

Do It Yourself 6

ENVISAT/ASAR Dual Polarisation Case

The objectives of this sixth *Do It Yourself* propose a complete process of an ENVISAT / ASAR dual polarimetric data set (APP mode).

1. EXTRACT AND VISUALIZE AN APP FORMAT DATA SET

An ASAR APP file is located in the ~/POLARSAR_DATA/ASAR directory

- Set ~/POLARSAR_DATA/ASAR as the main directory :

Click Environment

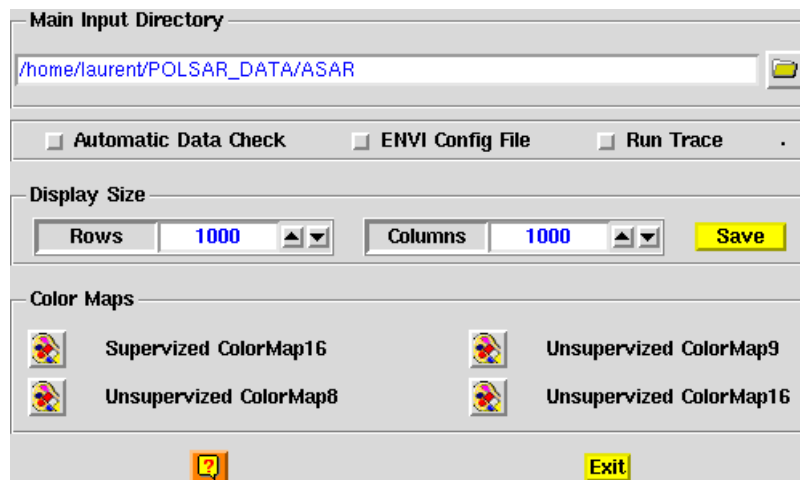


Figure 1 Main directory setting.

1.1 Import an APP file

Click Import → Input APP file

Select the desired input APP file

Run

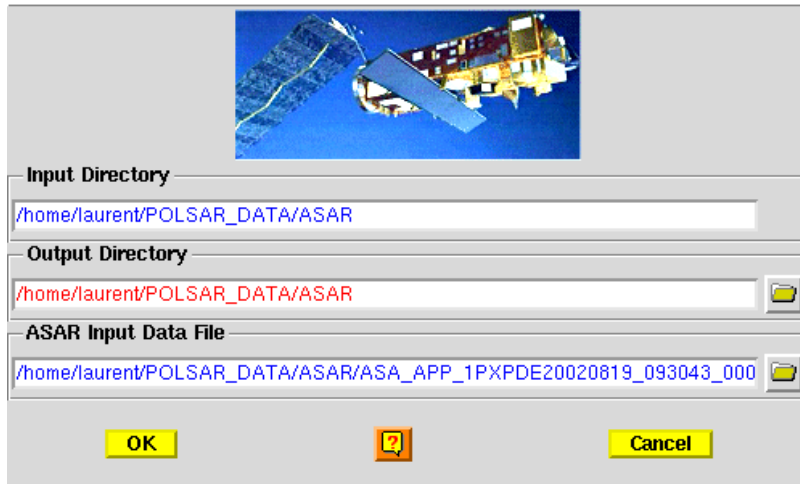


Figure 2 APP data import.

New files, corresponding to the APP file description headers, have been created in the ~/POLSAR_DATA/ASAR directory

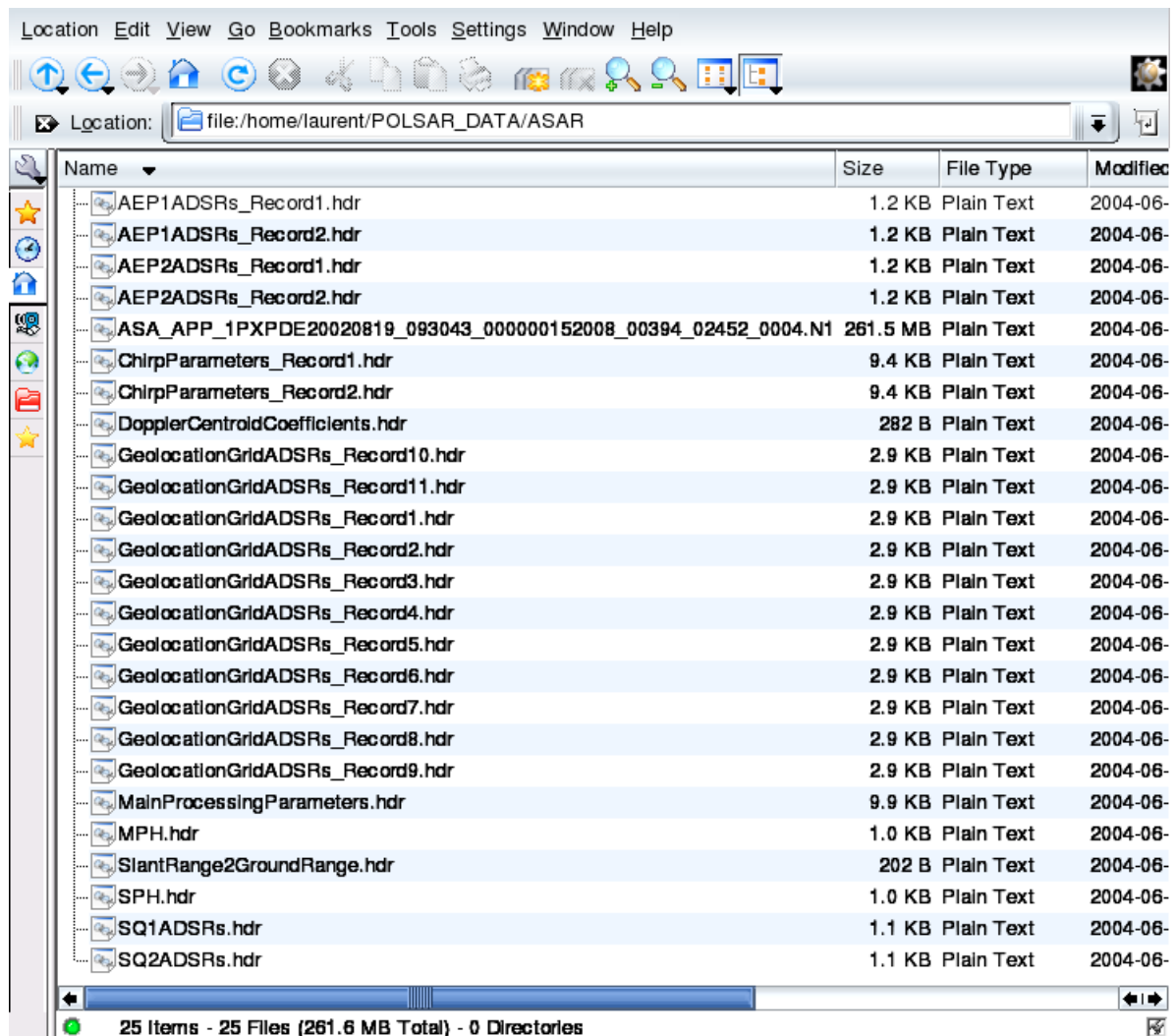
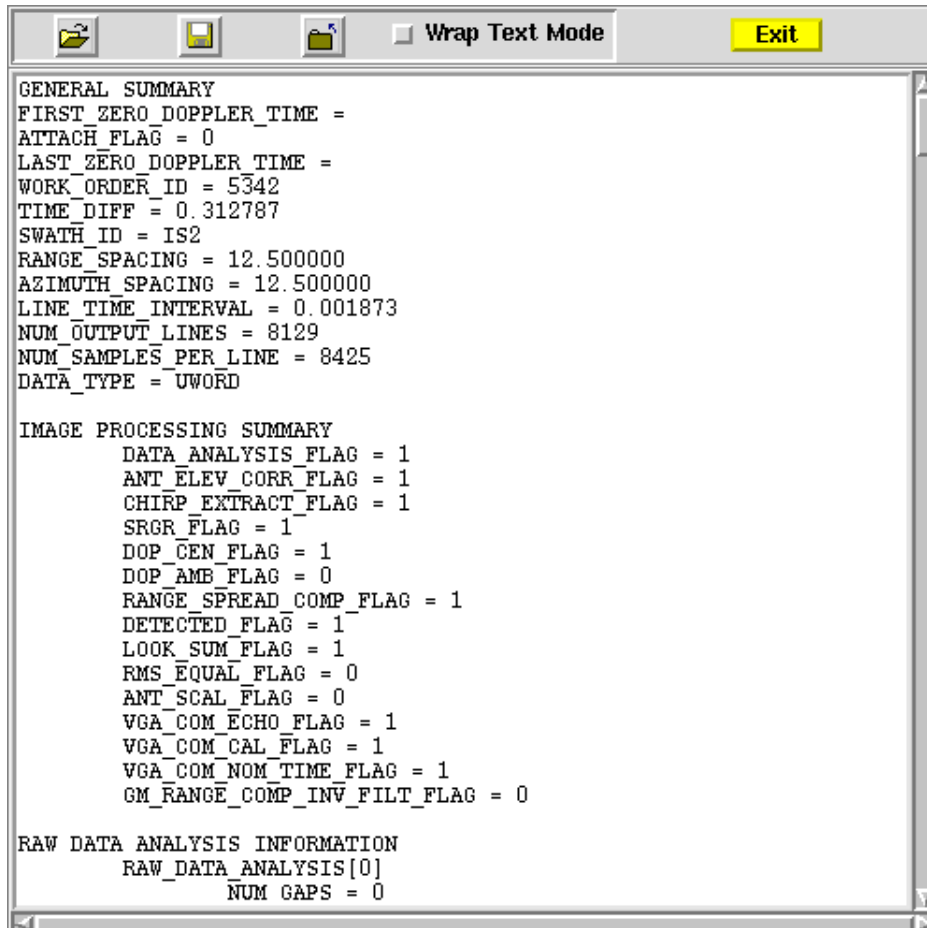


Figure 3 APP format data file headers.

Header files may be edited using common text editors or doing

Click Import → Header analysis



```
GENERAL SUMMARY
FIRST_ZERO_DOPPLER_TIME =
ATTACH_FLAG = 0
LAST_ZERO_DOPPLER_TIME =
WORK_ORDER_ID = 5342
TIME_DIFF = 0.312787
SWATH_ID = IS2
RANGE_SPACING = 12.500000
AZIMUTH_SPACING = 12.500000
LINE_TIME_INTERVAL = 0.001873
NUM_OUTPUT_LINES = 8129
NUM_SAMPLES_PER_LINE = 8425
DATA_TYPE = UWORD

IMAGE PROCESSING SUMMARY
  DATA_ANALYSIS_FLAG = 1
  ANT_ELEV_CORR_FLAG = 1
  CHIRP_EXTRACT_FLAG = 1
  SRGR_FLAG = 1
  DOP_CEN_FLAG = 1
  DOP_AMB_FLAG = 0
  RANGE_SPREAD_COMP_FLAG = 1
  DETECTED_FLAG = 1
  LOOK_SUM_FLAG = 1
  RMS_EQUAL_FLAG = 0
  ANT_SCAL_FLAG = 0
  VGA_COM_ECHO_FLAG = 1
  VGA_COM_CAL_FLAG = 1
  VGA_COM_NOM_TIME_FLAG = 1
  GM_RANGE_COMP_INV_FILT_FLAG = 0

RAW DATA ANALYSIS INFORMATION
  RAW_DATA_ANALYSIS[0]
    NUM_GAPS = 0
```

Figure 4 Example of header edition.

1.2 Visualize a quick-look

PolSARpro offers the possibility to first visualize a low resolution version of the image

Click Import → Quick look

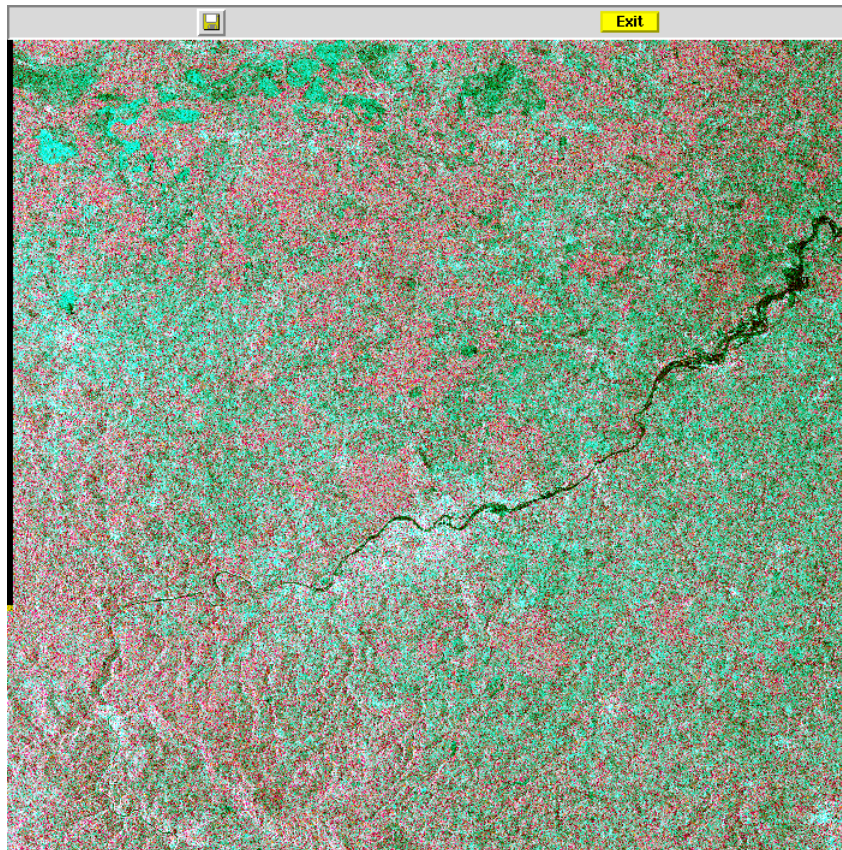


Figure 5 APP format data quick look.

1.3 Extract a sub-image

A sub part of the data set may be extracted from the ASAR app file using a graphic interface.

Click Extract → Sub area

A graphic interface permits to select a sub-area and extract it

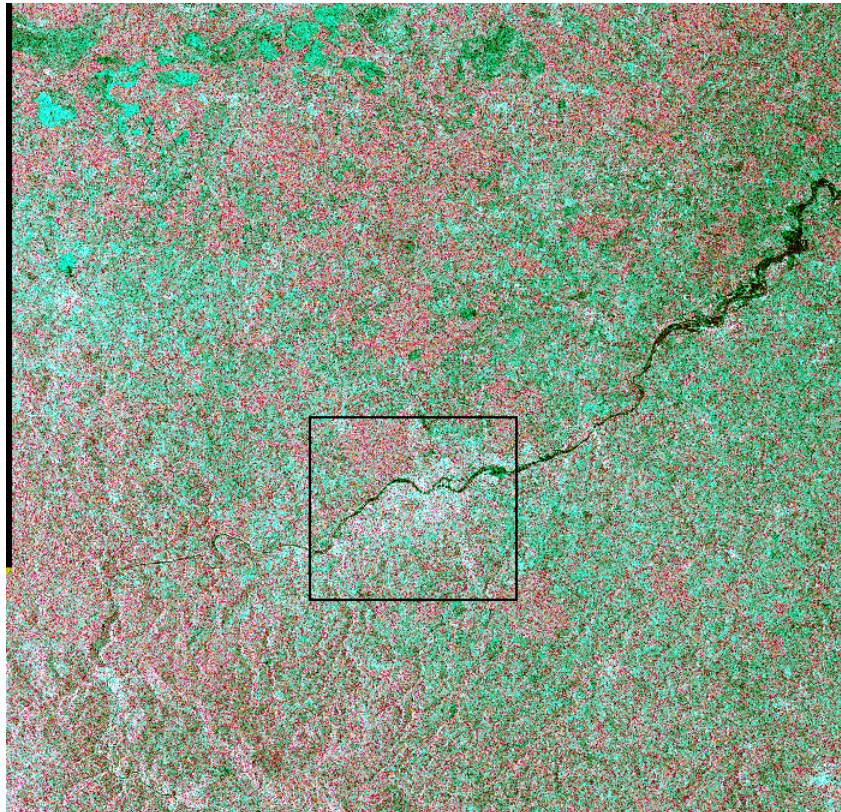


Figure 6 Selection of a sub-area on the quick look image.

A visual interface permits to refine the extracted area coordinates

ASAR Input Data File
 /home/laurent/POLSAR_DATA/ASAR/ASA_APP_1PXPDE20020819_093043_000

Output Directory
 /home/laurent/POLSAR_DATA/ASAR /

Init Row 4001 End Row 6000 Init Col 3001 End Col 5000

Full Resolution
 Sub Sampling Row Col
 Multi Look Row Col

Run Exit

Figure 7 Sub-area extraction interface.

Once the extraction is validated, two intensity binary files are created, whose name may vary according to the PP configuration. In this case, the intensity files are

~/POLARSAR_DATA/ASAR/I11.bin

~/POLARSAR_DATA/ASAR/I21.bin

2. FILTER AND VISUALIZE AN INTENSITY DATA SET

2.1 Apply a speckle filter

A lee filter is run on the intensity data sets

Click Process → (lxx,lxy) → Speckle Filter → J.S. Lee Refined Filter

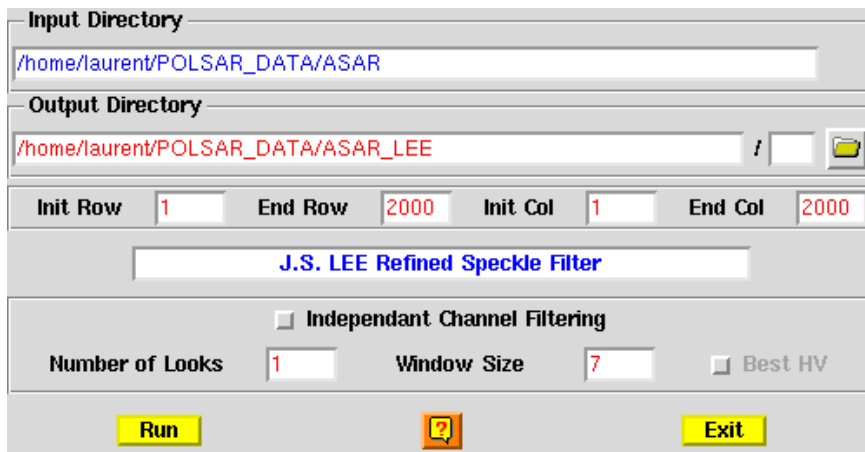


Figure 8 Intensity Lee filter interface.

A new directory, ~/POLARSAR_DATA/ASAR_LEE/, has been created and contains intensity binary files.

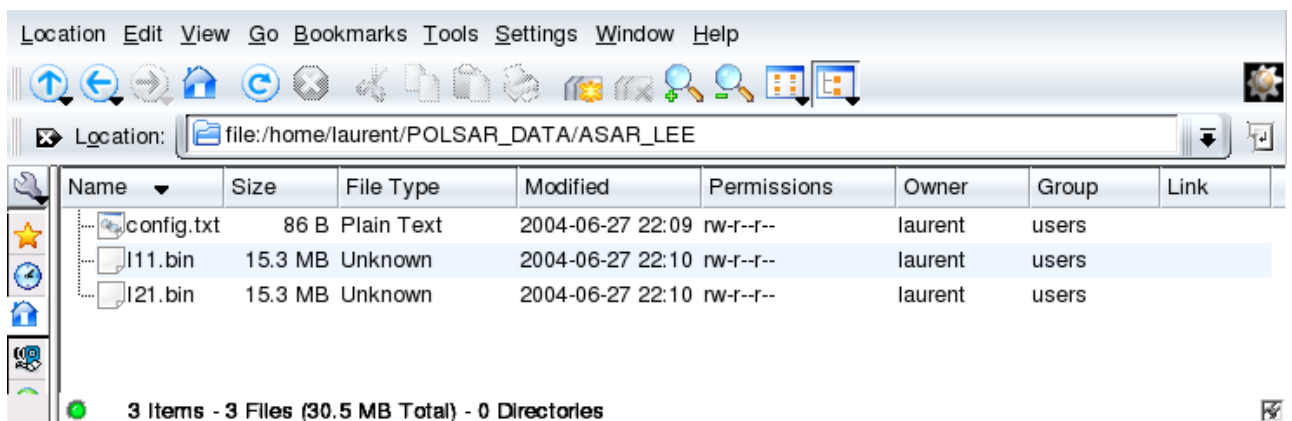


Figure 9 Contents of the filtered data directory.

2.2 Visualize filtered intensities

The joint intensity information may be visualized by building a color-coded image

Click Display → (lxx,lxy) → Creat RGB file → J.S. Lee Refined Filter

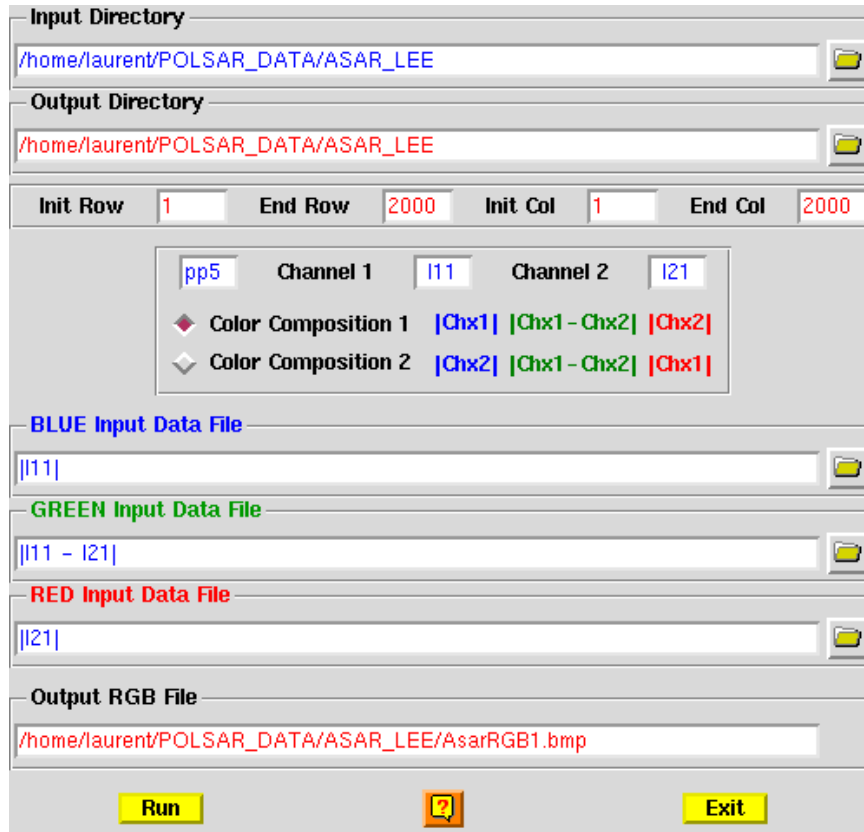


Figure 10 Intensity RGB file . creation interface.

A new image file is created under the current directory

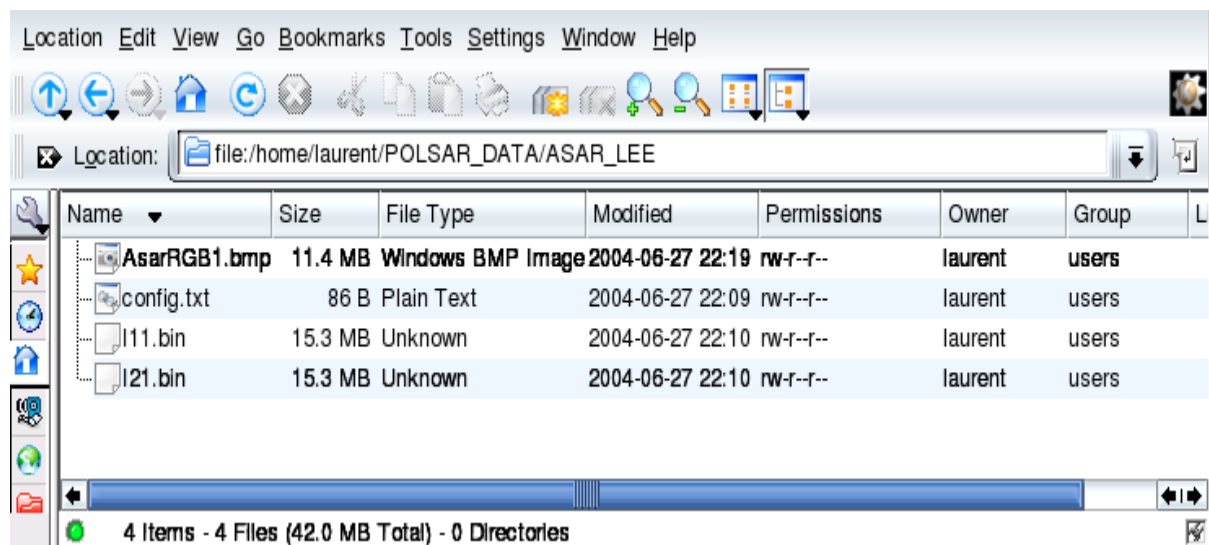


Figure 11 Filtered data directory contents.

The resulting image may be displayed using PolSARpro visualization tool



Figure 12 Filtered intensity data color coded image.

3. SUPERVISED CLASSIFICATION OF FILTERED INTENSITY IMAGES

A supervised classification process is run over the selected sub-area

Click Process → (Ixx,Ixy) → Wishart Unsupervised classification

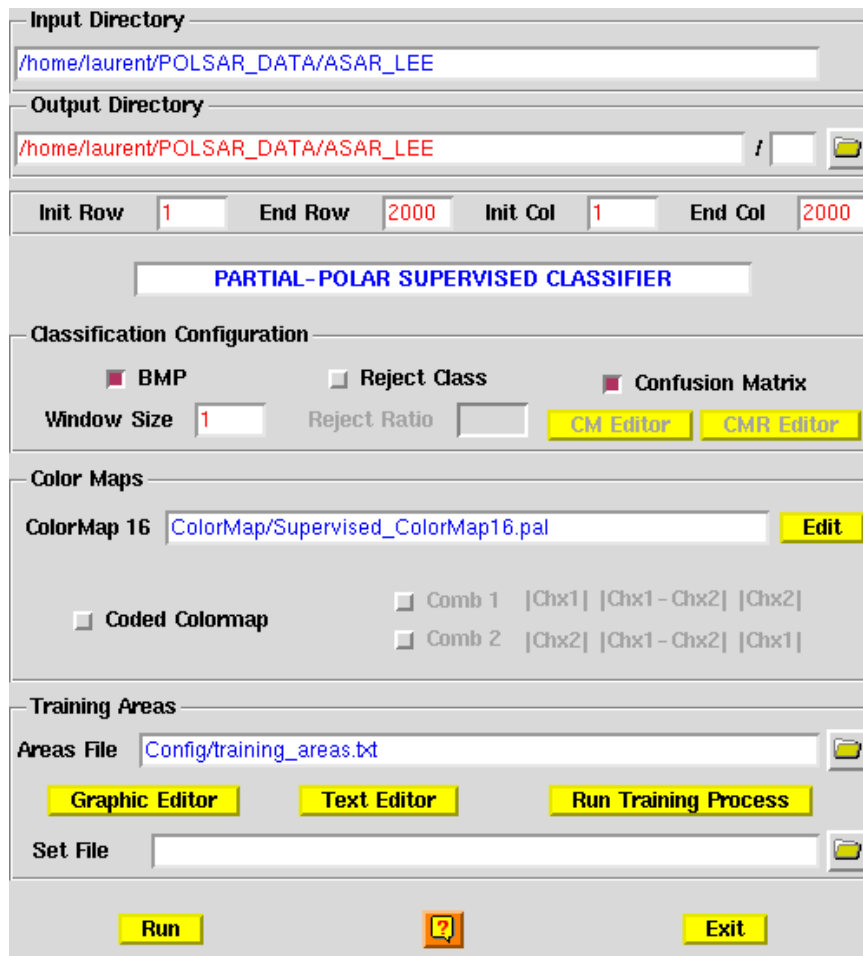


Figure 13 Unsupervised classification interface.

The first step of the classification consists in defining a training data set using a graphic editor.

Click Graphic editor

Polsarpro asks then to provide a bmp image file for the graphic selection

The propose file is ~/POLSAR_DATA/ASAR/ASAR_RGB1.bmp

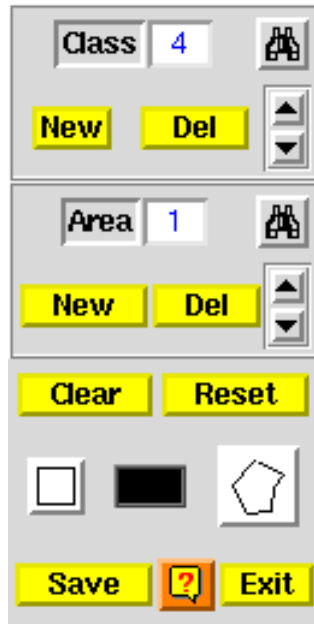


Figure 14 Training class selection tool.

A class may owe several areas and areas may be delimited by boxes or polygons

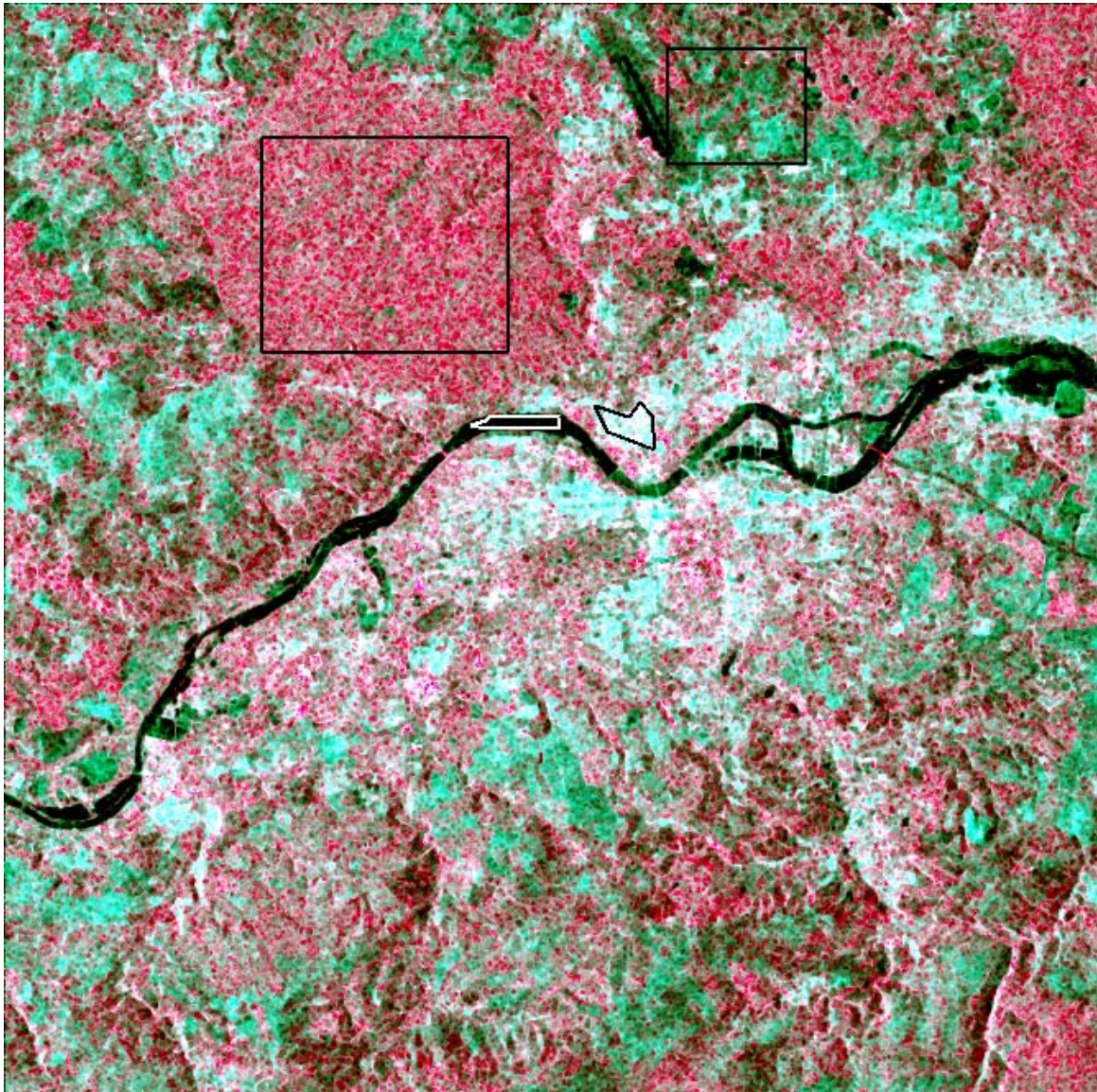


Figure 15 Selected areas.

The selected training area are then saved and the segmentation is run.

Click Run Training Process

The training cluster covariance matrices are built

Click Run

The segmentation process produces several files

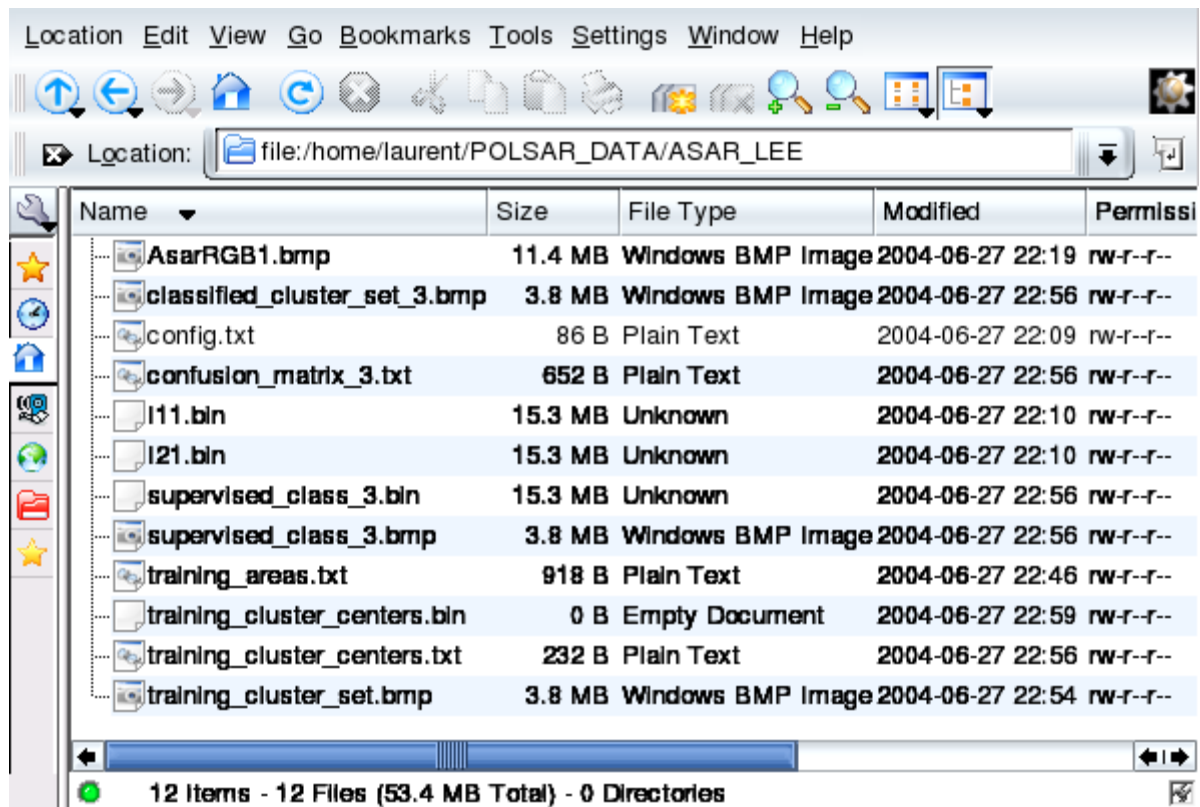


Figure 16 Directory content after segmentation

The main classification results are

- the classified image supervised_class_3.bmp
- the initial and segmented training cluster sets
- the confusion matrix

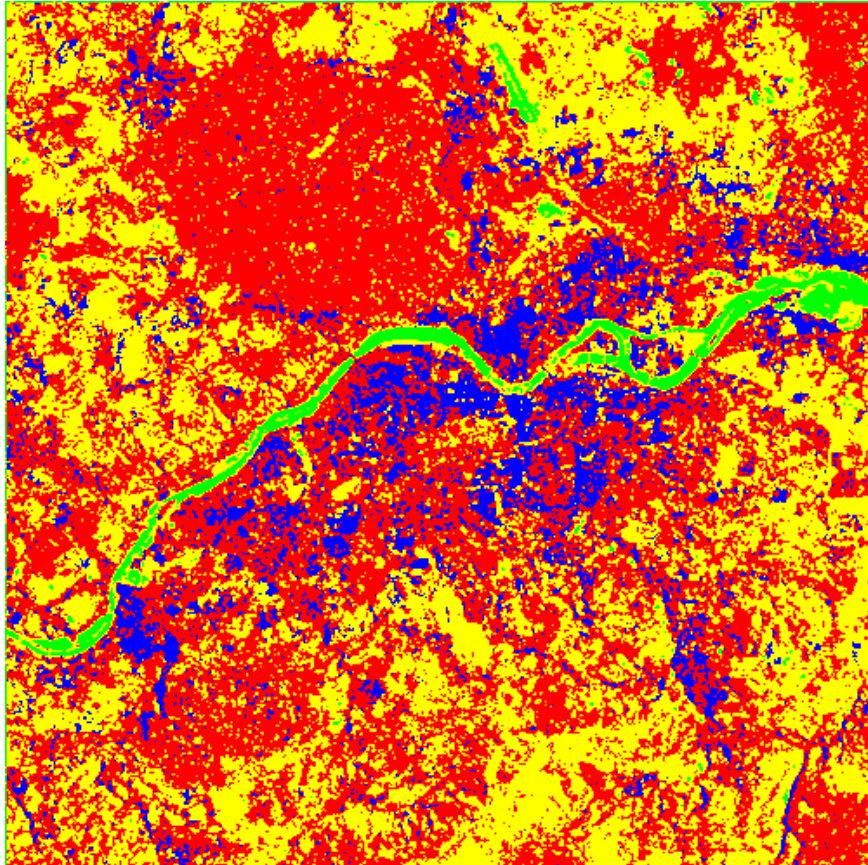


Figure 17 Classified image.

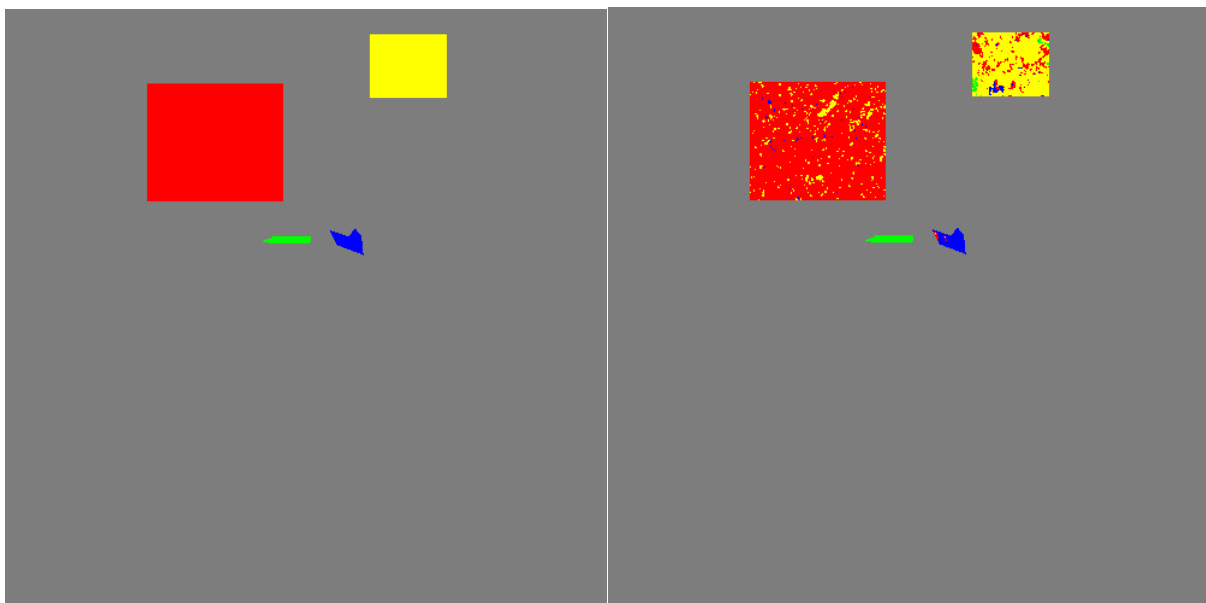


Figure 18 Training cluster set initial (left) segmented (right).

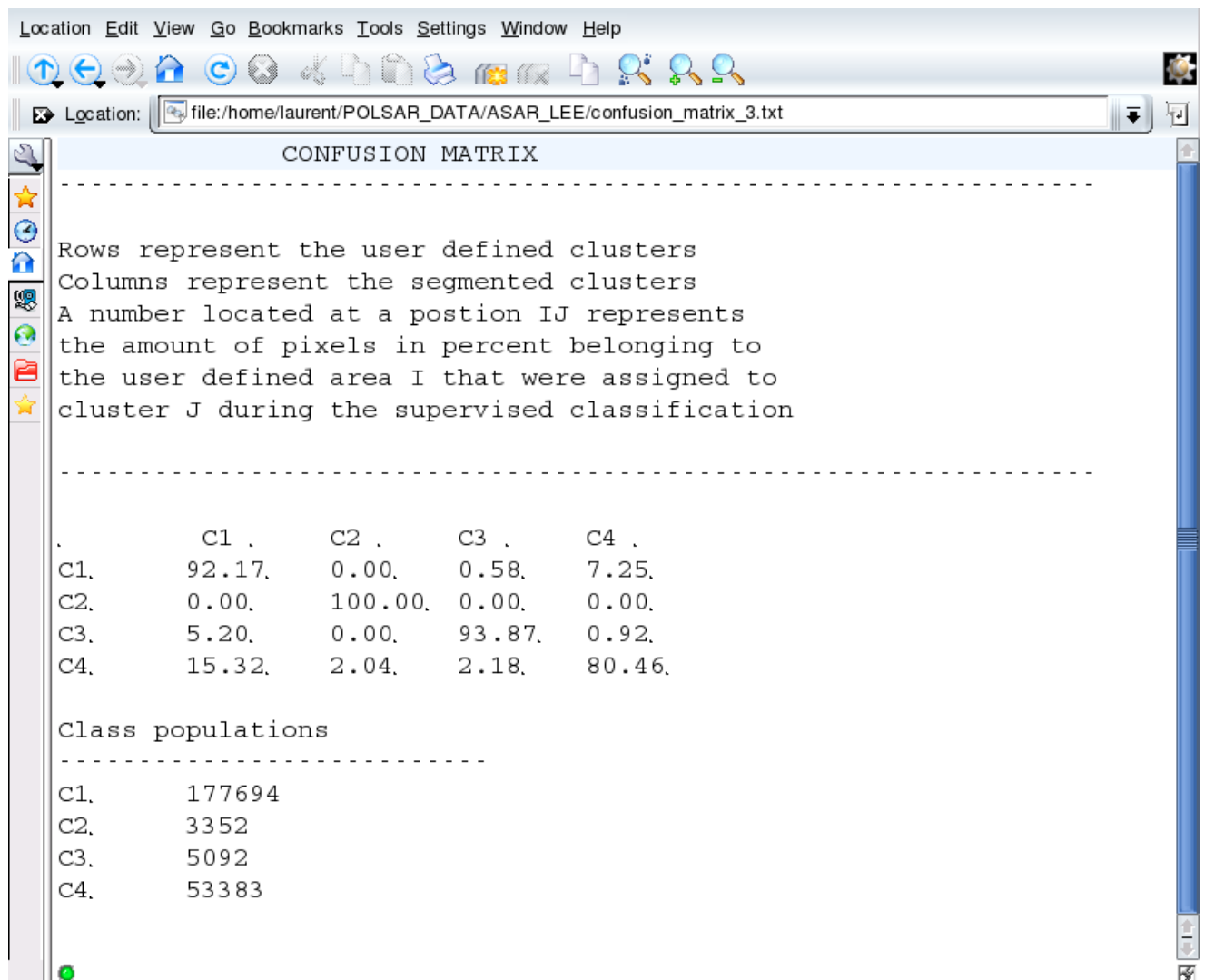


Figure 19 Confusion matrix.