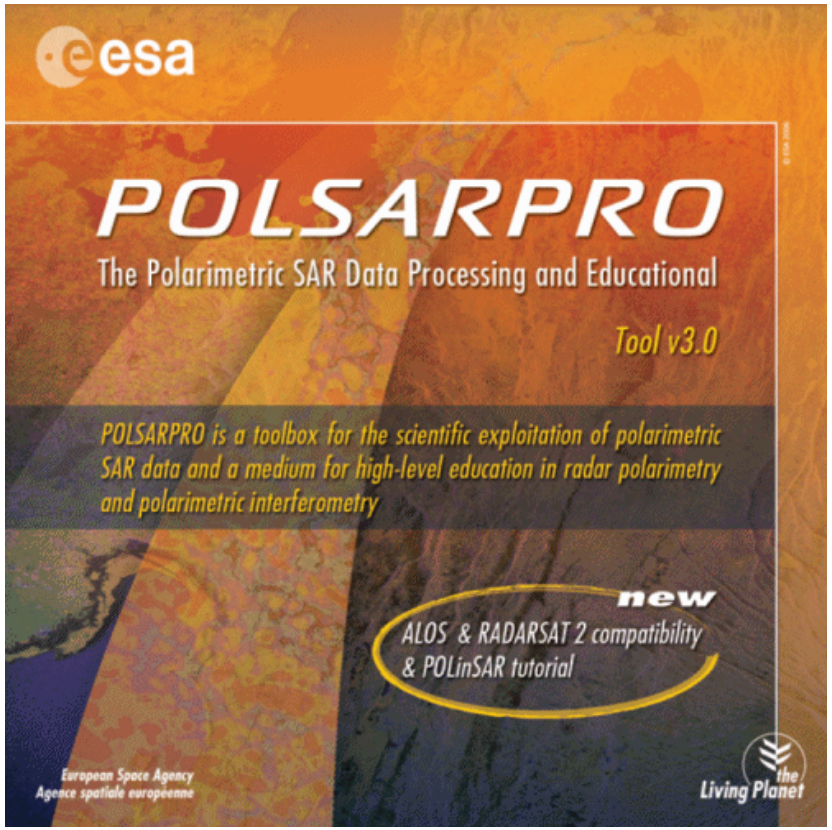
Introduction to PolSARpro v3.0

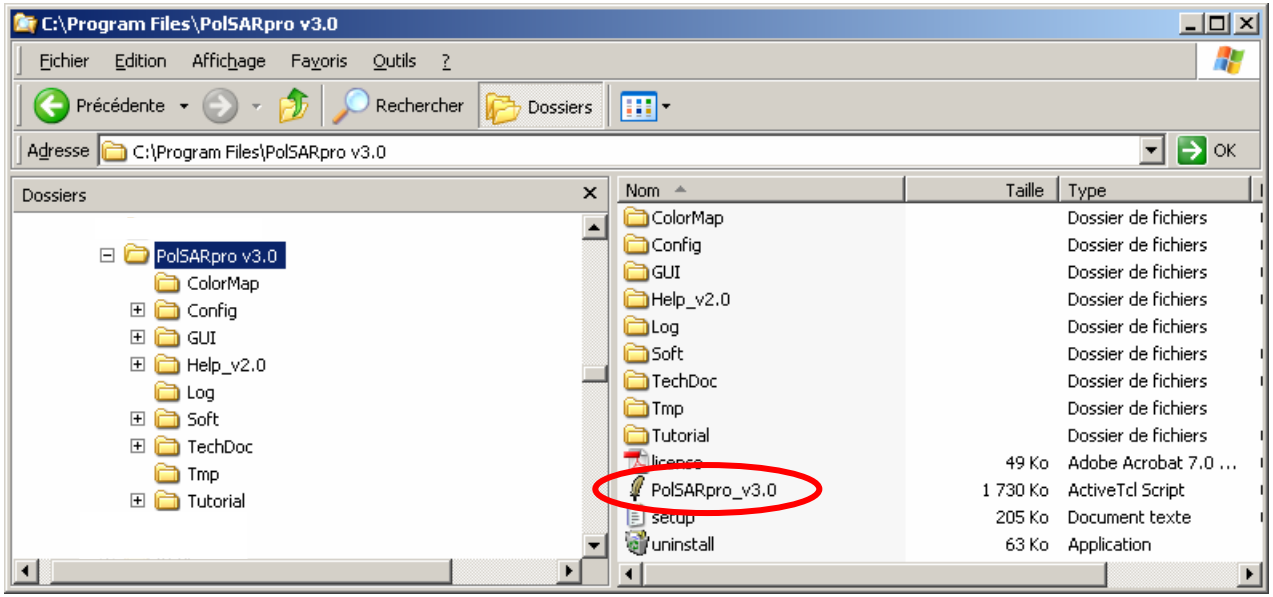
Eric POTTIER

Tuesday 4 September, Lecture D2PA-2 & D2PB-1



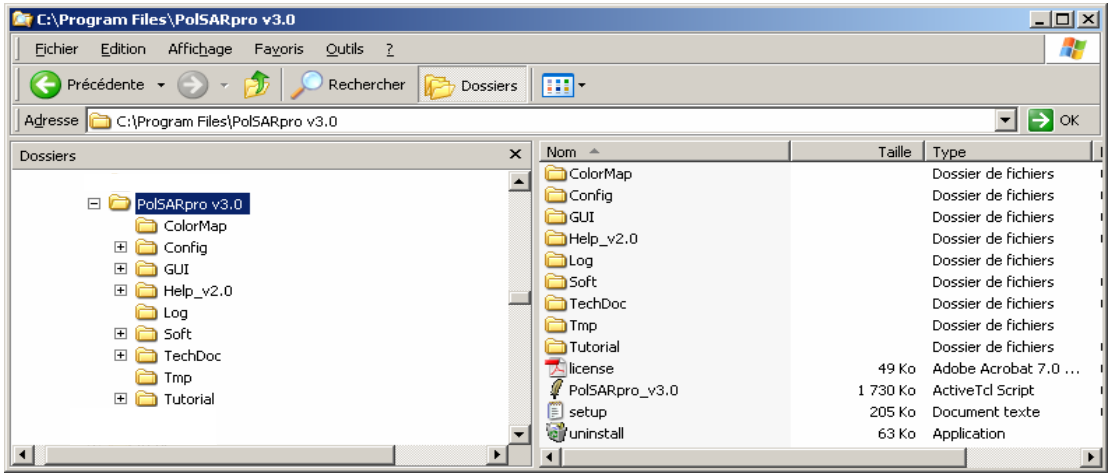
General Presentation of PolSARpro v3.0 Software

SOFTWARE DIRECTORY STRUCTURE



PolSARpro_v3.0.tcl is the **executable file** that launches the POLSARPRO user interface

SOFTWARE DIRECTORY STRUCTURE



- **ColorMap Directory contains user defined or modified PolSARpro v3.0 colour-map files.**
- **Config Directory contains default defined colour-map files or training class definition text files: *Never Change nor Modify*.**
- **GUI Directory contains all the Widget Window Tcl-Tk files.**
- **Help_v2.0 Directory contains PolSARpro v3.0 documentation files written in PDF format.**
- **Log Directory contains the "LogFiles" where are registered all the Session Function Calls, Arguments, and Error Trace (Multi Session Capability).**
- **Soft Directory contains C-Source code and ready to use executable processing files and libraries.**
- **Tech Doc Directory contains PolSARpro v3.0 Technical Documentation Material written in PDF format.**
- **Tutorial Directory contains PolSARpro v3.0 Tutorial Material written in PDF format.**

POLSARPRO

POLSARPRO
The Polarimetric SAR Data Processing and Educational
Tool v3.0
new
Enter
Copyright © esa
Exit

Polarimetric SAR Data Processing and Educational Tool v3.0 - Menu
PolSARpro
Spaceborne
Airborne
Quit

MAIN MENU

MAIN MENU

PolSARpro Full Software
– Single Data Set
– Multi Data Sets

Tutorial on POLSAR and POLinSAR

Help Files

Viewer

Display

Tools

Version for the EO Scientific Investigator

Spaceborne Sensors: ALOS, ENVISAT, RADARSAT2, TerraSar, SIR-C
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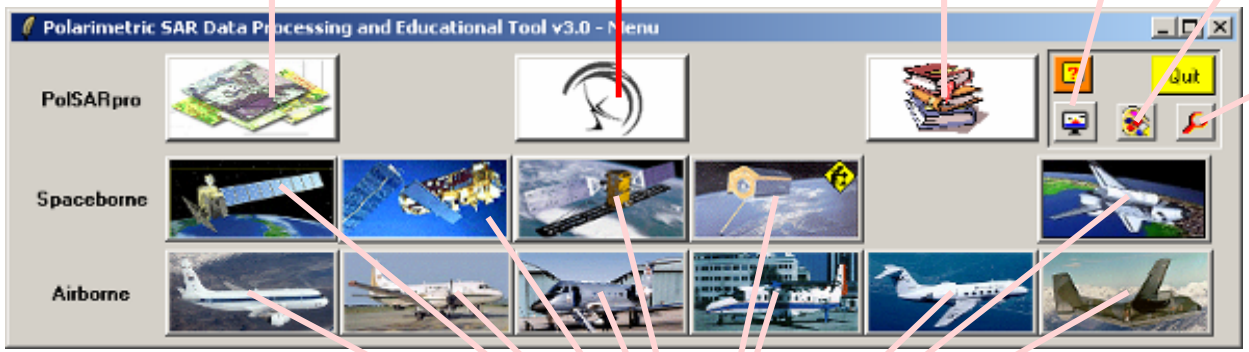
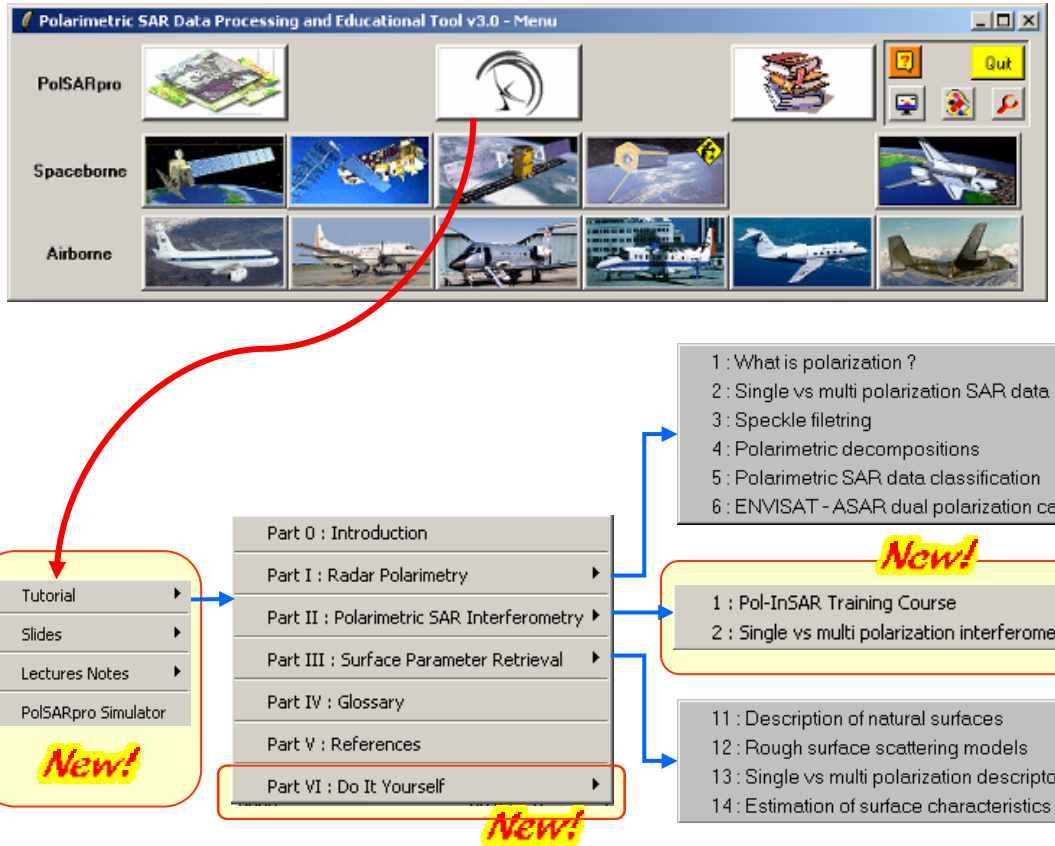
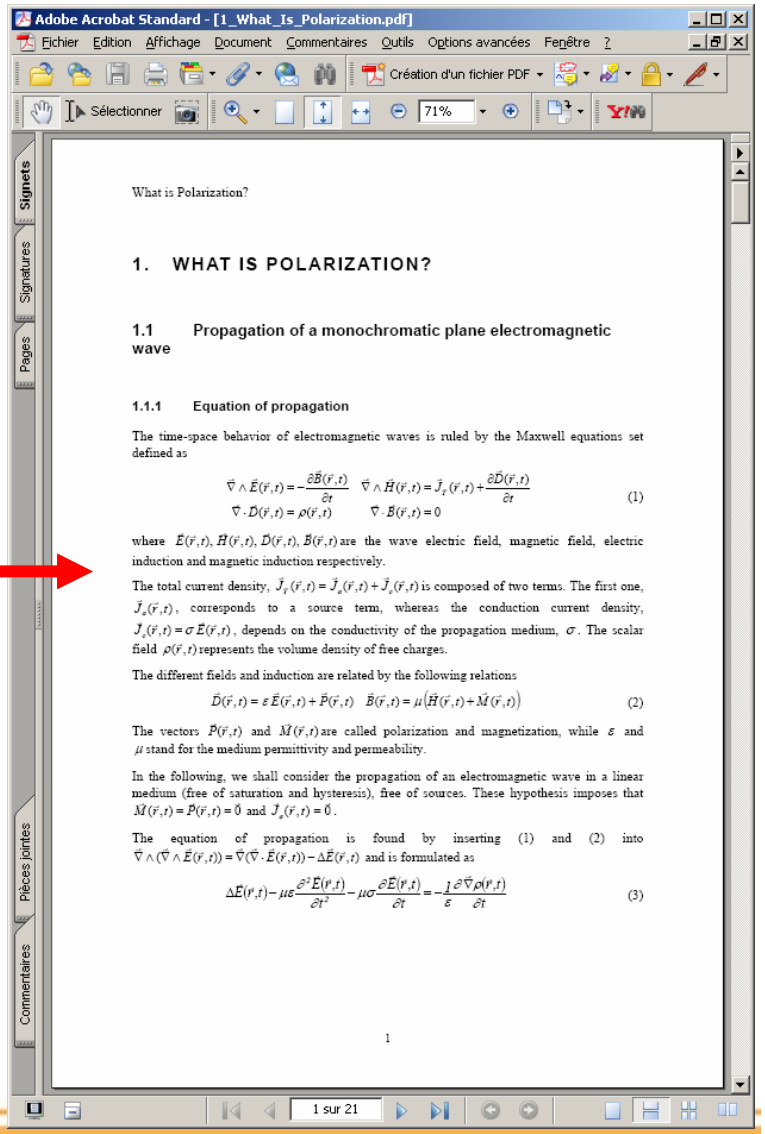


Version for the EO Scientific Investigator

Spaceborne Sensors: ALOS, ENVISAT, RADARSAT2, TerraSar, SIR-C
Airborne Sensors: AIRSAR, Convair, EMISAR, ESAR, PISAR, RAMSES

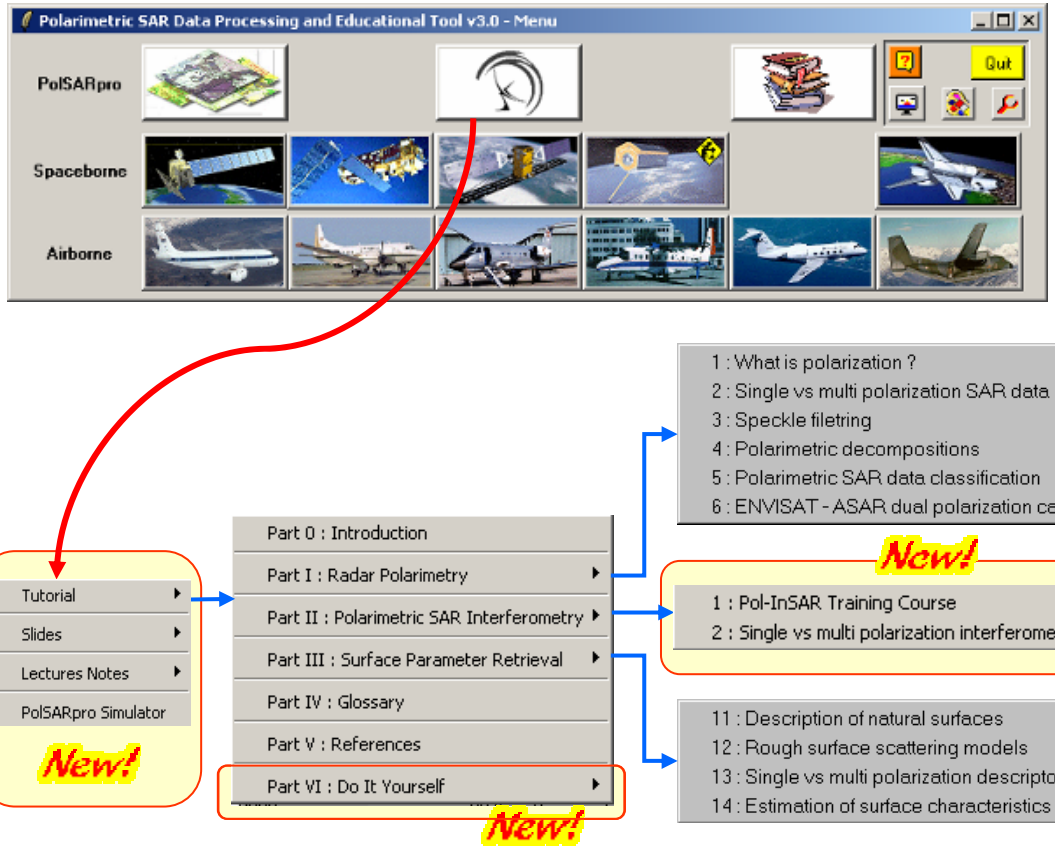
Provide a grounding in SAR Polarimetry (POLSAR) and SAR Polarimetric Interferometry (POLinSAR)

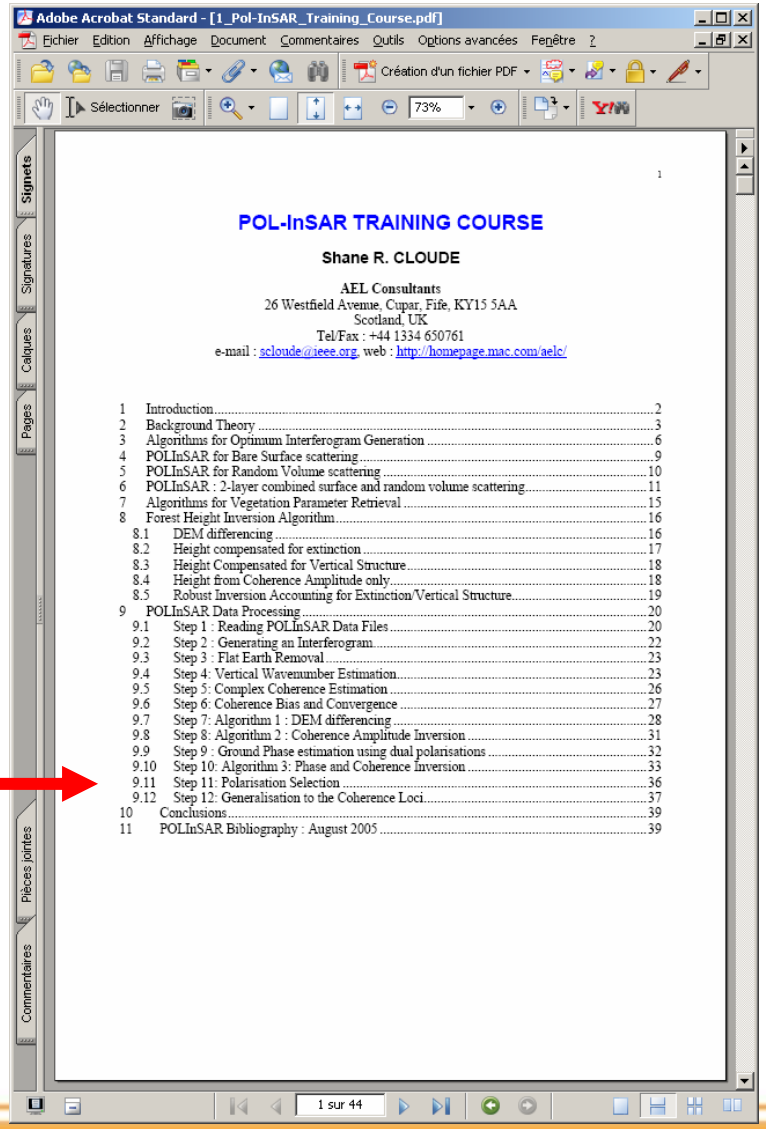




Direct access to the Tutorial while using PolSARpro facilities
The Tutorial is made available in PDF format.

Provide a grounding in SAR Polarimetry (POLSAR) and SAR Polarimetric Interferometry (POLinSAR)





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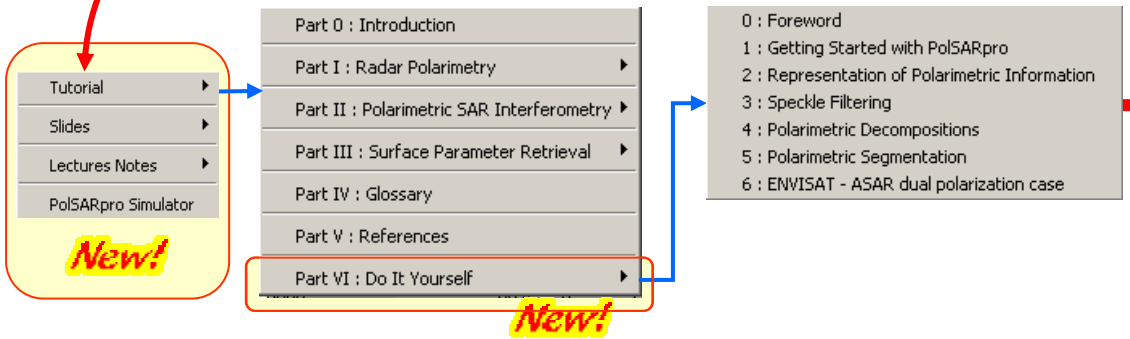
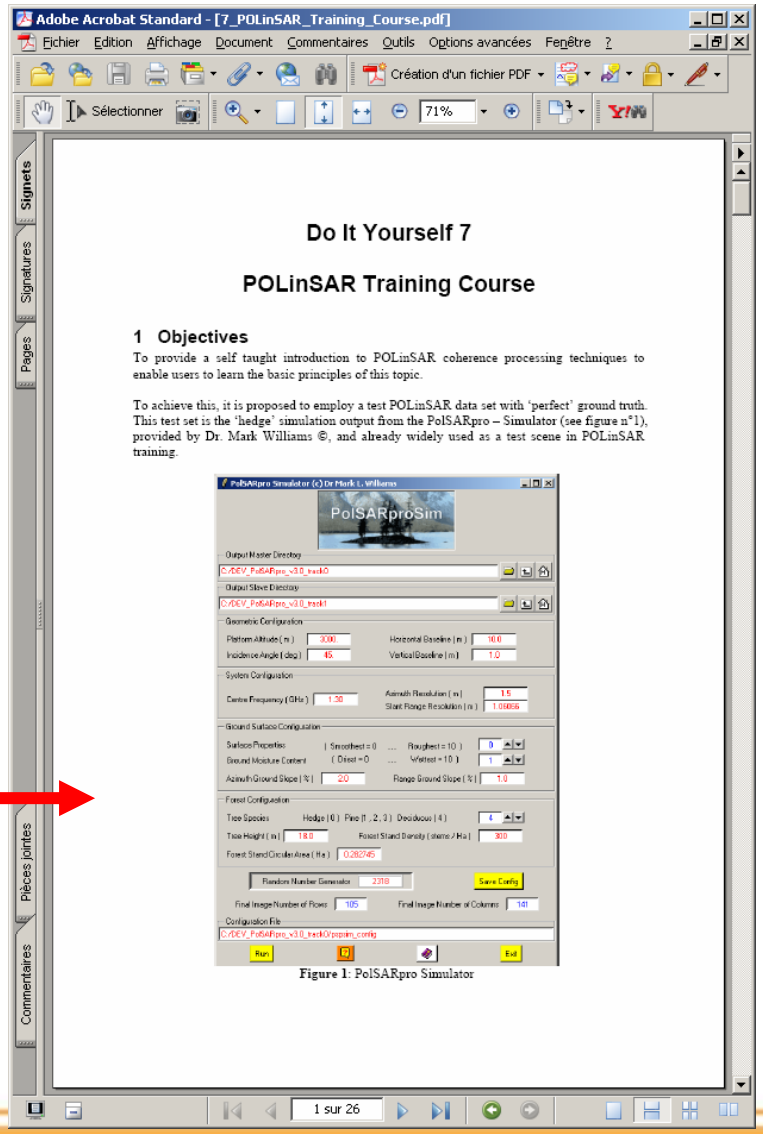
Provide a grounding in SAR Polarimetry (POLSAR) and SAR Polarimetric Interferometry (POLinSAR)

A More Progressive Approach





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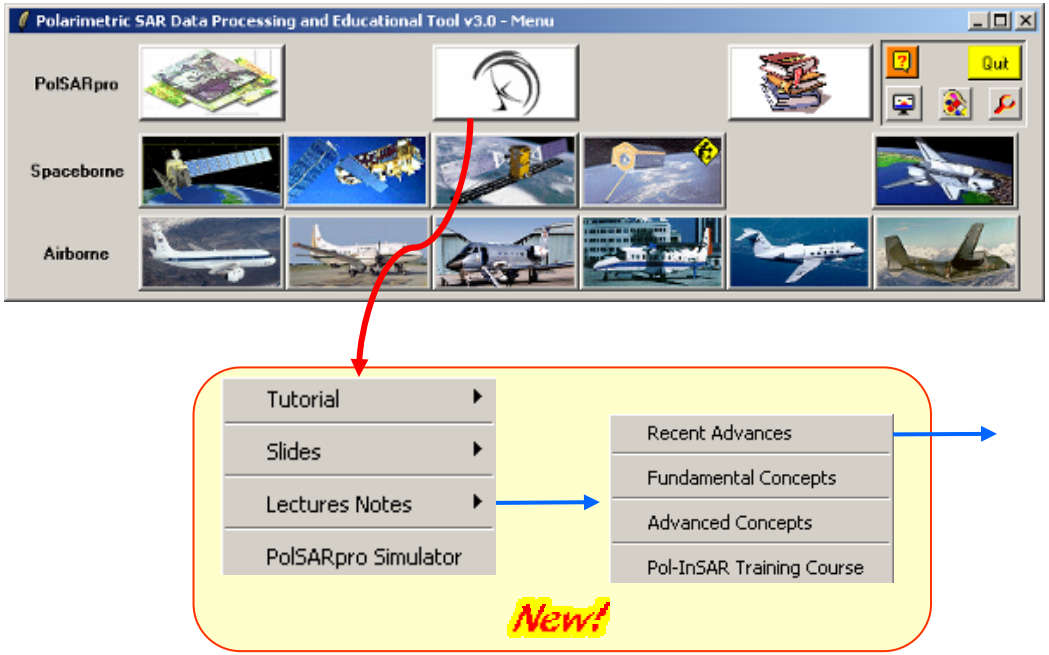
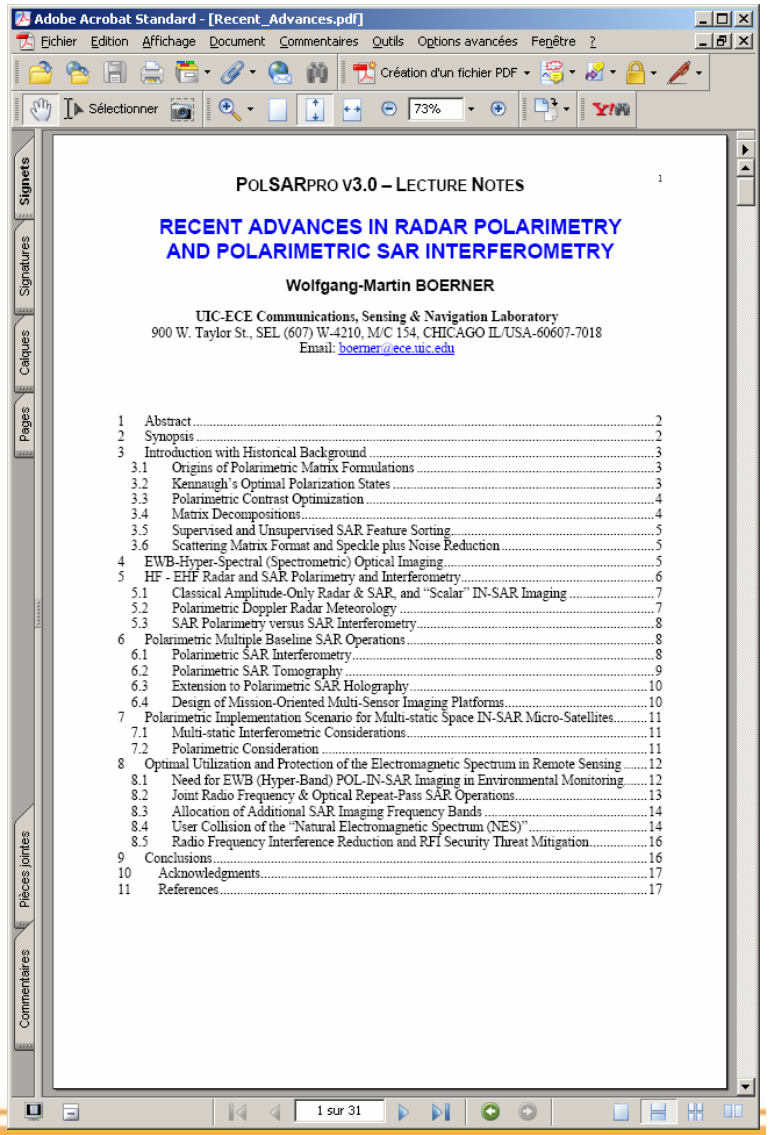


Recent Advances in Radar Polarimetry and Polarimetric SAR interferometry
W.M. Boerner – 31 pages



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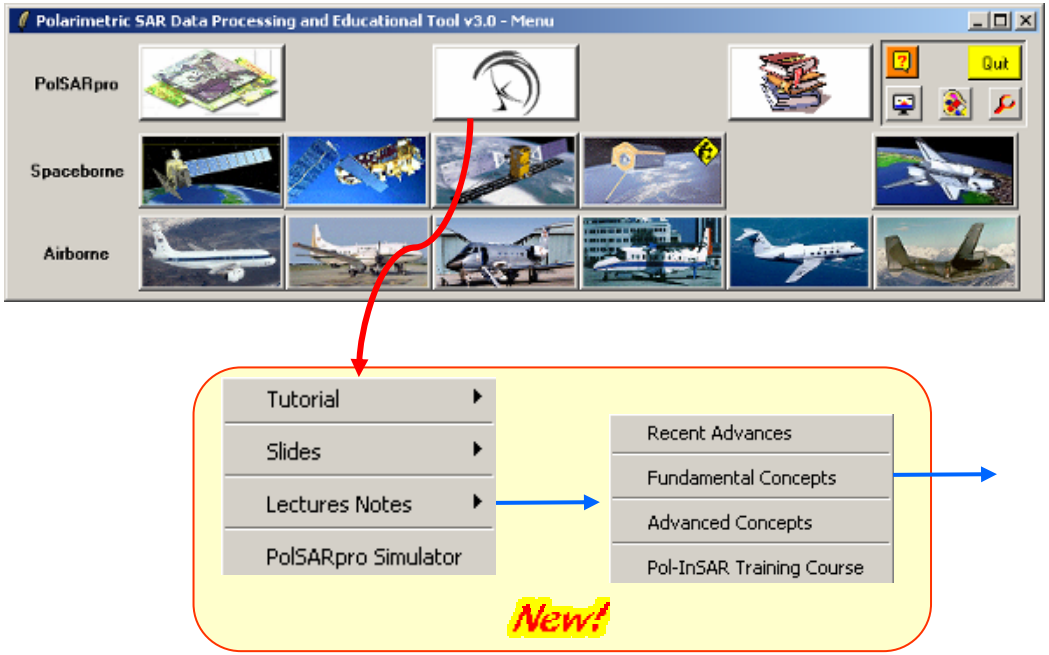
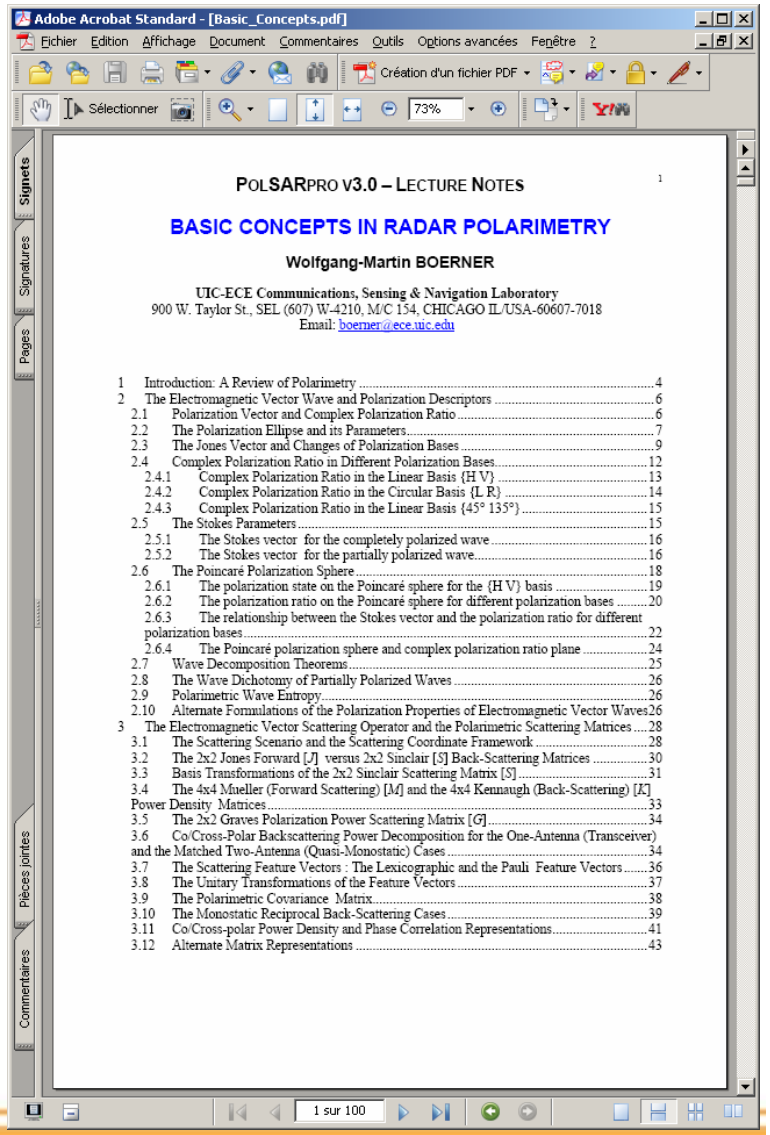


Basic Concepts in Radar Polarimetry
W.M. Boerner – 100 pages



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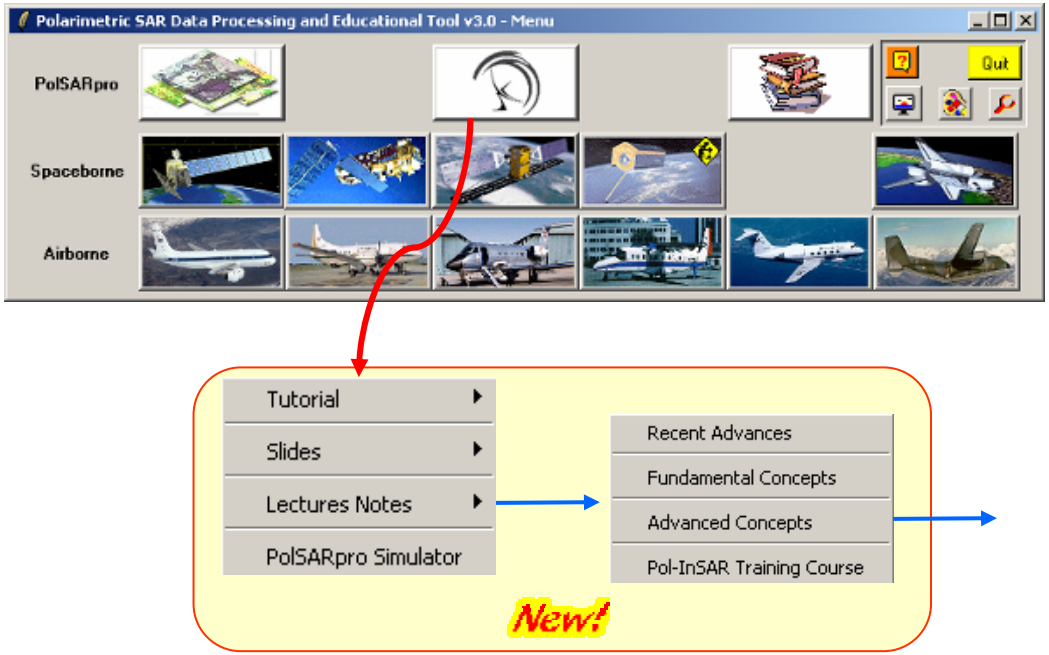
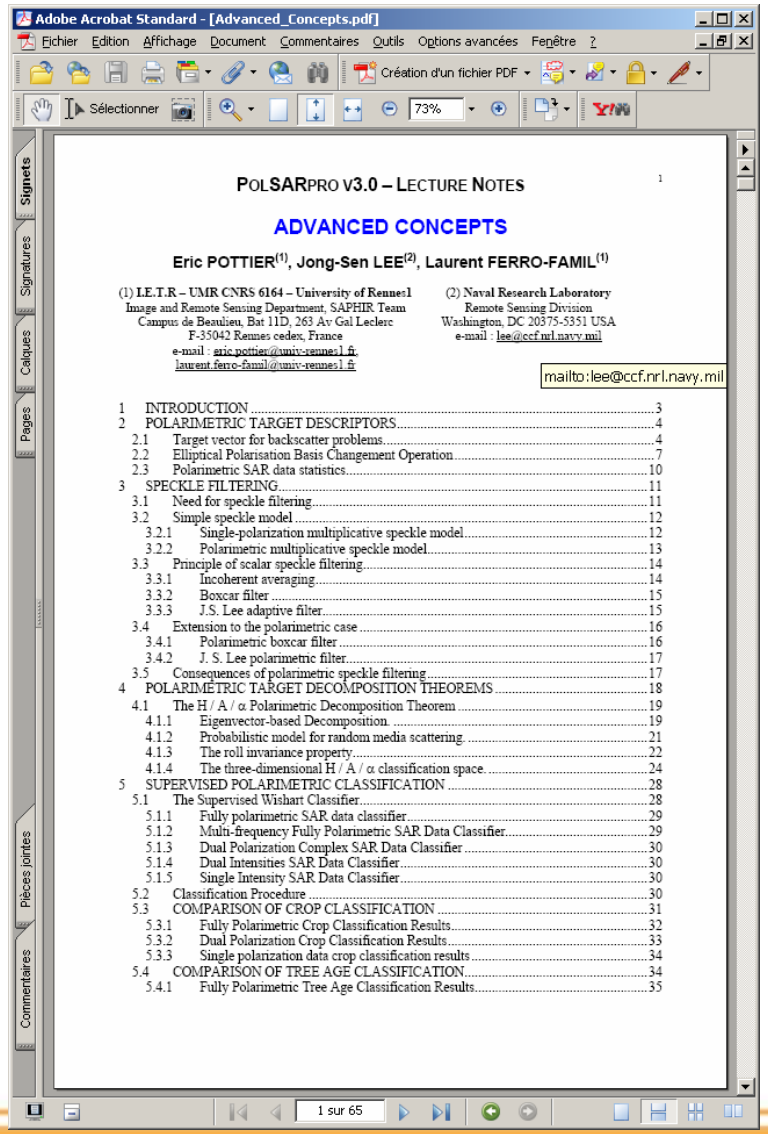


Advanced Concepts
E. Pottier, J.S. Lee, L. Ferro-Famil – 65 pages



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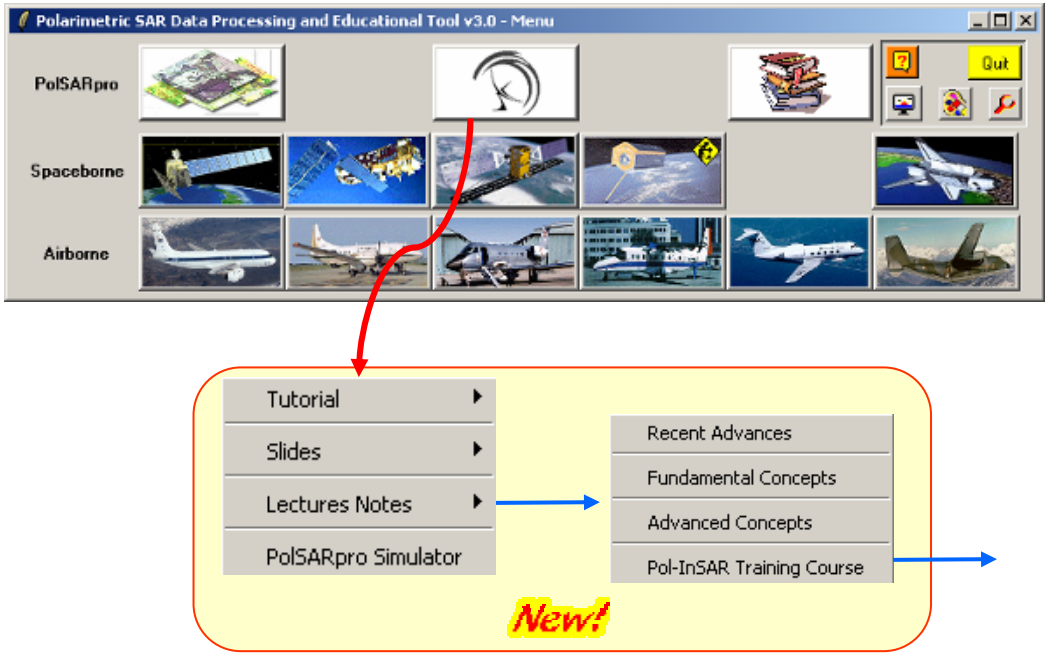
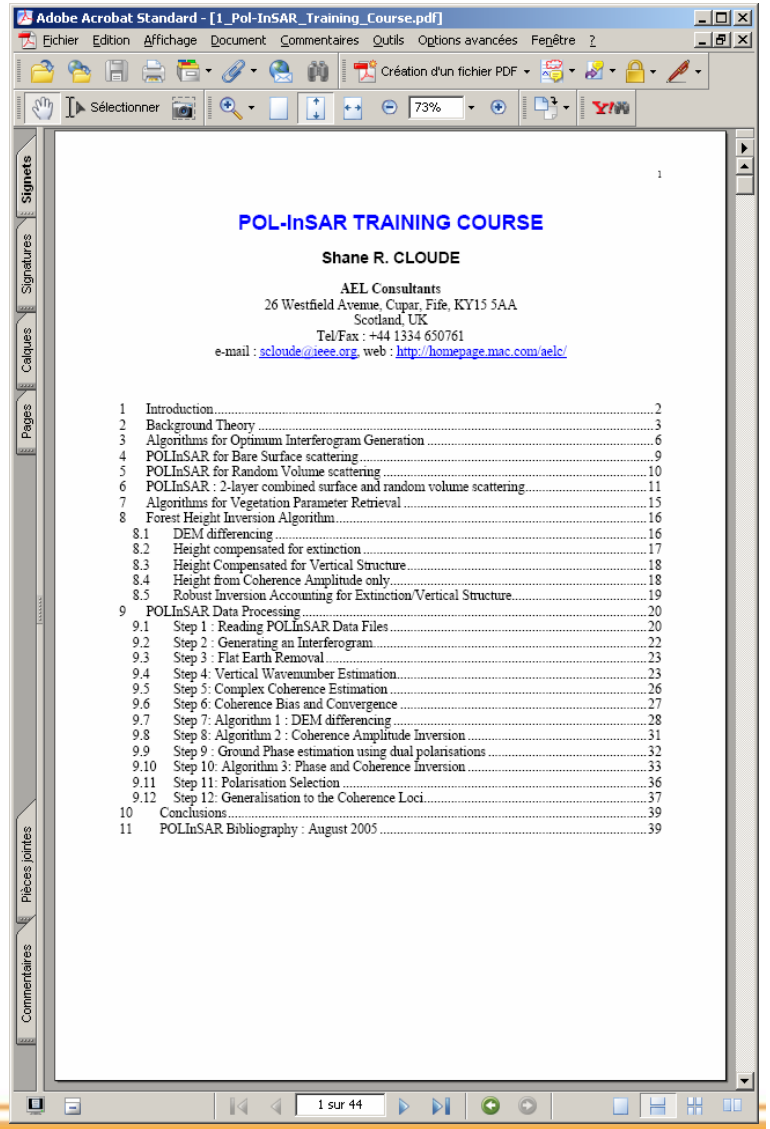
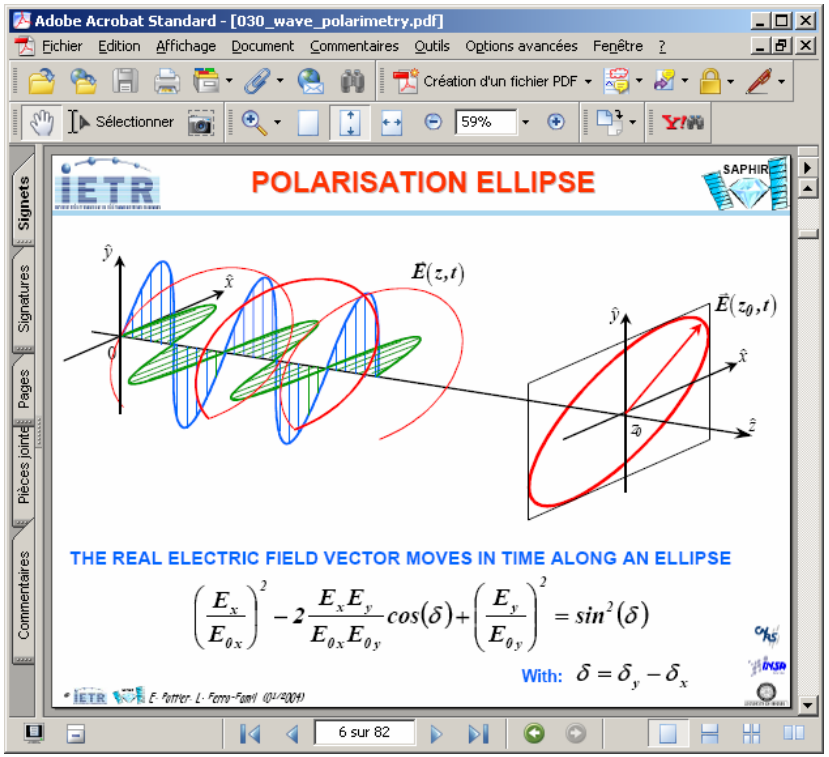


POL-InSAR Training Course
S.R. Cloude – 44 pages



Direct access to the Tutorial while using PolSARpro facilities
The Tutorial is made available in PDF format.

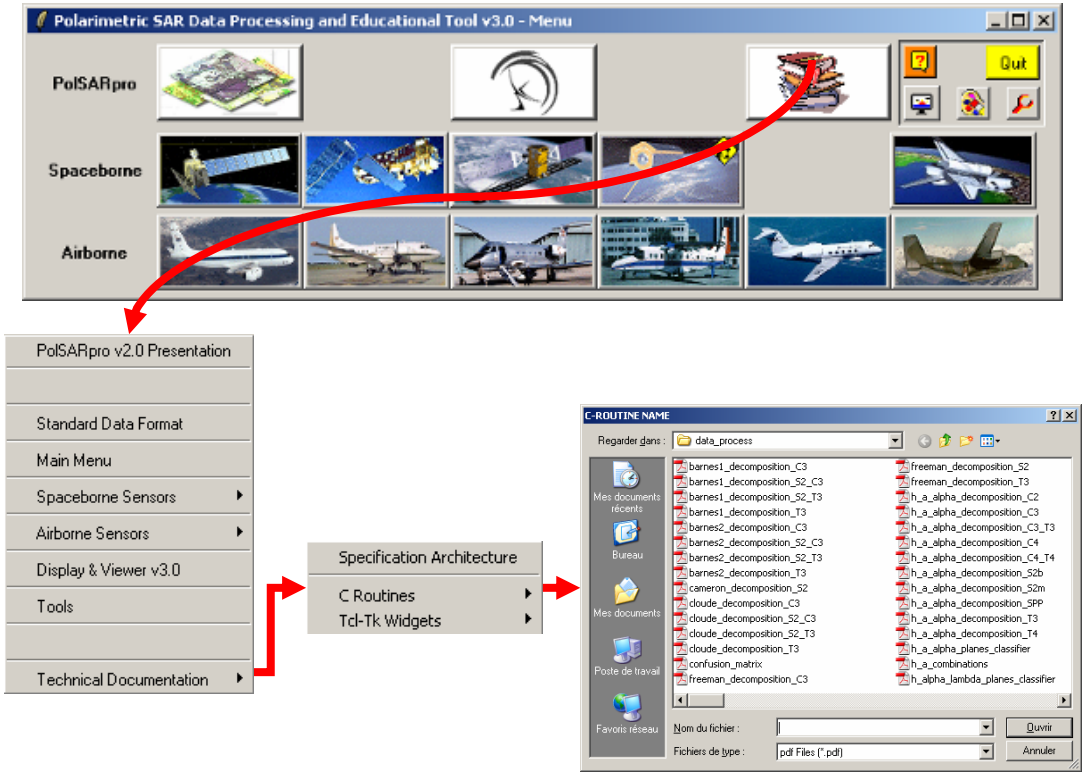
Series of Tutorial Slide Shows is mave available to support taught courses of for use as part of a self teaching programme.

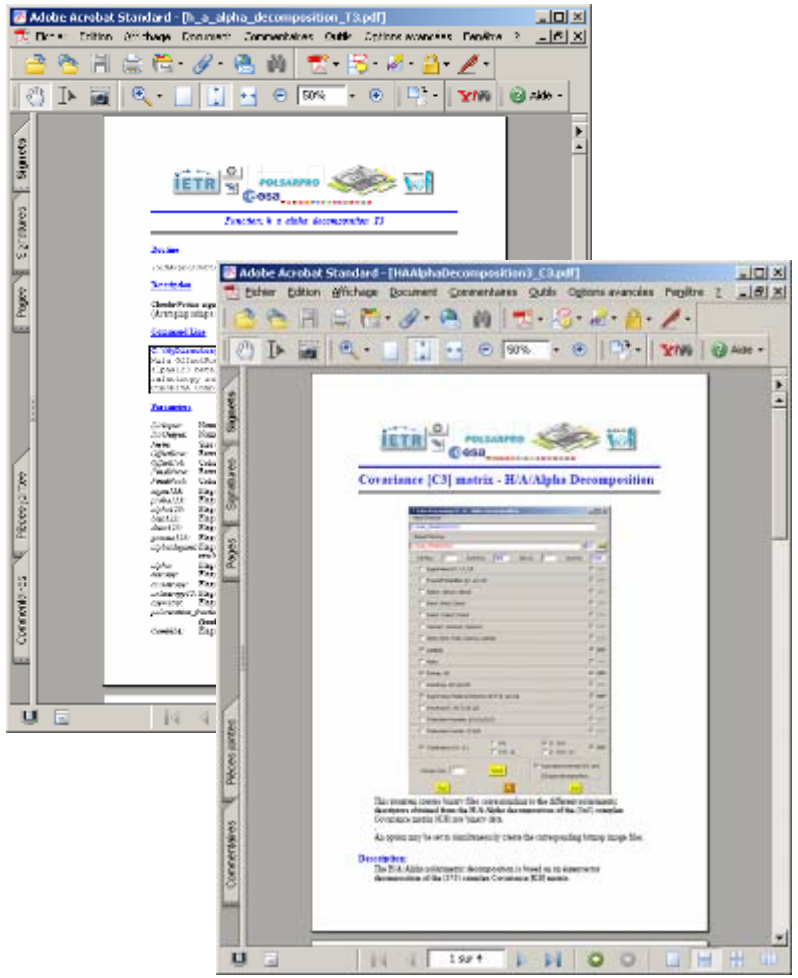


Direct access to the Slide Shows while using PolSARpro facilities

The Tutorial is made available in PDF format.

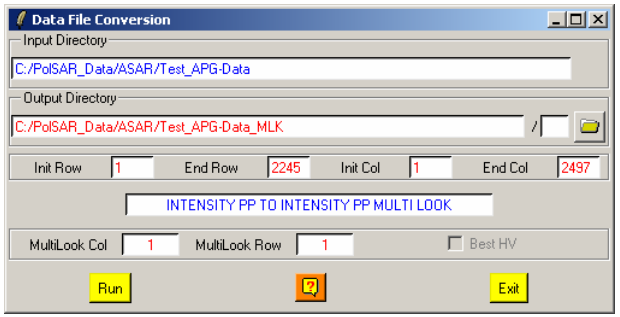
Series of concatenated sub-sections of the User Manual, containing all the individual pages necessary for a specific interface (Tech Doc).





228 Tcl-Tk Widget description files
526 C Routine description files

Direct access to the Technical Documentation while using PolSARpro facilities
The Technical Documentation is made available in PDF format.



PolSARpro v3.0 Software is accompanied by a comprehensive set of 228 Help Files for each individual function.

Individual Help Files are accessible from within the software by clicking on the help icon present in the relevant dialogue box.

User Manual is made available in PDF format.

MAIN MENU

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– Single Data Set
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Tutorial on POLSAR and POLinSAR

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PolSARpro V3.0 Software provides a comprehensive suite of functions for the scientific exploitation of fully and partially polarimetric data. It performs complete end-to-end processing without the need for other software.

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

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

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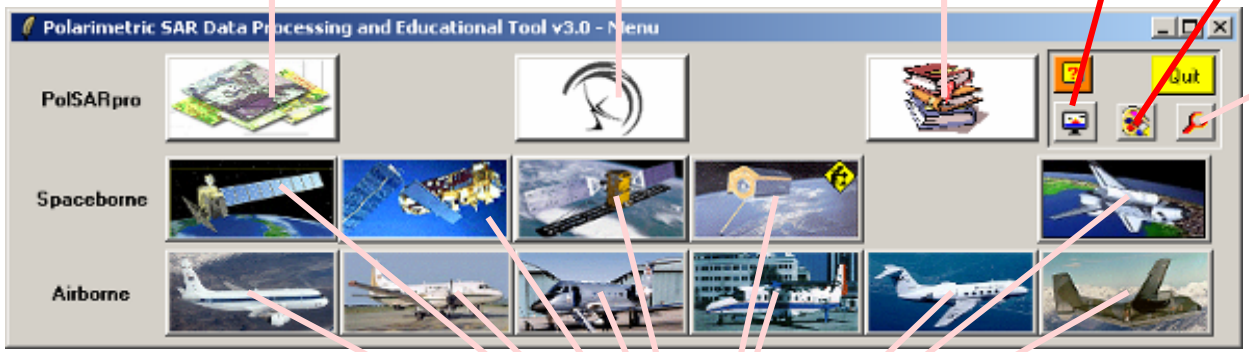

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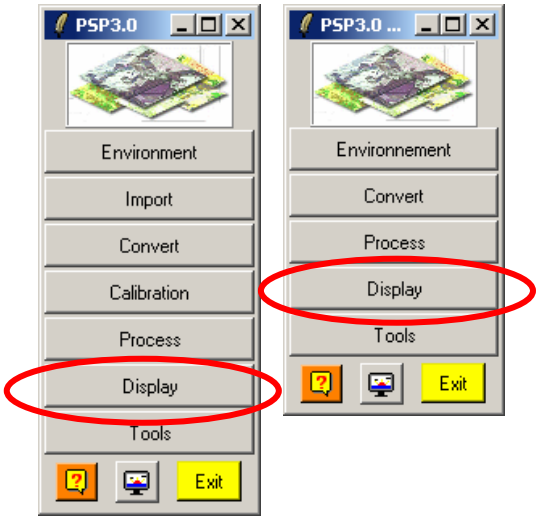
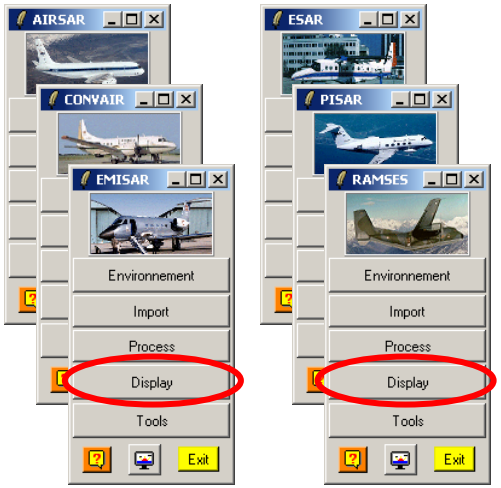
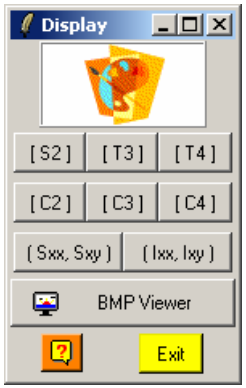
PolSARpro Display & Viewer v3.0



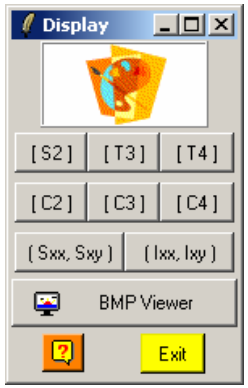


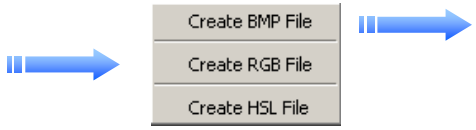


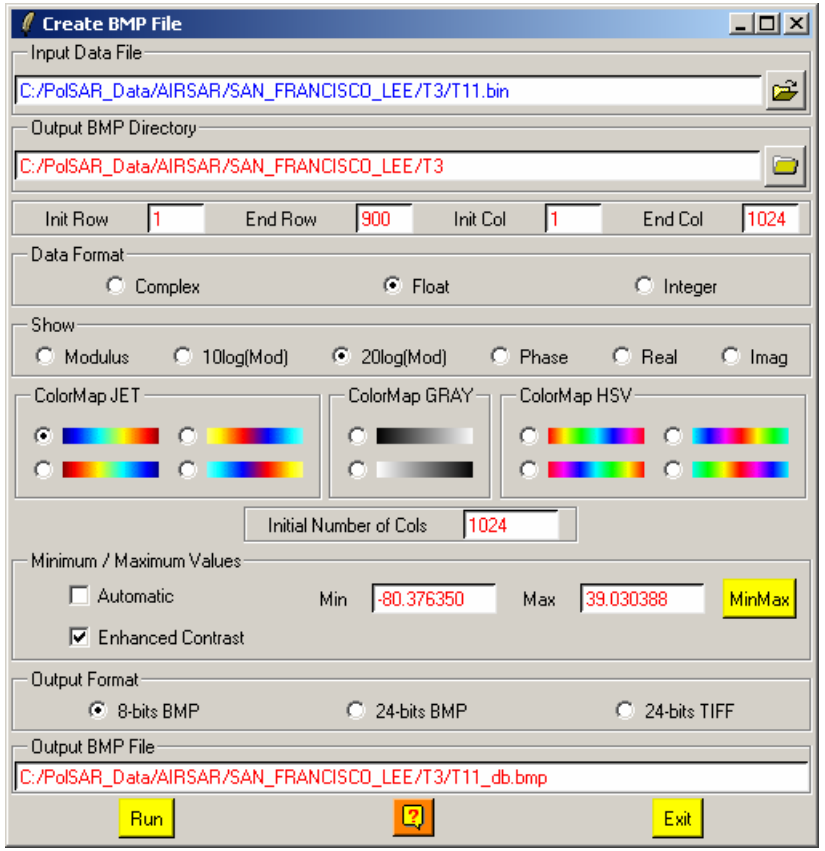
Display Interface offers the possibility to create and export images in an 8-bit or 24-bit dynamic range (Windows Bitmap and TIFF formats) for inclusion in reports, or import to GIS software for comparison with other data.

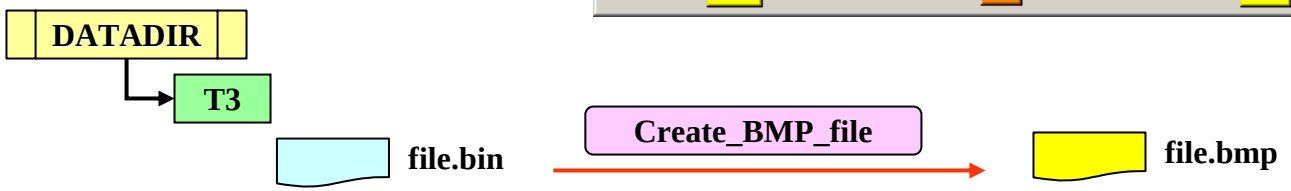
PolSARpro Display & Viewer v3.0

Create 8 – 24 bits BMP / TIFF file



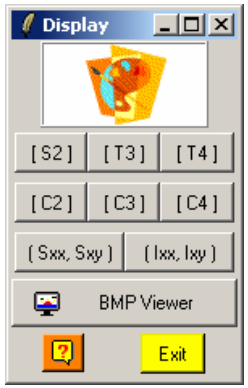


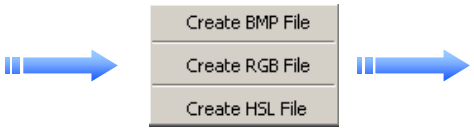


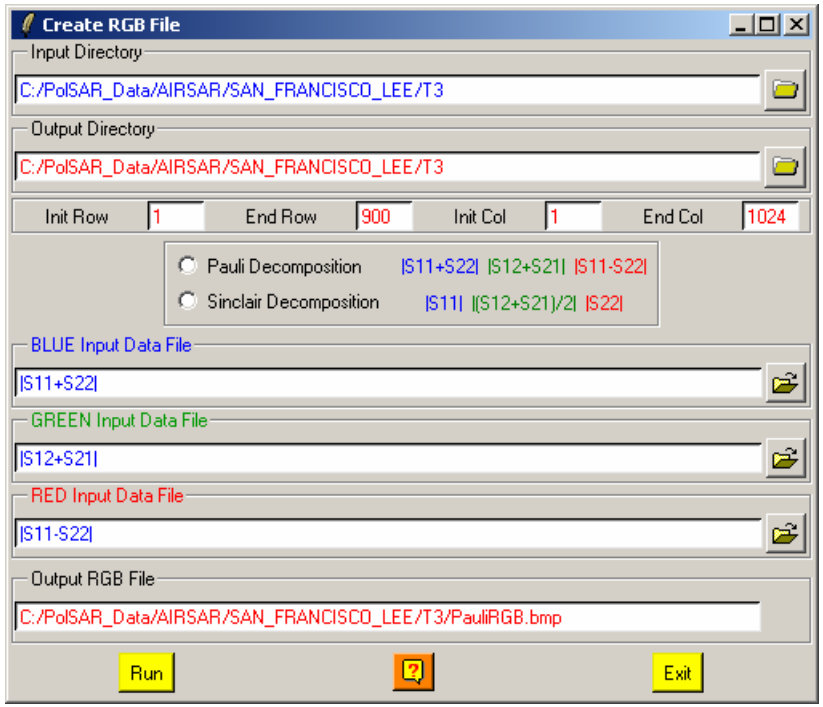


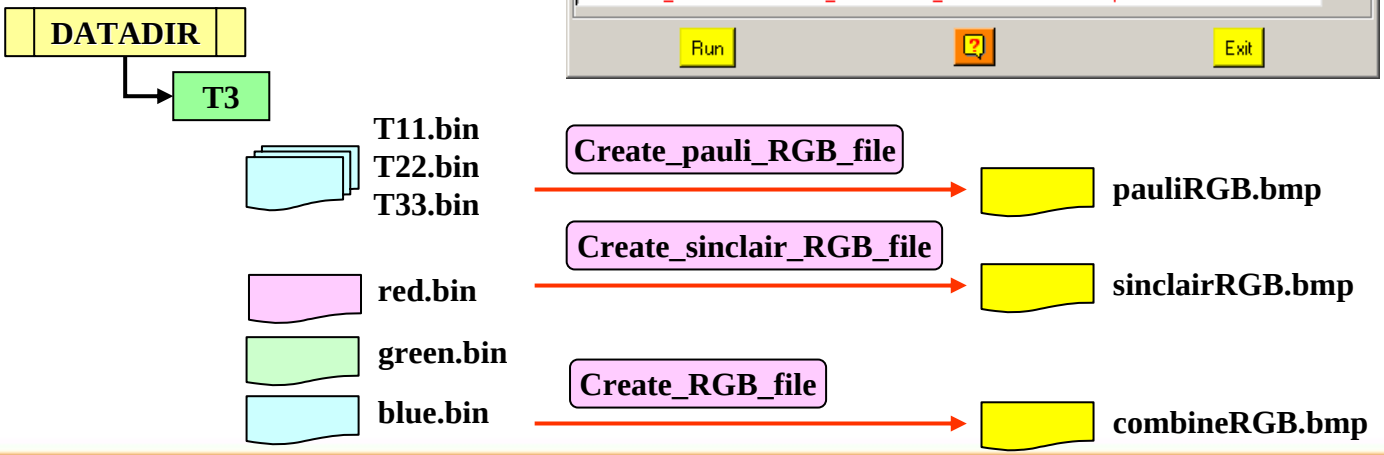
PolSARpro Display & Viewer v3.0

Create 24 bits RGB file



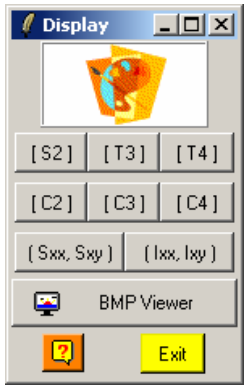


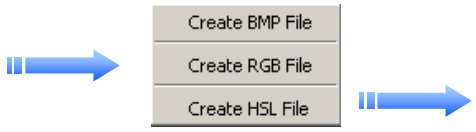


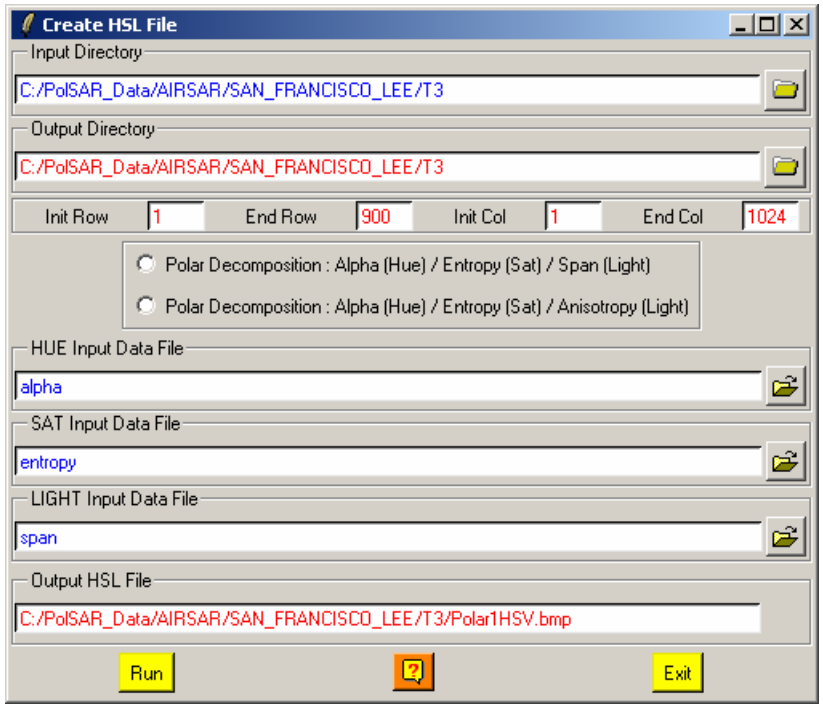


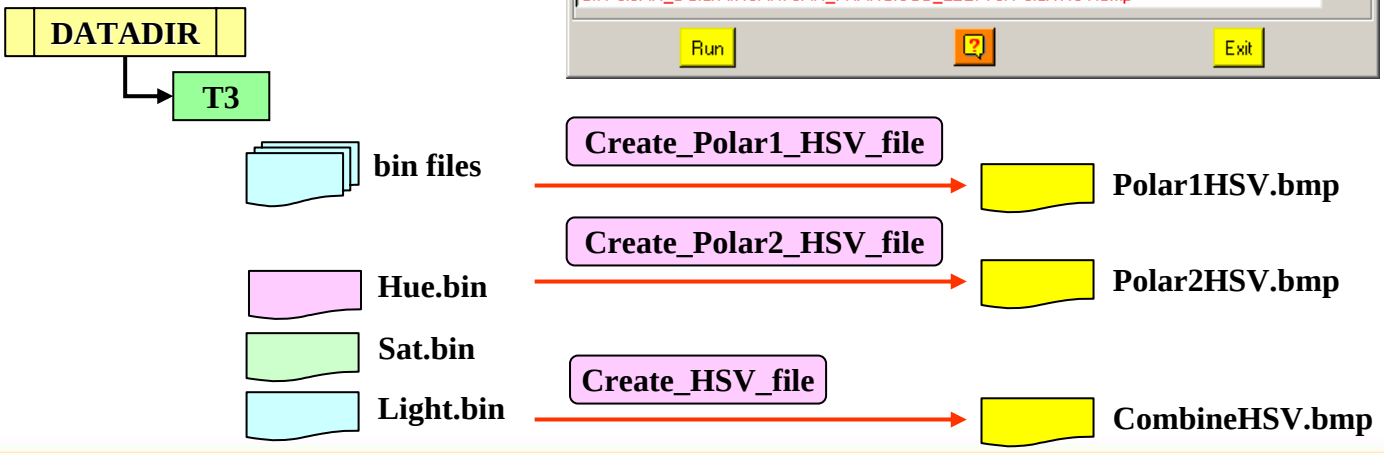
PolSARpro Display & Viewer v3.0

Create 24 bits HSL file



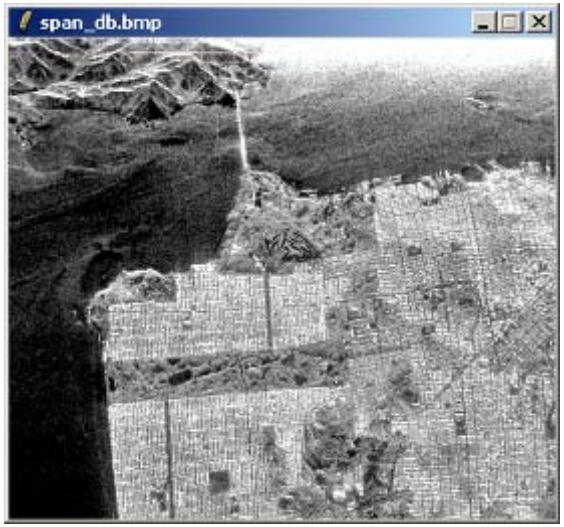






PolSARpro Display & Viewer v3.0

8-bit or 24-bit BMP file



Span image

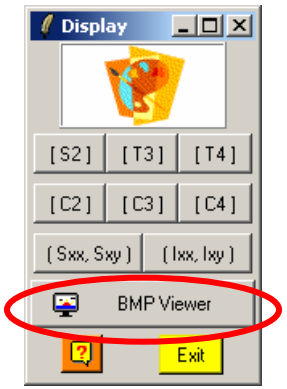
24-bit RGB file

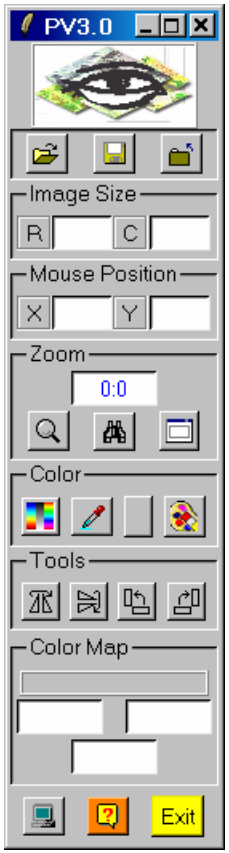
Pauli color coded image

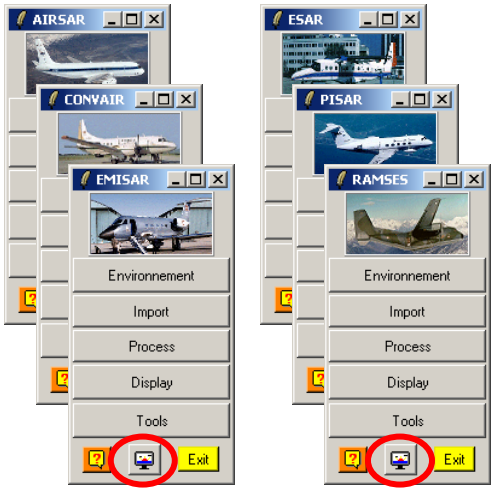
24-bit HSL file

Alpha / Entropy / Span coded image

PolSARpro Display & Viewer v3.0

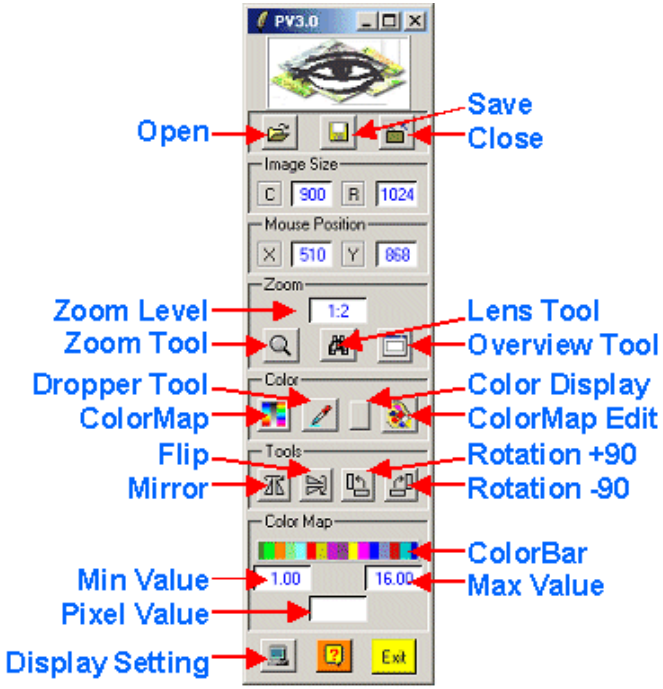






PolSARpro v3.0 offers a basic Viewer (PV 3.0) which can be use to display and modify results output in common graphics formats as 8 – 24 bits Windows Bitmap files.

PolSARpro Display & Viewer v3.0



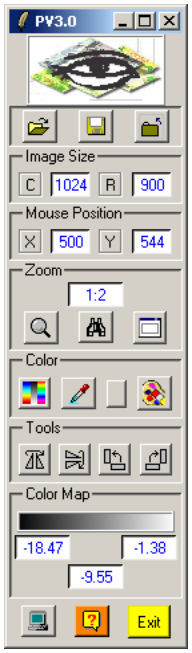
Main Functionalities

- Save Windows Bitmap output files in different graphic formats like GIF, JPG, PS and TIFF.

- Image Display Size setting

- In/Out Zoom function
- Zoom Lens Window
- Overview Window
- Image Flip Up-Down - Flip Left-Right
- Image 90° Left / Right rotation
- Image Transpose
- Color Dropper
- Color Palette edition
- ColorMap modification

PolSARpro Display & Viewer v3.0 EXAMPLES



Zoom Lens Window

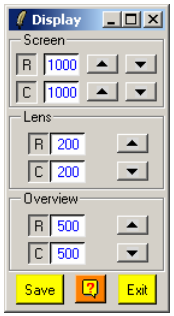
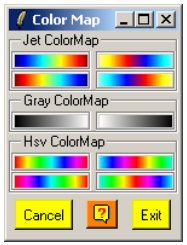
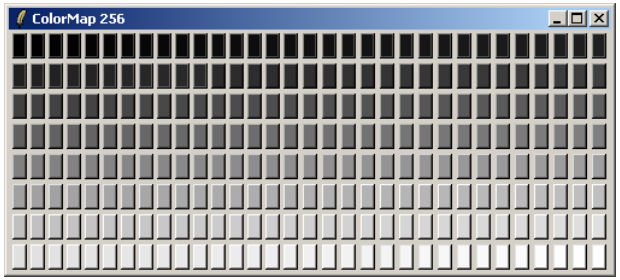


Image Display size setting



ColorMap modification



Color Palette Edition

Overview Window

MAIN MENU

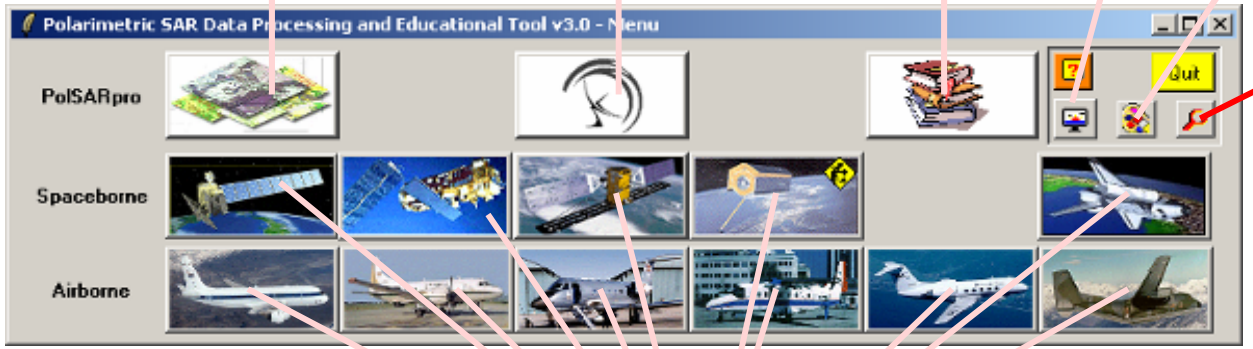
PolSARpro Full Software
– Single Data Set
– Multi Data Sets

Tutorial on
POLSAR and
POLinSAR

Help
Files

Viewer

Display

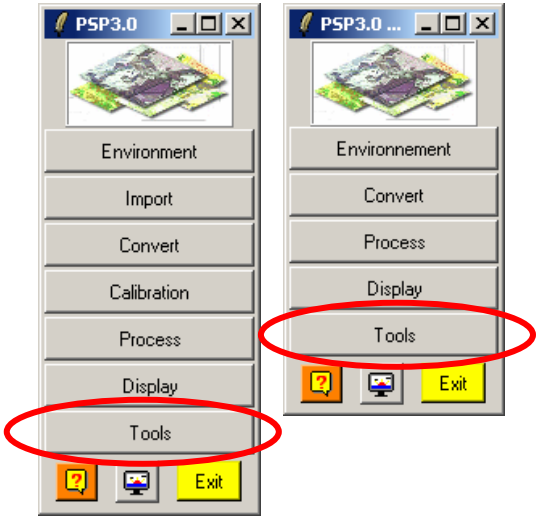


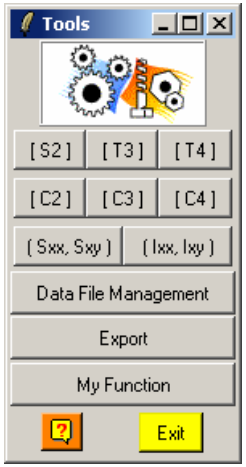
Tools

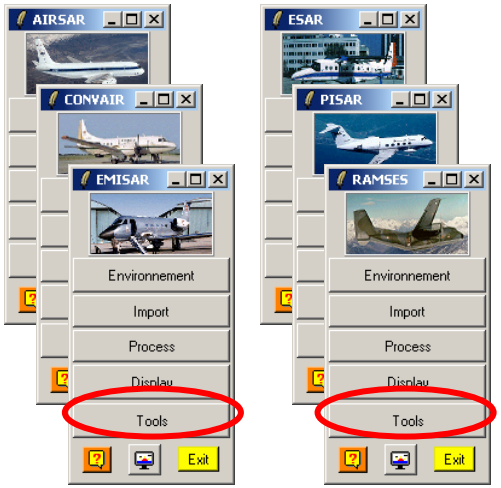
Version for the EO Scientific Investigator

Spaceborne Sensors: ALOS, ENVISAT, RADARSAT2, TerraSar, SIR-C
Airborne Sensors: AIRSAR, Convair, EMISAR, ESAR, PISAR, RAMSES

PolSARpro Tools





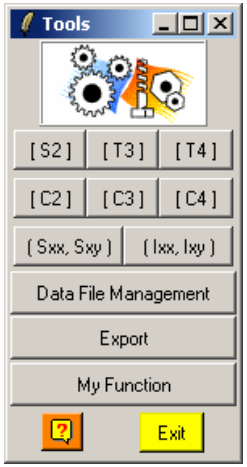


Tools Interface offers different Data Files management and transformation facilities :

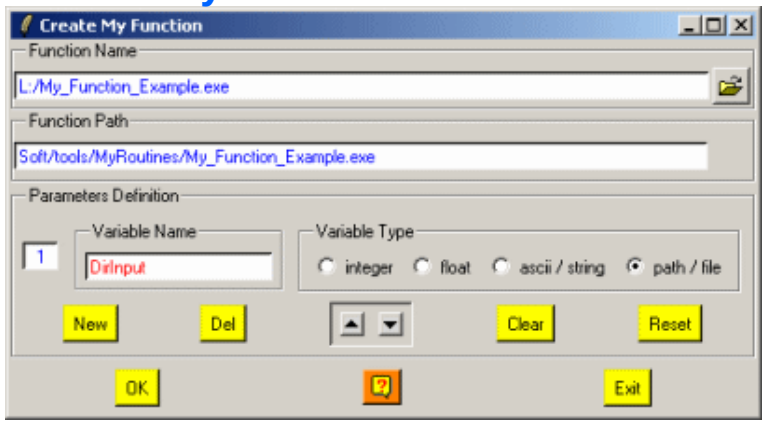
- File / Directory create, delete, rename options
- Raw Binary Data file: rotate +/-90°, 180°, flip up-down, flip left-right, transpose
- Complex Raw Binary Data FFT
- Export to GIS software like ENVI

PolSARpro Tools

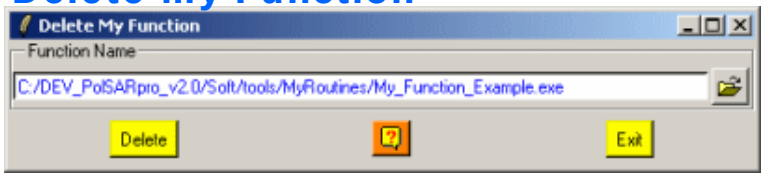
Export / Import – My Function



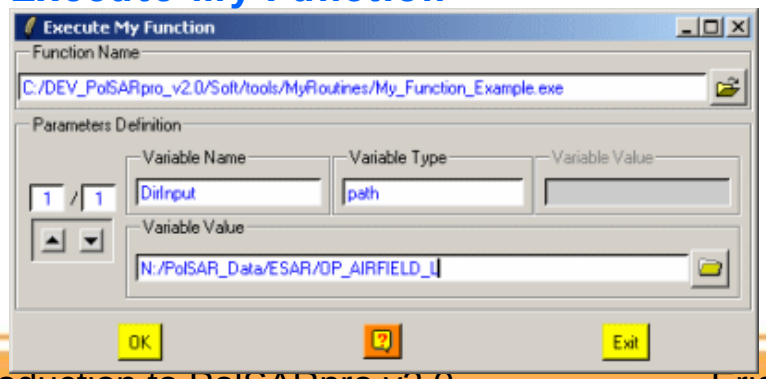
Create my Function



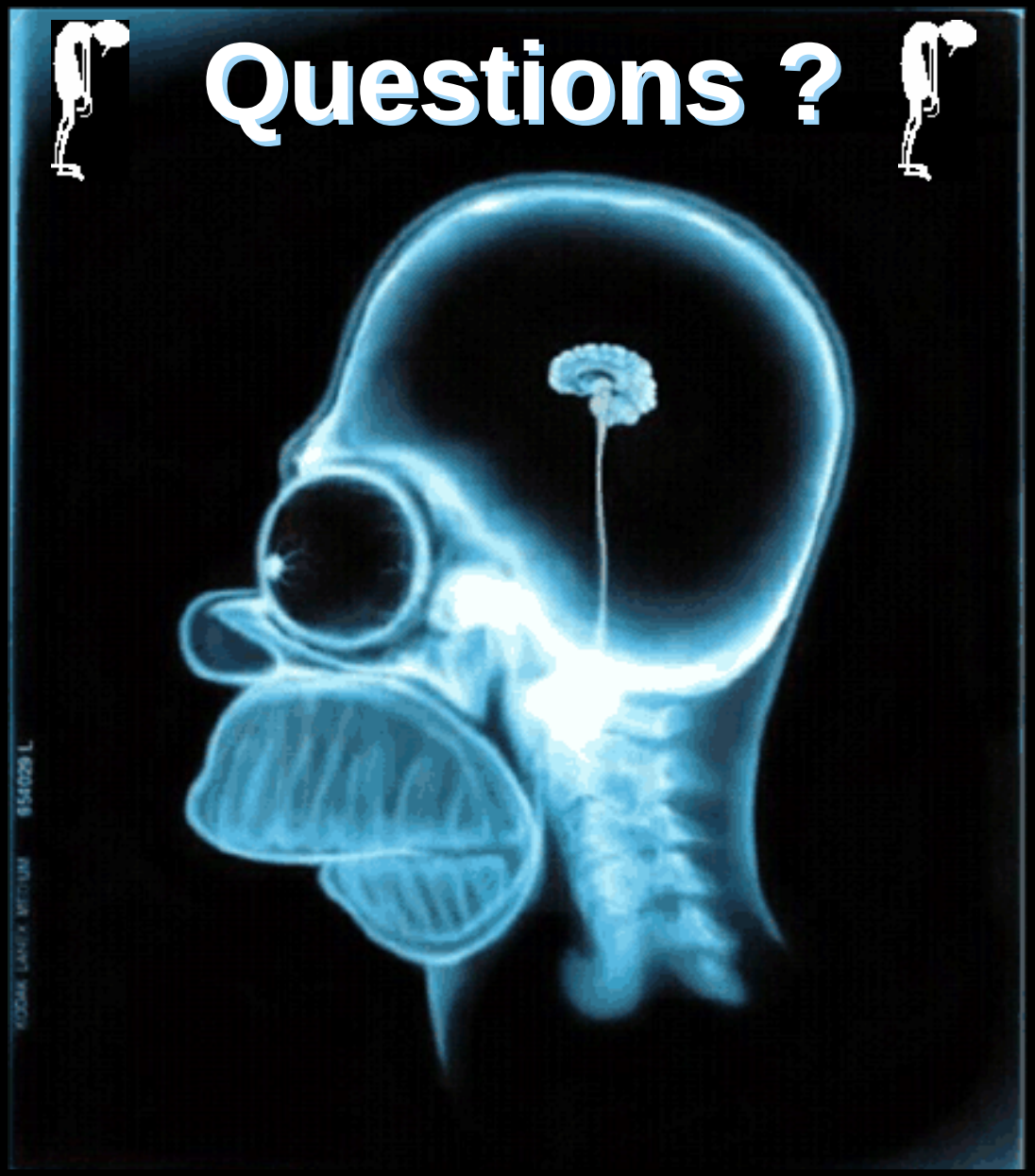
Delete my Function



Execute my Function



Questions ?



Earth Observation Scientific Investigator Package

MAIN MENU

PolSARpro Full Software
– Single Data Set
– Multi Data Sets

Tutorial on
POLSAR and
POLinSAR

Help
Files

Viewer

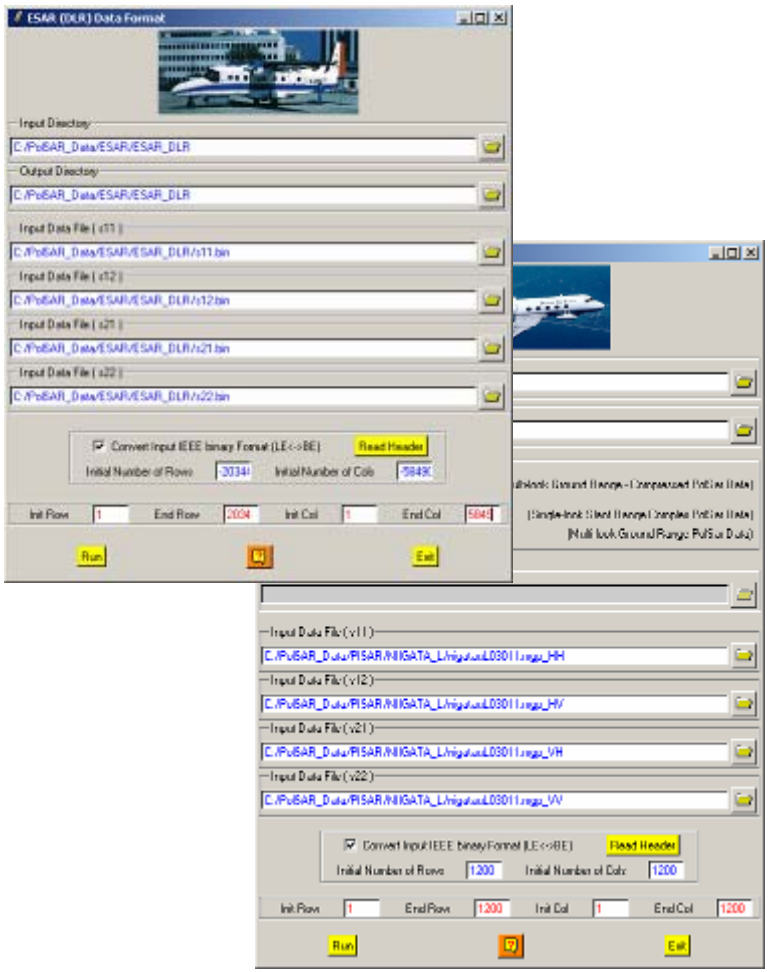
Display

Tools

Version for the EO Scientific Investigator

Spaceborne Sensors: ALOS, ENVISAT, RADARSAT2, TerraSar, SIR-C
Airborne Sensors: AIRSAR, Convair, EMISAR, ESAR, PISAR, RAMSES

AIRBORNE / SPACEBORNE SENSORS



PolSARpro v3.0 Software offers the possibility to handle and convert polarimetric data from a range of well established polarimetric airborne platforms.

PolSARpro v3.0 Software accepts today the following input specific formats:

AIRSAR

CONVAIR

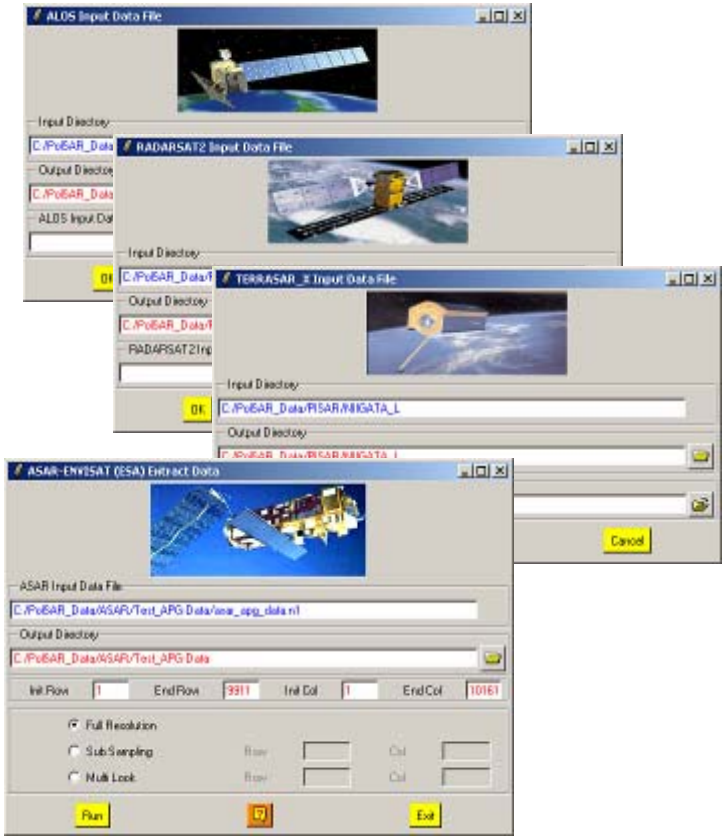
EMISAR

ESAR

PISAR

RAMSES

AIRBORNE / SPACEBORNE SENSORS



PolSARpro v3.0 Software handles and converts polarimetric data from a range of future and planned spaceborne missions.

PolSARpro v3.0 Software is flexible to accommodate data from the following current and future missions:

ALOS - PALSAR

ENVISAT - ASAR

RADARSAT 2

TerraSAR X

SIR-C

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

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

PROCESSING CHAIN

Configuration

Data Import

- Input Data File
- QuickLook
- Extract Raw Data

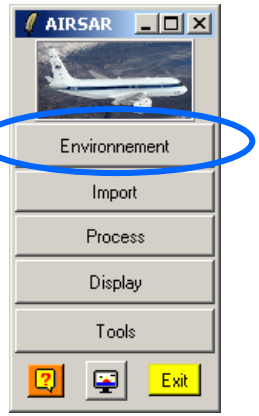
Data Process

- [T3] Elements
- Speckle Filtering *New!*
  - Box Car
  - Gaussian
  - Lee Refined
- H / A / Alpha
  - Decomposition Parameters
  - Eigenvectors Parameters
  - Eigenvalues Parameters
- Polarimetric Segmentation
  - H / A / alpha Segmentation
  - Unsupervised Wishart H / A / alpha Segmentation
  - Supervised Wishart H / A / alpha Segmentation
- Batch Process
  - Speckle Filtering
  - H / A / alpha Decomposition
  - Unsupervised Wishart H / A / alpha Segmentation

Data Display

- BMP 8 / 24 bits
- RGB

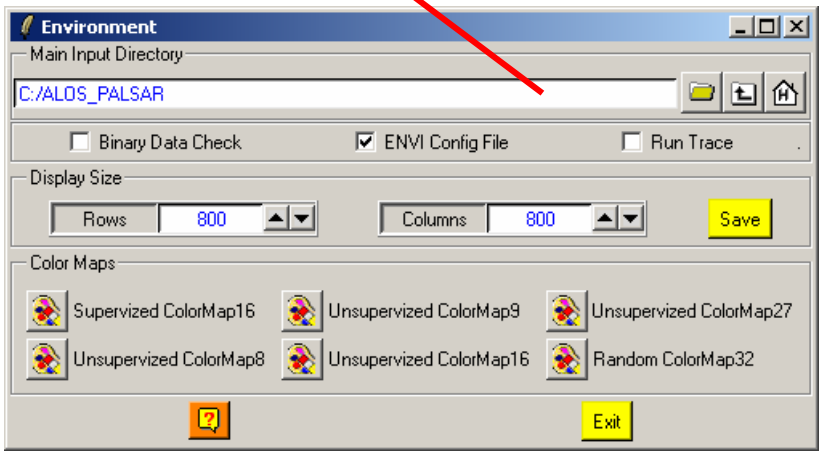
ENVIRONNEMENT

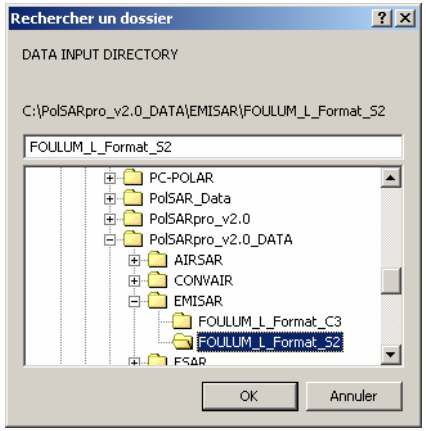


ENVIRONNEMENT

Processing Configuration

Configure Data Main Directory location





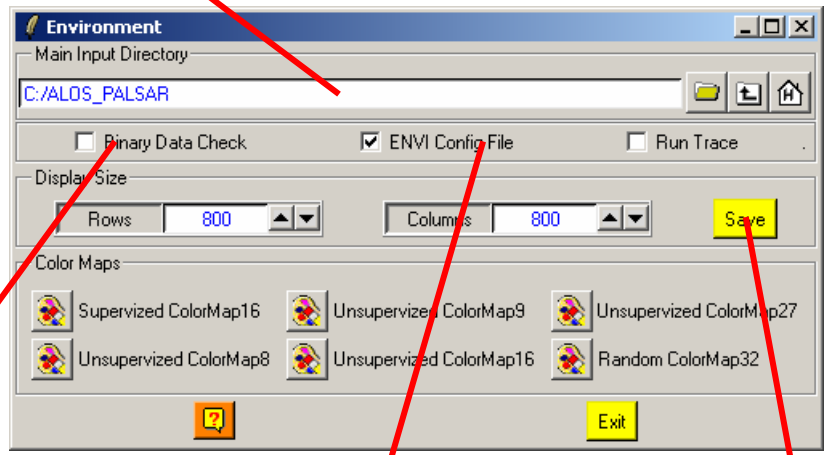
Input Directory: C:/SAN_FRANCISCO

Note: Copy the data directory to the root directory to shorten the path name length

ENVIRONNEMENT

Processing Configuration

Configure Data Main Directory location



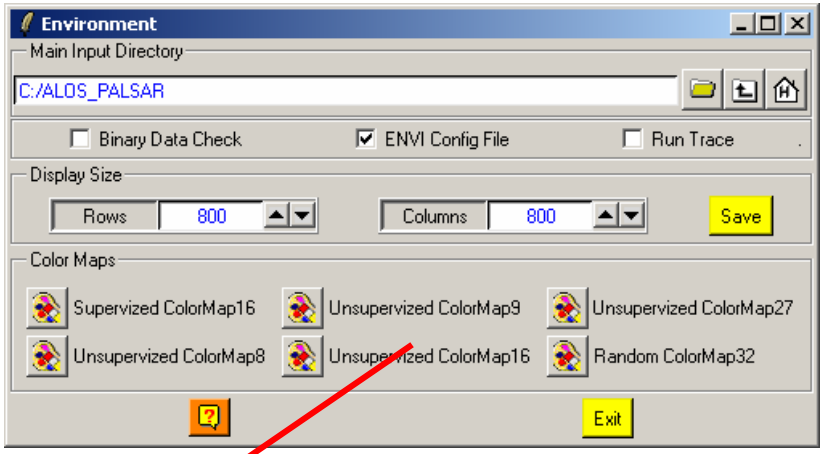
Automatic Data Check (Null or NaN)

Configuration File (ENVI)

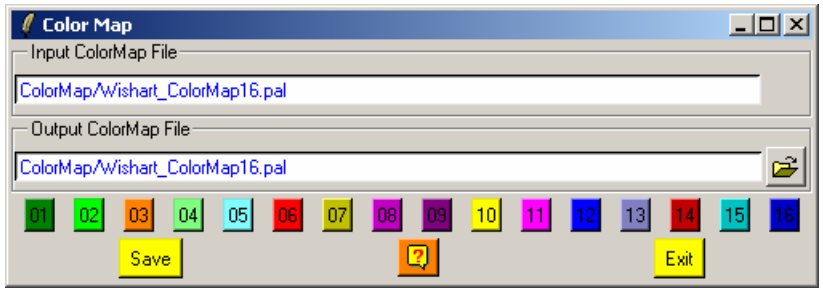
Image Display Size setting

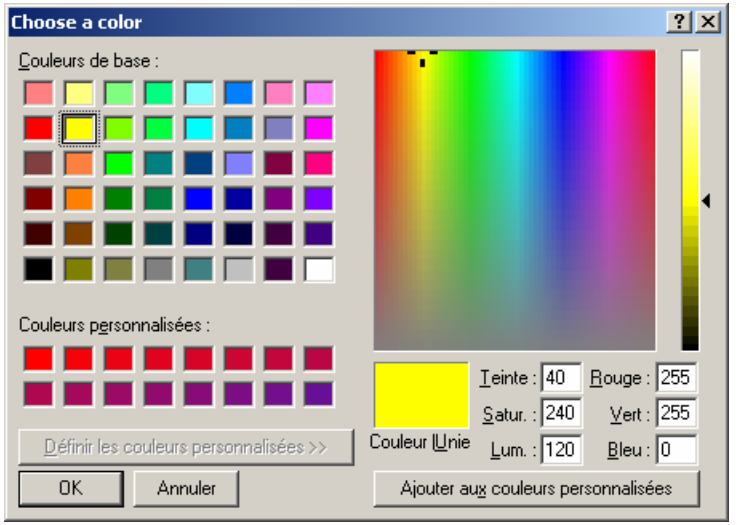
ENVIRONNEMENT

Processing Configuration



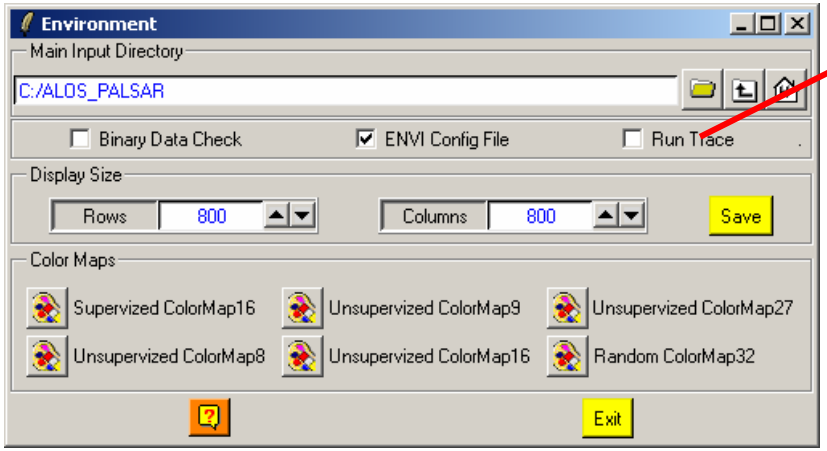
Color Palette Edition & Modification



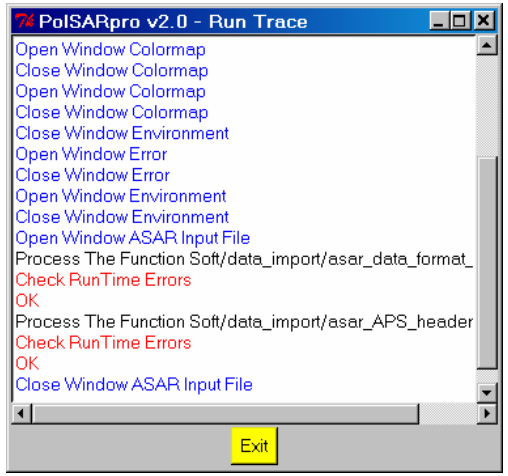


ENVIRONNEMENT

Processing Configuration



Run Trace Selection



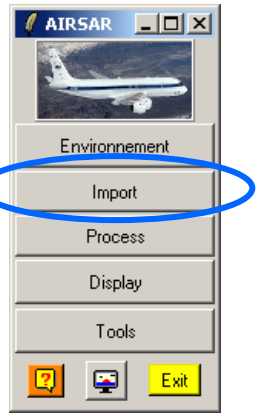
Specific Tcl-Tk widget window providing operational and informative error messages. Backtrace with each warning or error message (equivalent to the Unix command: *troff*).

Blue : Widget Window
Black: C Routines
Red: RunTime Errors Checking Result

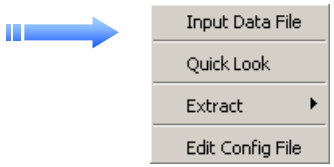
POLSARPRO

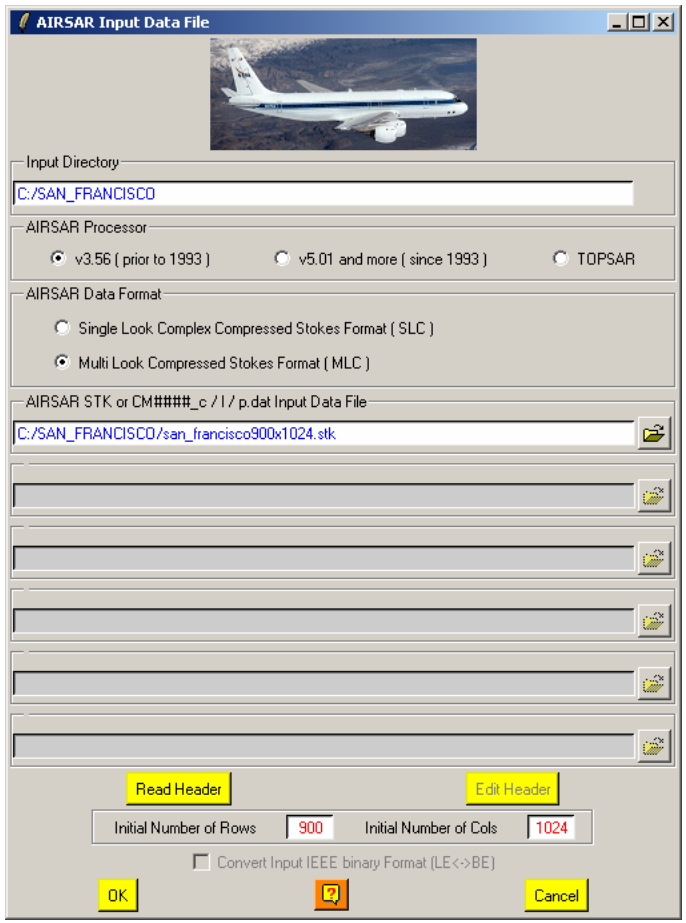
Data IMPORT

AIRSAR
Environnement
Import
Process
Display
Tools
Exit


AIRSAR
Environnement
Import
Process
Display
Tools
Exit

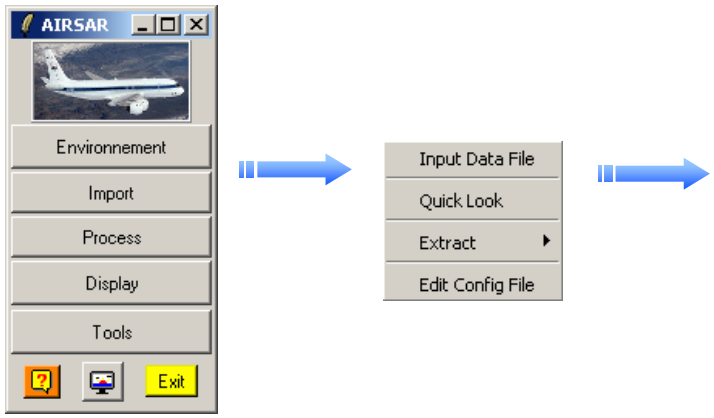
Data IMPORT – AIRSAR Data File

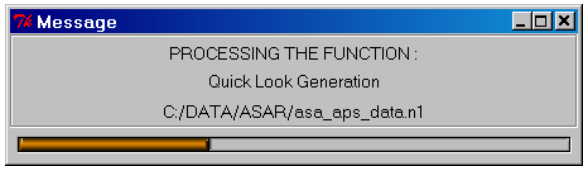




Do it Yourself:
Select AIRSAR Processor: v3.56
Select Multi Look Compressed Stokes Format (MLC)
Enter Input Data File Name: *san_francisco900x1024.stk*
Read Header
Enter Configuration: 900 rows x 1024 col

Data IMPORT – AIRSAR Data File





Create a RGB (24-bit Output BMP File) color image: Pauli Color coded Image

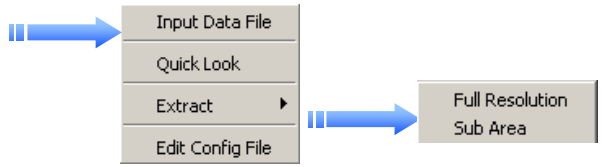
|T22|=|HH-VV|

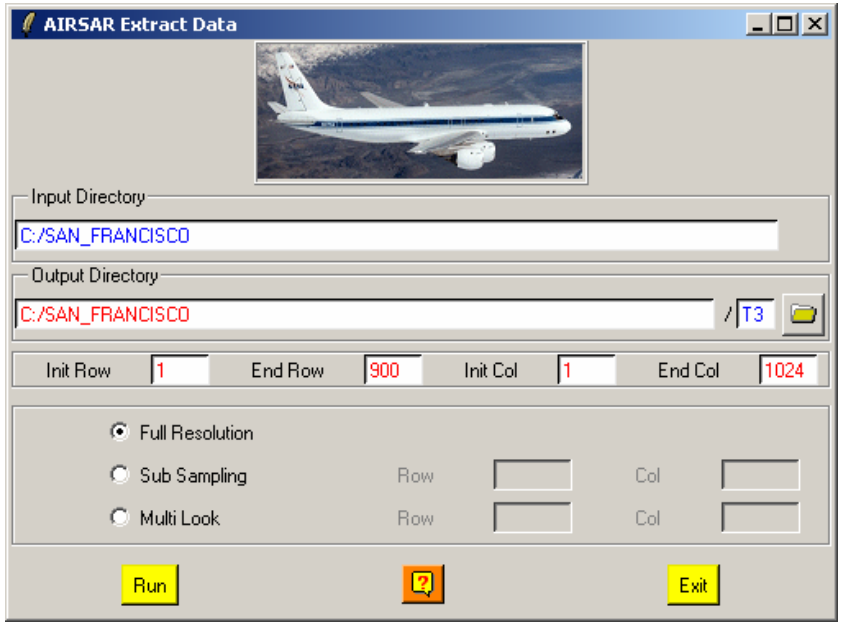
|T33|=|HV+VH|

|T11|=|HH+VV|

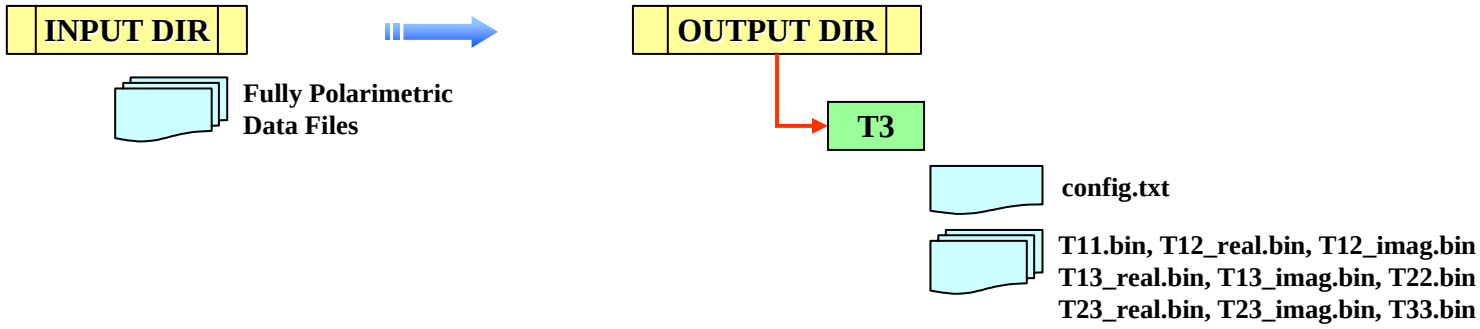
Do it Yourself:
Run Quick look

Data IMPORT – Extract Binary Data

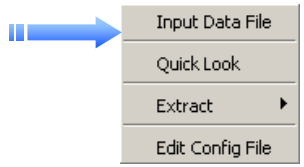


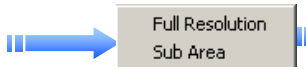


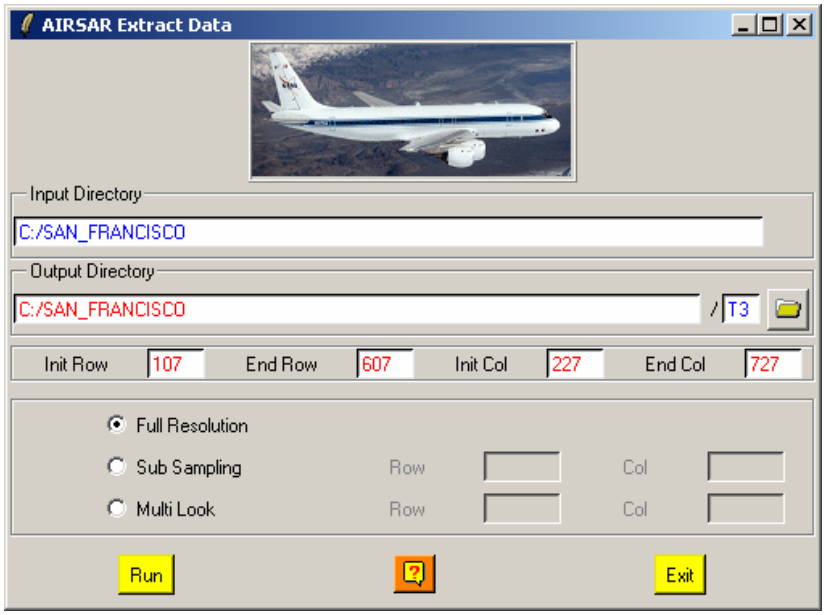
Convert Fully Polarimetric Data Files to Complex (3x3) Coherency Matrix **[T3]**



Data IMPORT – Extract Binary Data

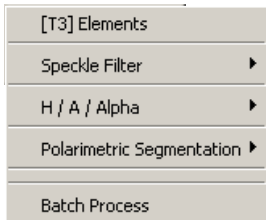


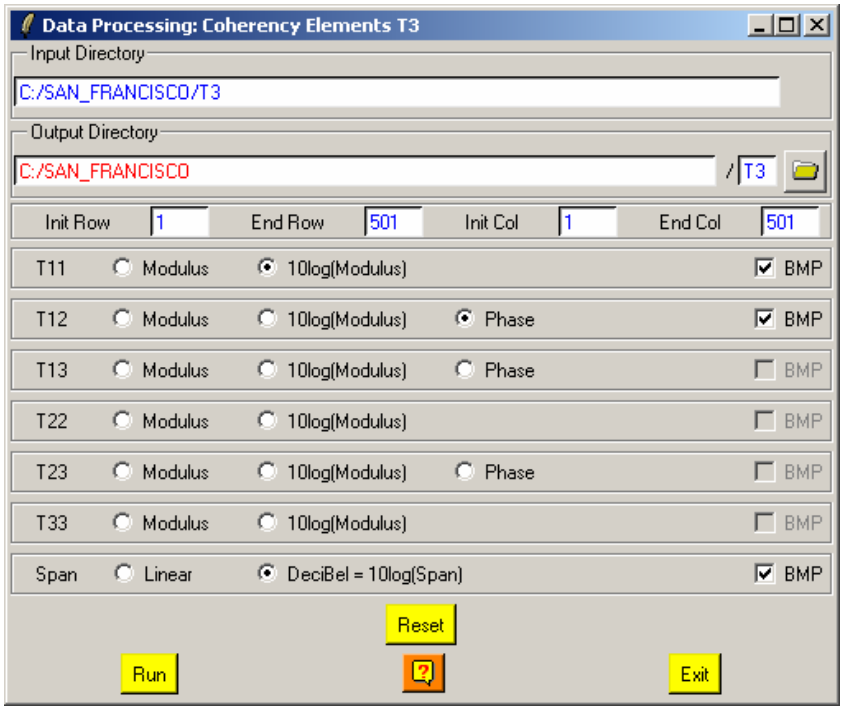


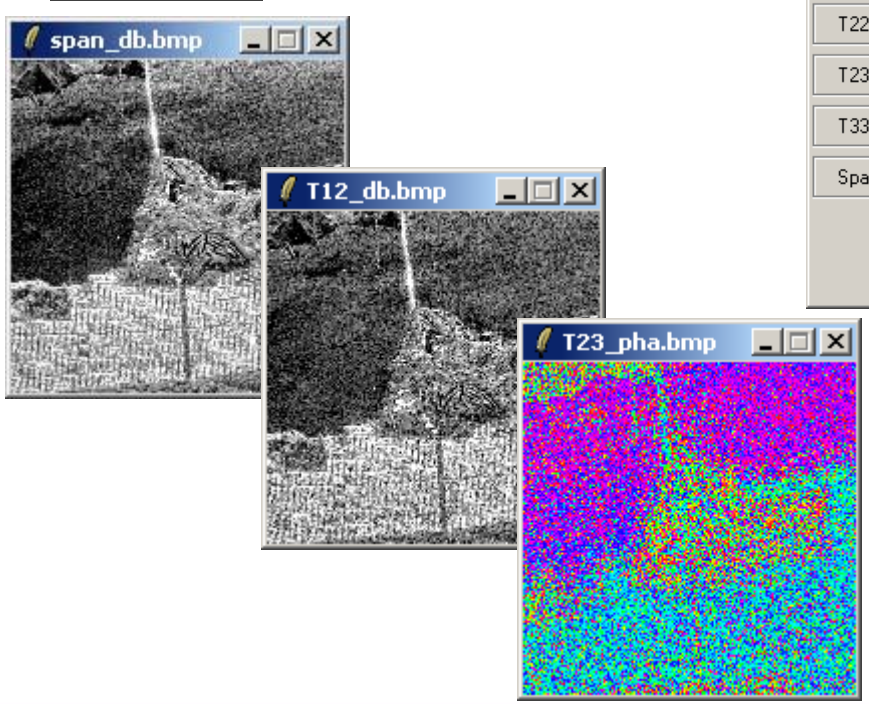


Do it Yourself:
Select an area, then Extract the Data :
Full Resolution

Data PROCESS – [T3] Elements

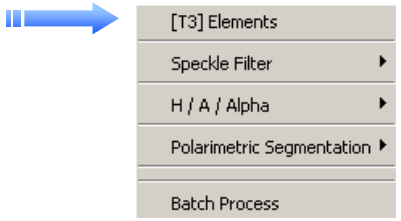


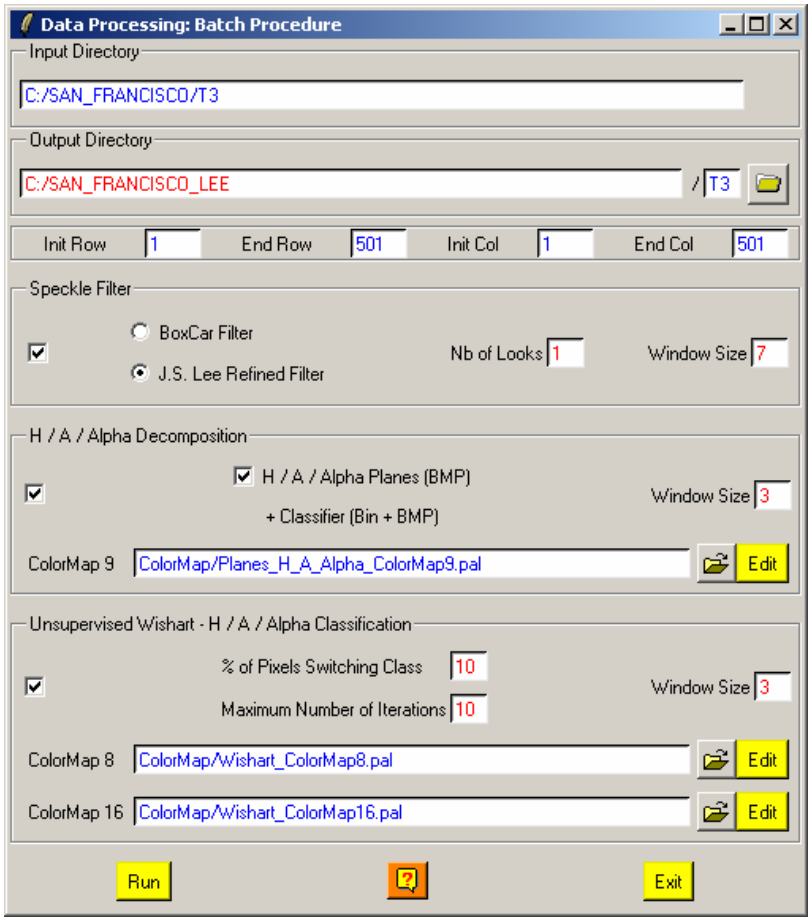




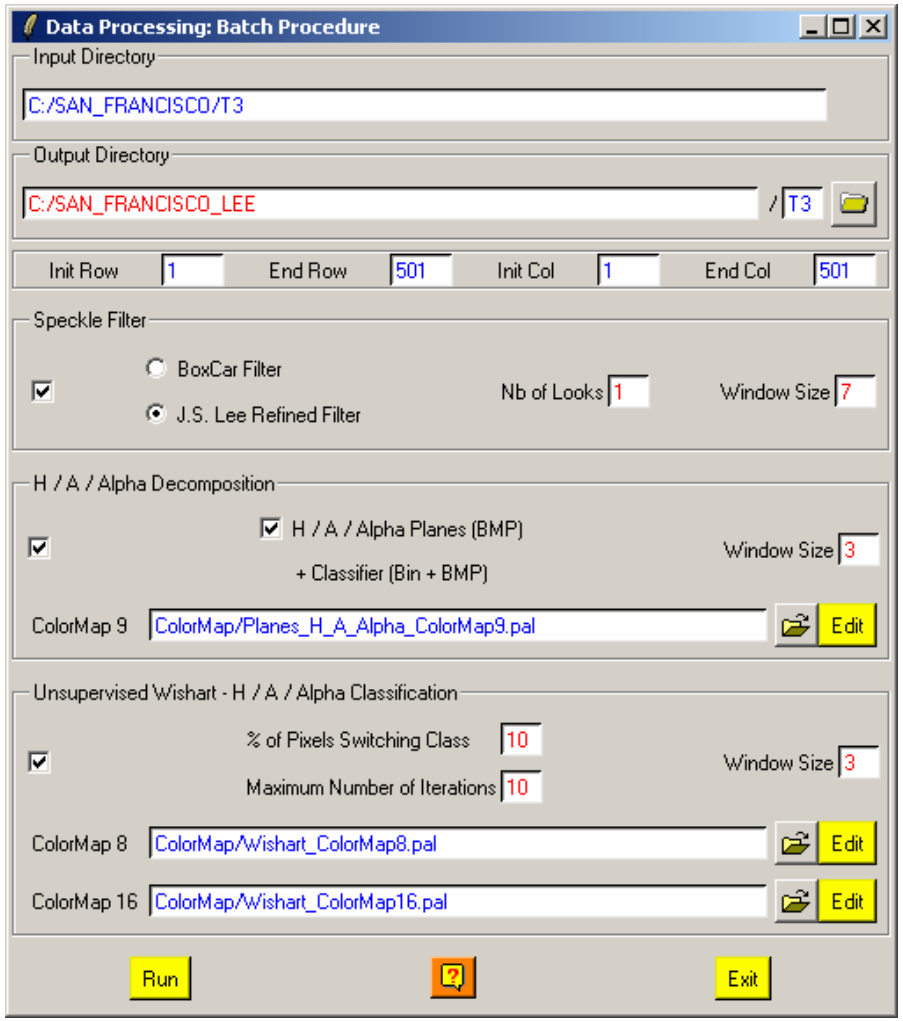
Do it Yourself:
Select some elements, set the parameters and view the corresponding BMP files (select BMP).

Data PROCESS – Batch Process

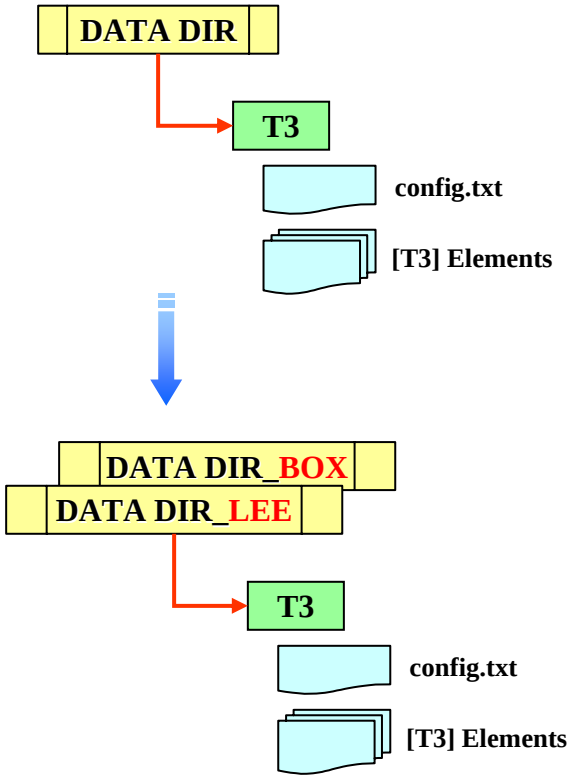




Data PROCESS – Batch Process

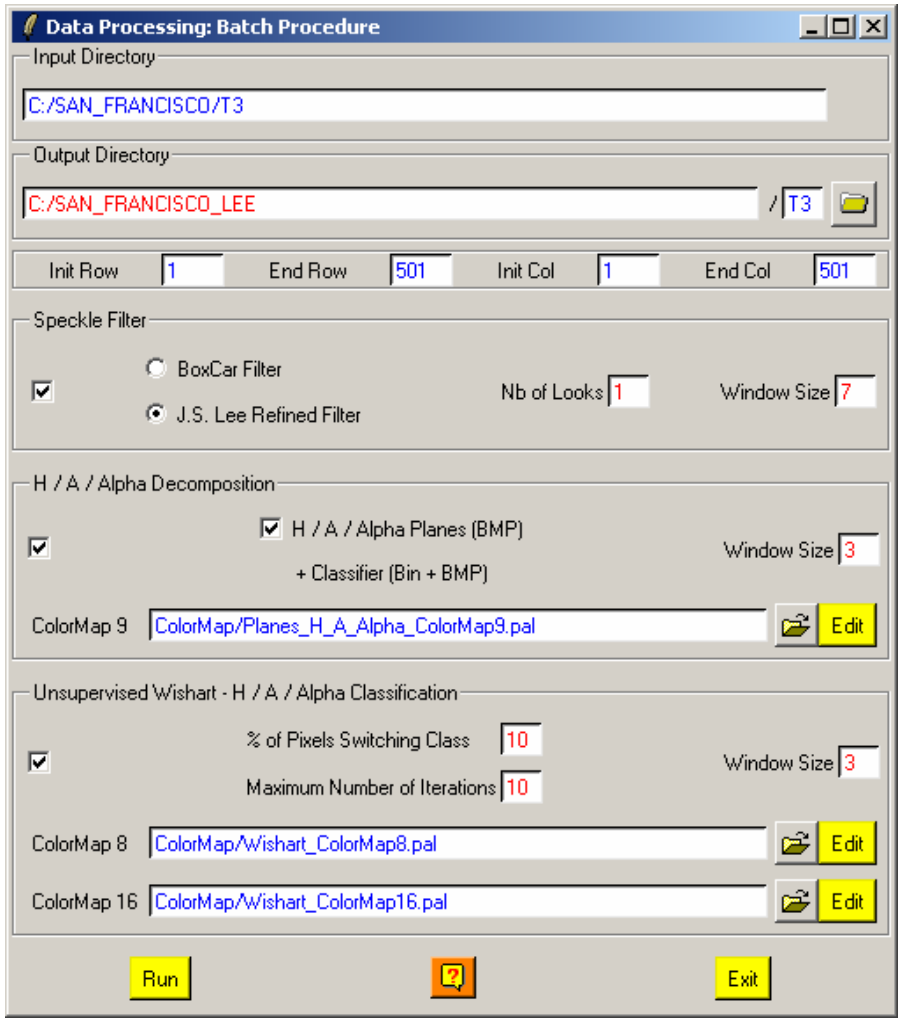


Polarimetric Speckle Filetring

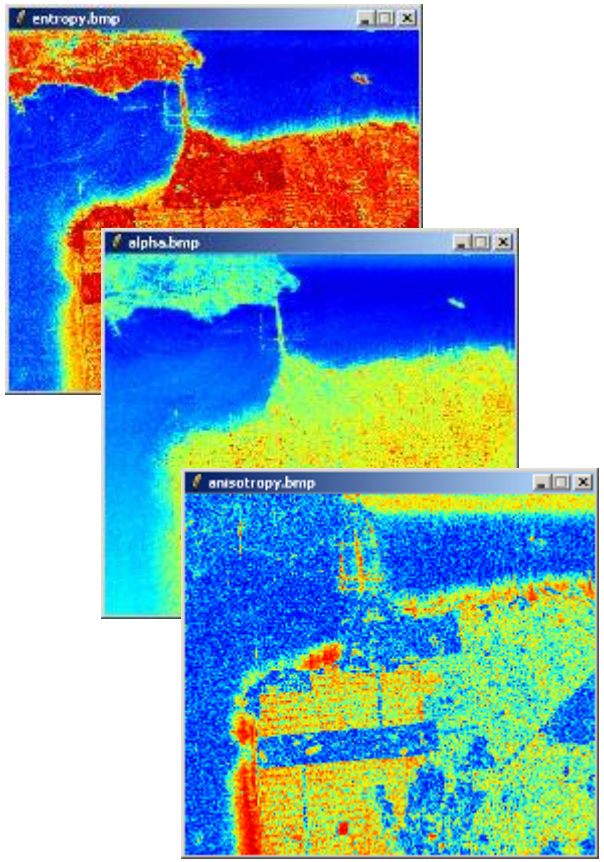


Do it Yourself:
Select the different functions, set the parameters and view the corresponding BMP files.

Data PROCESS – Batch Process

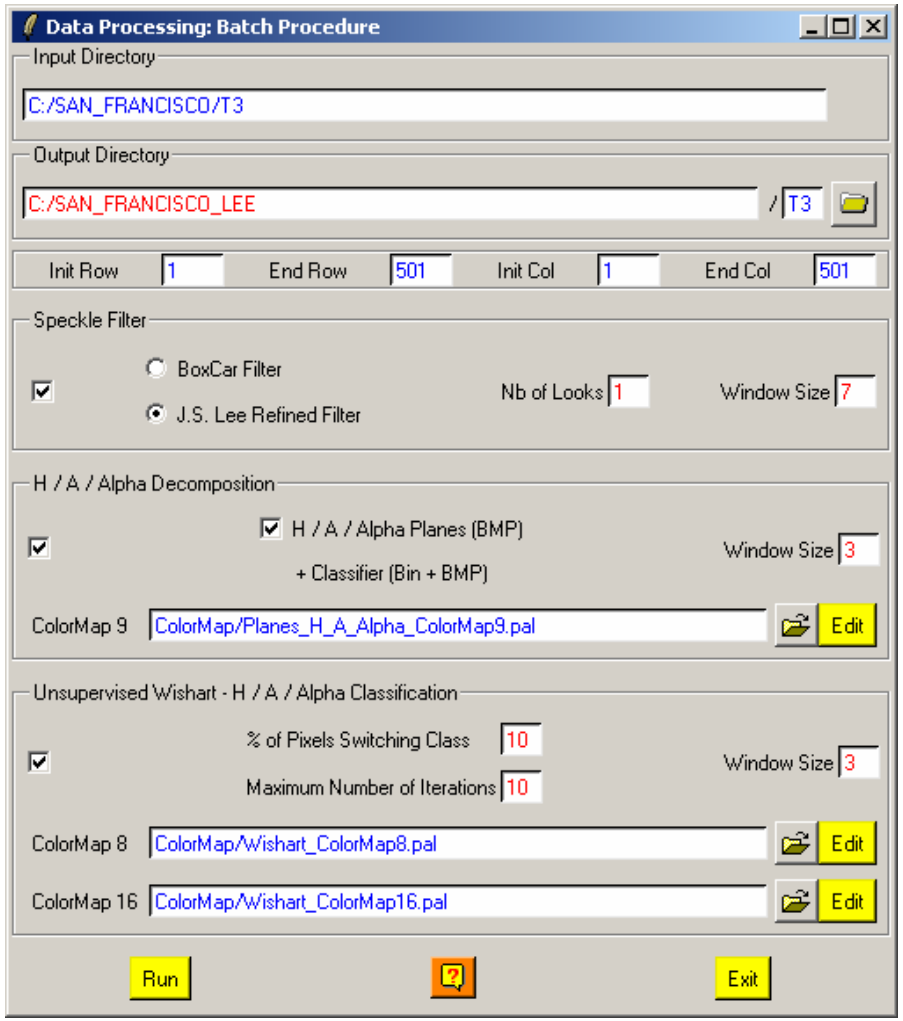


H / A / alpha Decomposition

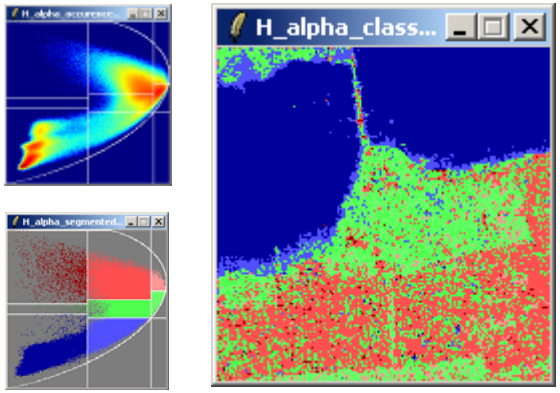


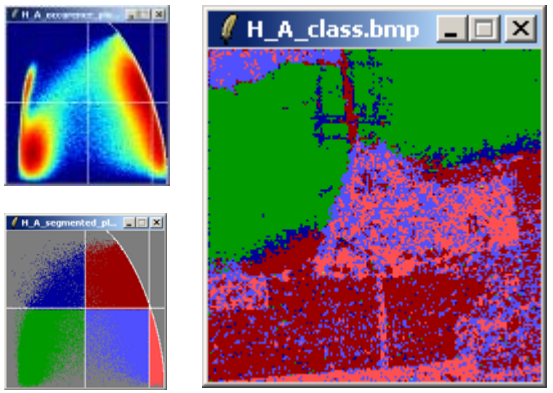
Do it Yourself:
Select the different functions, set the parameters and view the corresponding BMP files.

Data PROCESS – Batch Process



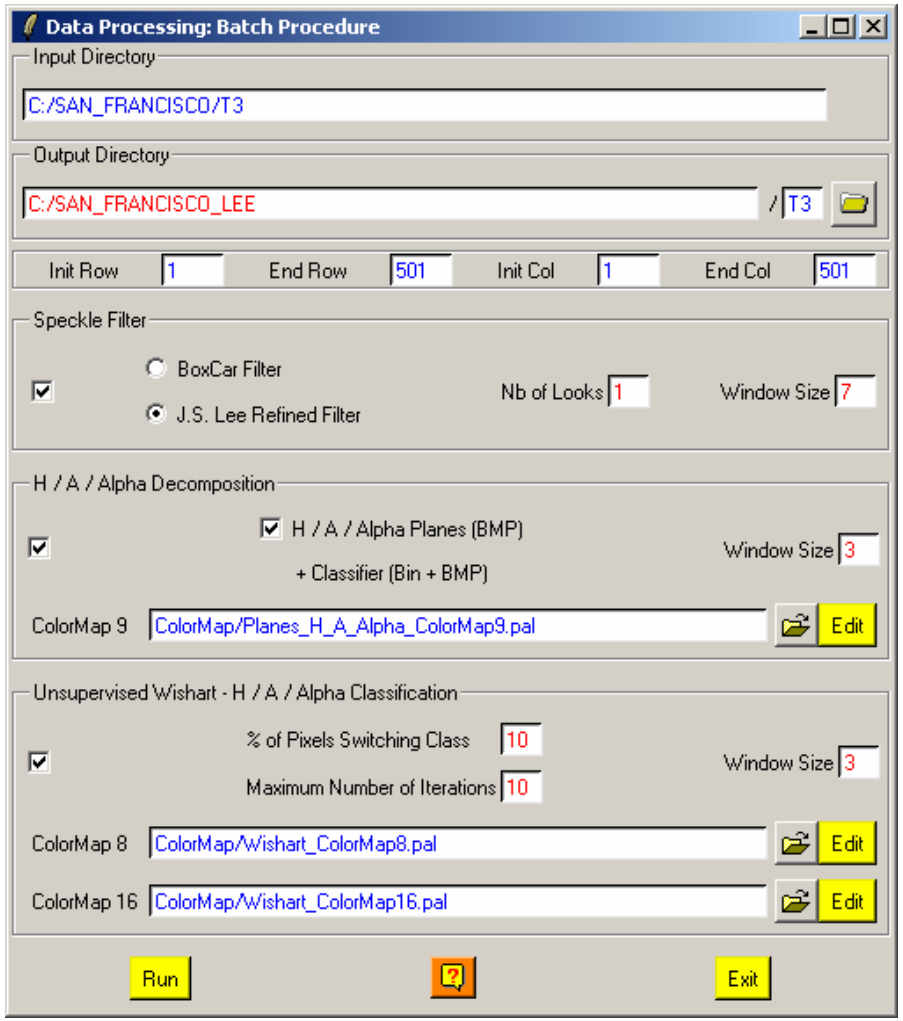
H / A / alpha Planes



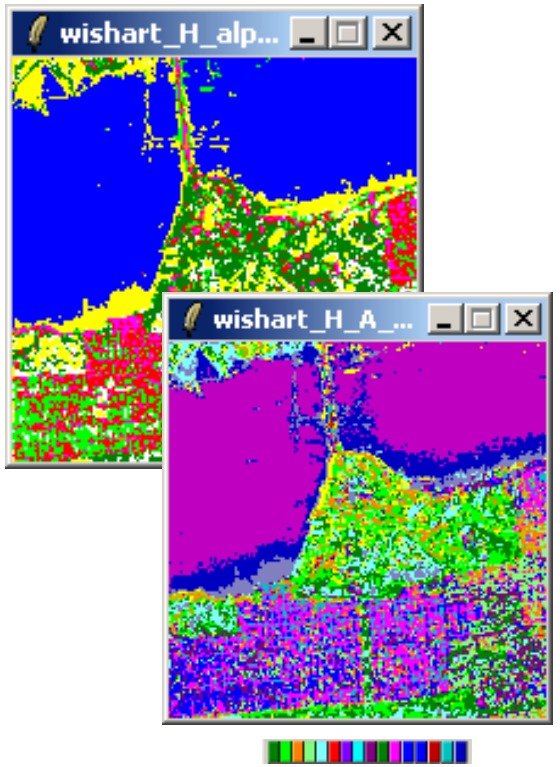


Do it Yourself:
Select the different functions, set the parameters and view the corresponding BMP files.

Data PROCESS – Batch Process



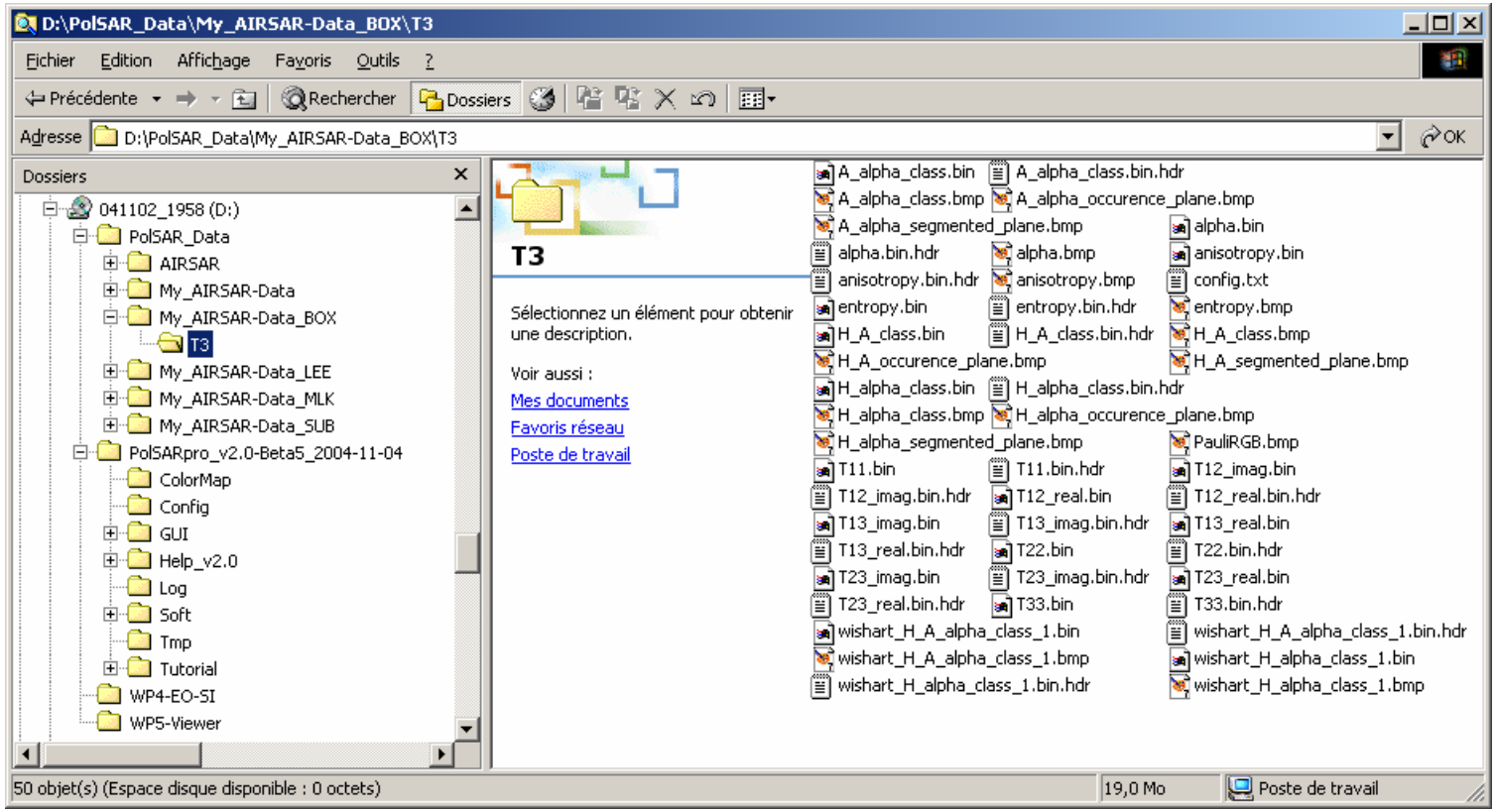
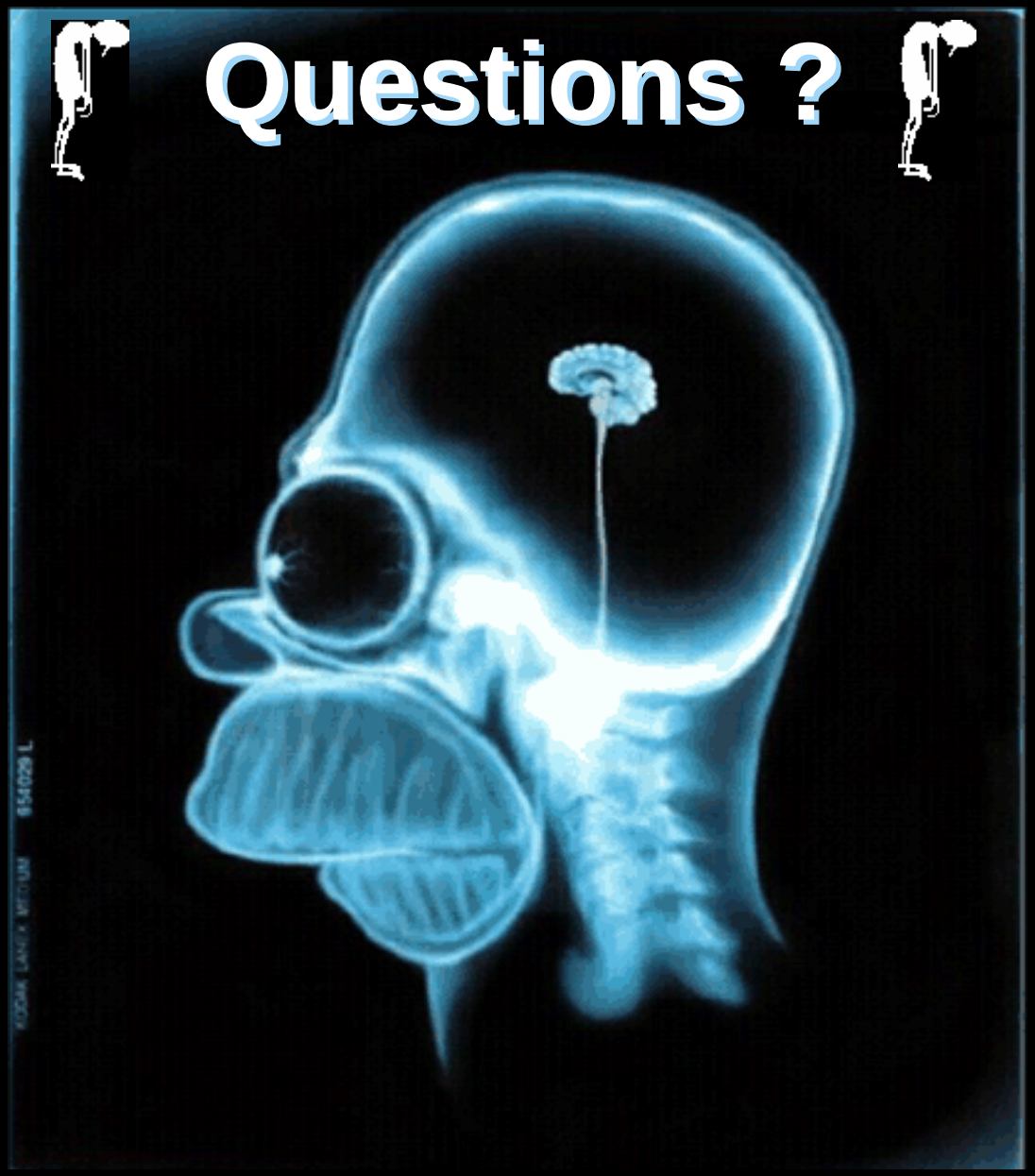
Unsupervised Wishart
H / A / alpha Classification



Do it Yourself:
Select the different functions, set the parameters and view the corresponding BMP files.

ENVIRONNEMENT

Processing Configuration



Questions ?