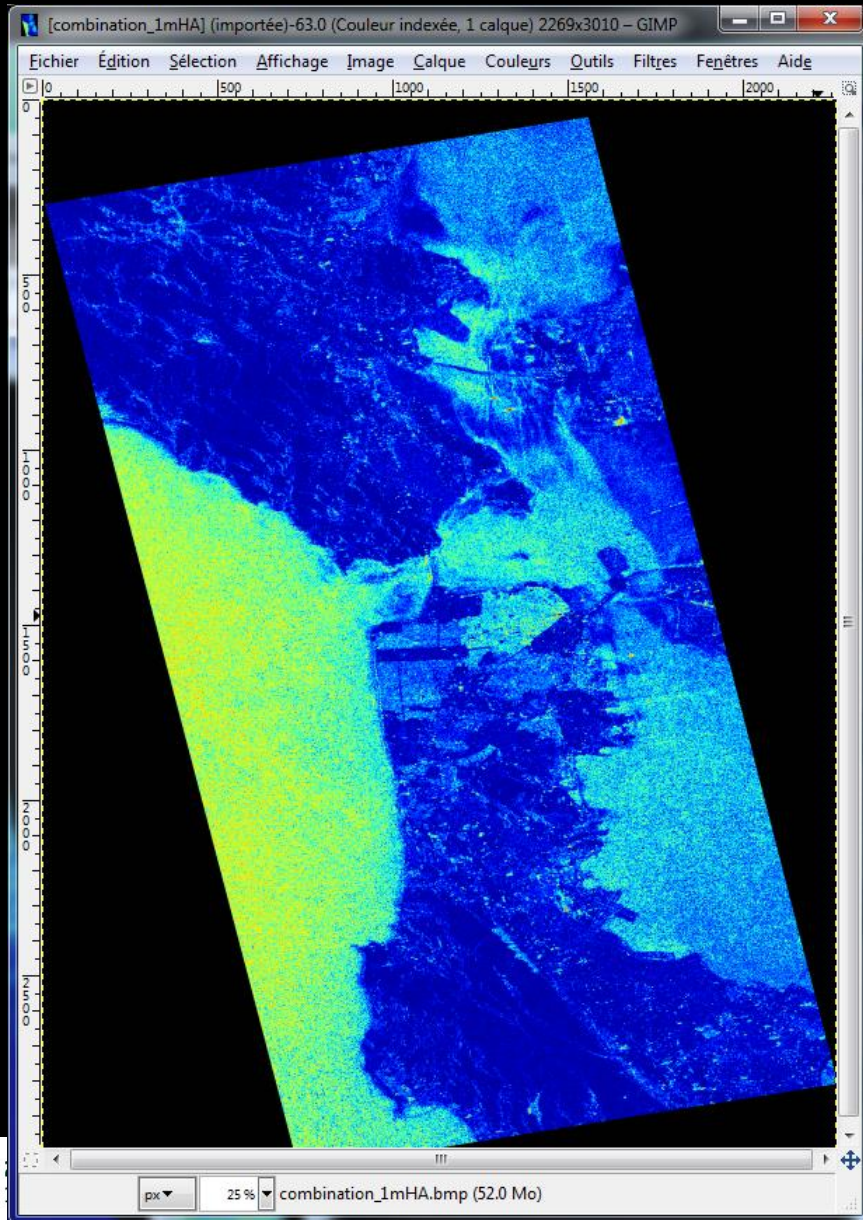
Entropy



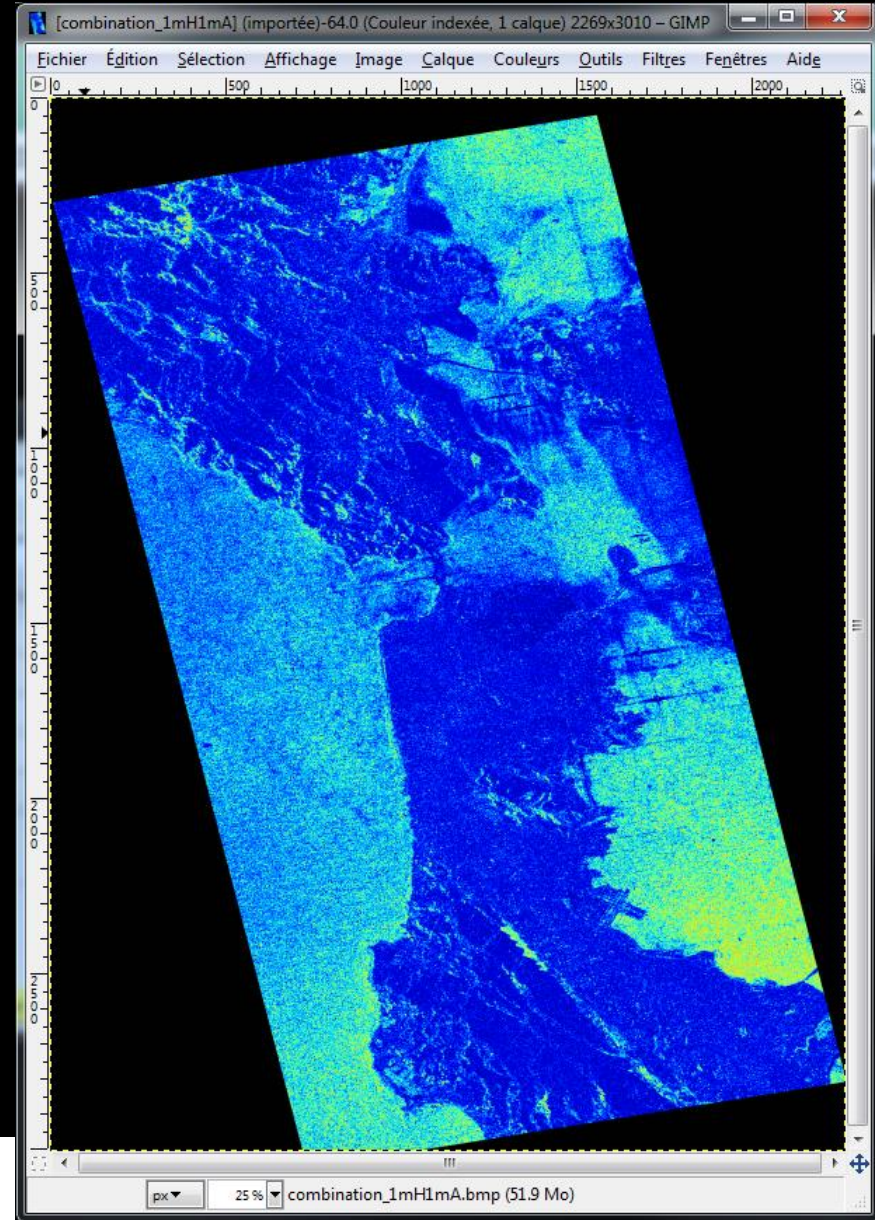
Anisotropy



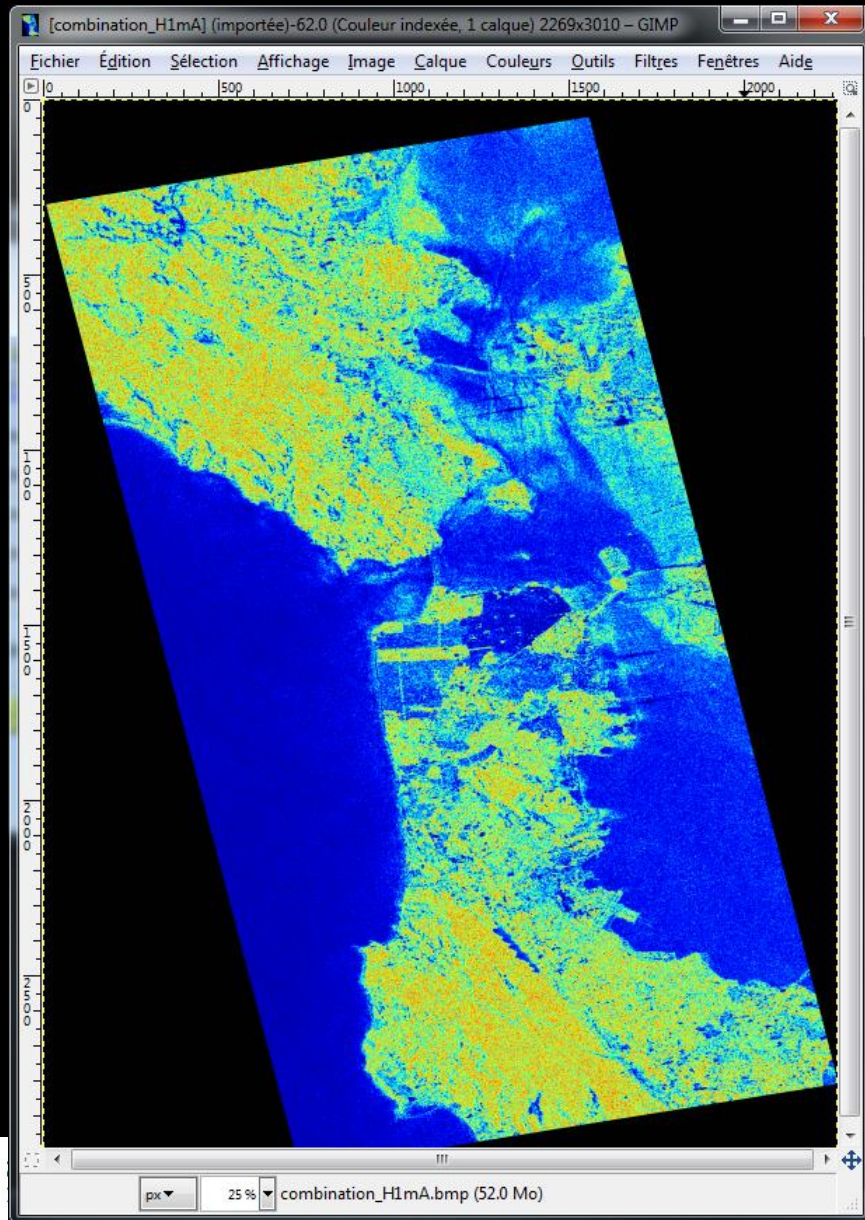
(1-H) A



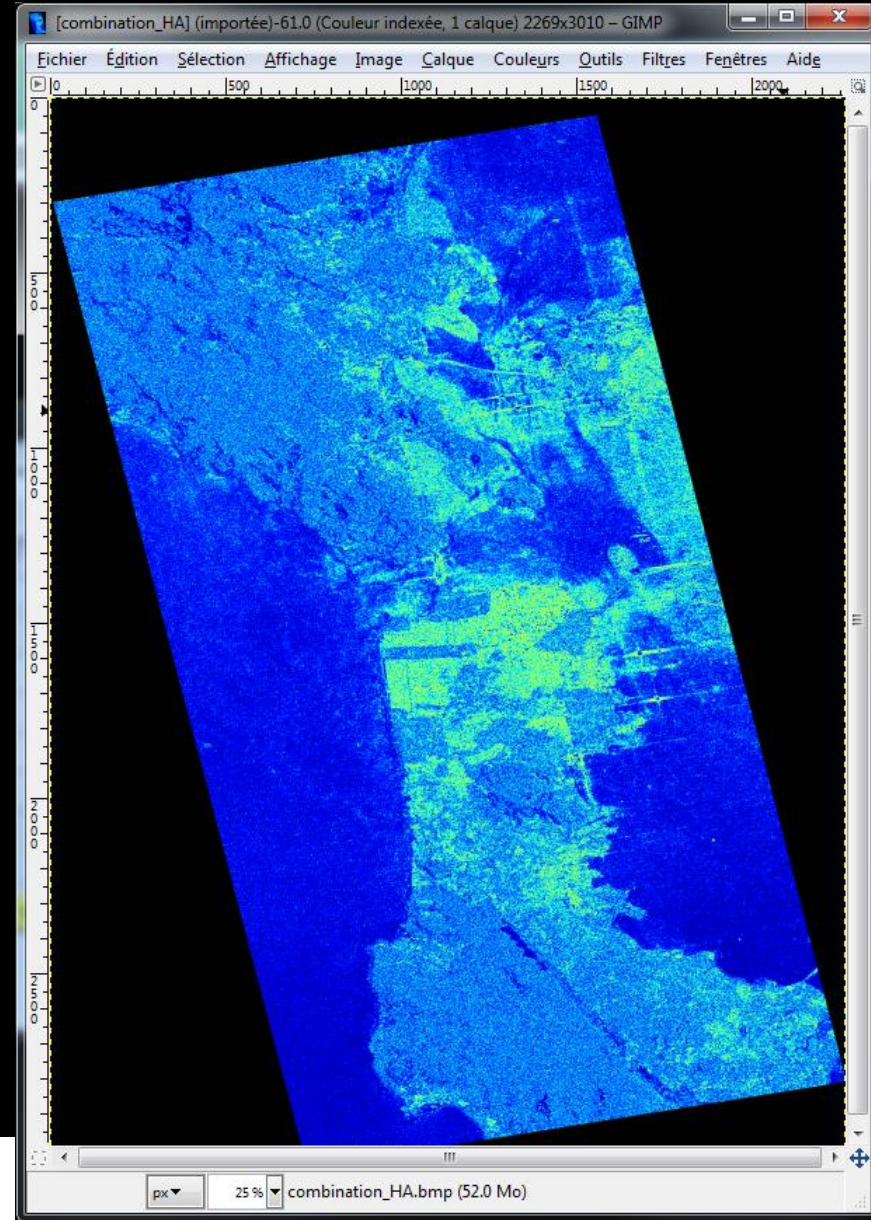
(1-H) (1-A)

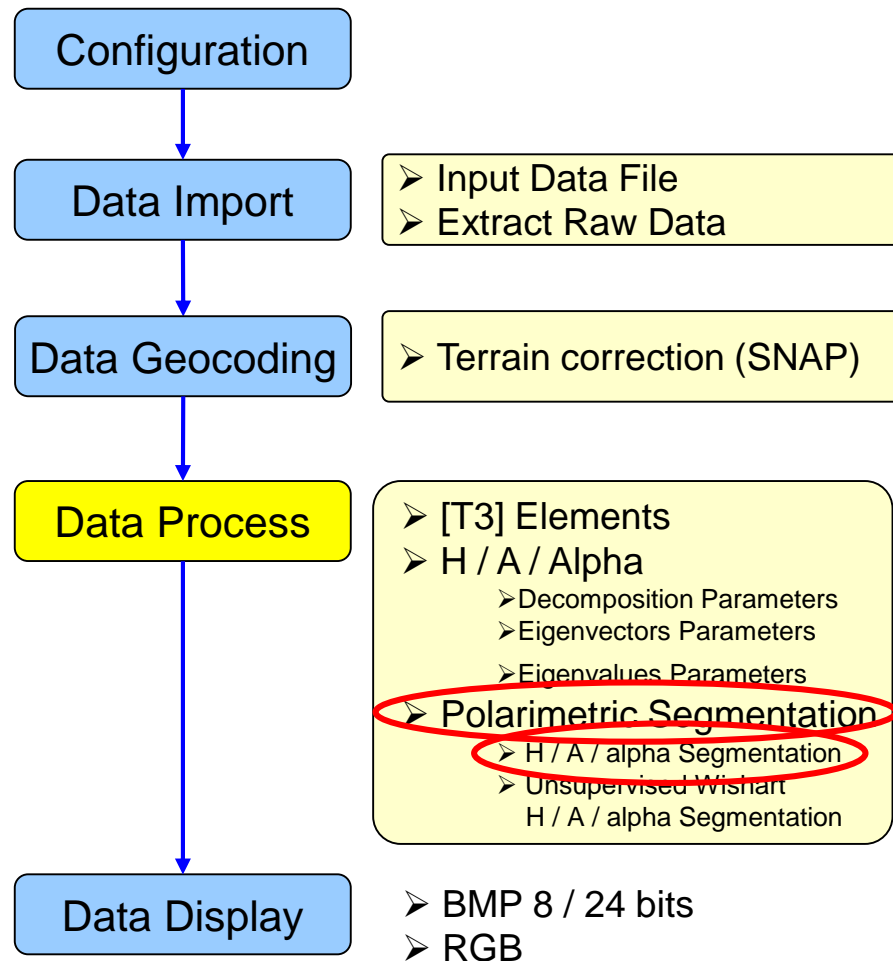


H (1-A)

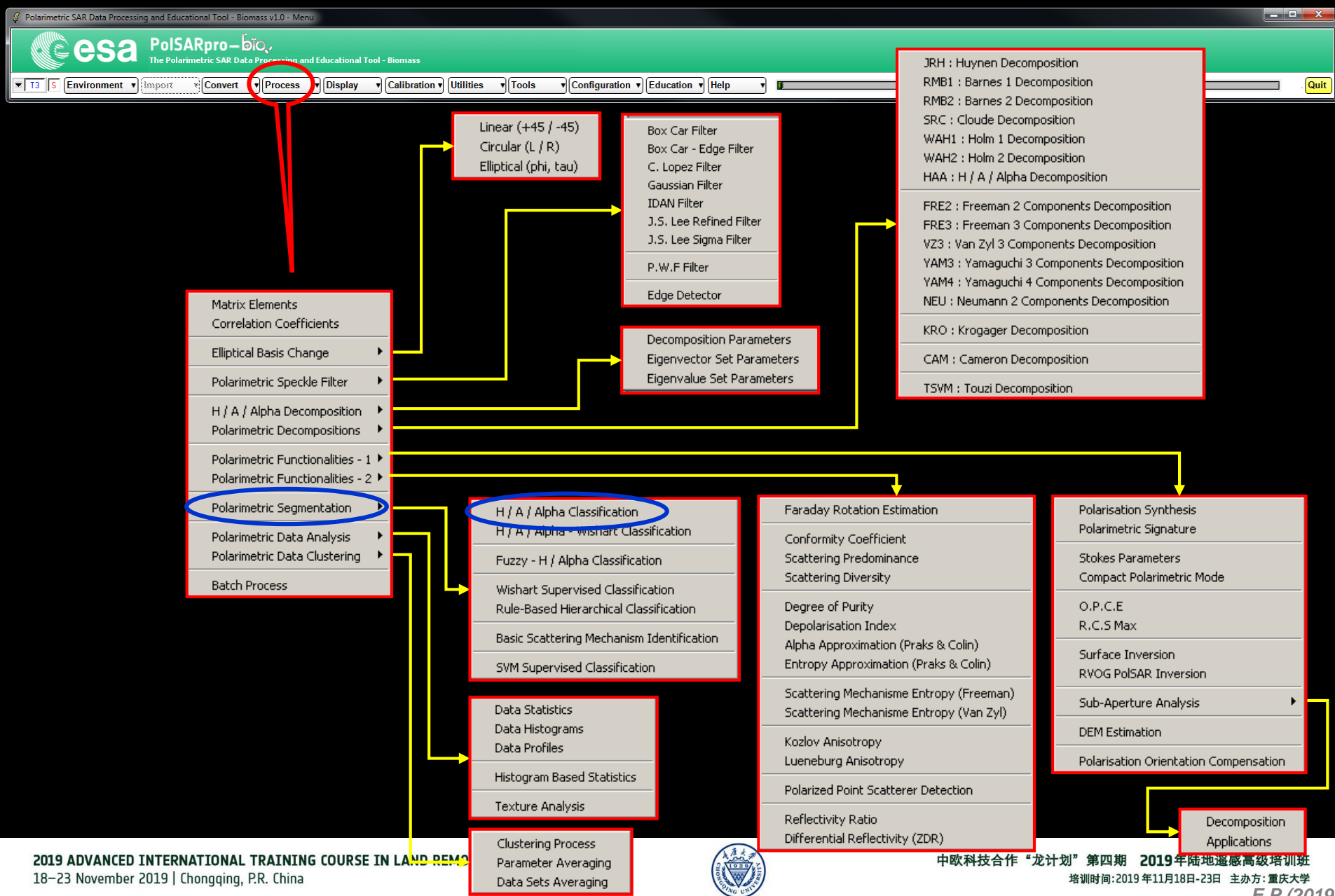


HA





PoISARpro - Bio SOFTWARE





Do it Yourself:
 Select some elements, set the parameters (**Nwin = 3**) and view the corresponding BMP files.

Data Processing: H / A / Alpha Classification

Input Directory:

Output Directory: / T3

Init Row: End Row: Init Col: End Col:

Representation

- Anisotropy Entropy Alpha
- $HA + (1-H)A$ $H(1-A)$ $(1-H)(1-A)$
- Alpha (Hue) / Entropy (Sat) / Lambda (Light)

H / A / Alpha Classification

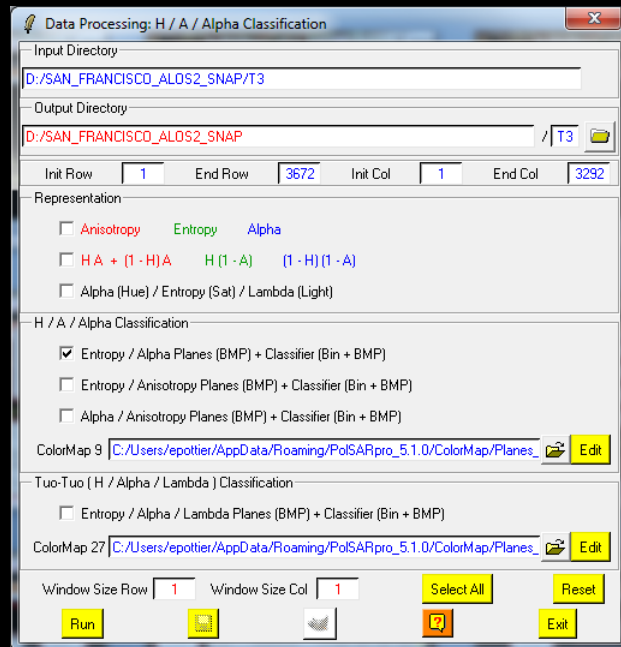
- Entropy / Alpha Planes (BMP) + Classifier (Bin + BMP)
- Entropy / Anisotropy Planes (BMP) + Classifier (Bin + BMP)
- Alpha / Anisotropy Planes (BMP) + Classifier (Bin + BMP)

Tuo-Tuo (H / Alpha / Lambda) Classification

- Entropy / Alpha / Lambda Planes (BMP) + Classifier (Bin + BMP)

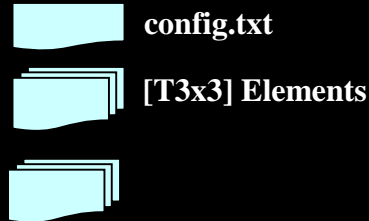
Window Size Row: Window Size Col:

Buttons: Run, [Folder Icon], [Map Icon], Select All, Reset, Exit



Do it Yourself:
Select some elements, set the parameters (Nwin = 3) and view the corresponding BMP files.

DATADIR

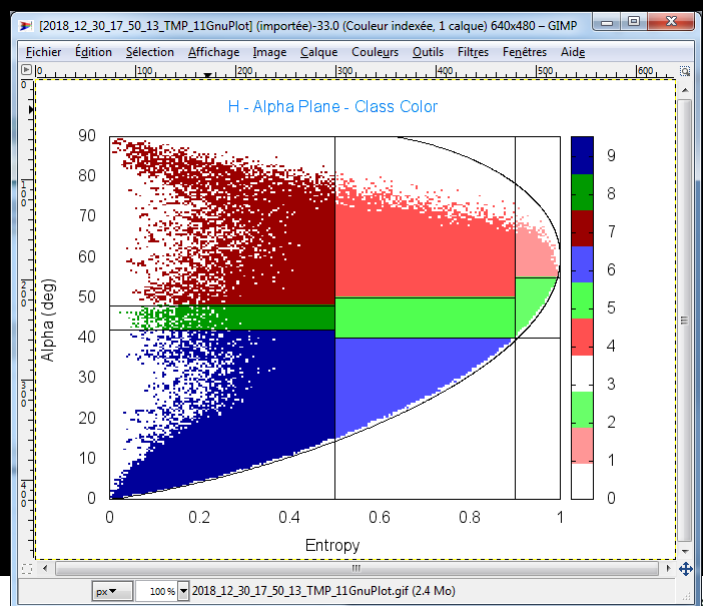
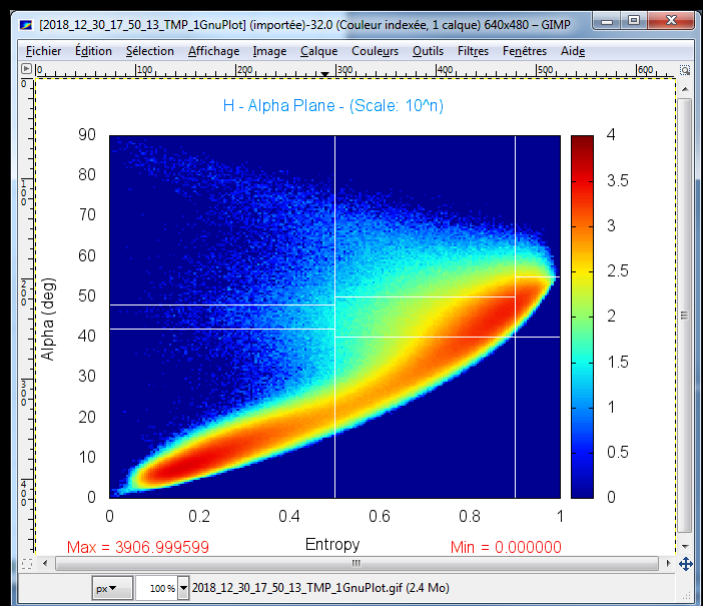
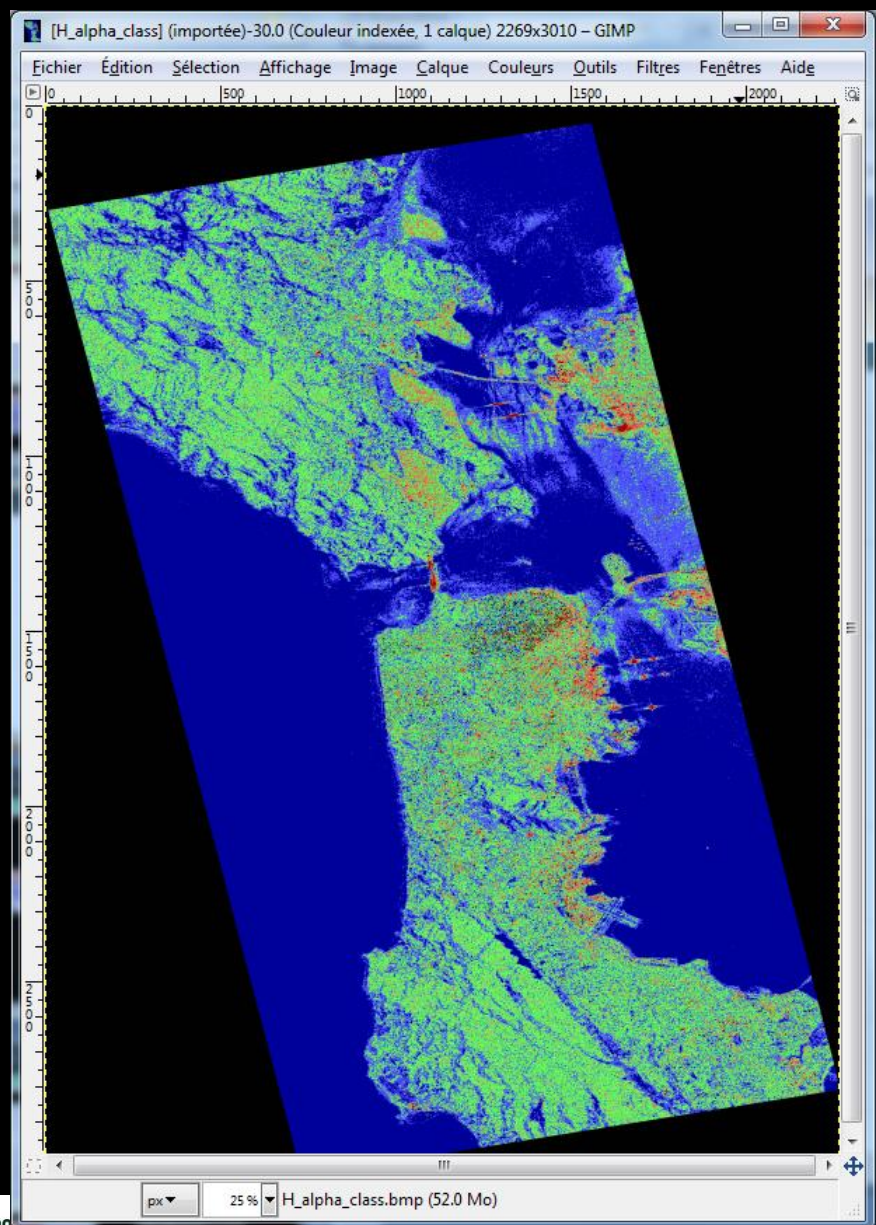


entropy.bin, anisotropy.bin, alpha.bin
 combination_HA.bin, combination_1mHA.bin,
 combination_H1mA.bin, combination_1mH1mA.bin
 H_A_class.bin, H_Alpha_class.bin, A_Alpha_class.bin



entropy.bmp, anisotropy.bmp, alpha.bmp
 combination_HA.bmp, combination_1mHA.bmp,
 combination_H1mA.bmp, combination_1mH1mA.bmp
 H_A_class.bmp, H_Alpha_class.bmp, A_Alpha_class.bmp
 H_A_occurrence.bmp, H_Alpha_occurrence.bmp,
 A_Alpha_occurrence.bmp, H_A_segmented.bmp,
 H_Alpha_segmented.bmp, A_Alpha_segmented.bmp
 HAlphaLambda_RGB.bmp, HAlpha_RGB.bmp
 HACombinations_RGB.bmp

H / A / alpha CLASSIFICATION





Do it Yourself:
 Select some elements, set the parameters (**Nwin = 3**) and view the corresponding BMP files.

Data Processing: H / A / Alpha Classification

Input Directory:

Output Directory: / T3

Init Row: End Row: Init Col: End Col:

Representation

- Anisotropy Entropy Alpha
- $HA + (1-H)A$ $H(1-A)$ $(1-H)(1-A)$
- Alpha (Hue) / Entropy (Sat) / Lambda (Light)

H / A / Alpha Classification

- Entropy / Alpha Planes (BMP) + Classifier (Bin + BMP)
- Entropy / Anisotropy Planes (BMP) + Classifier (Bin + BMP)
- Alpha / Anisotropy Planes (BMP) + Classifier (Bin + BMP)

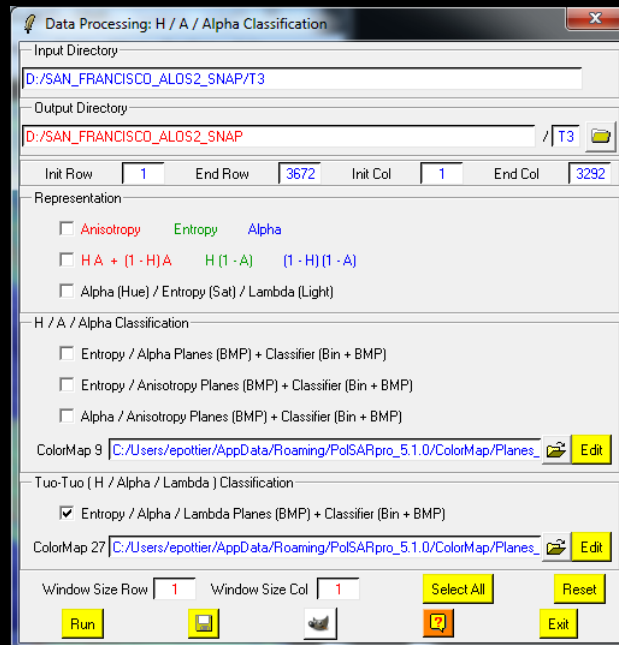
Tuo-Tuo (H / Alpha / Lambda) Classification

- Entropy / Alpha / Lambda Planes (BMP) + Classifier (Bin + BMP)

Window Size Row: Window Size Col: Select All Reset

Run Save Print Help Exit





Do it Yourself:
Select some elements, set the parameters (Nwin = 3) and view the corresponding BMP files.

DATDIR

config.txt

[T3x3] Elements

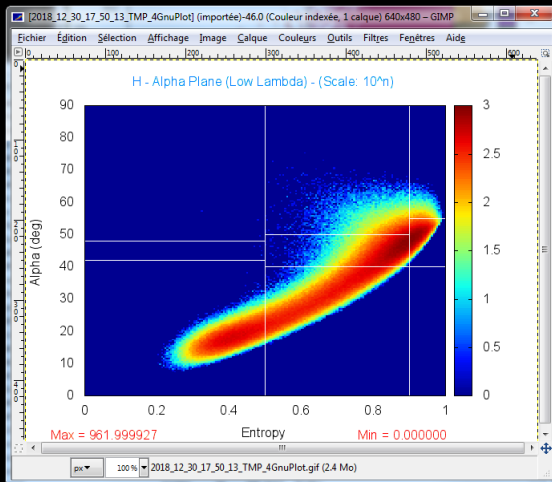
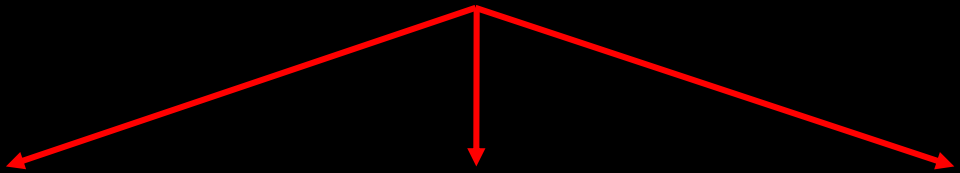
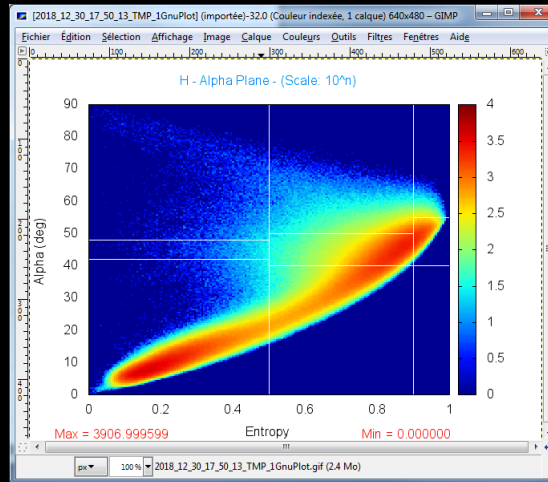


H_alpha_lambda_class1(2,3).bin,
 H_alpha_lambda_occurrence_class1(2,3).bin,
 H_alpha_lambda_segmented_class1(2,3).bin,
 H_alpha_lambda_class.bin,

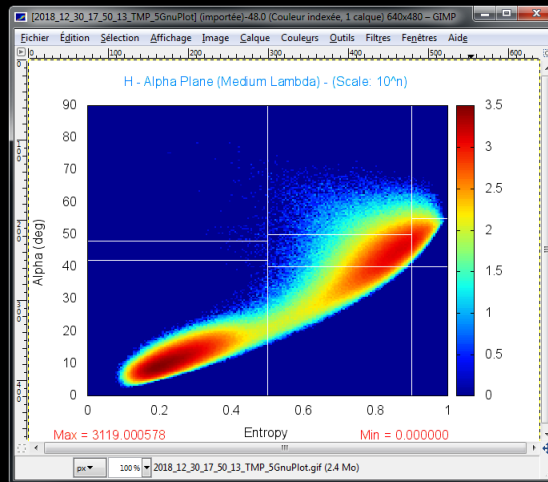


H_alpha_lambda_class1(2,3).bmp,
 H_alpha_lambda_occurrence_class1(2,3).bmp,
 H_alpha_lambda_segmented_class1(2,3).bmp,
 H_alpha_lambda_class.bmp,

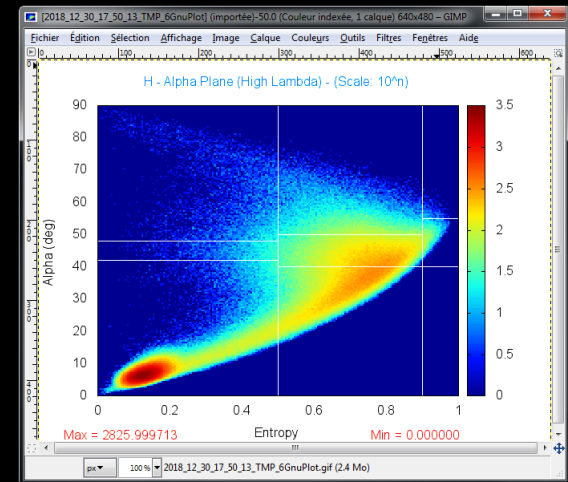
H / A / alpha CLASSIFICATION



Low λ



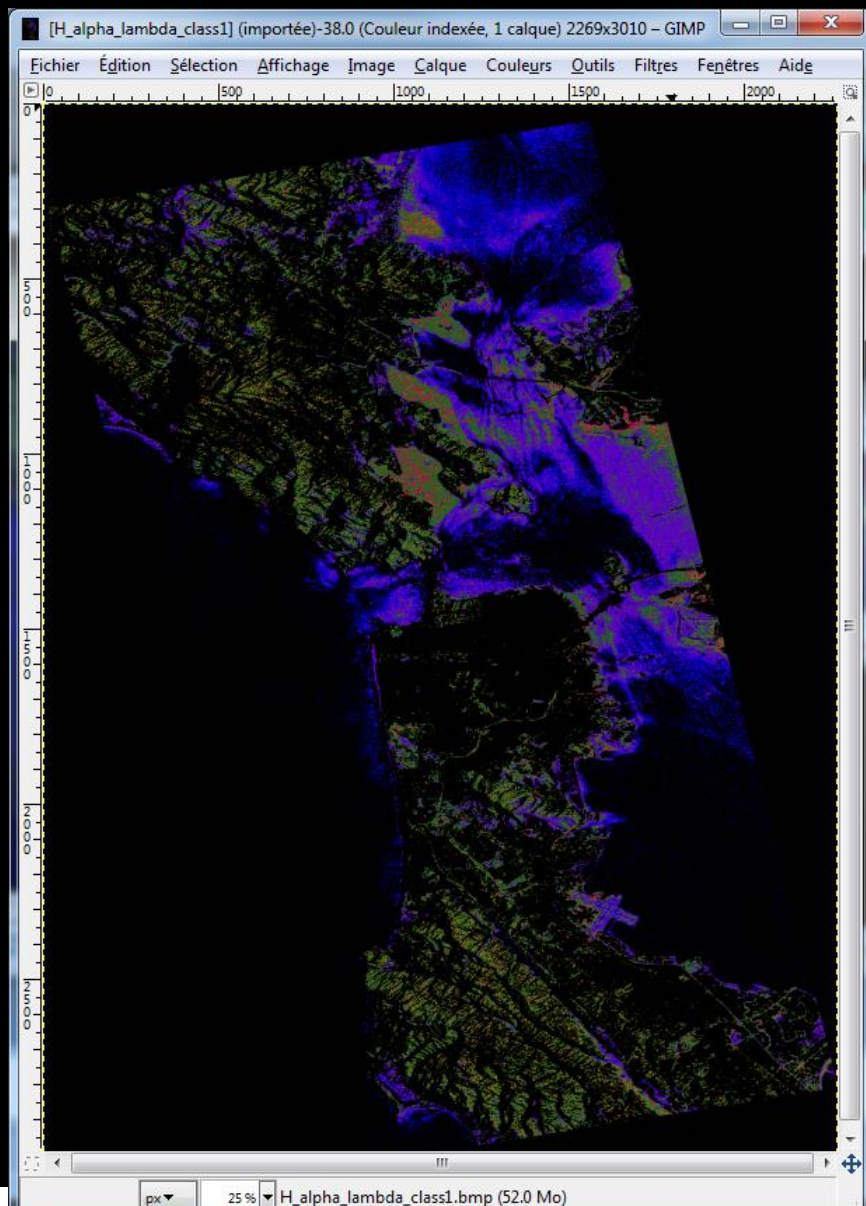
Medium λ



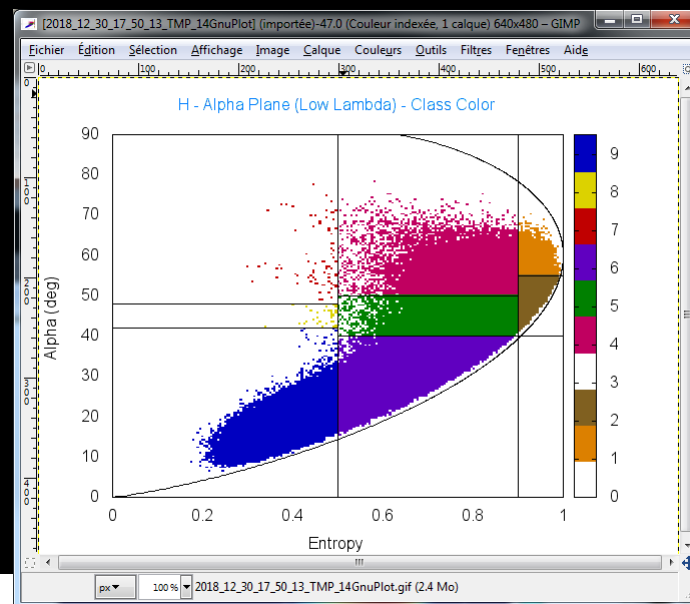
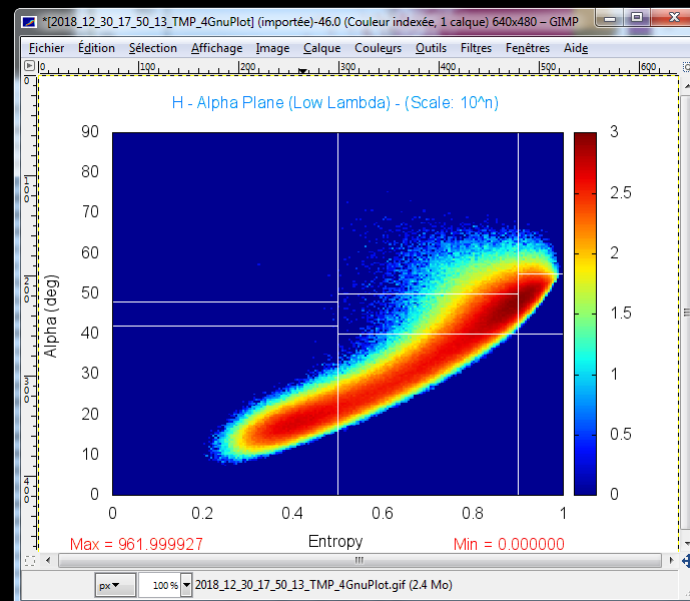
High λ

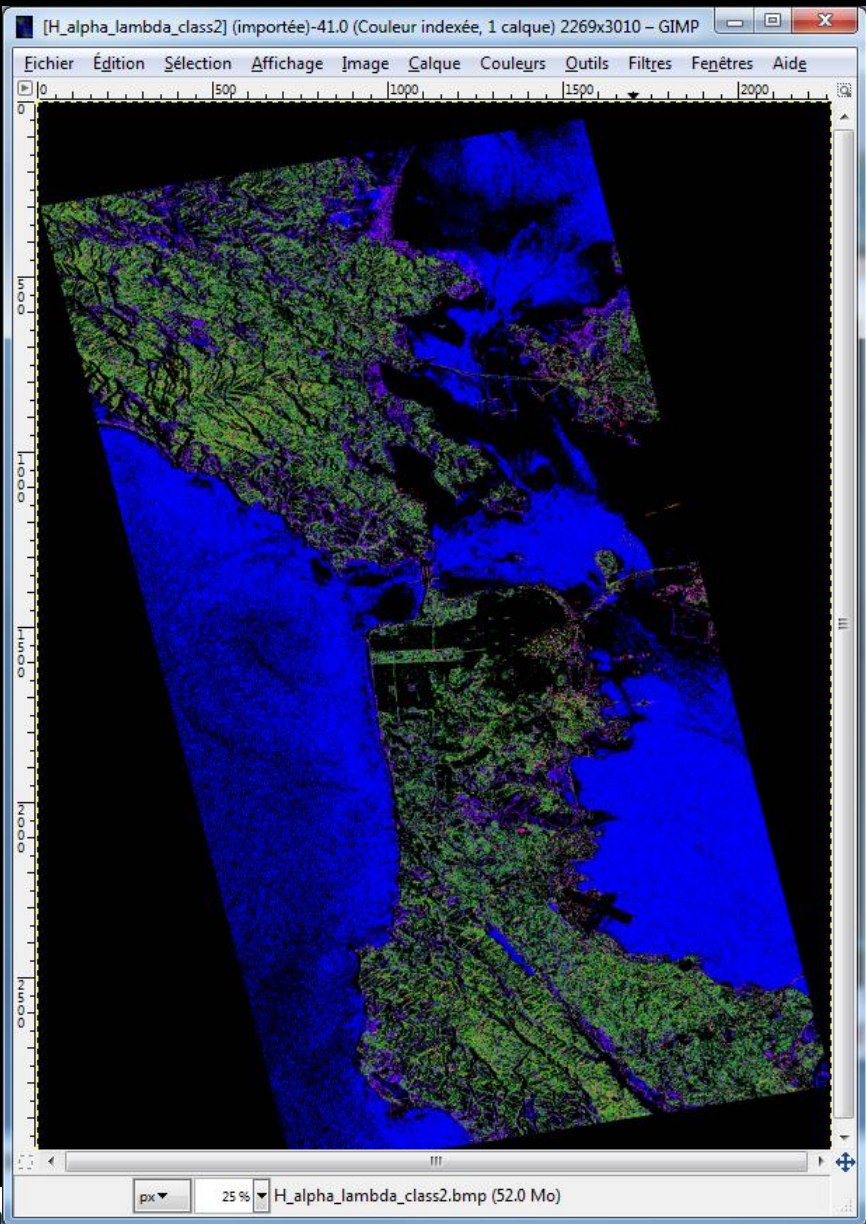


H / A / alpha CLASSIFICATION

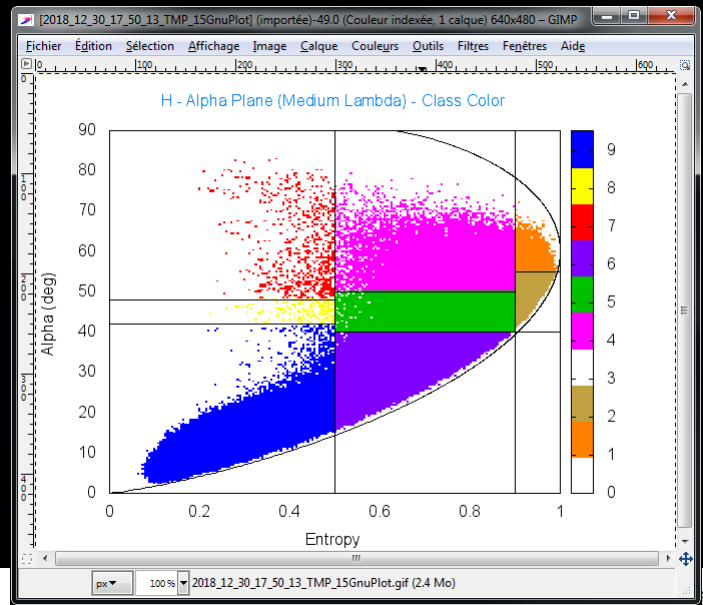
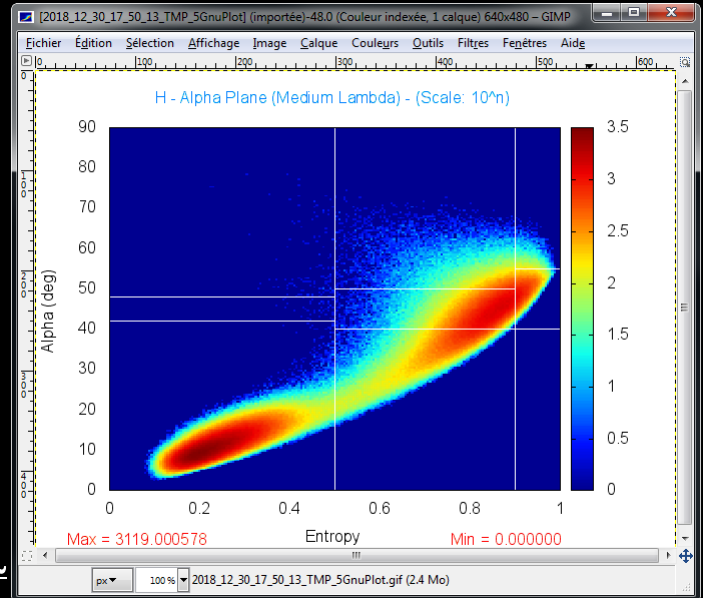


Low λ

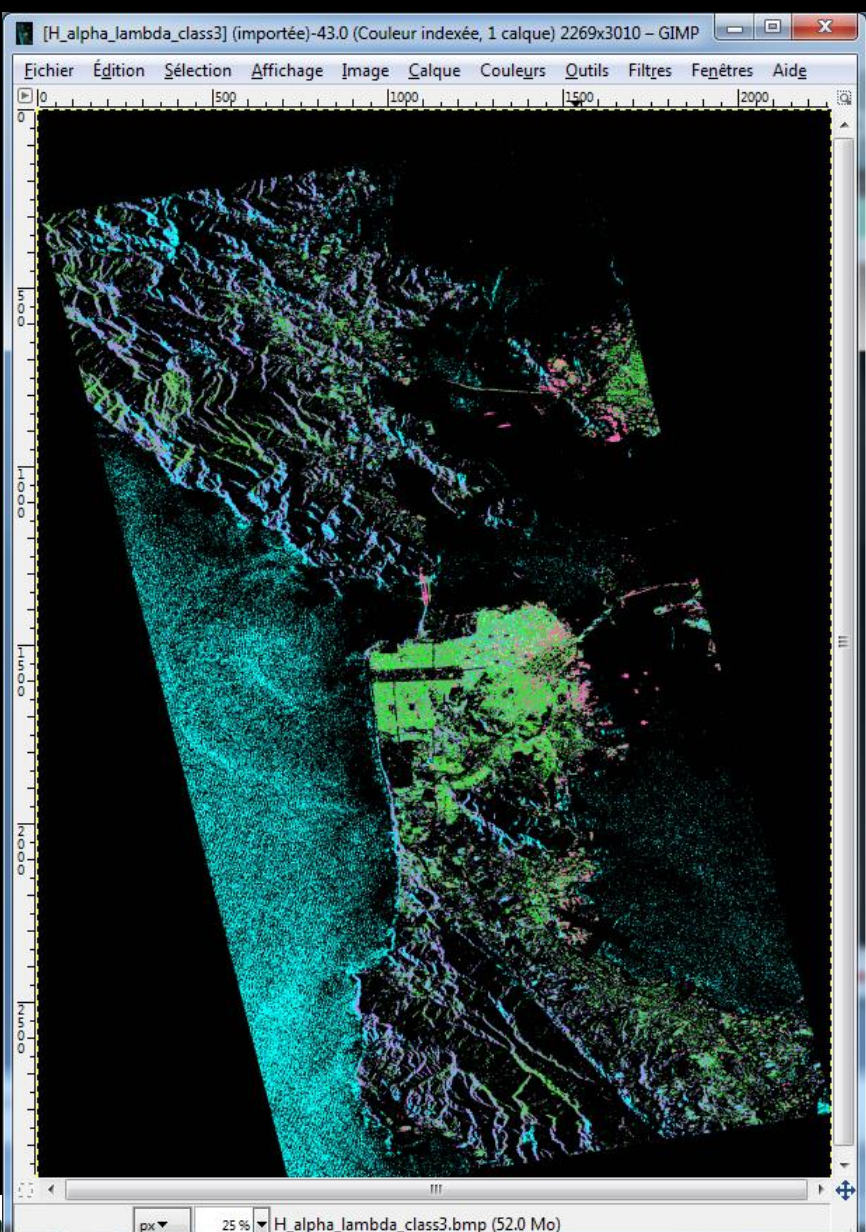




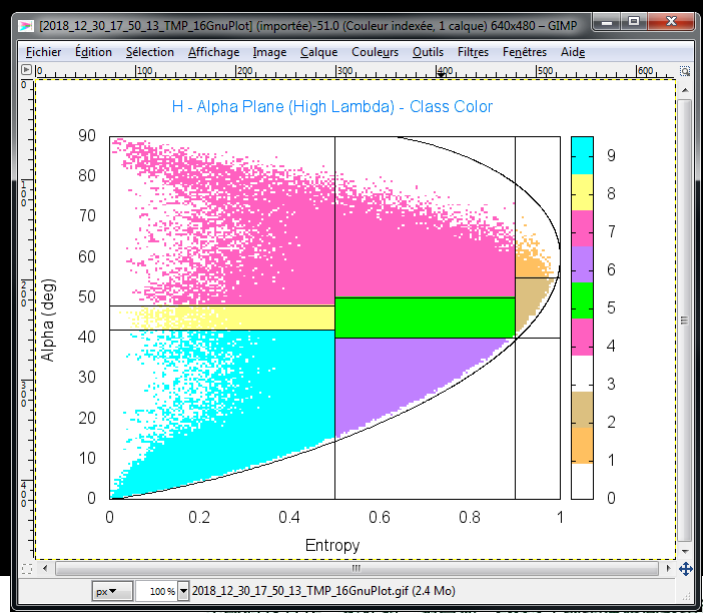
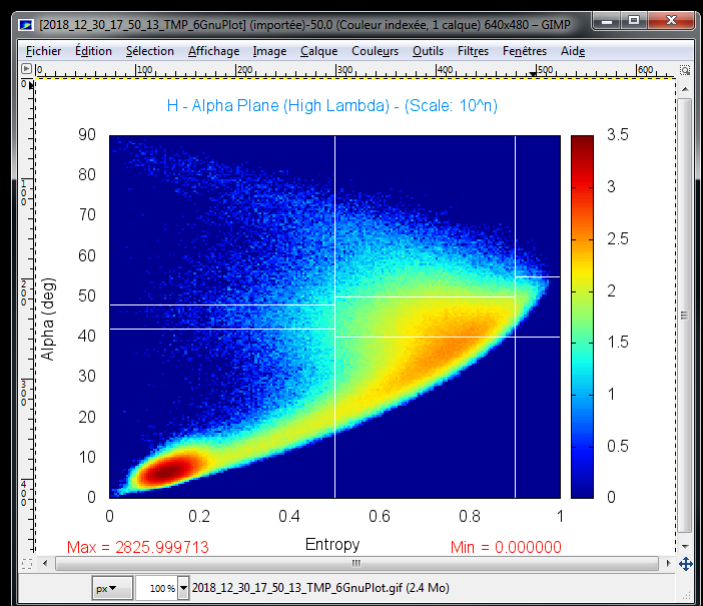
Medium λ

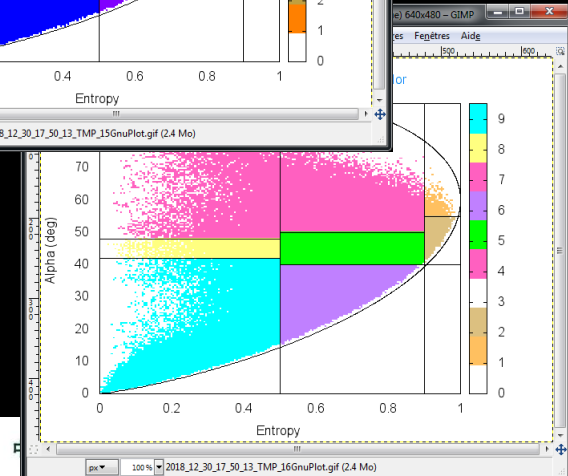
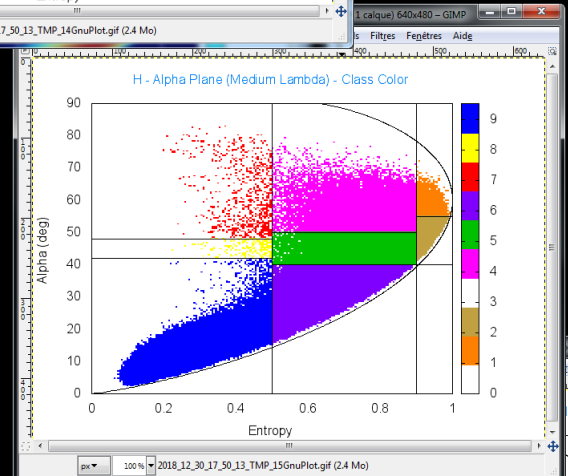
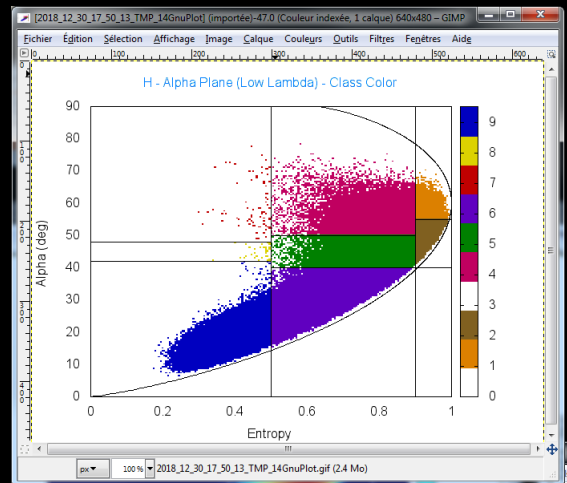
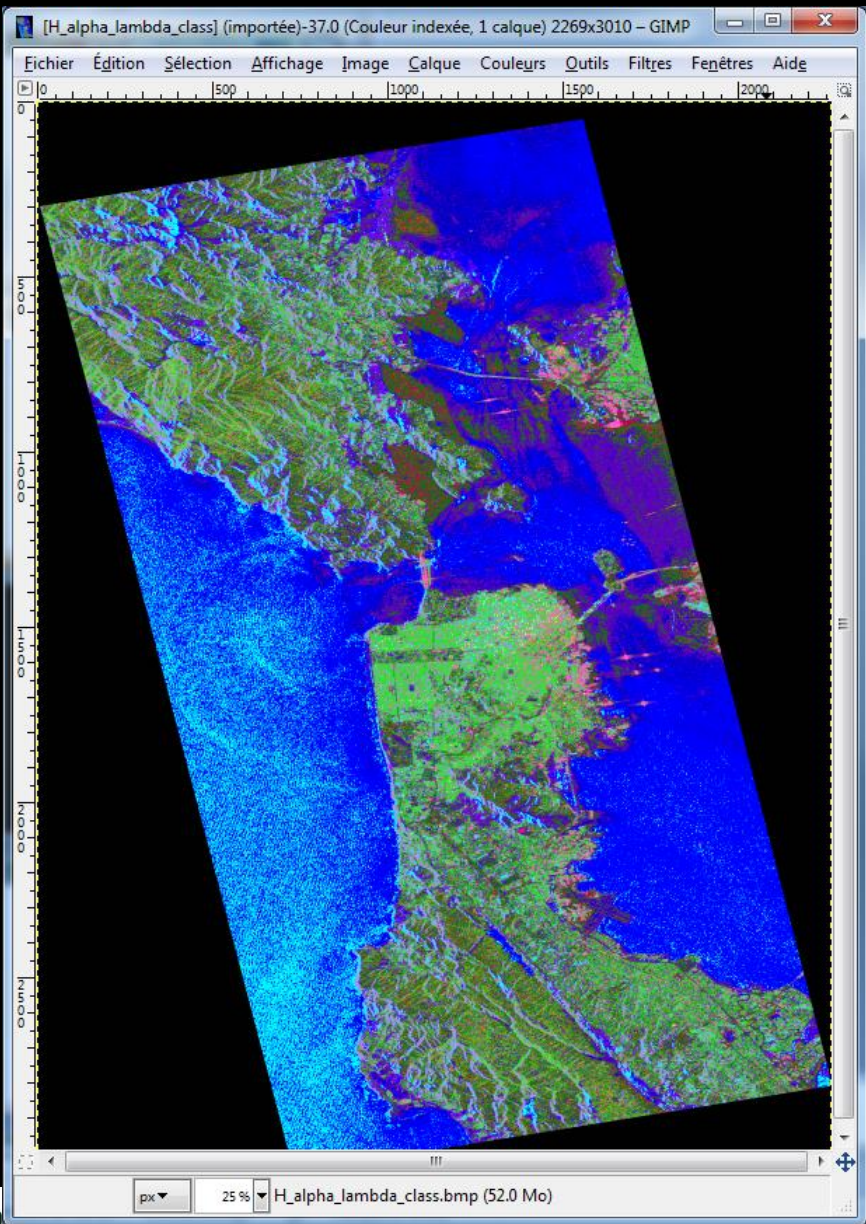


H / A / alpha CLASSIFICATION

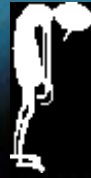


High λ

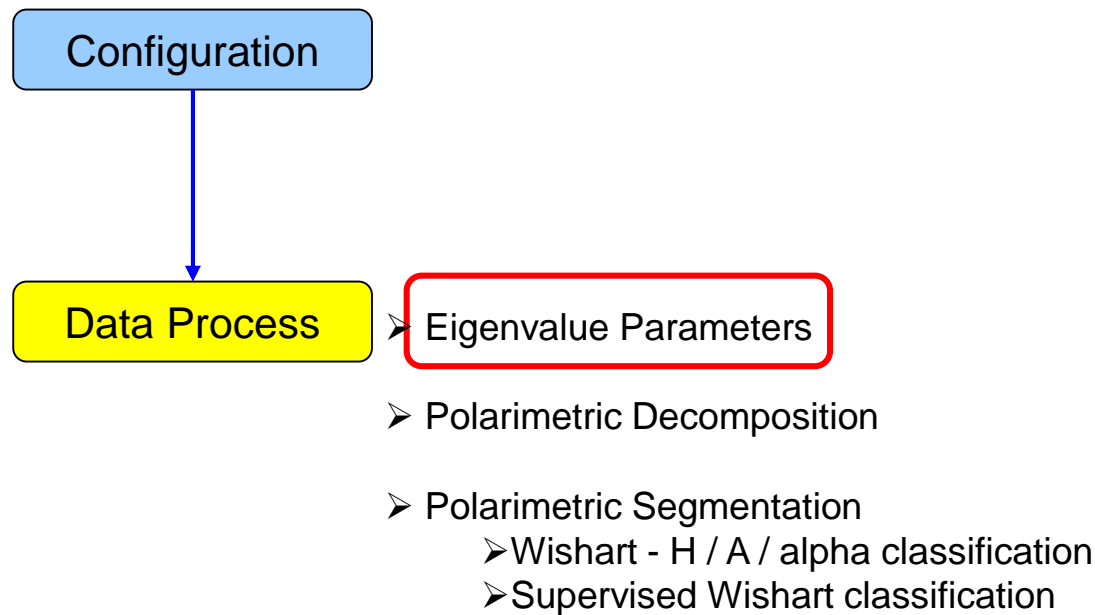




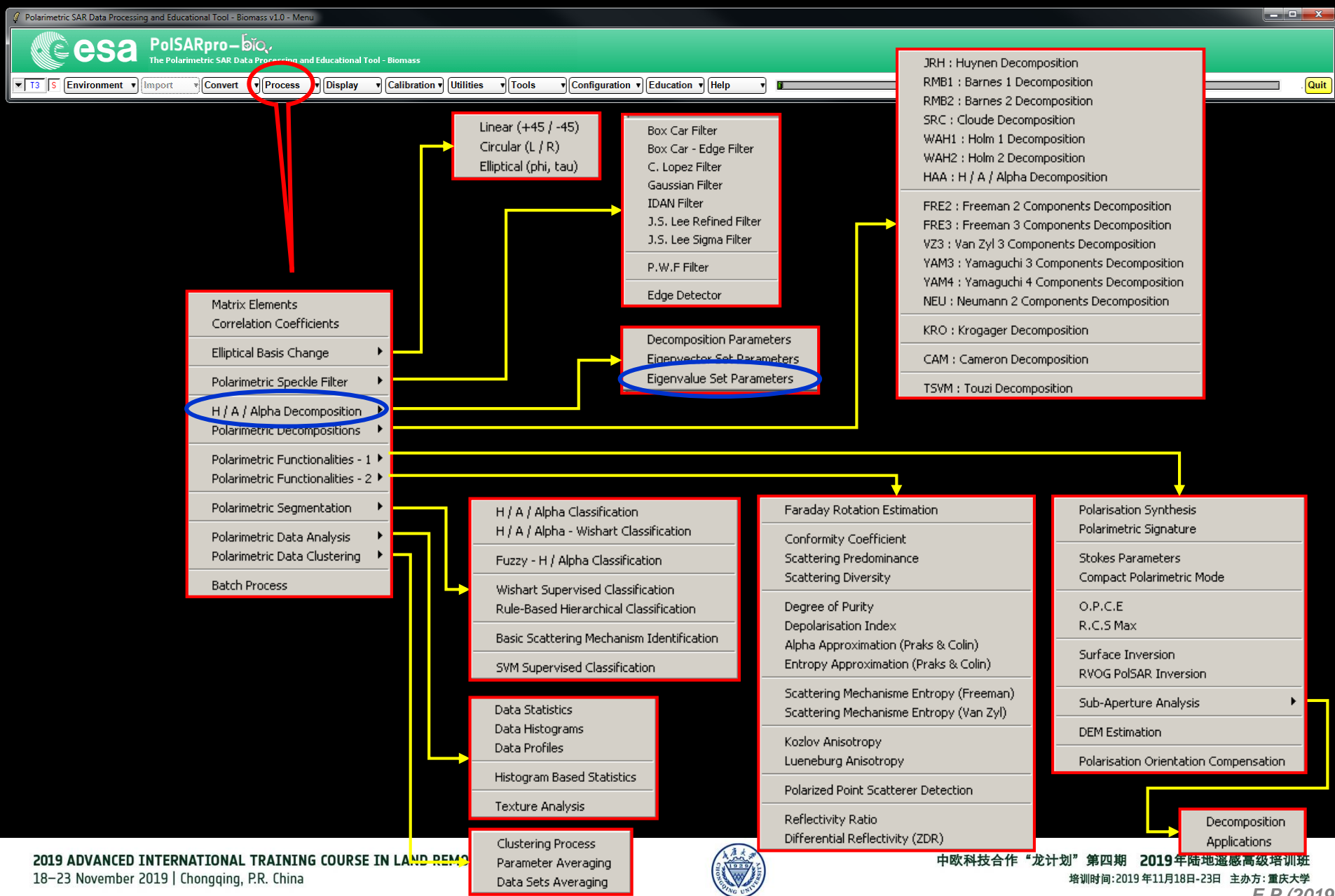
Questions ?



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PoISARpro v5.1 SOFTWARE



EIGENVALUE SET PARAMETERS



Do it Yourself:
Select some elements, set the parameters and view the corresponding BMP files (select BMP).

Window Size = 3

Data Processing: H / A / Alpha Eigenvalue Set Parameters

Input Directory: D:/SAN_FRANCISCO_ALDOS_SNAP/T3

Output Directory: D:/SAN_FRANCISCO_ALDOS_SNAP / T3

Init Row	End Row	Init Col	End Col
1	3010	1	2269

- Eigenvalues (L1 , L2 , L3) BMP
- Pseudo Probabilities (p1 , p2 , p3) BMP
- Anisotropy (A) (p2 , p3) BMP
- Anisotropy12 (A12) (p1 , p2) BMP
- Eigenvalues Relative Difference (S.E.R.D - D.E.R.D) BMP
- Polarisation Asymmetry (p1-p3 , 1-3p3) BMP
- Polarisation Fraction (1-3p3) BMP
- Lueneburg Anisotropy BMP
- Radar Vegetation Index (R.V.I) BMP
- Pedestal Height BMP
- Shannon Entropy (H = Hi + Hp) BMP

Window Size Row: 3 Window Size Col: 3

Equivalence between [T] and [C] eigen-decompositions.



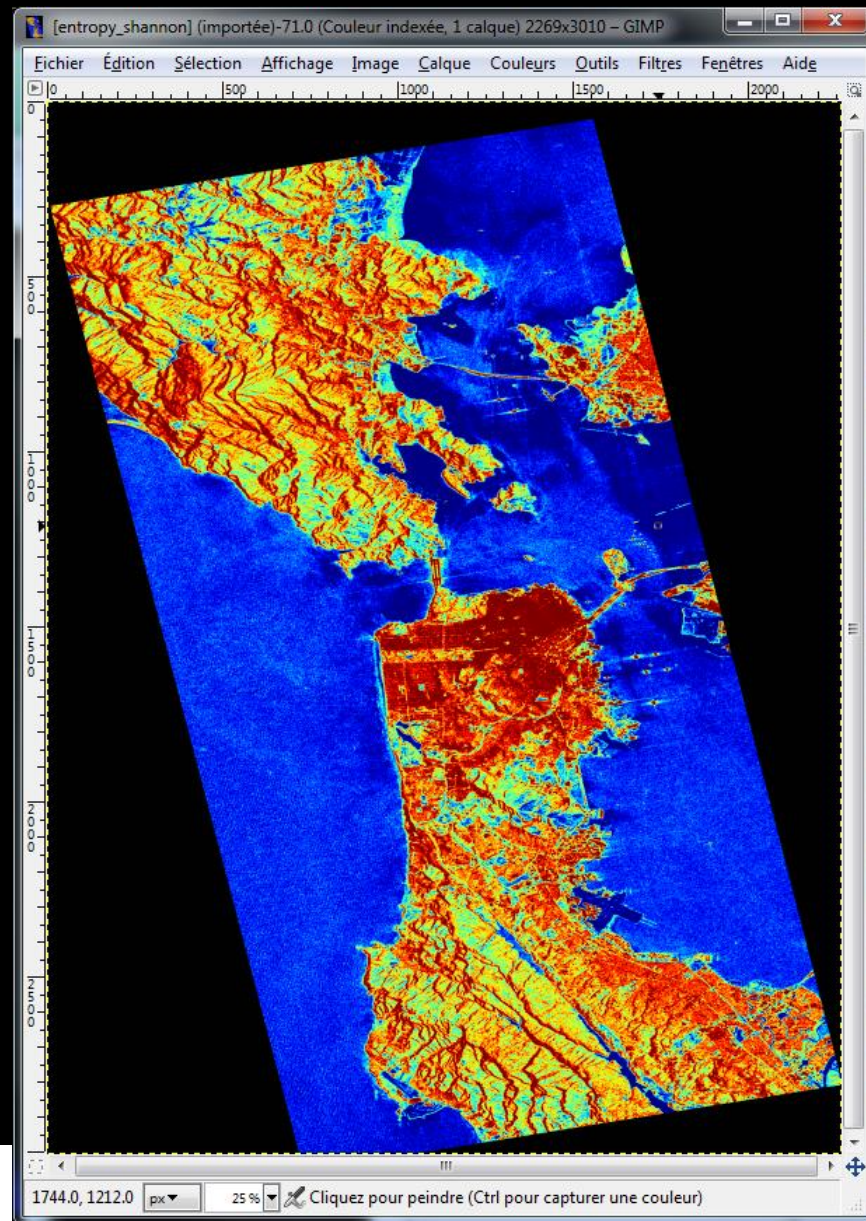
EIGENVALUE SET PARAMETER



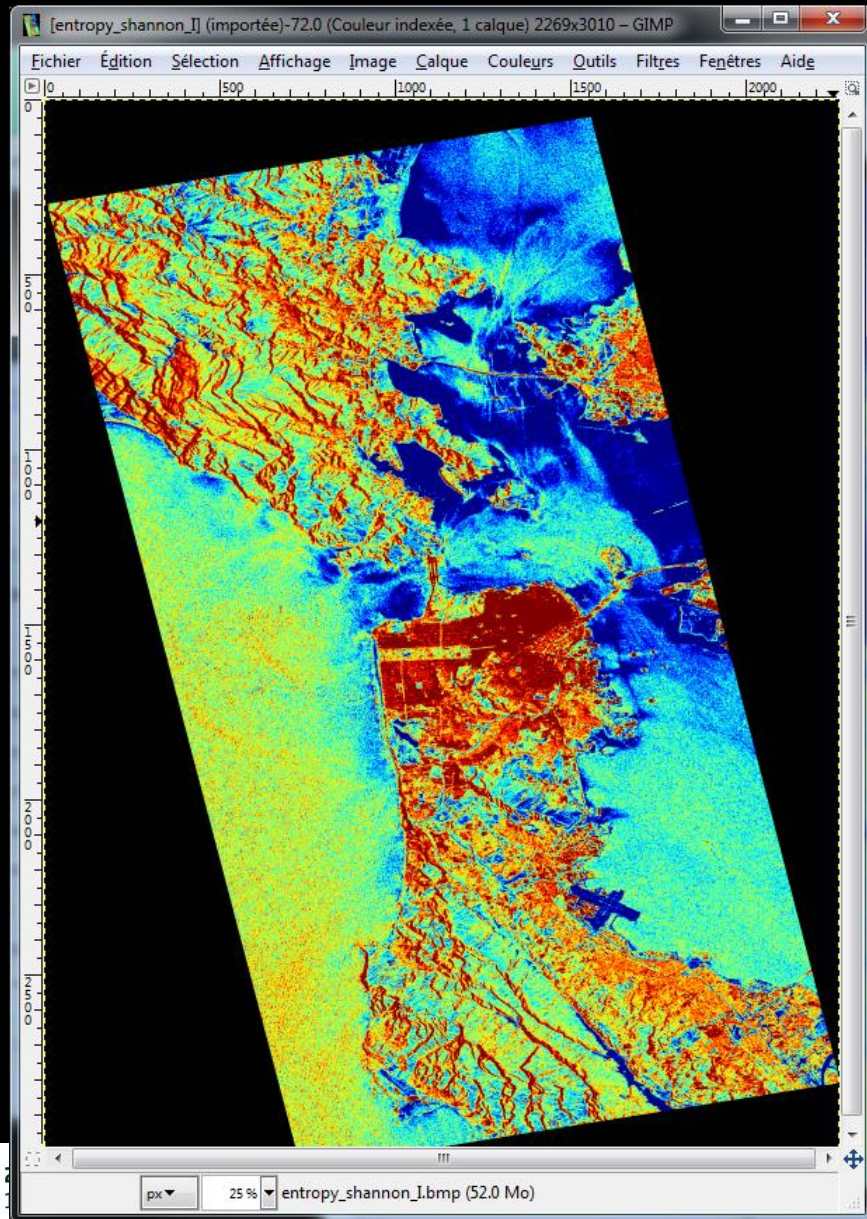
Pauli RGB



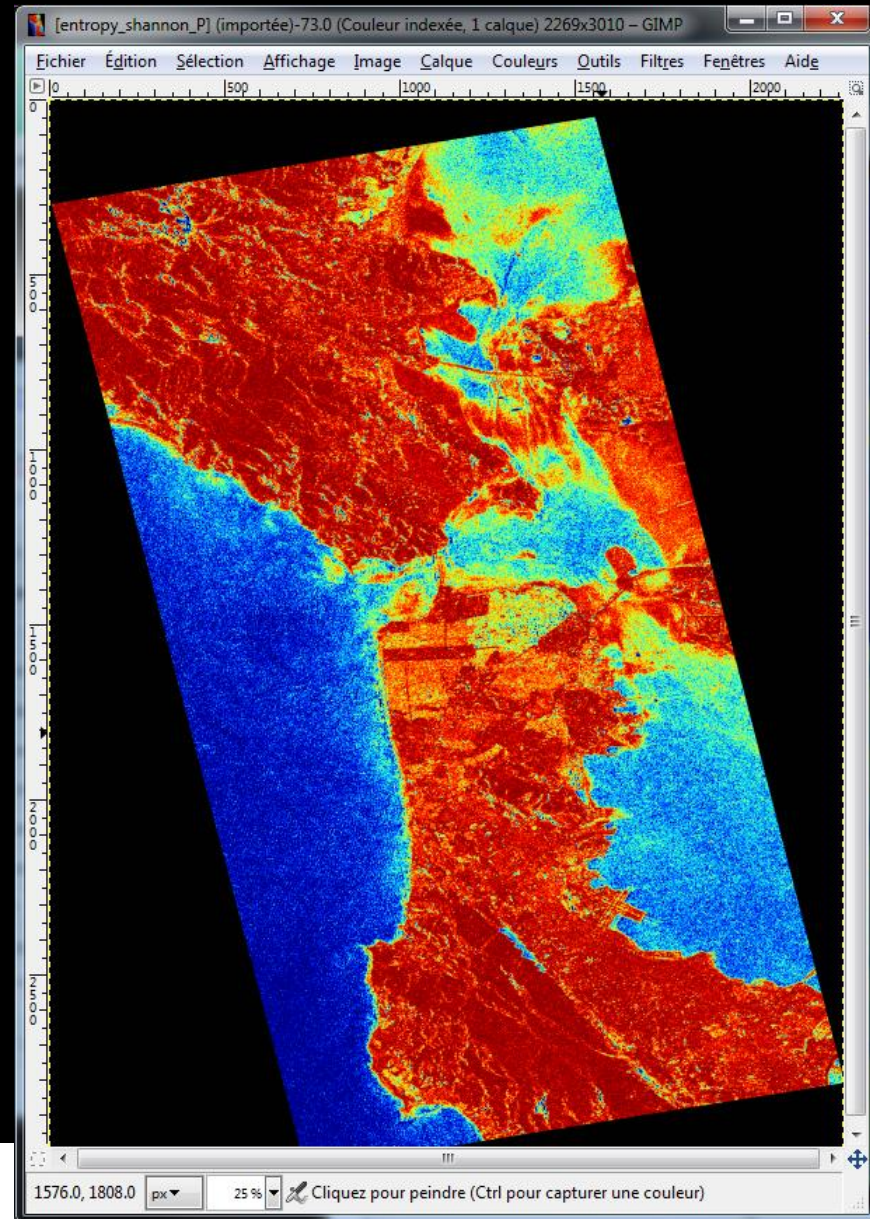
Entropy Shannon



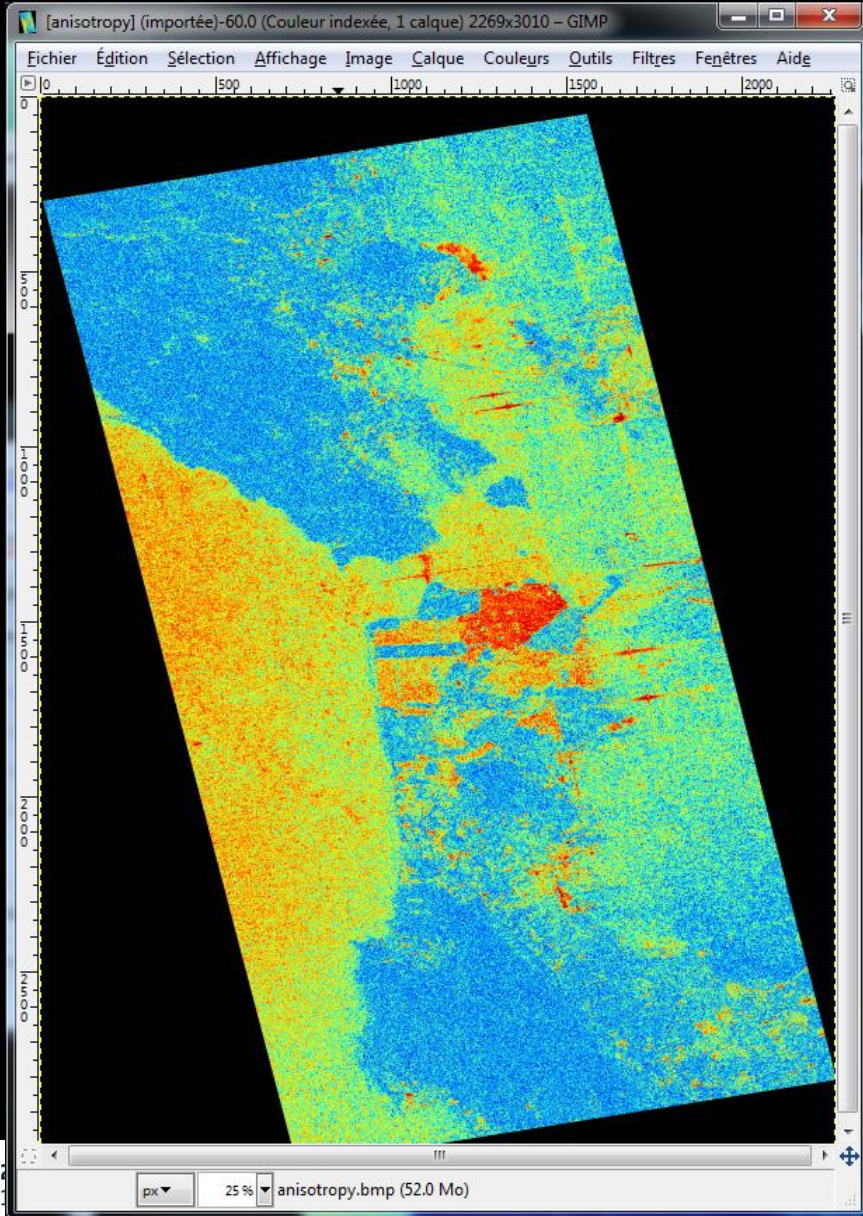
Entropy I



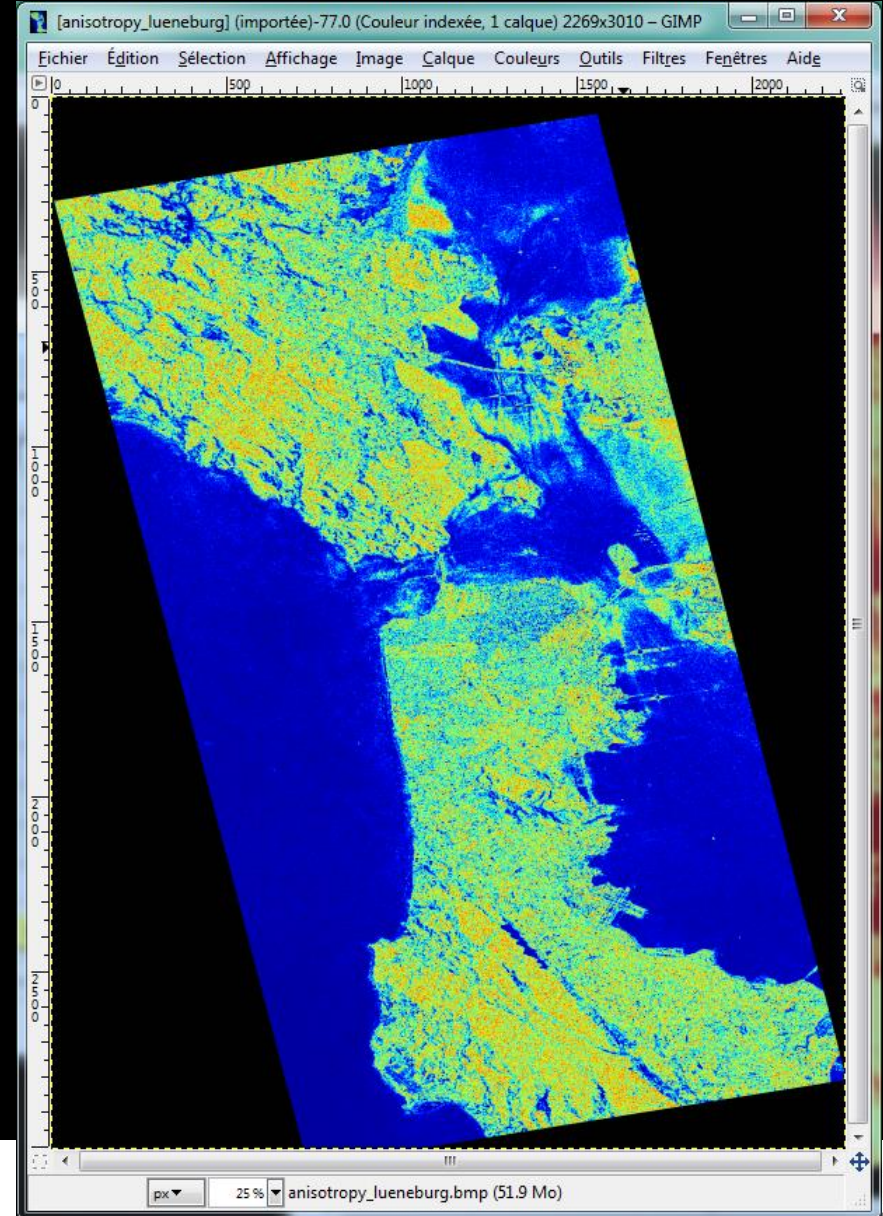
Entropy P

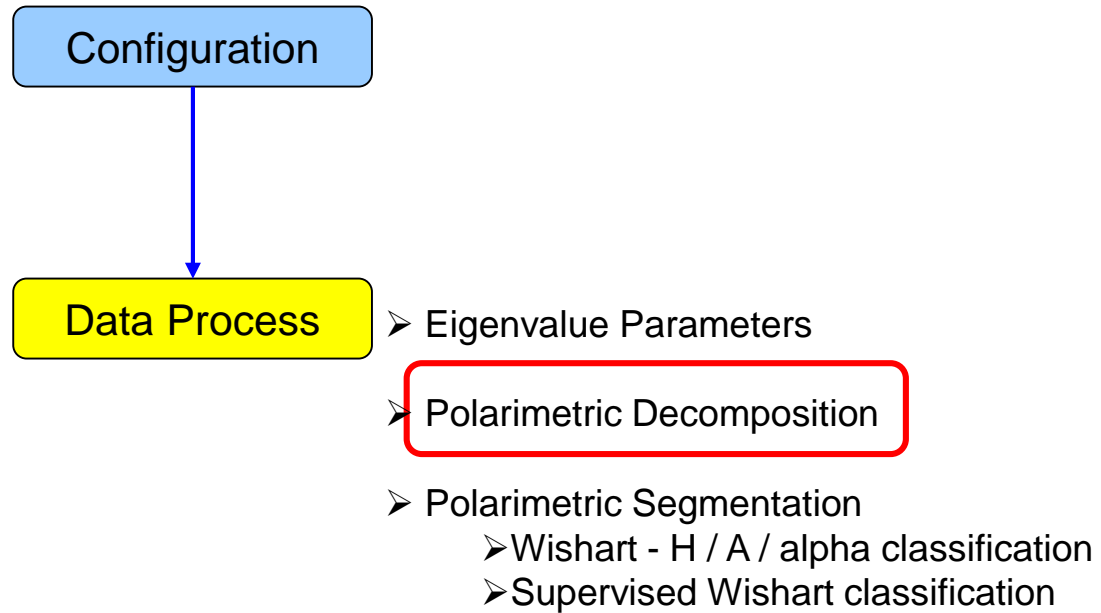


Anisotropy



Lueneburg Anisotropy





PoISARpro v5.1 SOFTWARE



Polarimetric SAR Data Processing and Educational Tool - Biomass v1.0 - Menu

esa PoISARpro-bio
The Polarimetric SAR Data Processing and Educational Tool - Biomass

Environment Import Convert **Process** Display Calibration Utilities Tools Configuration Education Help

Linear (+45 / -45)
Circular (L / R)
Elliptical (phi, tau)

Box Car Filter
Box Car - Edge Filter
C. Lopez Filter
Gaussian Filter
IDAN Filter
J.S. Lee Refined Filter
J.S. Lee Sigma Filter
P.W.F Filter
Edge Detector

Decomposition Parameters
Eigenvector Set Parameters
Eigenvalue Set Parameters

Matrix Elements
Correlation Coefficients
Elliptical Basis Change
Polarimetric Speckle Filter
H / A / Alpha Decomposition
Polarimetric Decompositions
Polarimetric Functionalities - 1
Polarimetric Functionalities - 2
Polarimetric Segmentation
Polarimetric Data Analysis
Polarimetric Data Clustering
Batch Process

H / A / Alpha Classification
H / A / Alpha - Wishart Classification
Fuzzy - H / Alpha Classification
Wishart Supervised Classification
Rule-Based Hierarchical Classification
Basic Scattering Mechanism Identification
SVM Supervised Classification

Data Statistics
Data Histograms
Data Profiles
Histogram Based Statistics
Texture Analysis

Clustering Process
Parameter Averaging
Data Sets Averaging

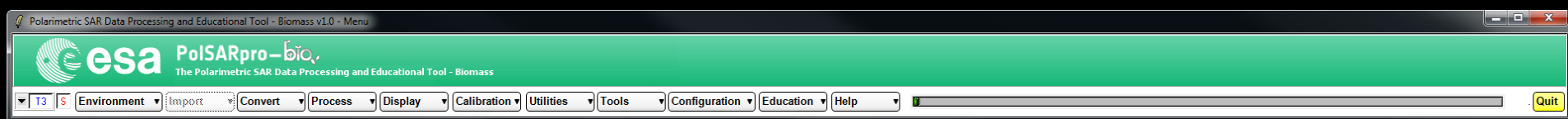
Faraday Rotation
Conformity Coef
Scattering Pred
Scattering Diver
Degree of Purity
Depolarisation I
Alpha Approxim
Entropy Approx
Scattering Mech
Scattering Mech
Kozlov Anisotropy
Lueneburg Anisotropy
Polarized Point Scatterer Detection
Reflectivity Ratio
Differential Reflectivity (ZDR)

Depolarisation
Polarisation Orientation Compensation

Decomposition Applications

KRO : Krogager Decomposition
CAM : Cameron Decomposition
HAA : H / A / Alpha Decomposition
JRH : Huynen Decomposition
RMB1 : Barnes 1 Decomposition
RMB2 : Barnes 2 Decomposition
SRC : Cloude Decomposition
UHDx : Unified Huynen Decomposition
WAH1 : Holm 1 Decomposition
WAH2 : Holm 2 Decomposition
AN3 : An & Yang 3 Component Decomposition
AN4 : An & Yang 4 Component Decomposition
BF4 : Bhattacharya & Frey 4 Component Decomposition
FRE2 : Freeman 2 Component Decomposition
FRE3 : Freeman 3 Component Decomposition
NEU : Neumann 2 Component Decomposition
NNED : Arie 3 Component NNED Decomposition
ANNED : Arie 3 Component ANNED Decomposition
VZ3 : Van Zyl (1992) 3 Component Decomposition
SIN4 : Singh 4 Component Decomposition
YAM3 : Yamaguchi 3 Component Decomposition
YAM4 : Yamaguchi 4 Component Decomposition
MCSM5 : L. Zhang 5 Component Decomposition
TSVM : Touzi Decomposition
Aghababae Decomposition
2KR : Raney Decomposition
CPD : Compact-Pol Decomposition

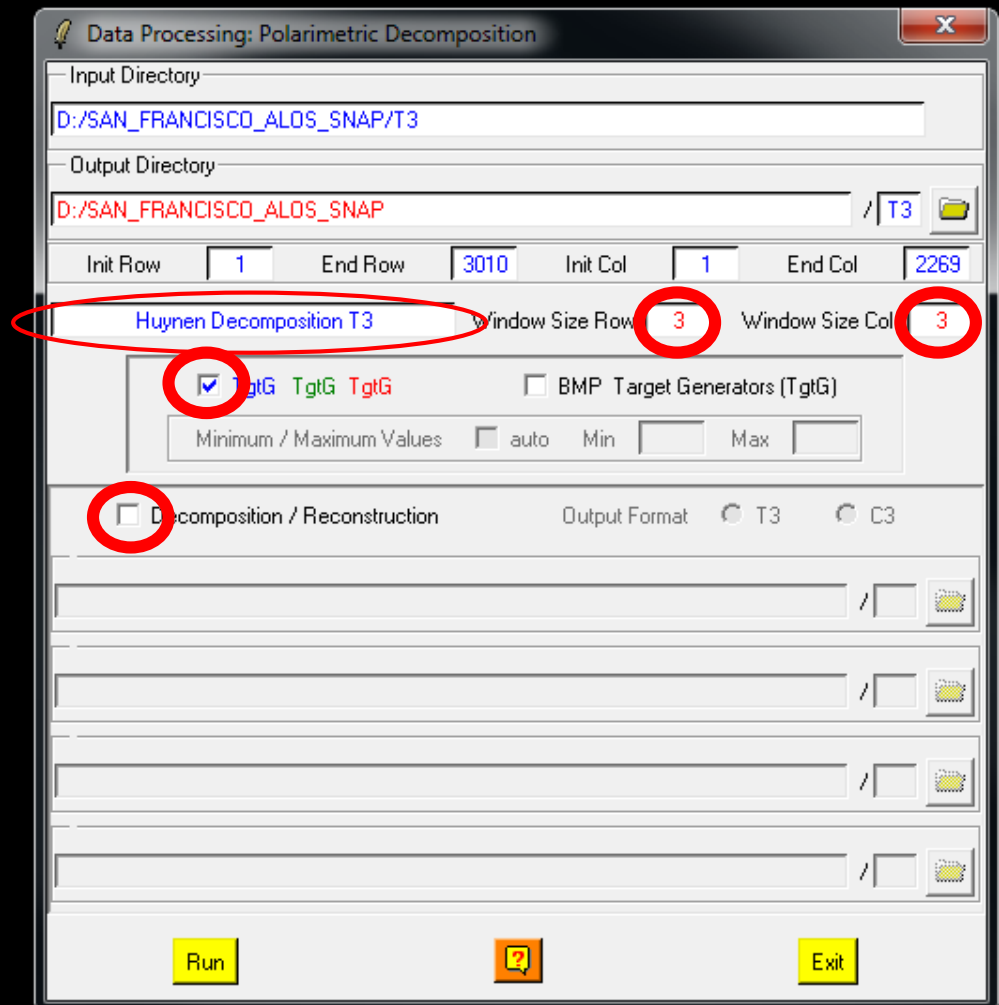




Do it Yourself:
Select a decomposition,
Select the pauli RGB generation.

Don't select Decomposition / Reconstruction

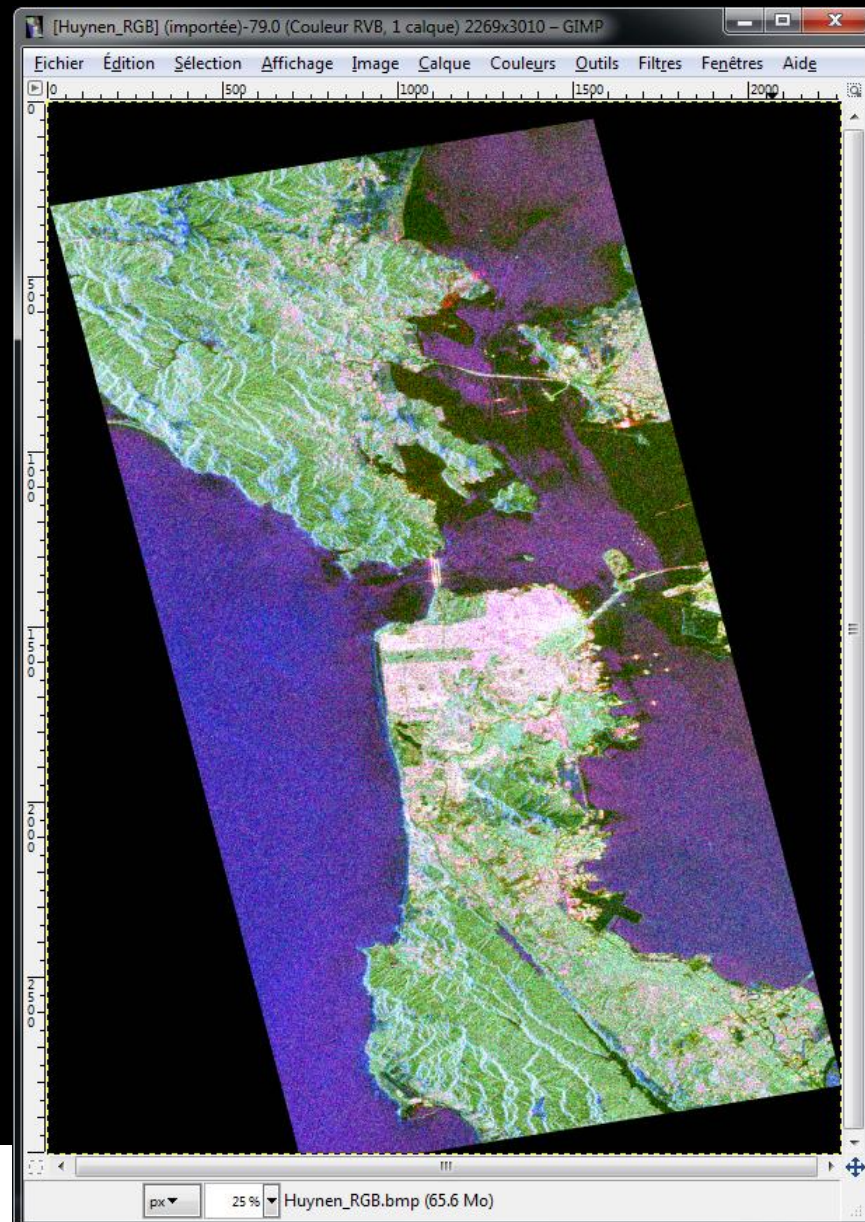
Window Size = 3



Pauli RGB



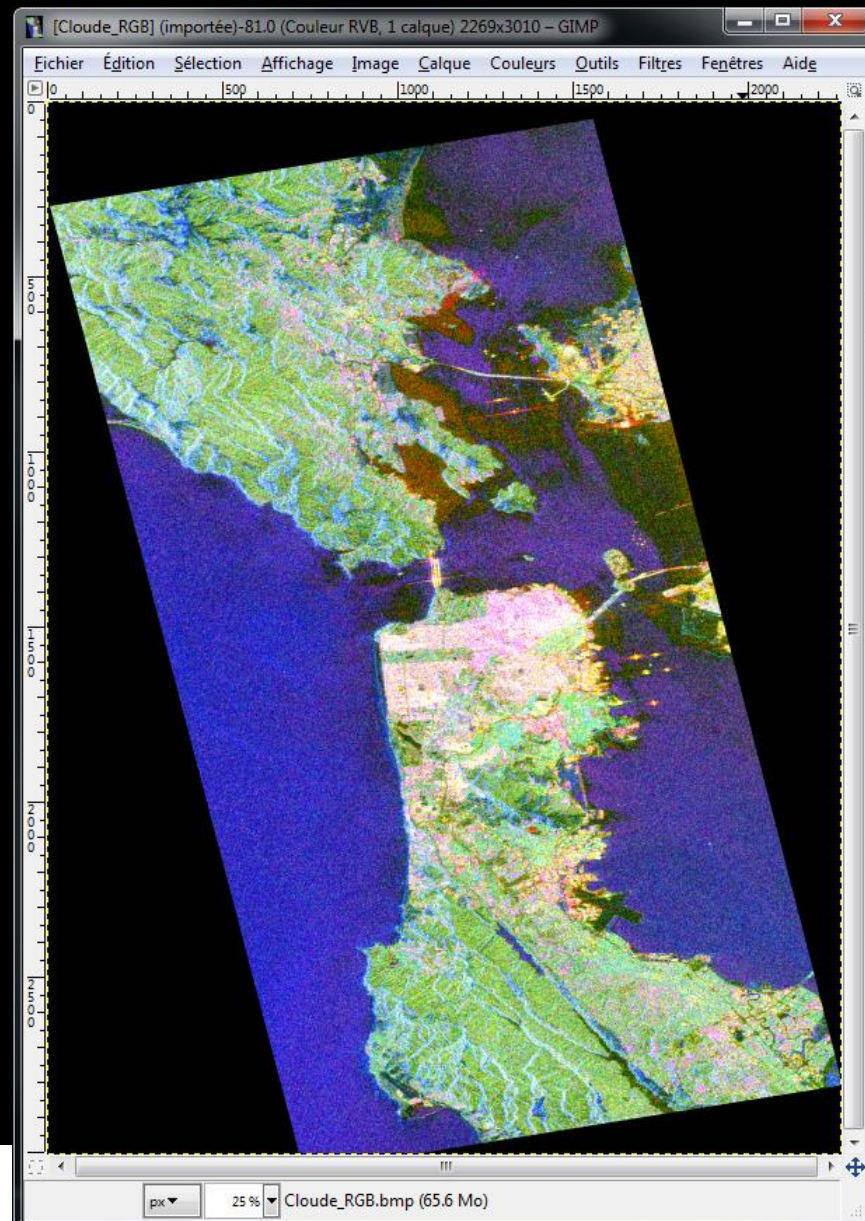
Pauli Huynen



Pauli RGB



Pauli Cloude



Pauli RGB



Pauli H-A-Alpha



POLARIMETRIC DECOMPOSITION



Pauli RGB



Pauli Van Zyl 3



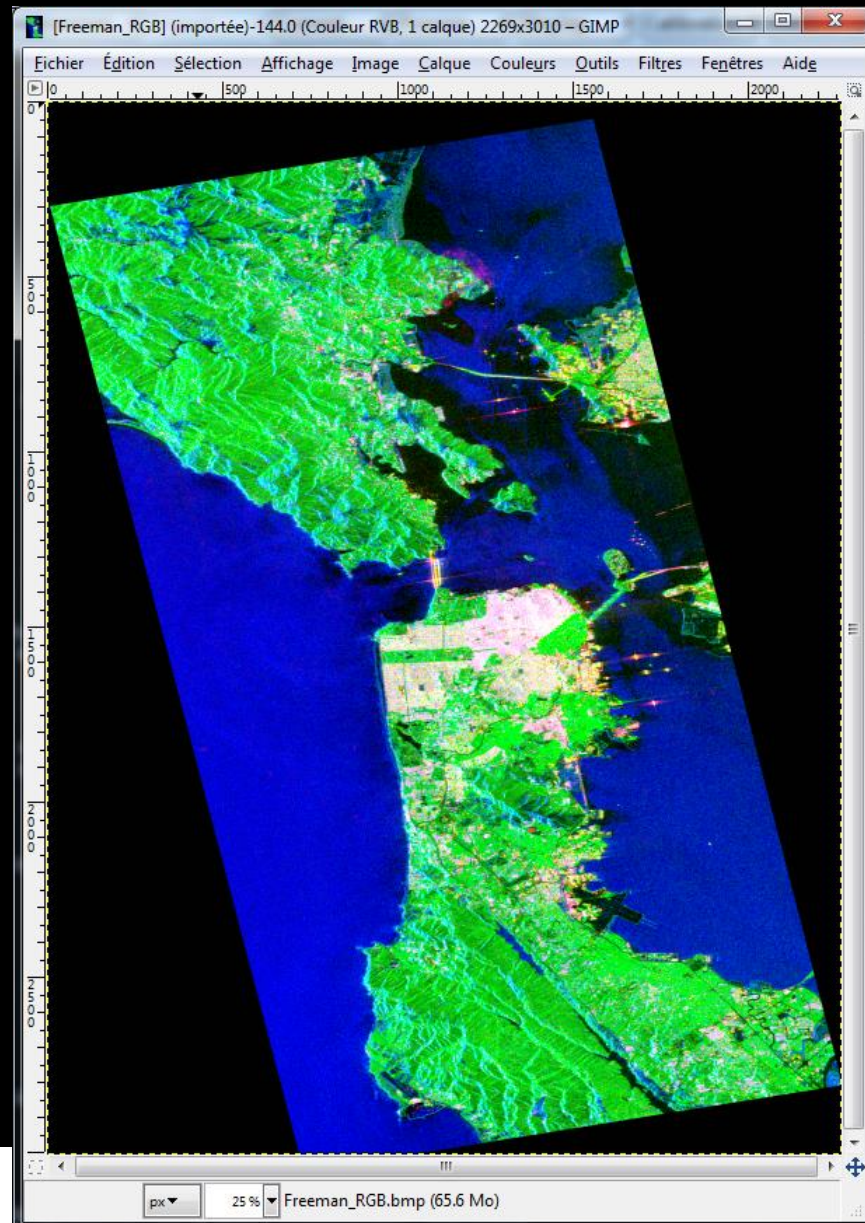
POLARIMETRIC DECOMPOSITION



Pauli RGB



Pauli Freeman 3



Pauli RGB



Pauli Yamaguchi 3

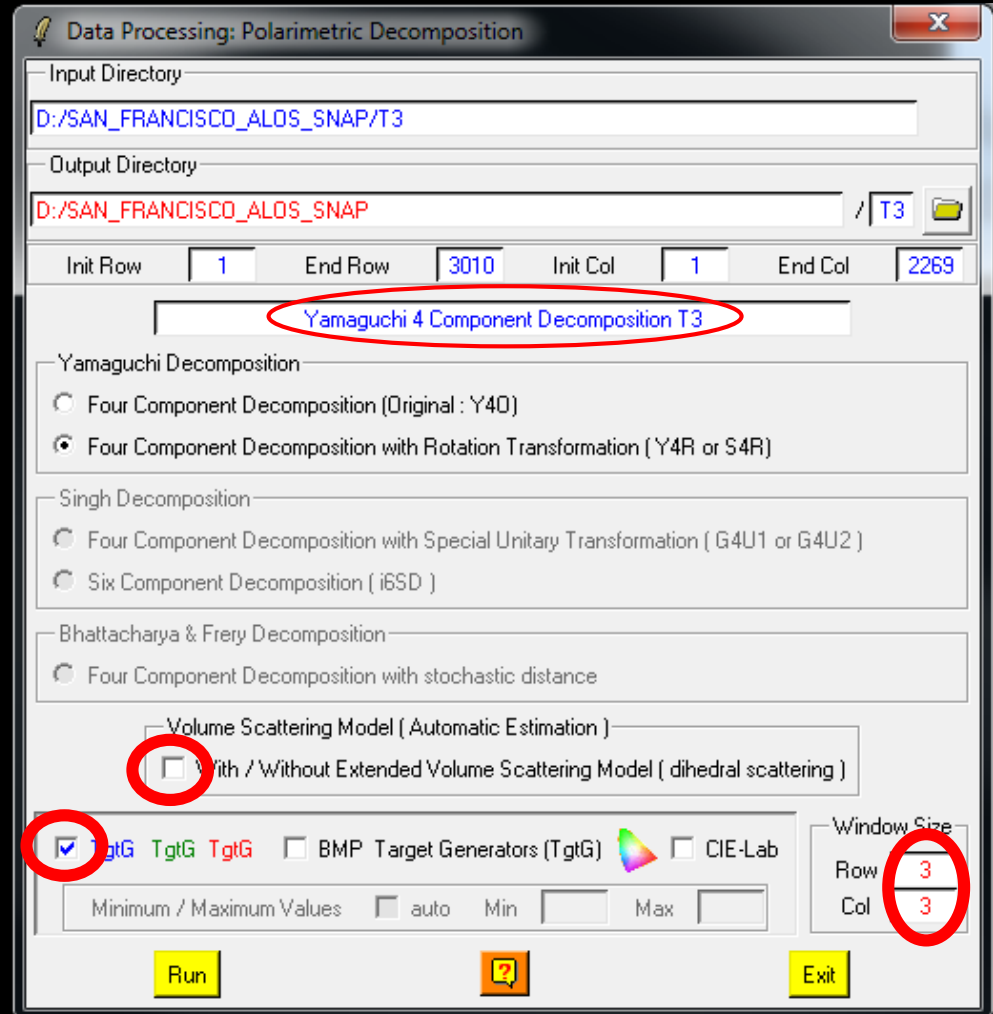




Do it Yourself:
Select a decomposition,
Select the pauli RGB generation.

Window Size = 3

Yamaguchi Y40, Y4R, S4R
Singh G4U1, G4U2



Pauli Yamaguchi 3



Pauli Yamaguchi Y4R



Pauli Yamaguchi Y4R



Pauli Singh - Yamaguchi G4U2



Configuration

Data Process

➤ Eigenvalue Parameters

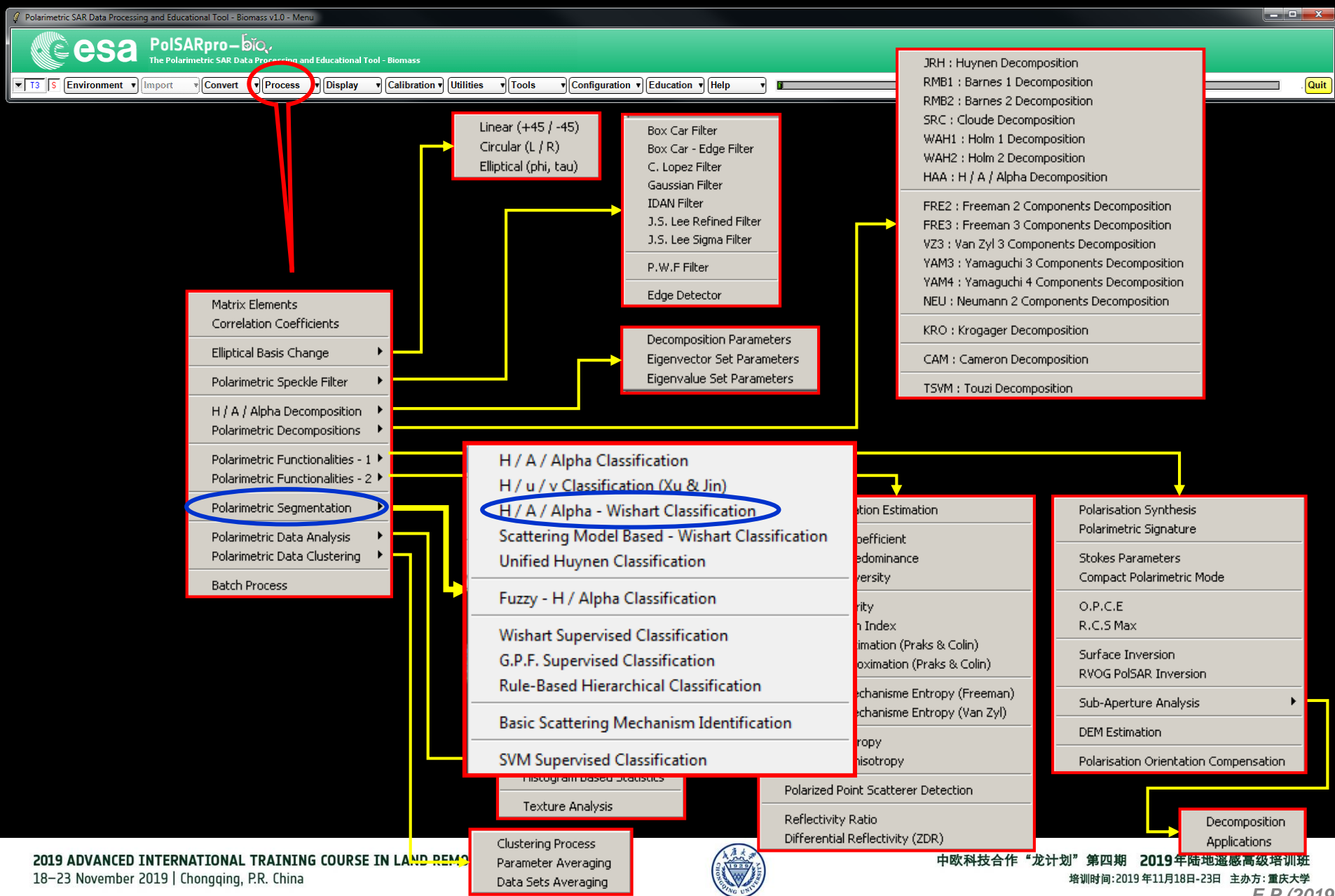
➤ Polarimetric Decomposition

➤ Polarimetric Segmentation

➤ Wishart - H / A / alpha classification

➤ Supervised Wishart classification

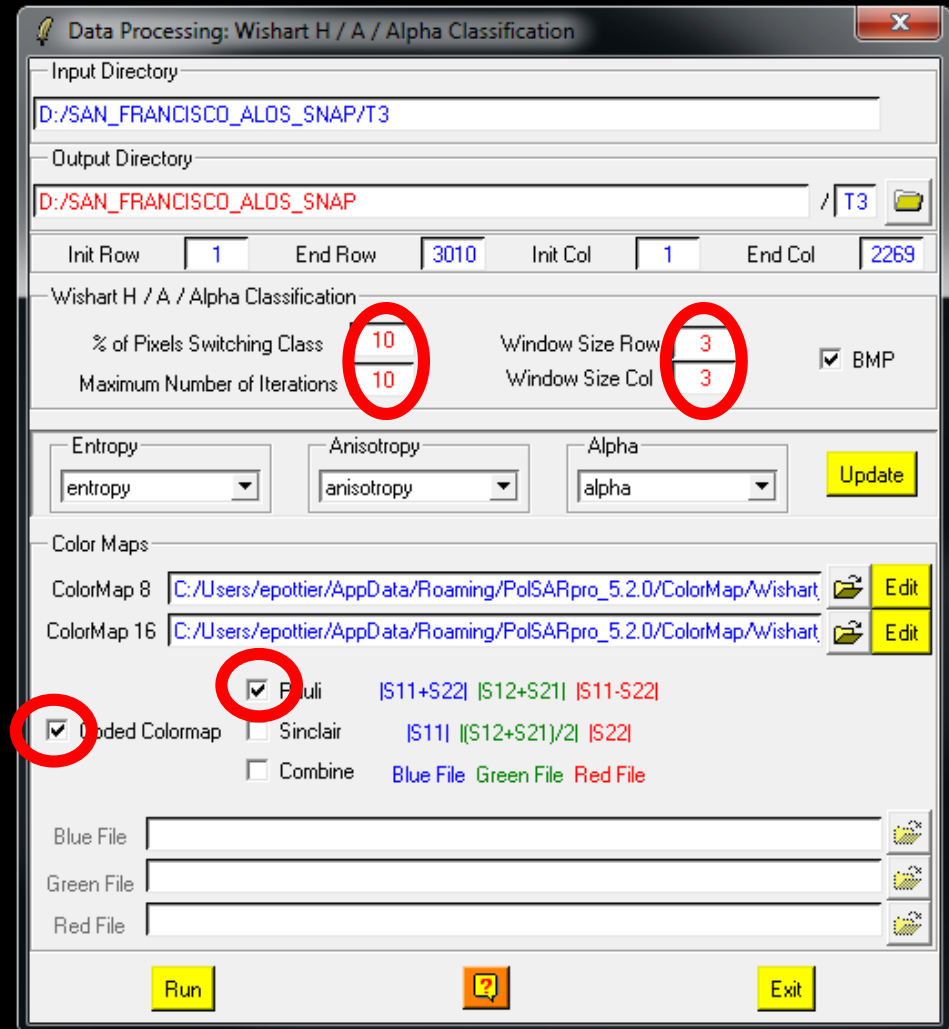
PoISARpro v5.1 SOFTWARE

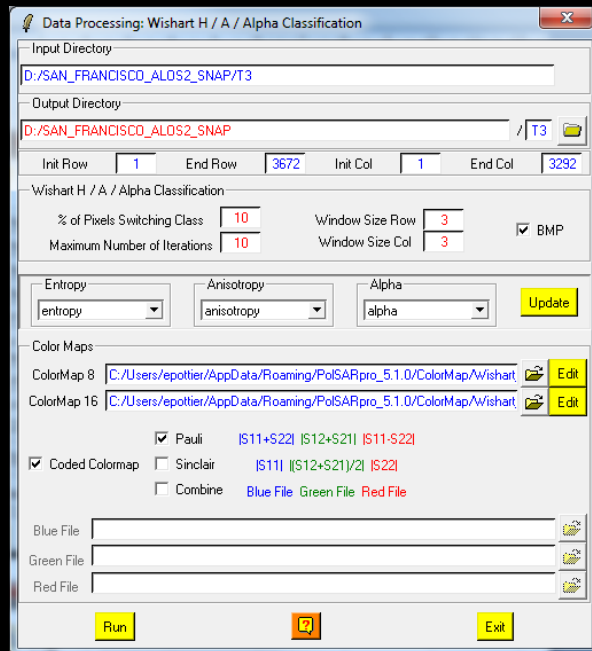


WISHART - H/A/alpha CLASSIFICATION



Do it Yourself:
Set the parameters, run and view
the corresponding BMP files.





DATADIR

config.txt

[T3x3] Elements

Wishart_H_alpha_class_X.bin
Wishart_H_A_alpha_class_X.bin

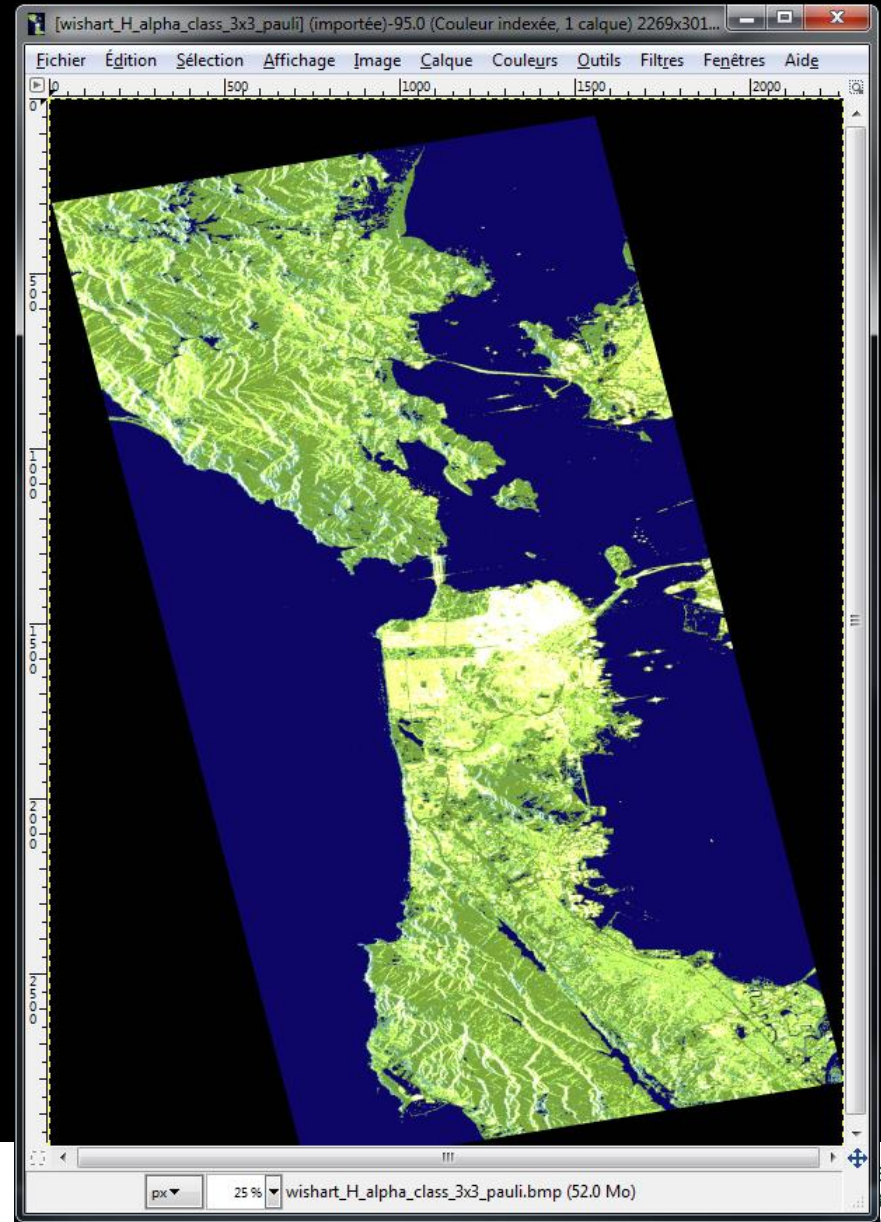
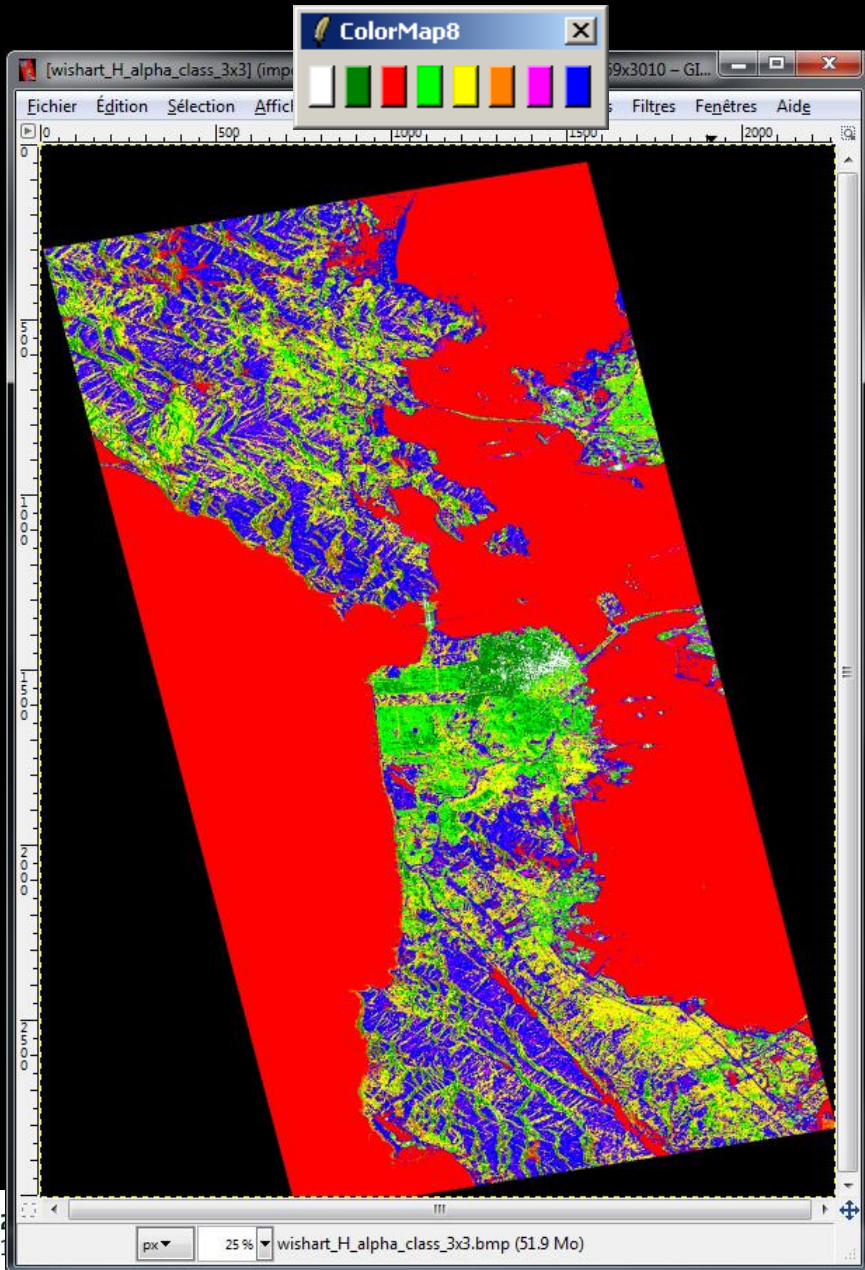
Wishart_H_alpha_class_X.bmp
Wishart_H_A_alpha_class_X.bmp

X = window size

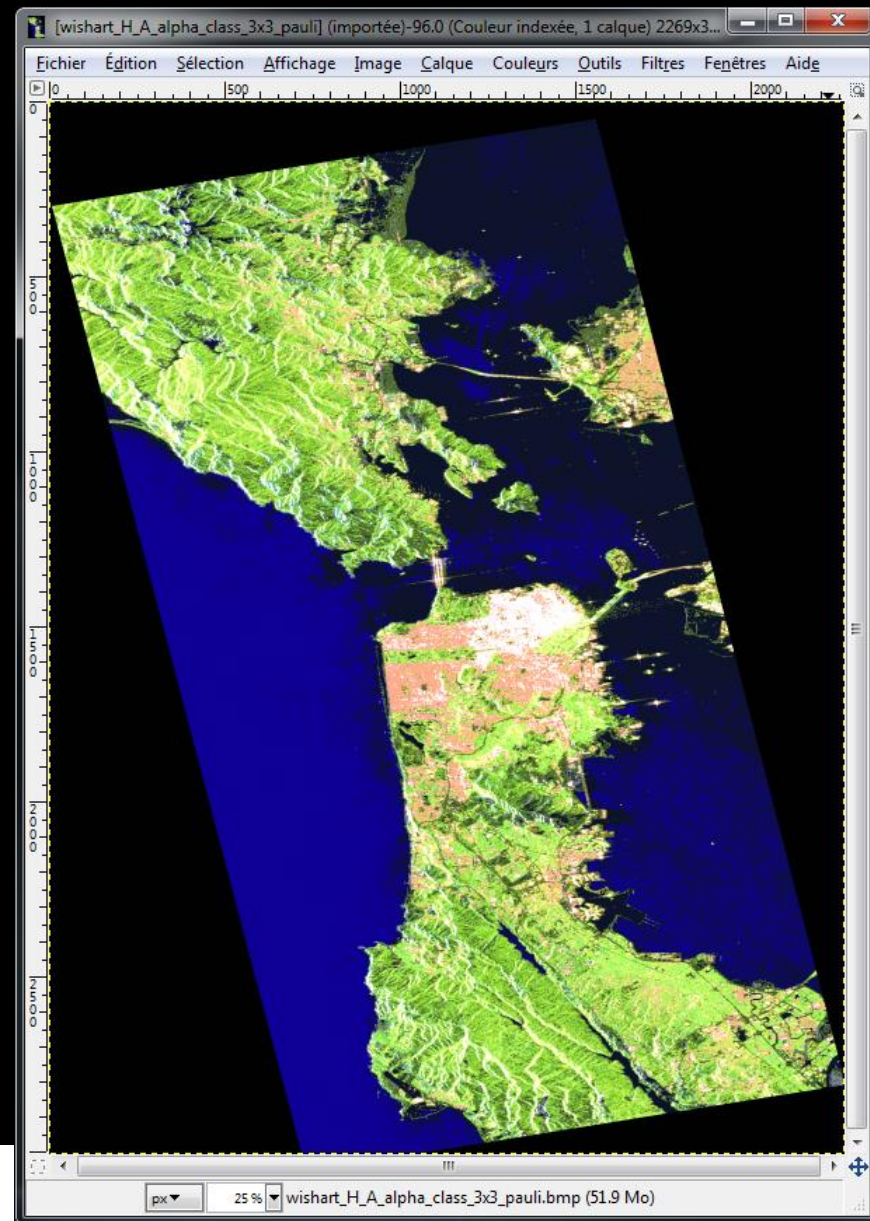
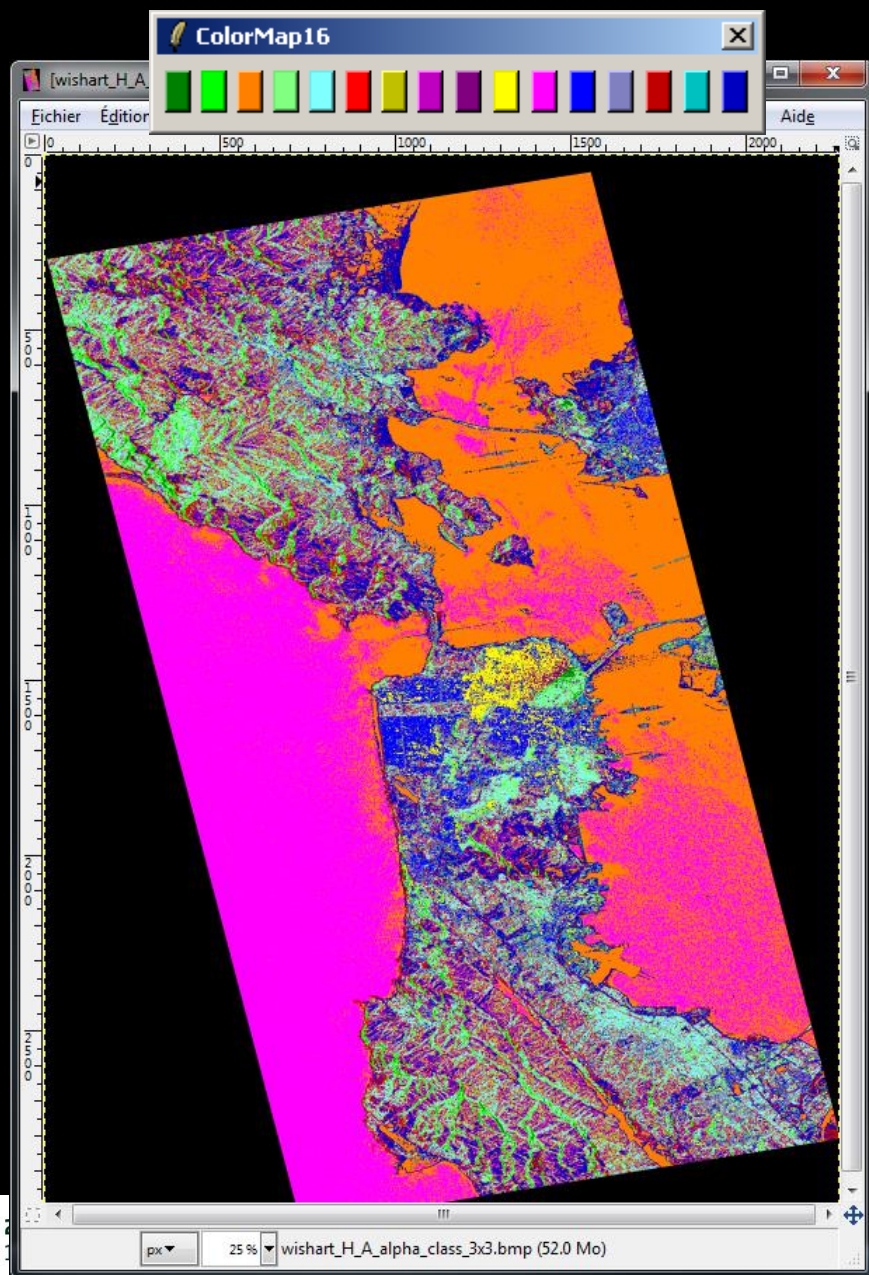
Do it Yourself:

Set the parameters, run and view the corresponding BMP files.

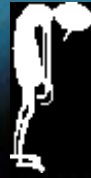
WISHART - H/A/alpha CLASSIFICATION



WISHART - H/A/alpha CLASSIFICATION



Questions ?



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