

Polarimetric SAR Tomography

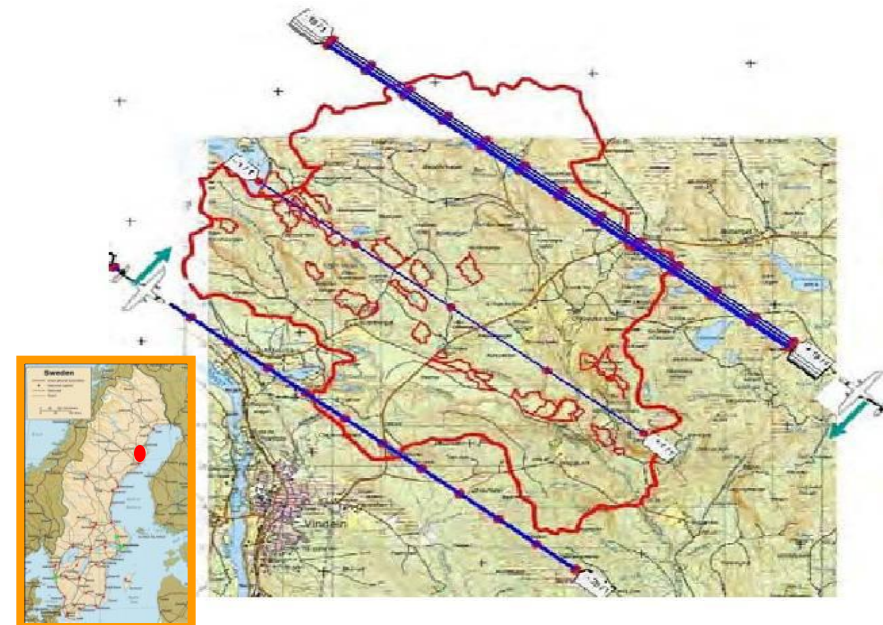
using PolSARpro

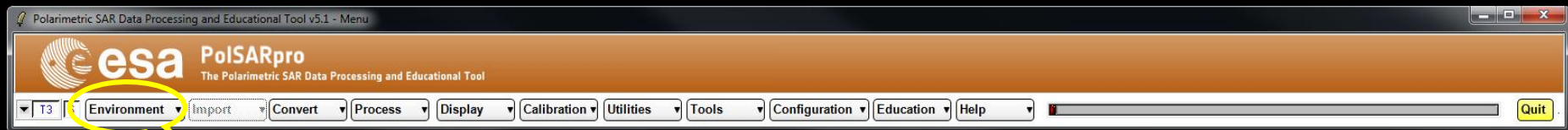
(Practical Session D5P1a)

Laurent FERRO-FAMIL - Eric POTTIER

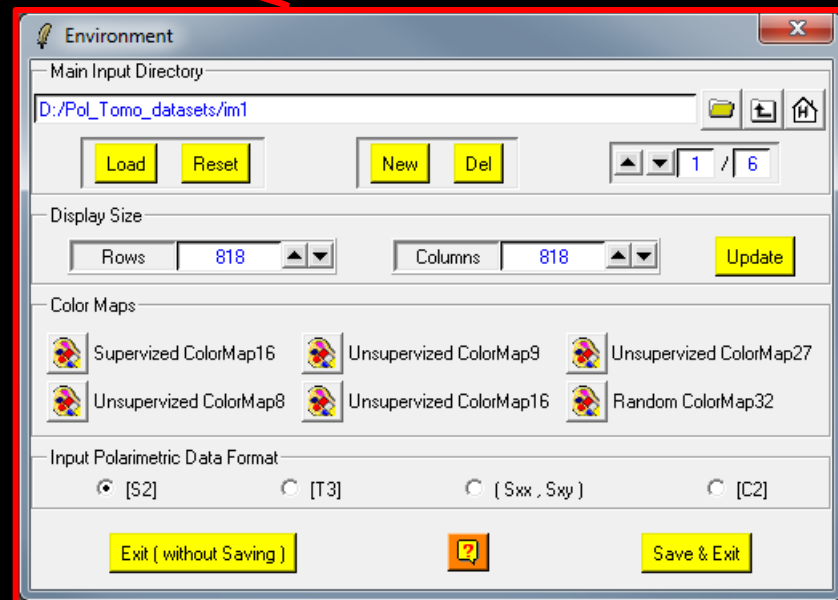
University of Rennes 1

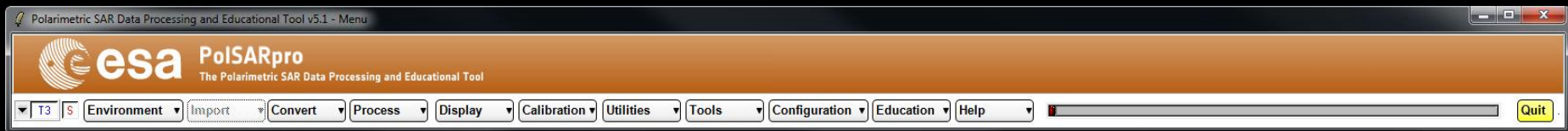
<u>Campaign</u>	<u>BioSAR 2008 - ESA</u>
System	E-SAR - DLR
Site	Krycklan river catchment, Northern Sweden
Scene	Boreal forest Pine, Spruce, Birch, Mixed stand
Topography	Hilly
Tomographic Tracks	6 + 6 – Fully Polarimetric (South-West and North-East)
Carrier Frequency	P-Band and L-Band
Slant range resolution	1.5 m
Azimuth resolution	1.6 m
Vertical resolution (P-Band)	20 m (near range) to >80 m (far range)
Vertical resolution (L-Band)	6 m (near range) to 25 m (far range)



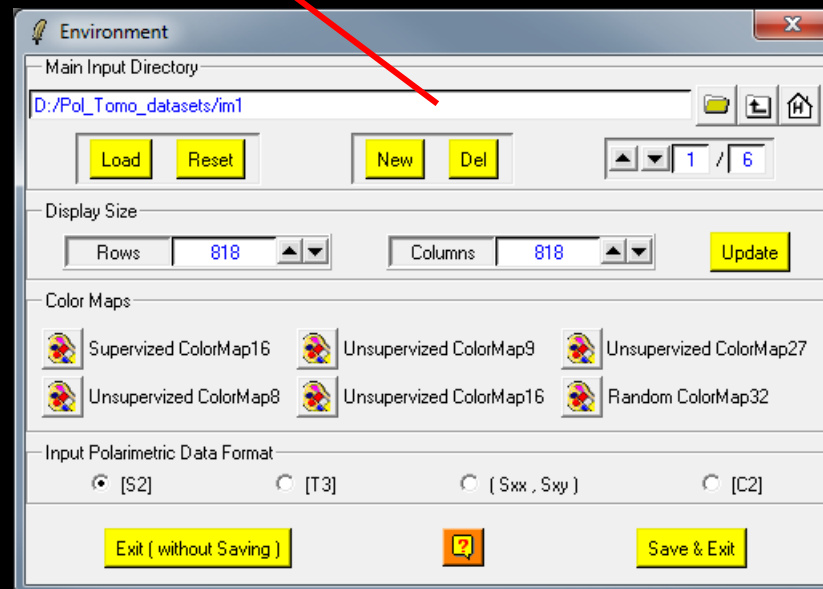


- Single Data Set (Pol-SAR)
- Dual Data Sets (Single Baseline Pol-InSAR)
- Multi Data Sets (Time series / Pol-TomSAR)**

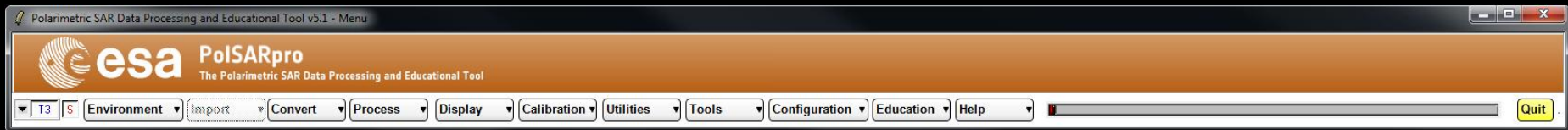




Configure Data Main Directory location



Input Directory: C:/ .../Pol_Tomo_datasets/im1

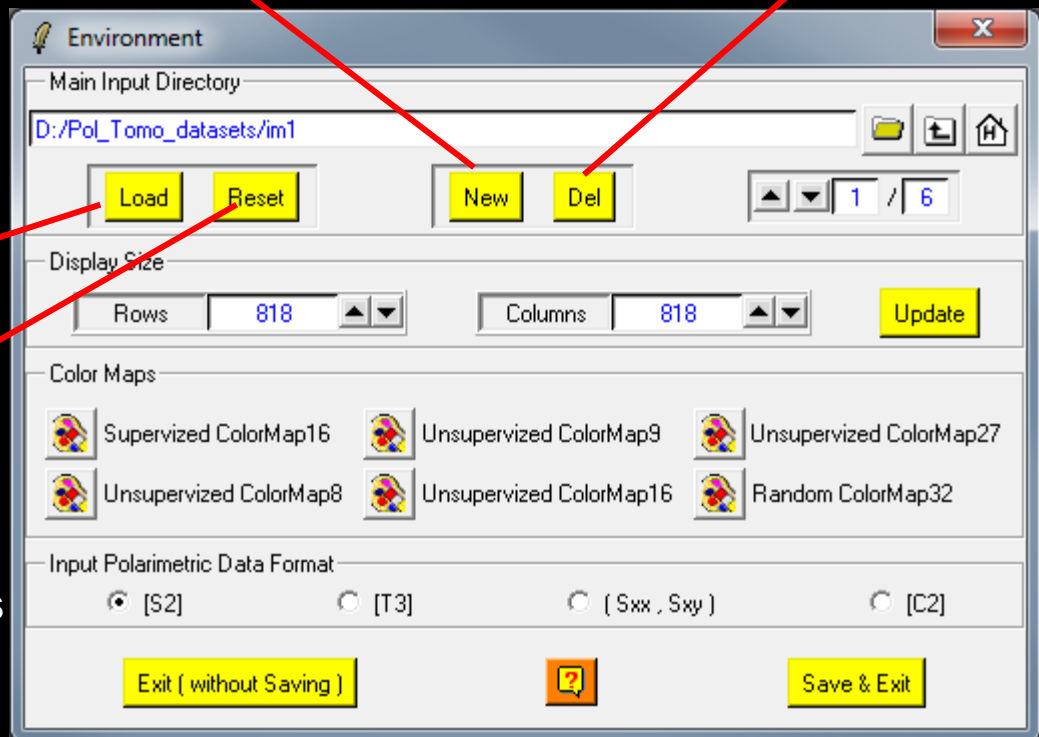


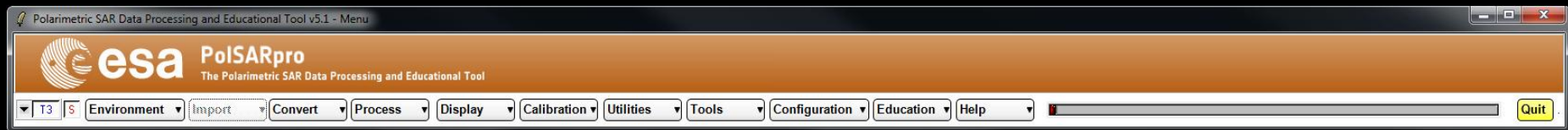
Add a new Data Directory

Delete a Data Directory

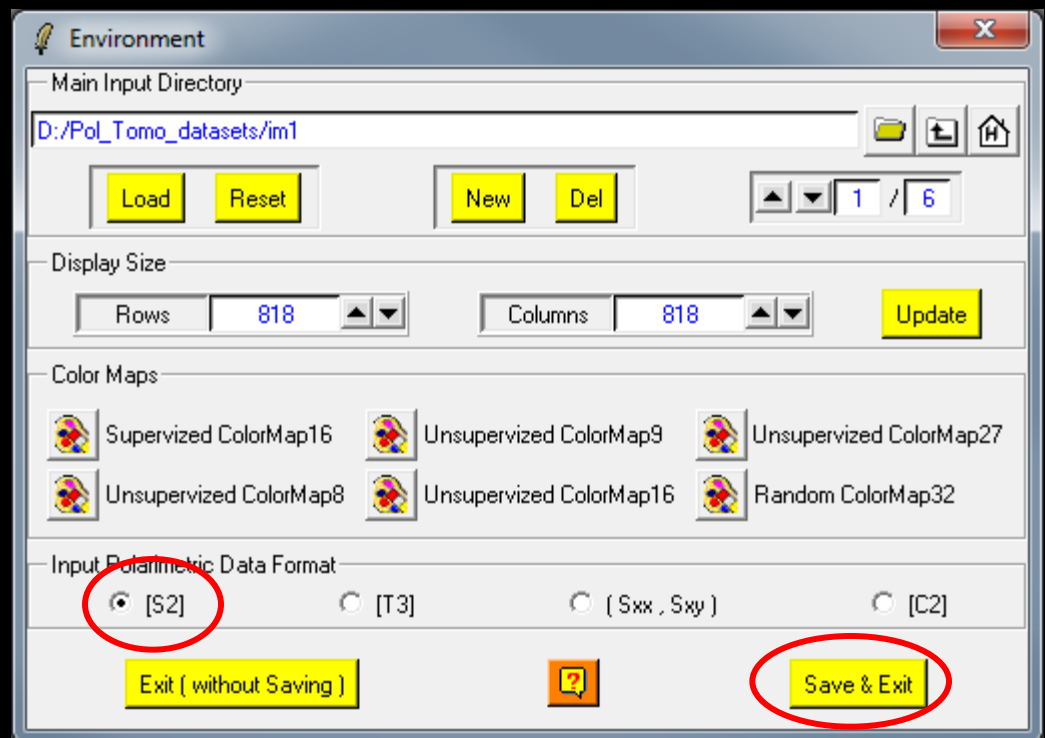
Load a predefined list of Data Directories

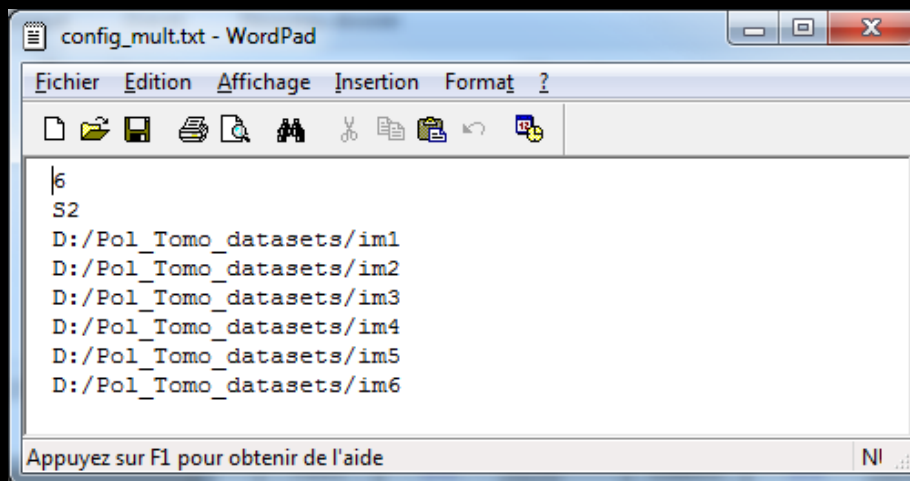
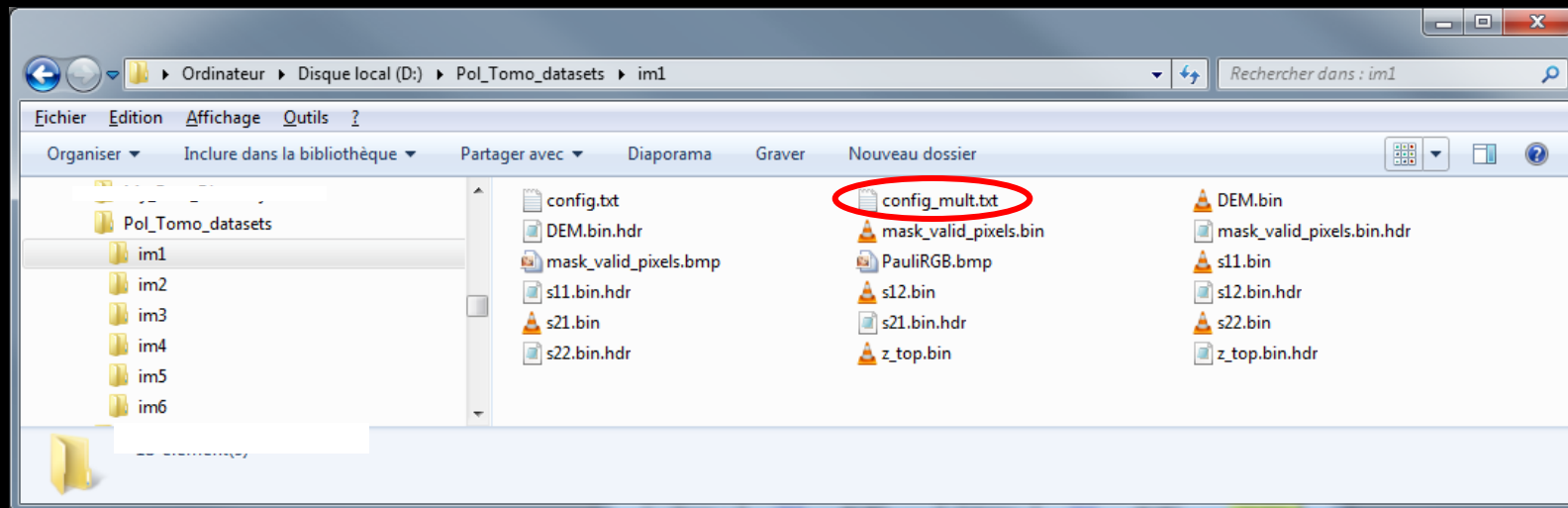
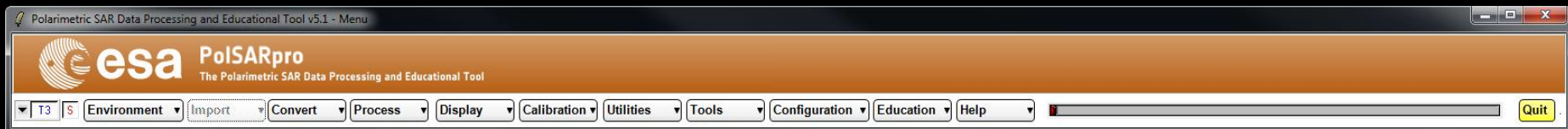
Reset the list of the Data Directories

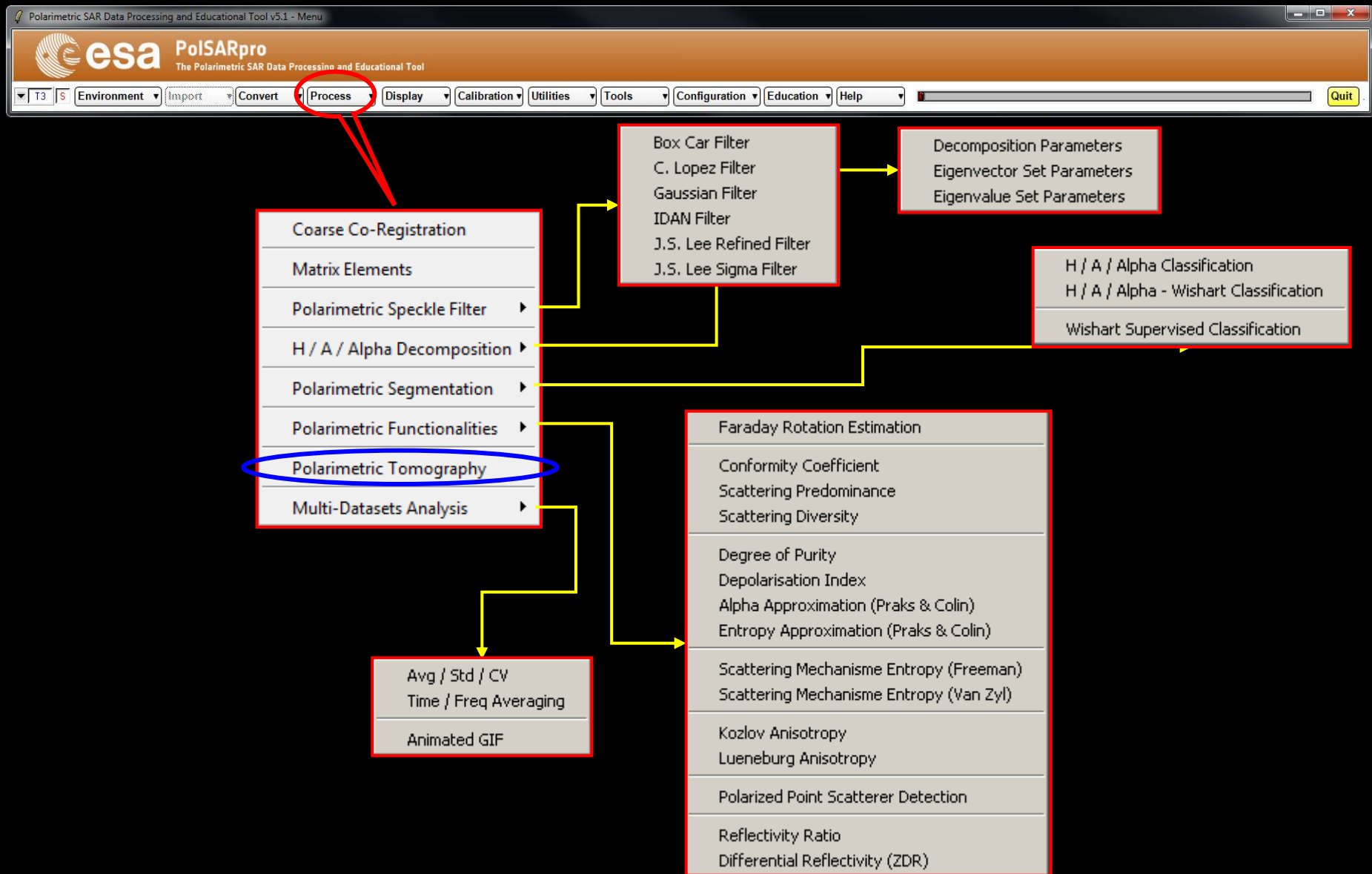


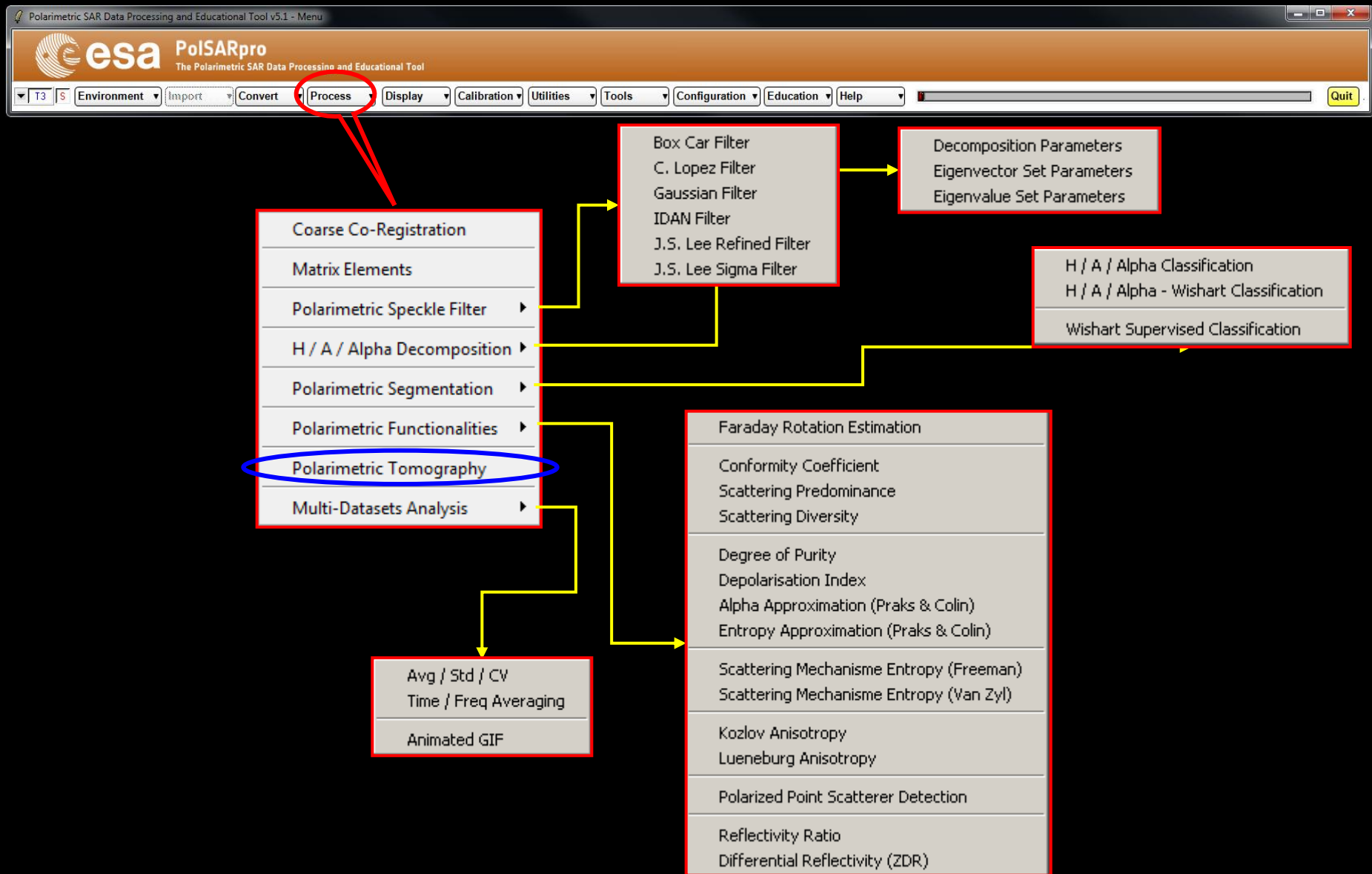


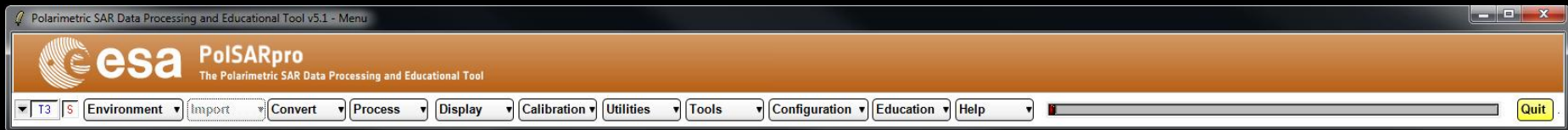
Pol_Tomo_datasets/im1
Pol_Tomo_datasets/im2
Pol_Tomo_datasets/im3
Pol_Tomo_datasets/im4
Pol_Tomo_datasets/im5
Pol_Tomo_datasets/im6



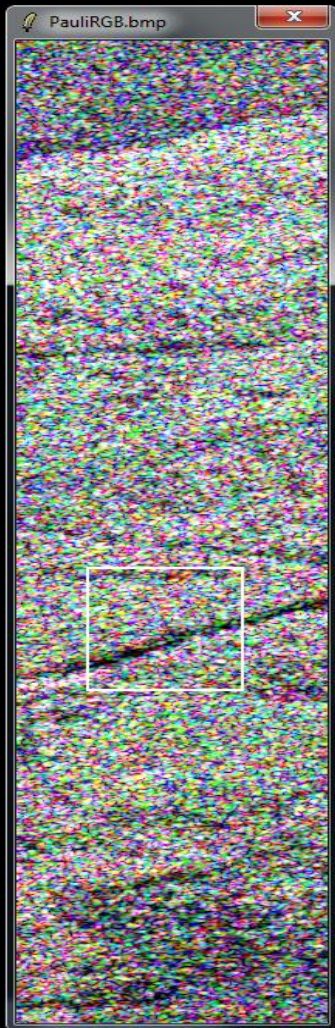


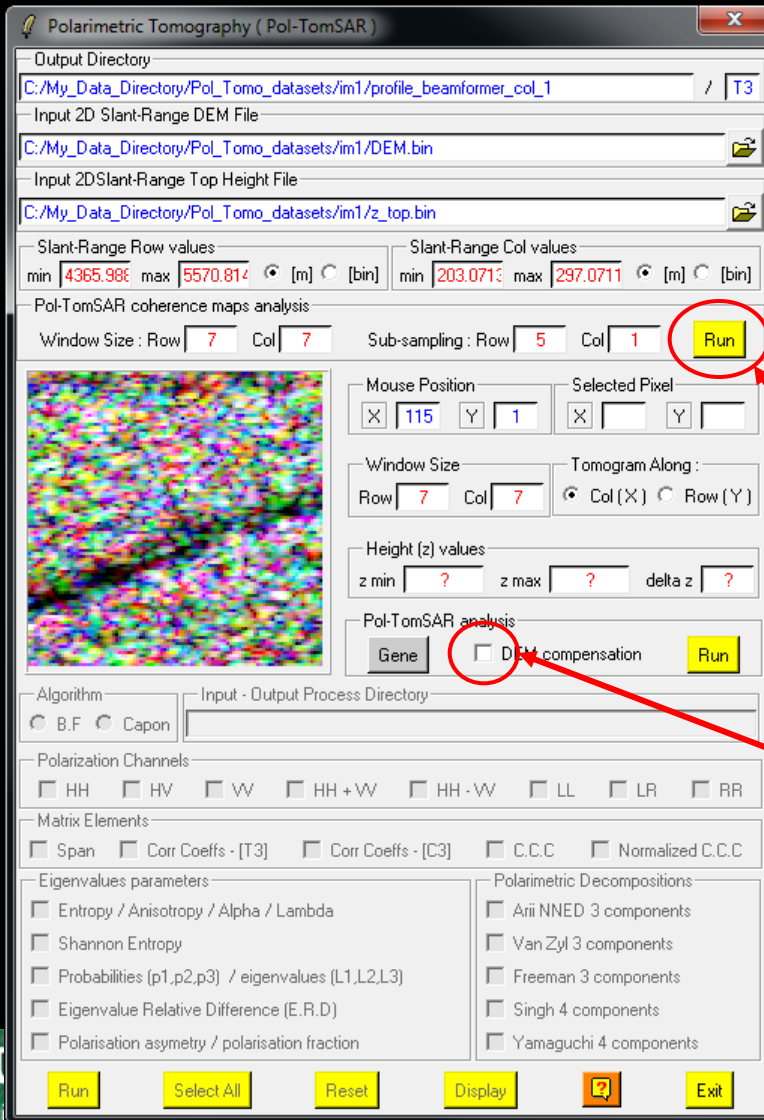
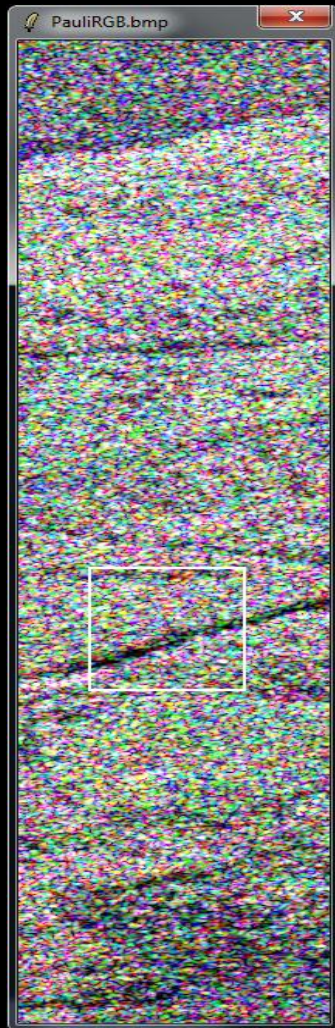
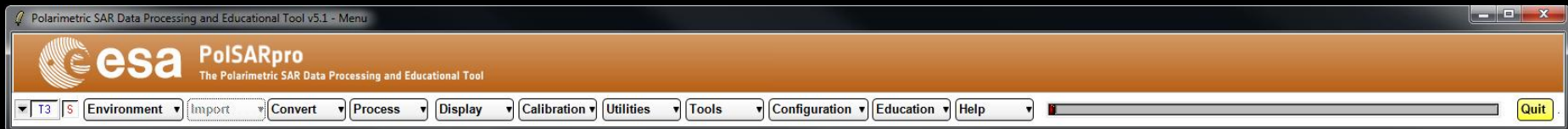






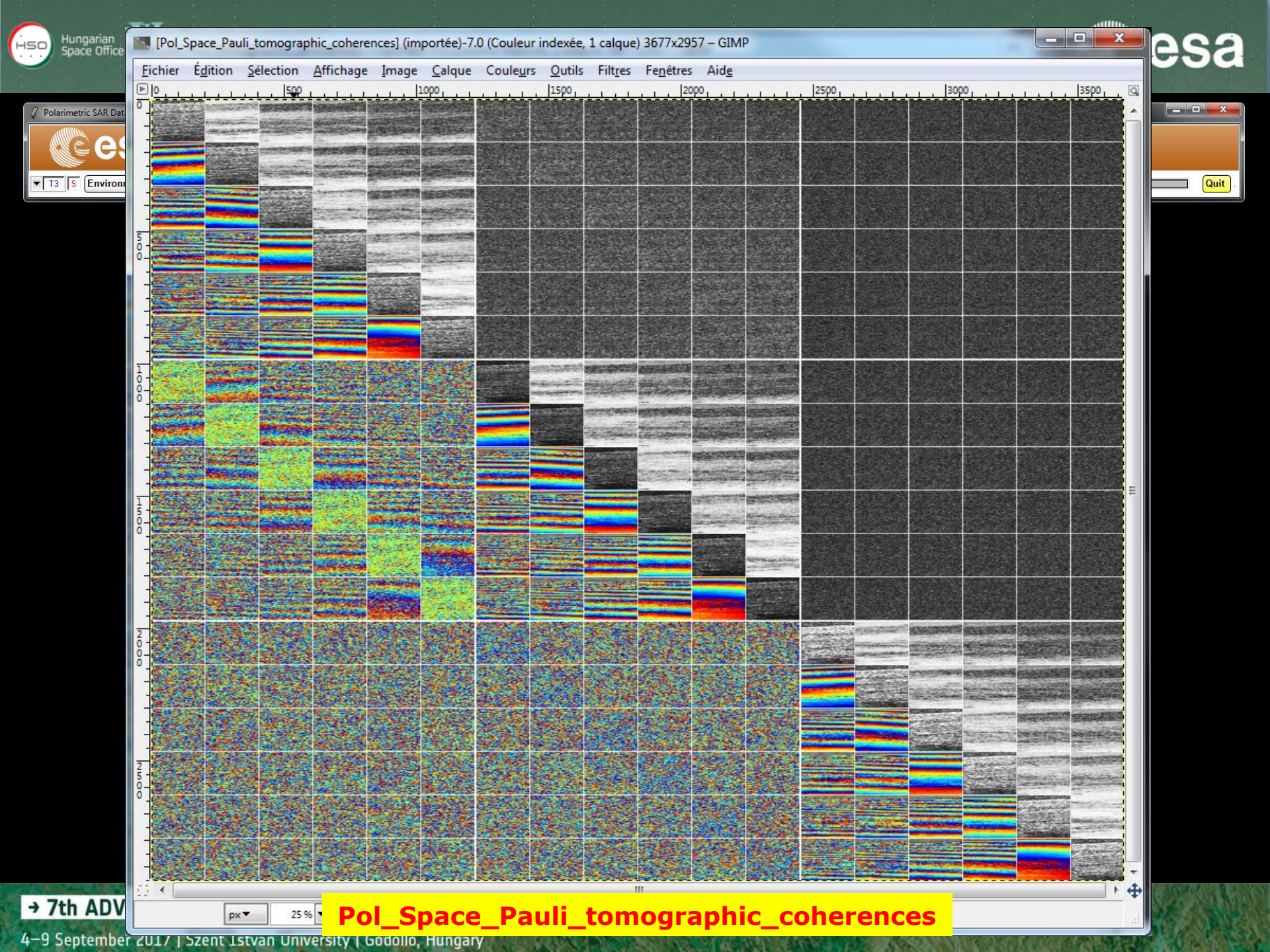
**Step 0 :
Open a BMP file**

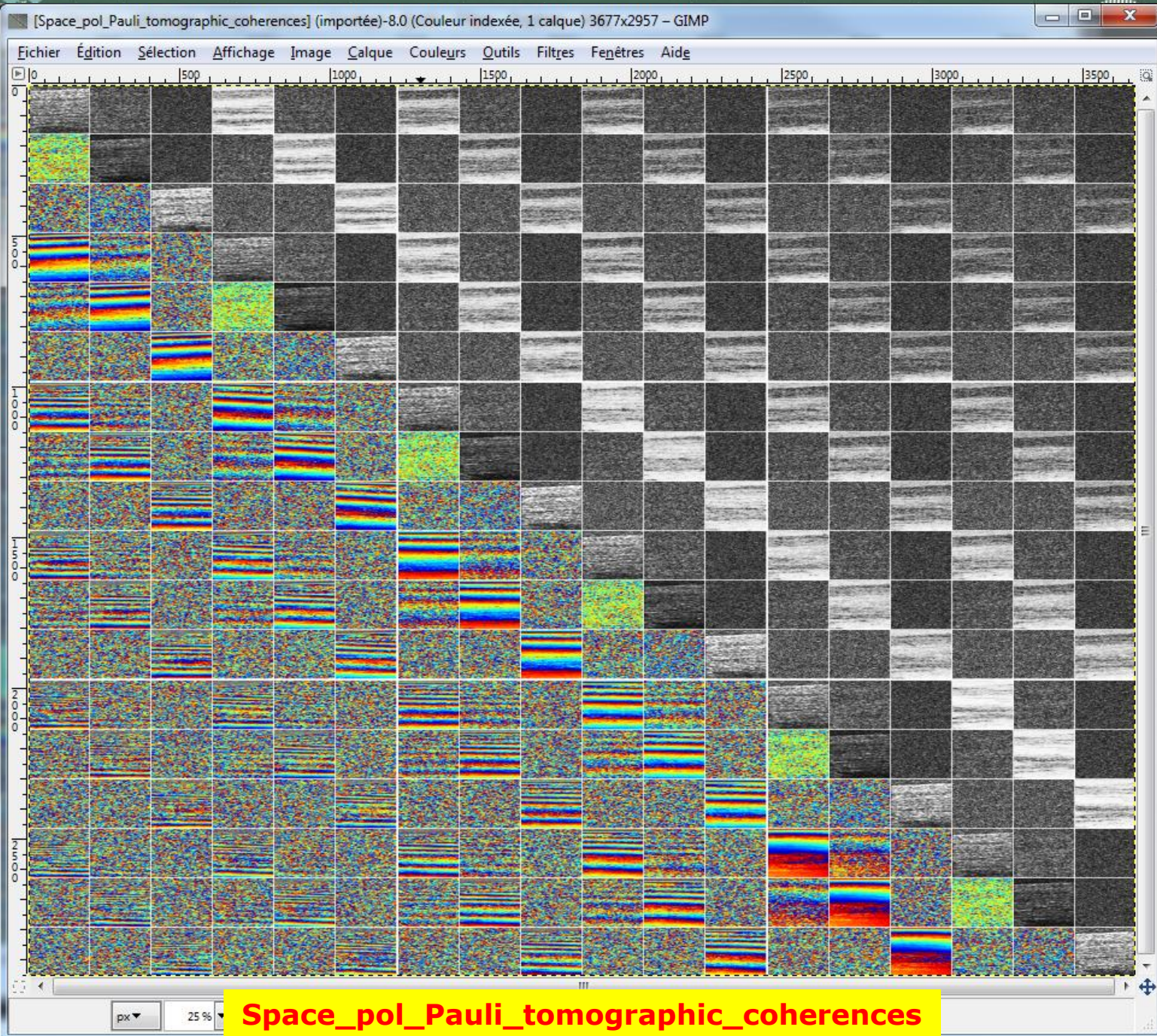
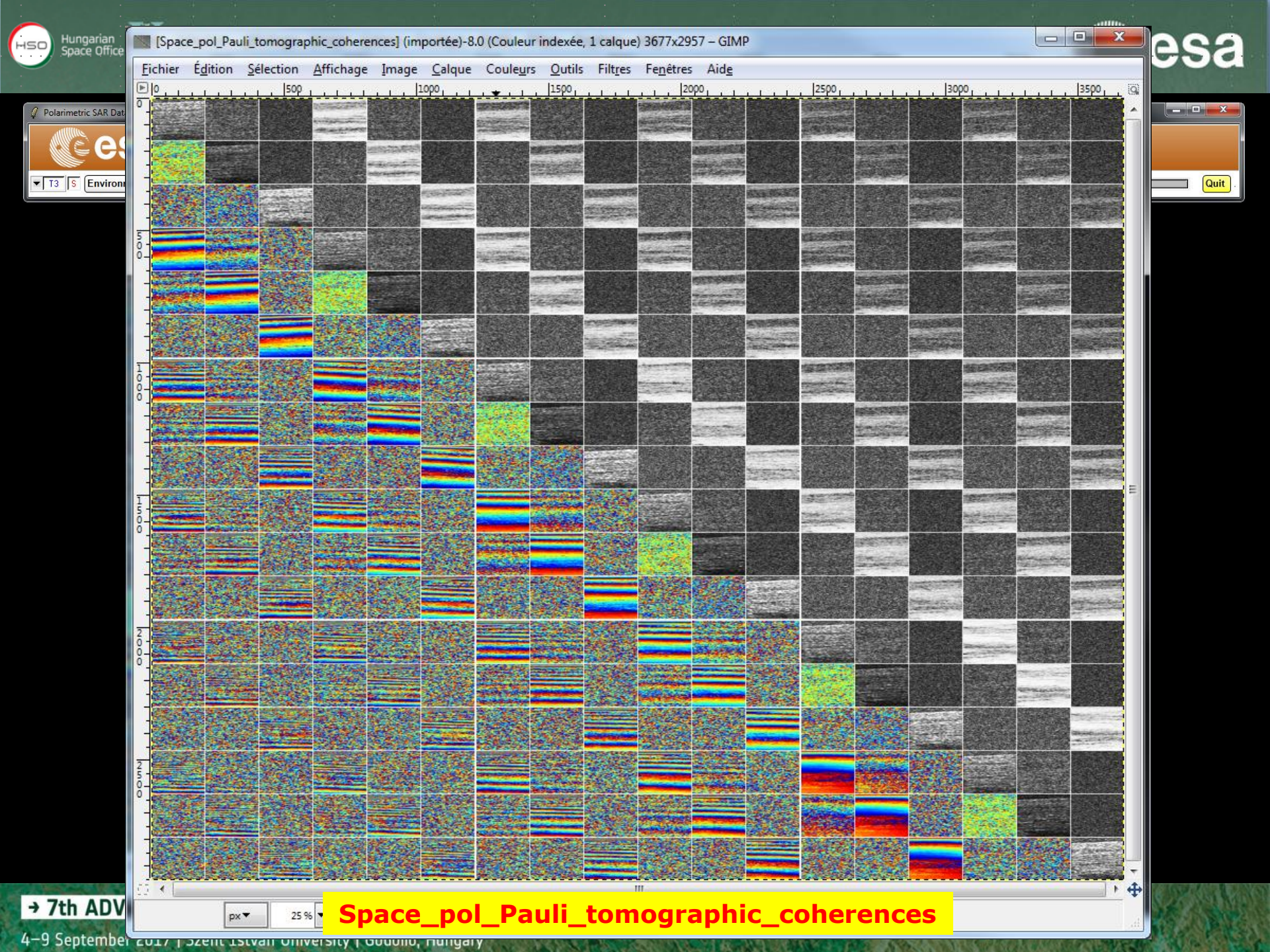


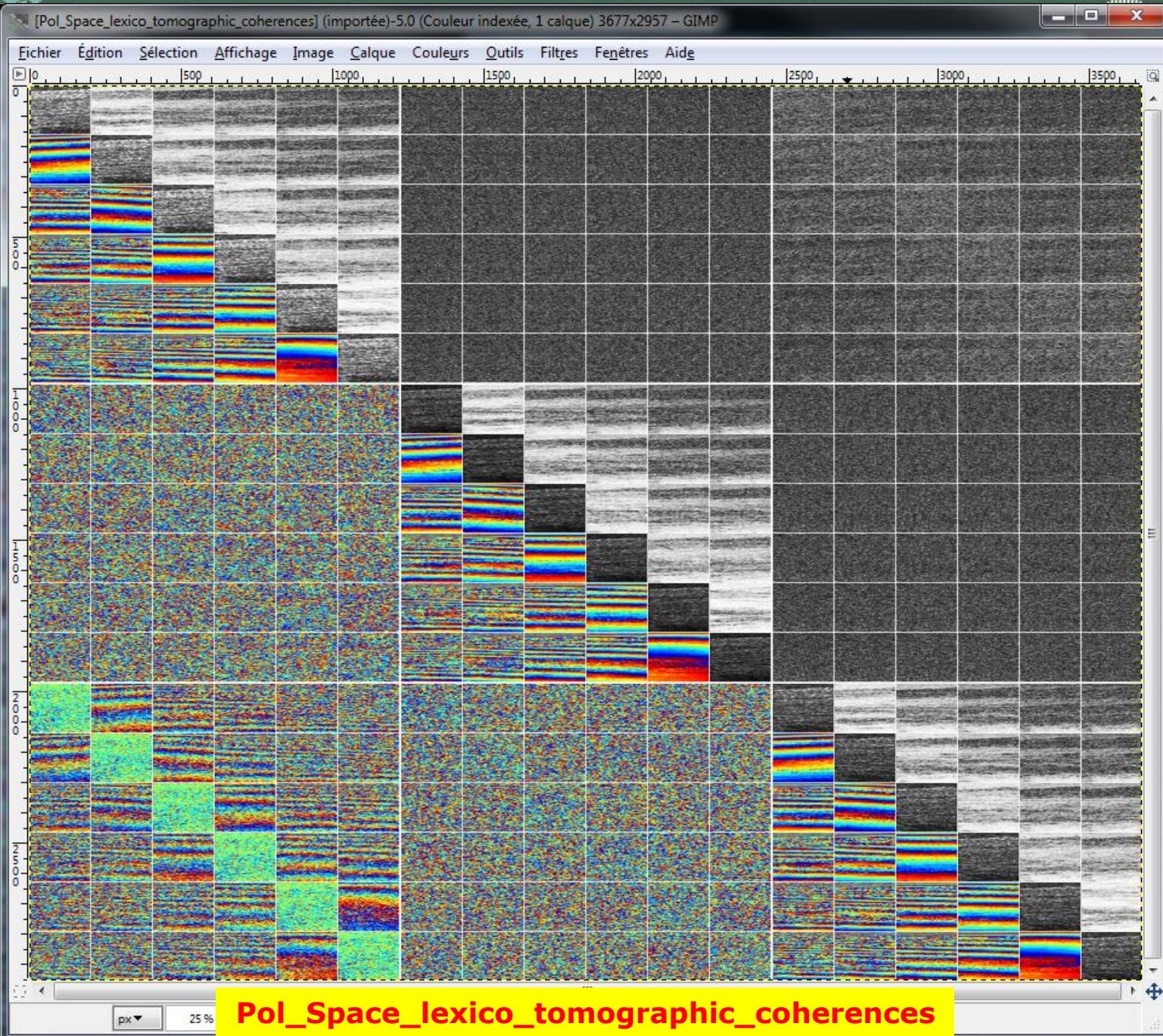
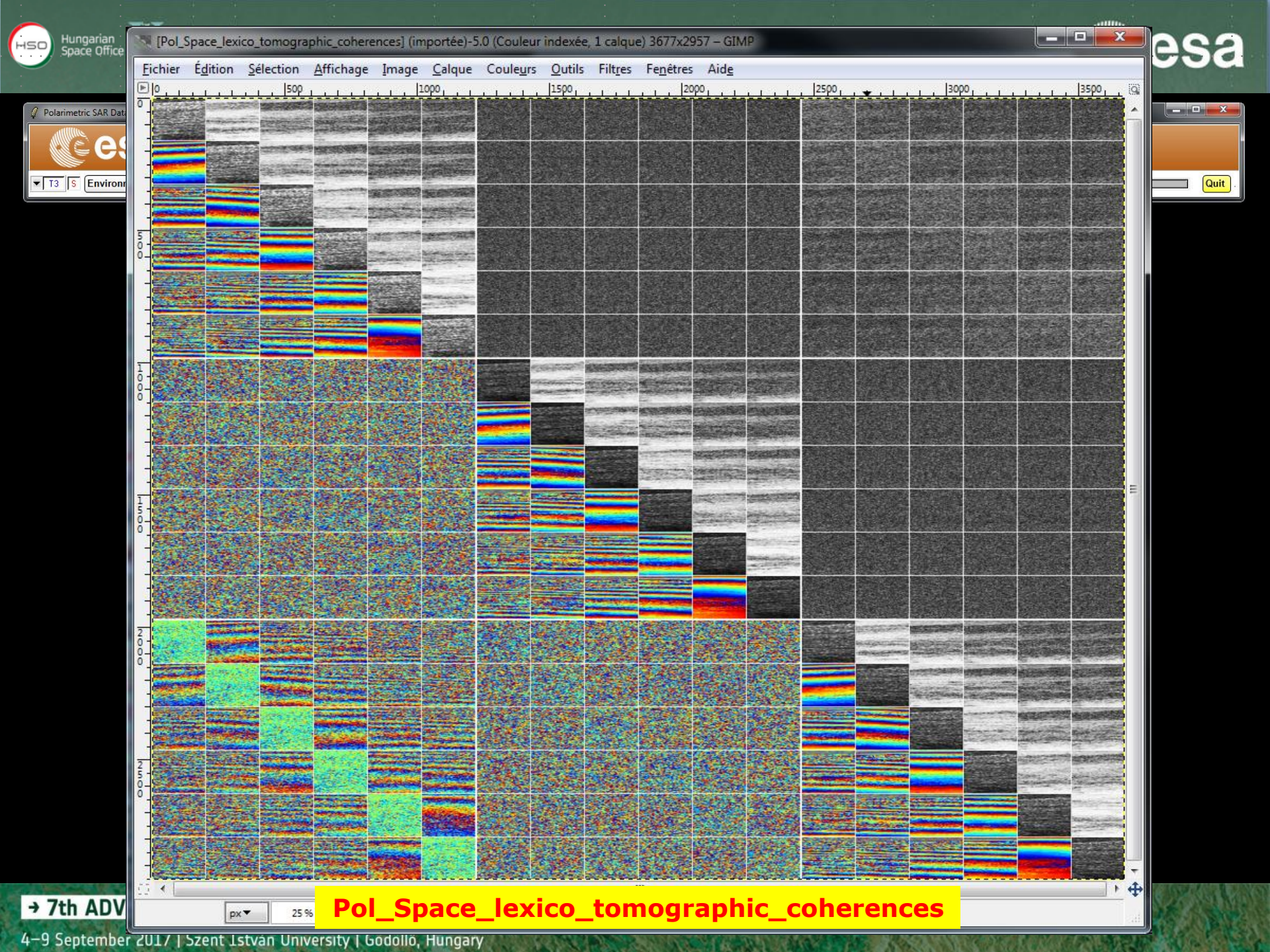


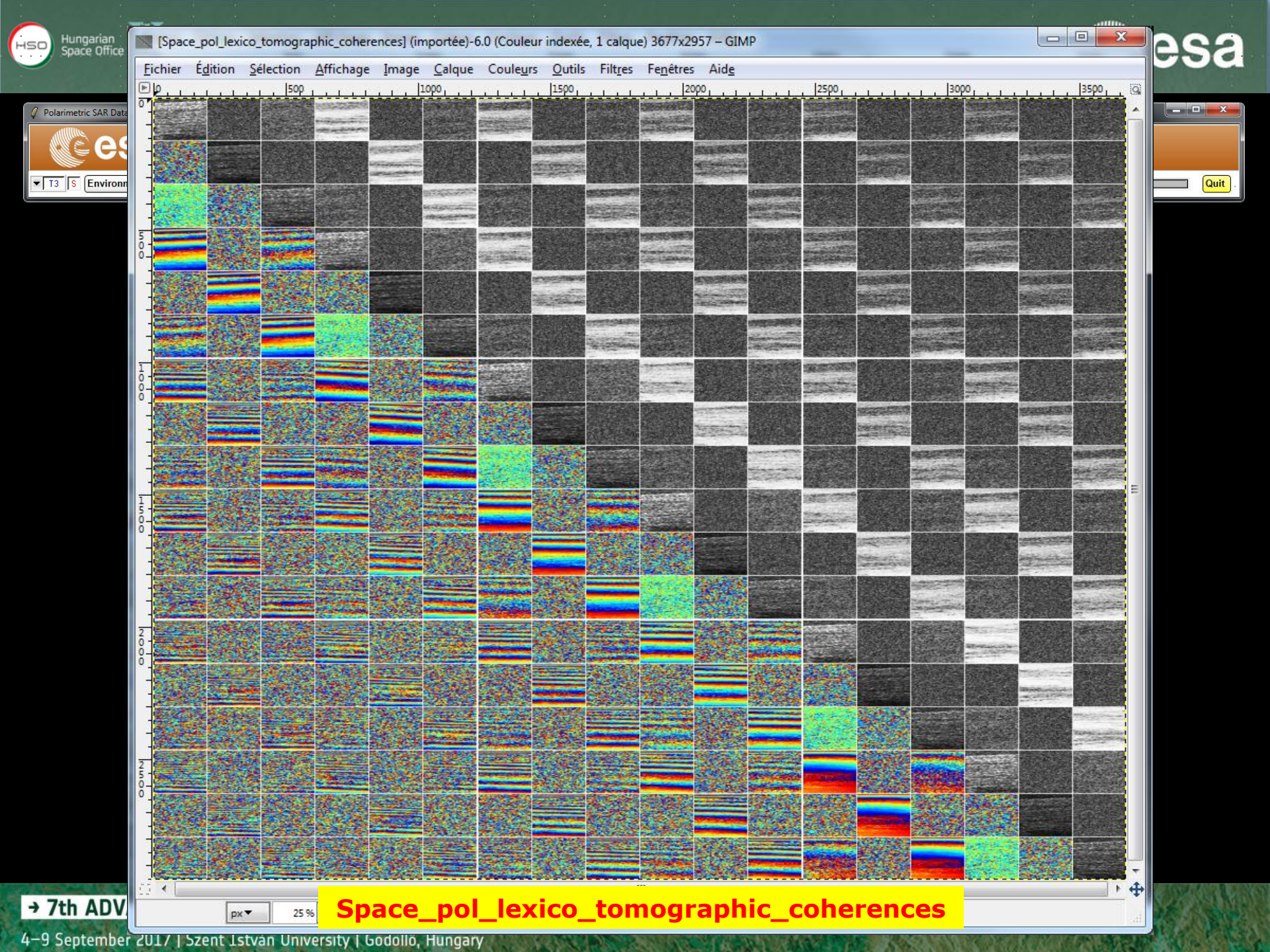
**Step 1 :
Display Coherence Maps**

**Without DEM
compensation**







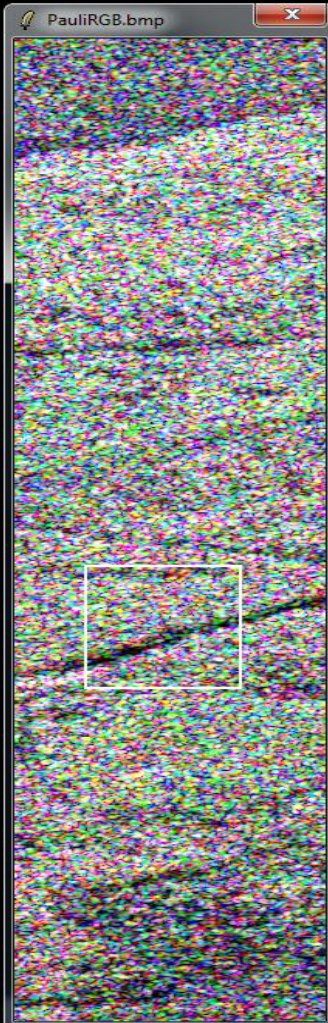


Polarimetric SAR Data Processing and Educational Tool v5.1 - Menu


PolSARpro
 The Polarimetric SAR Data Processing and Educational Tool

T3 | S | Environment | Import | Convert | Process | Display | Calibration | Utilities | Tools | Configuration | Education | Help | Quit

PauliRGB.bmp



Polarimetric Tomography (Pol-TomSAR)

Output Directory: C:/My_Data_Directory/Pol_Tomo_datasets/im1/profile_beamformer_col_1 / T3

Input 2D Slant-Range DEM File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/DEM.bin

Input 2D Slant-Range Top Height File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/z_top.bin

Slant-Range Row values: min 4365.986 max 5570.814 [m] [bin]

Slant-Range Col values: min 203.0713 max 297.0711 [m] [bin]

Pol-TomSAR coherence maps analysis

Window Size : Row 7 Col 7 Sub-sampling : Row 5 Col 1 **Run**

Mouse Position: X 115 Y 1 Selected Pixel: X Y

Window Size: Row 7 Col 7 Tomogram Along: Col (X) Row (Y)

Height (z) values: z min ? z max ? delta z ?

Pol-TomSAR analysis: Gene **X** DEM compensation Run

Algorithm: B.F Capon

Input - Output Process Directory:

Polarization Channels: HH HV VV HH + VV HH - VV LL LR RR

Matrix Elements: Span Corr Coeffs - [T3] Corr Coeffs - [C3] C.C.C Normalized C.C.C

Eigenvalues parameters: Entropy / Anisotropy / Alpha / Lambda Shannon Entropy Probabilities (p1,p2,p3) / eigenvalues (L1,L2,L3) Eigenvalue Relative Difference (E.R.D) Polarisation asymetry / polarisation fraction

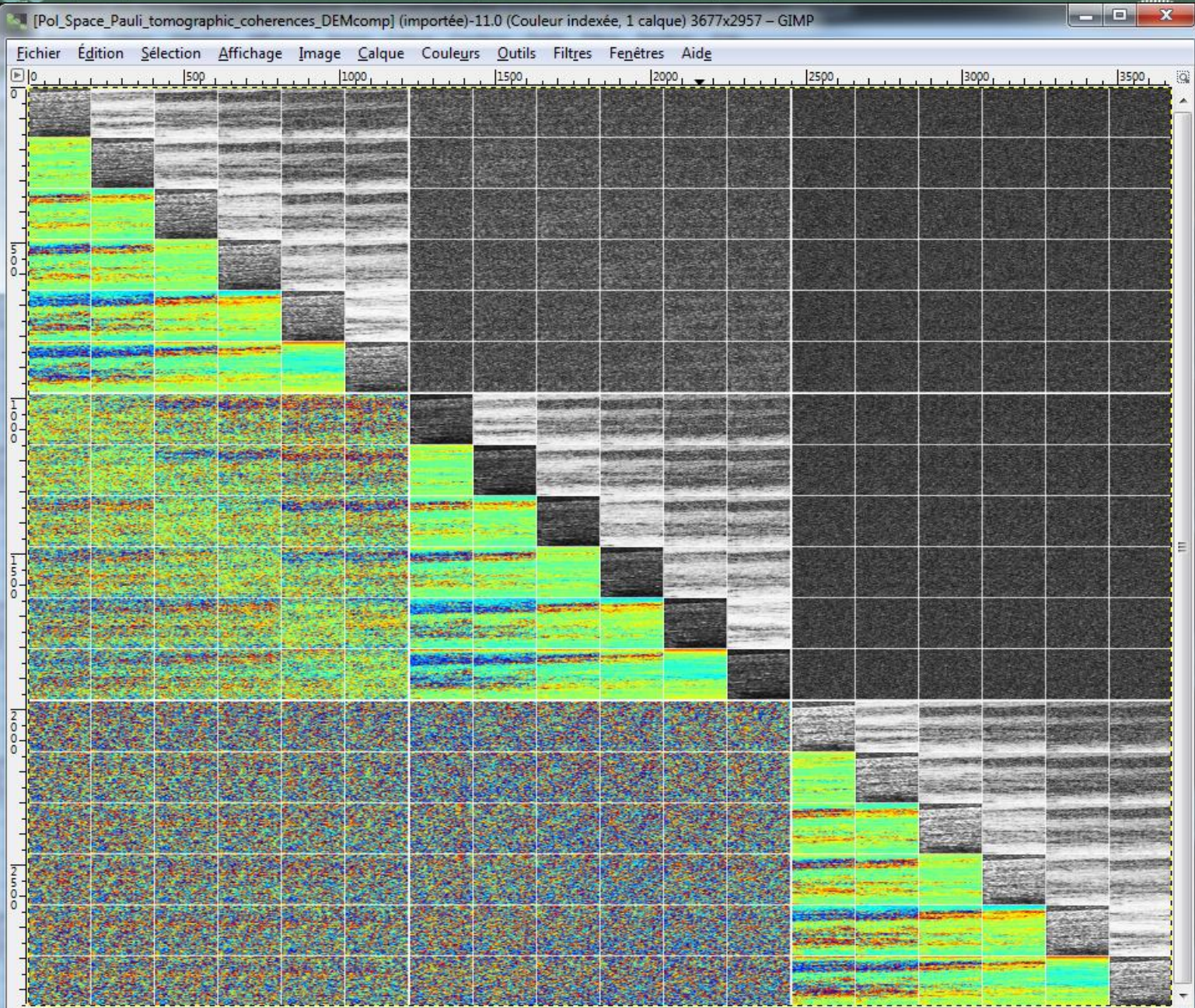
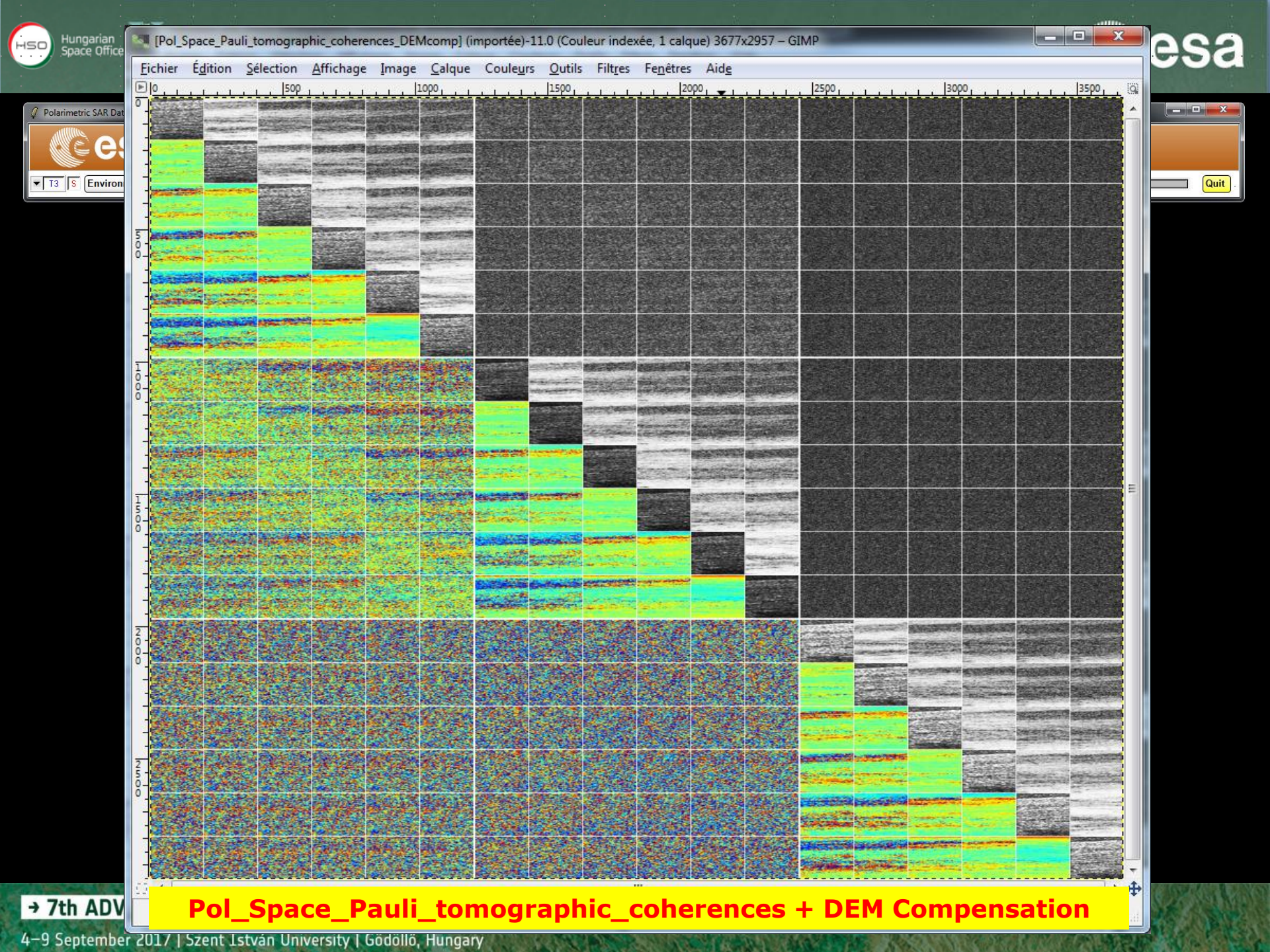
Polarimetric Decompositions: Anis NED 3 components Van Zyl 3 components Freeman 3 components Singh 4 components Yamaguchi 4 components

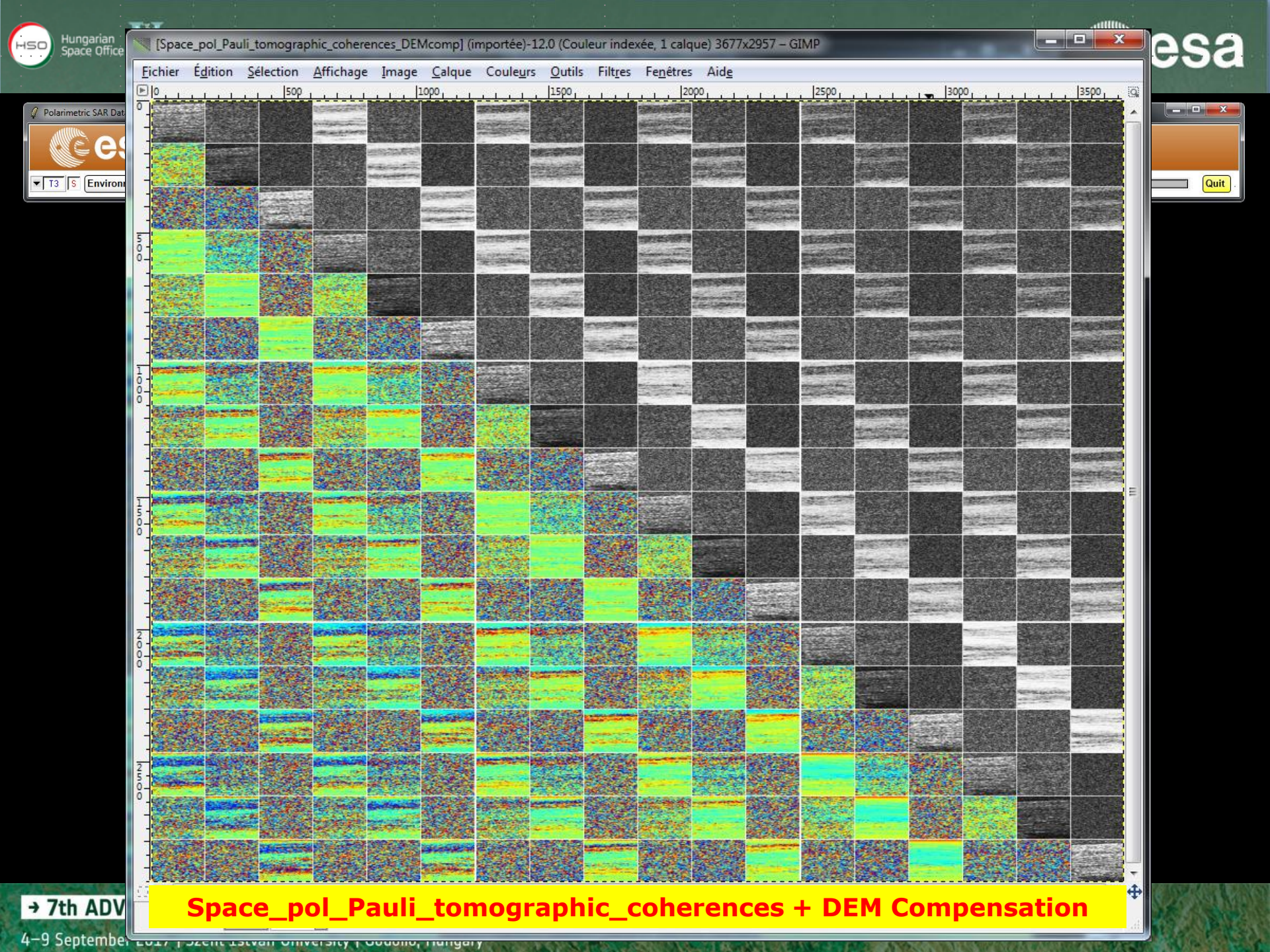
Run Select All Reset Display Exit

Step 1-bis : Display Coherence Maps

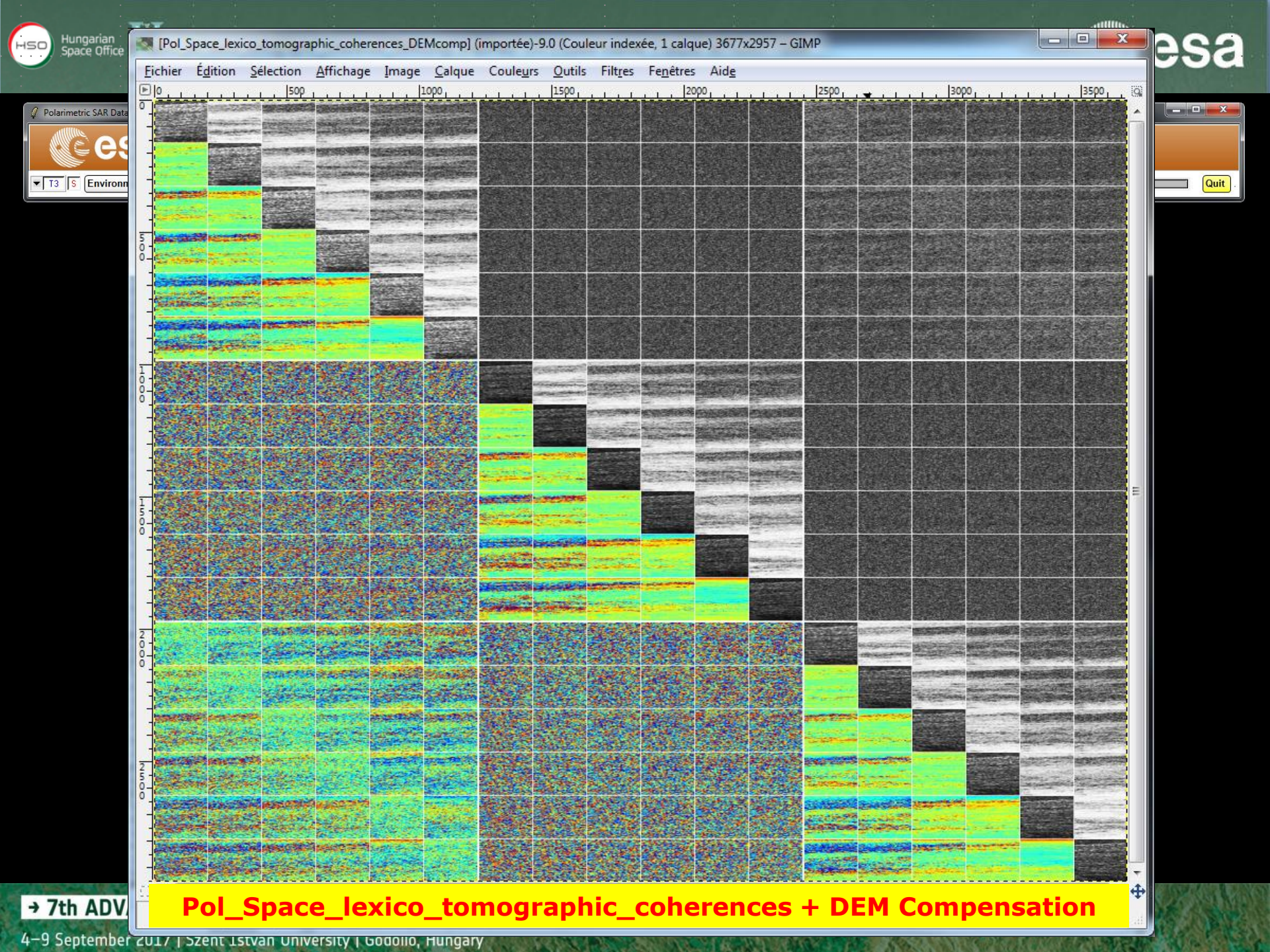
With DEM compensation

→ 7th ADVANCED TRAINING COURSE
4-9 September 2017 | Szent István University

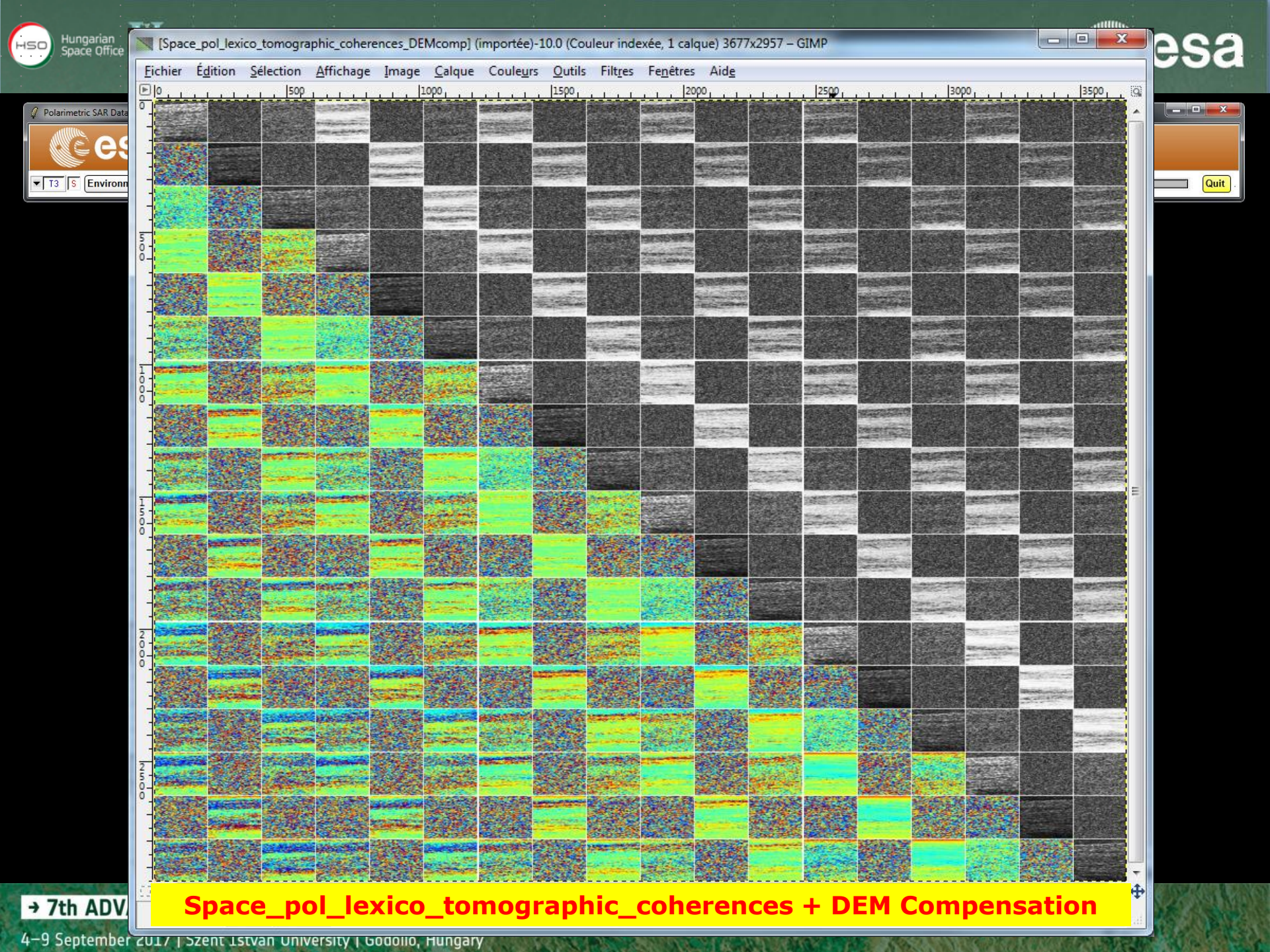




Space_pol_Pauli_tomographic_coherences + DEM Compensation



→ 7th ADV. **Pol_Space_lexico_tomographic_coherences + DEM Compensation**

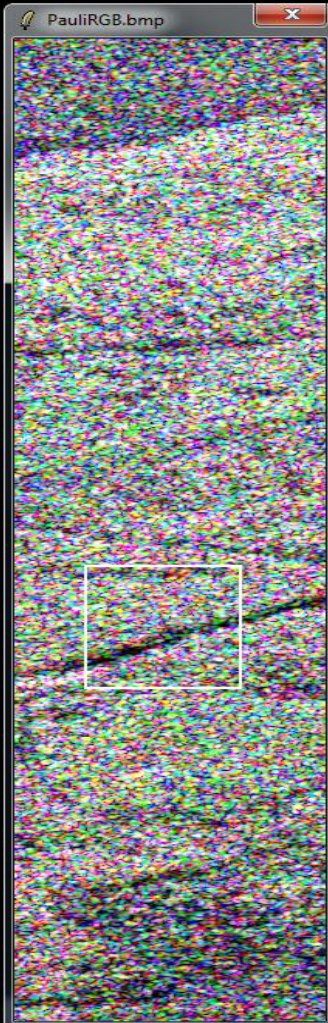


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PauliRGB.bmp



Polarimetric Tomography (Pol-TomSAR)

Output Directory: C:/My_Data_Directory/Pol_Tomo_datasets/im1/profile_beamformer_col_100 / T3

Input 2D Slant-Range DEM File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/DEM.bin

Input 2D Slant-Range Top Height File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/z_top.bin

Slant-Range Row values: min 4365.986 max 5570.814 [m] [bin]

Slant-Range Col values: min 203.0713 max 297.0711 [m] [bin]

Pol-TomSAR coherence maps analysis

Window Size : Row 7 Col 7 Sub-sampling : Row 5 Col 1 Run

Mouse Position: X 149 Y 459 Selected Pixel: X 100 Y 474

Window Size: Row 15 Col 35 Tomogram Along: Col (X) Row (Y)

Height (z) values: z min 180 z max 300 delta 0.5

Pol-TomSAR analysis: Gene DEM compensation Run

Algorithm: B.F Capon Input - Output Process Directory:

Polarization Channels: HH HV VW HH + WV HH - WV LL LR RR

Matrix Elements: Span Corr Coeffs - [T3] Corr Coeffs - [C3] C.C.C Normalized C.C.C

Eigenvalues parameters: Entropy / Anisotropy / Alpha / Lambda Shannon Entropy Probabilities (p1,p2,p3) / eigenvalues (L1,L2,L3) Eigenvalue Relative Difference (E.R.D) Polarisation asymmetry / polarisation fraction

Polarimetric Decompositions: Arie NNED 3 components Van Zyl 3 components Freeman 3 components Singh 4 components Yamaguchi 4 components

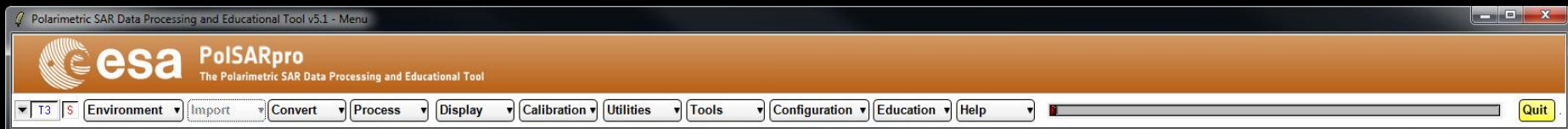
Run Select All Reset Display Exit

Step 2 : Run Pol-TomSAR analysis

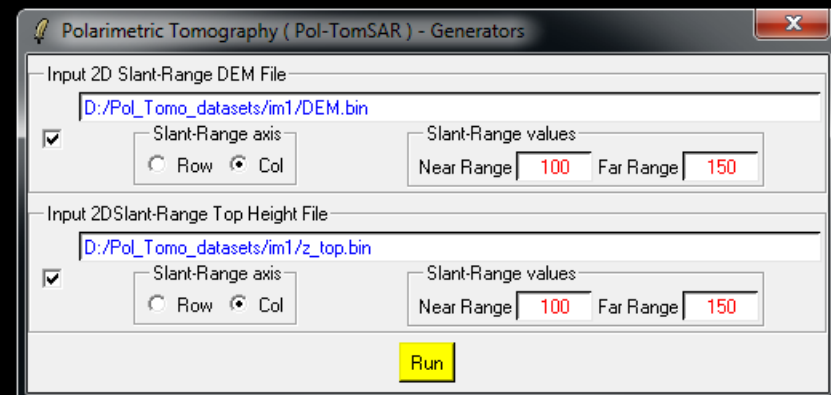
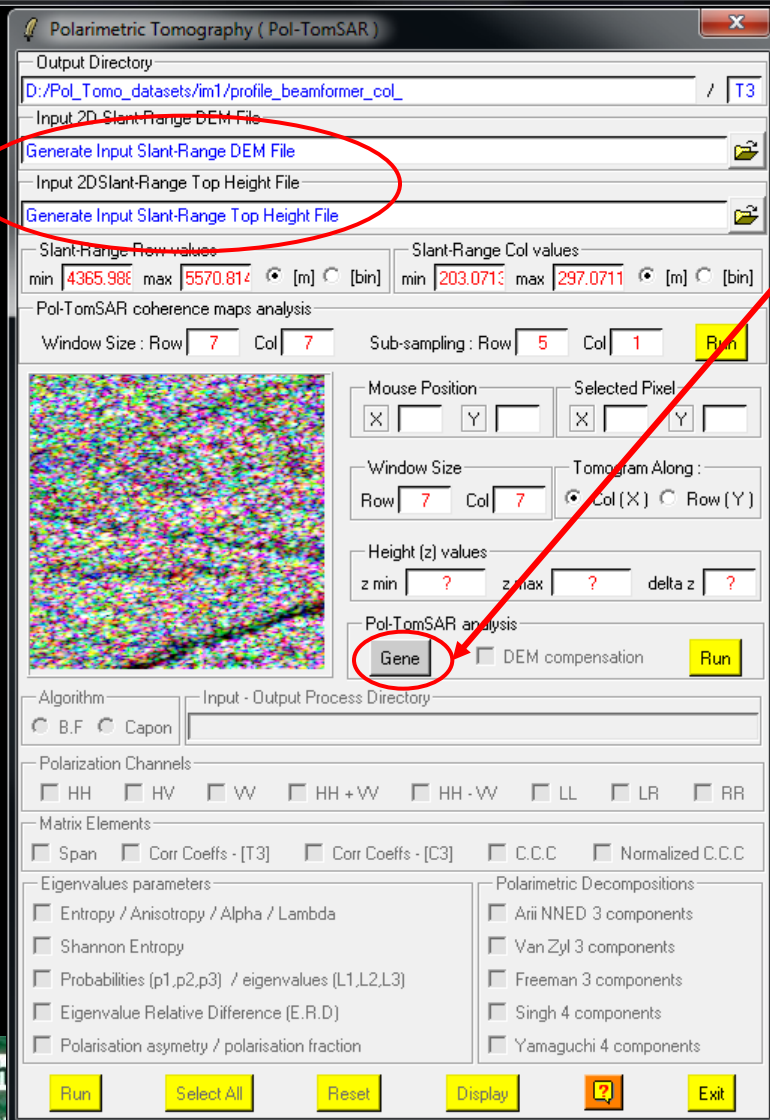
Window size : 15 x 35

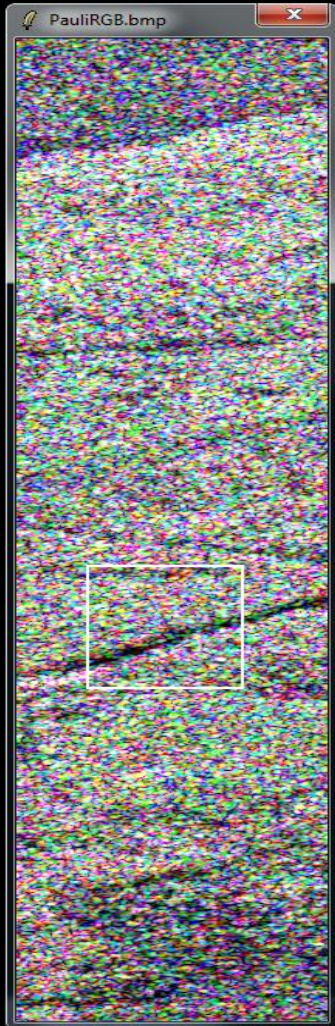
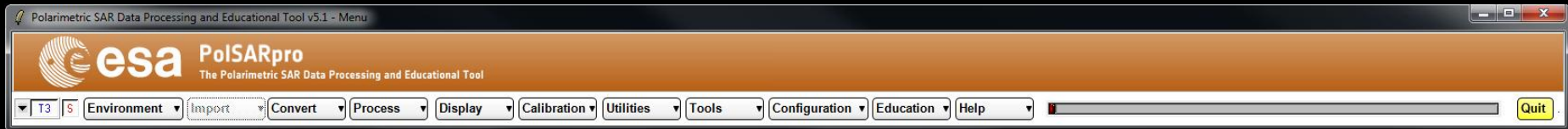
Height (z) values :
Min = 180m
Max = 300m
Delta = 0.5m

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 4-9 September 2017 | Szent István University



Note :
DEM and Top height
files generator





Output Directories

C:/Pol-Tomo_datasets/im1/profile_beamformer_col_100

C:/Pol-Tomo_datasets/im1/profile_capon_col_100

process

col / row

number

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Polarimetric Tomography (Pol-TomSAR)

Output Directory: C:/My_Data_Directory/Pol_Tomo_datasets/im1/profile_beamformer_col_100 / T3

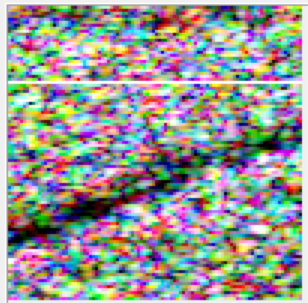
Input 2D Slant-Range DEM File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/DEM.bin

Input 2D Slant-Range Top Height File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/z_top.bin

Slant-Range Row values: min 4365.986 max 5570.814 [m] [bin] Slant-Range Col values: min 203.071 max 297.071 [m] [bin]

Pol-TomSAR coherence maps analysis

Window Size: Row 7 Col 7 Sub-sampling: Row 5 Col 1 Run



Mouse Position: X 149 Y 459 Selected Pixel: X 100 Y 474

Window Size: Row 15 Col 35 Tomogram Along: Col (X) Row (Y)

Height (z) values: z min 180 z max 300 delta z 0.5

Pol-TomSAR analysis: Gene DEM compensation Run

Algorithm: B.F Capon Input - Output Process Directory:

Polarization Channels: HH HV VV HH + VV HH - VV LL LR RR

Matrix Elements: Span Corr Coeffs - [T3] Corr Coeffs - [C3] C.C.C Normalized C.C.C

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Polarimetric Decompositions: ARI NNED 3 components Van Zyl 3 components Freeman 3 components Singh 4 components Yamaguchi 4 components

Run Select All Reset Display ? Exit

Polarimetric Tomography (Pol-TomSAR)

Output Directory: C:/My_Data_Directory/Pol_Tomo_datasets/im1/profile_capon_col_100 / T3

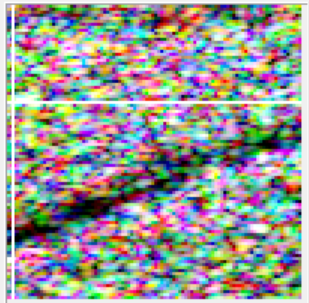
Input 2D Slant-Range DEM File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/DEM.bin

Input 2D Slant-Range Top Height File: C:/My_Data_Directory/Pol_Tomo_datasets/im1/z_top.bin

Slant-Range Row values: min 4365.986 max 5570.814 [m] [bin] Slant-Range Col values: min 203.071 max 297.071 [m] [bin]

Pol-TomSAR coherence maps analysis

Window Size: Row 7 Col 7 Sub-sampling: Row 5 Col 1 Run



Mouse Position: X 50 Y 466 Selected Pixel: X 100 Y 474

Window Size: Row 15 Col 35 Tomogram Along: Col (X) Row (Y)

Height (z) values: z min 180.00000 z max 300.00000 delta z 0.5

Pol-TomSAR analysis: Gene DEM compensation Run

Algorithm: B.F Capon Input - Output Process Directory: C:/My_Data_Directory/Pol_Tomo_datasets/im1/profile_beamformer_col_100/T

Polarization Channels: HH HV VV HH + VV HH - VV LL LR RR

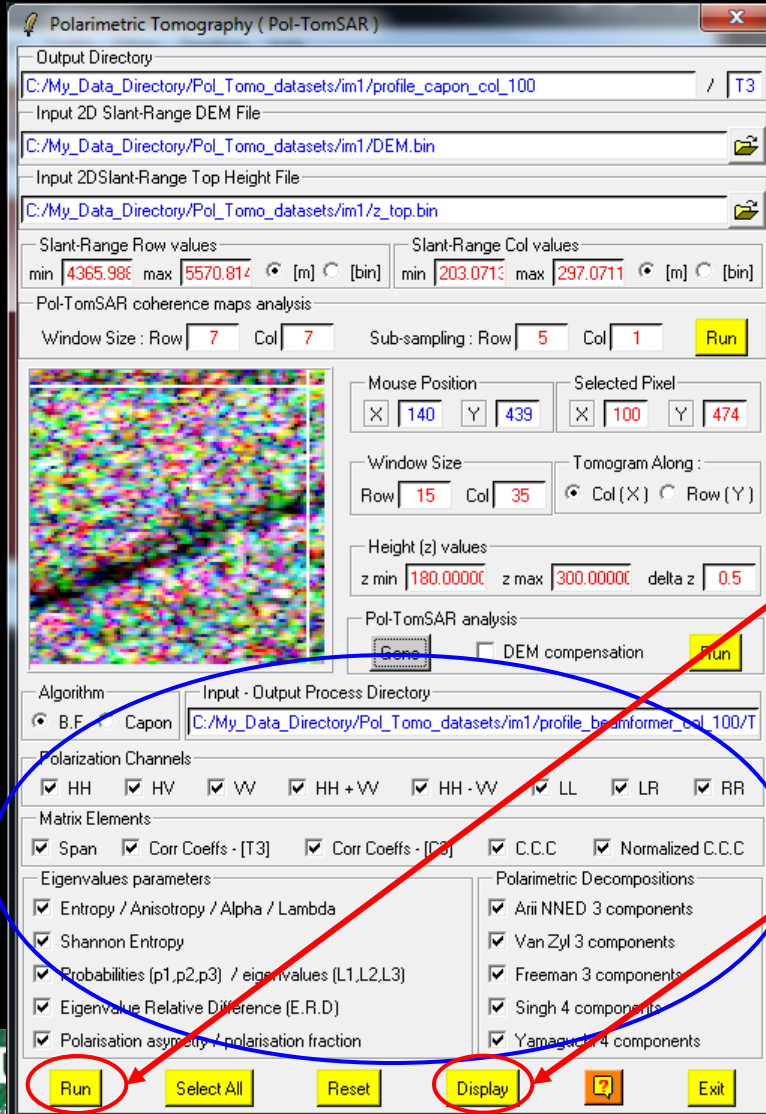
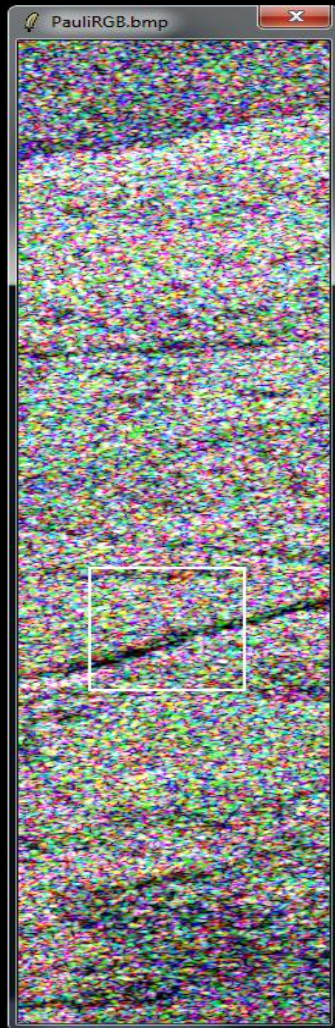
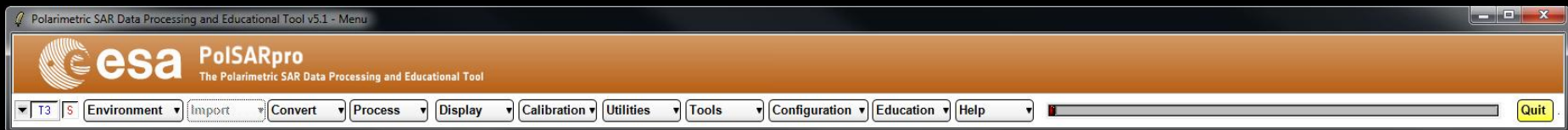
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Eigenvalues parameters: Entropy / Anisotropy / Alpha / Lambda Shannon Entropy Probabilities (p1,p2,p3) / eigenvalues (L1,L2,L3) Eigenvalue Relative Difference (E.R.D) Polarisation asymetry / polarisation fraction

Polarimetric Decompositions: ARI NNED 3 components Van Zyl 3 components Freeman 3 components Singh 4 components Yamaguchi 4 components

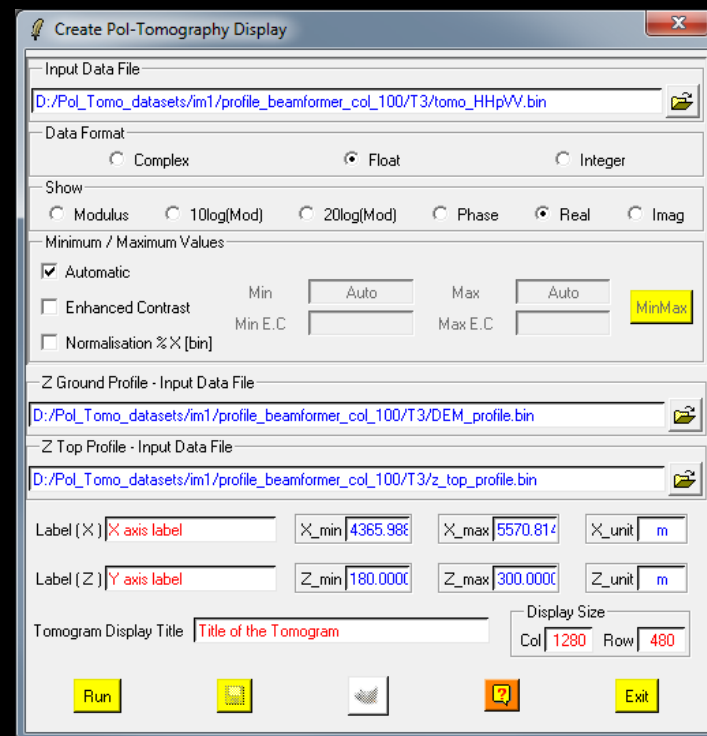
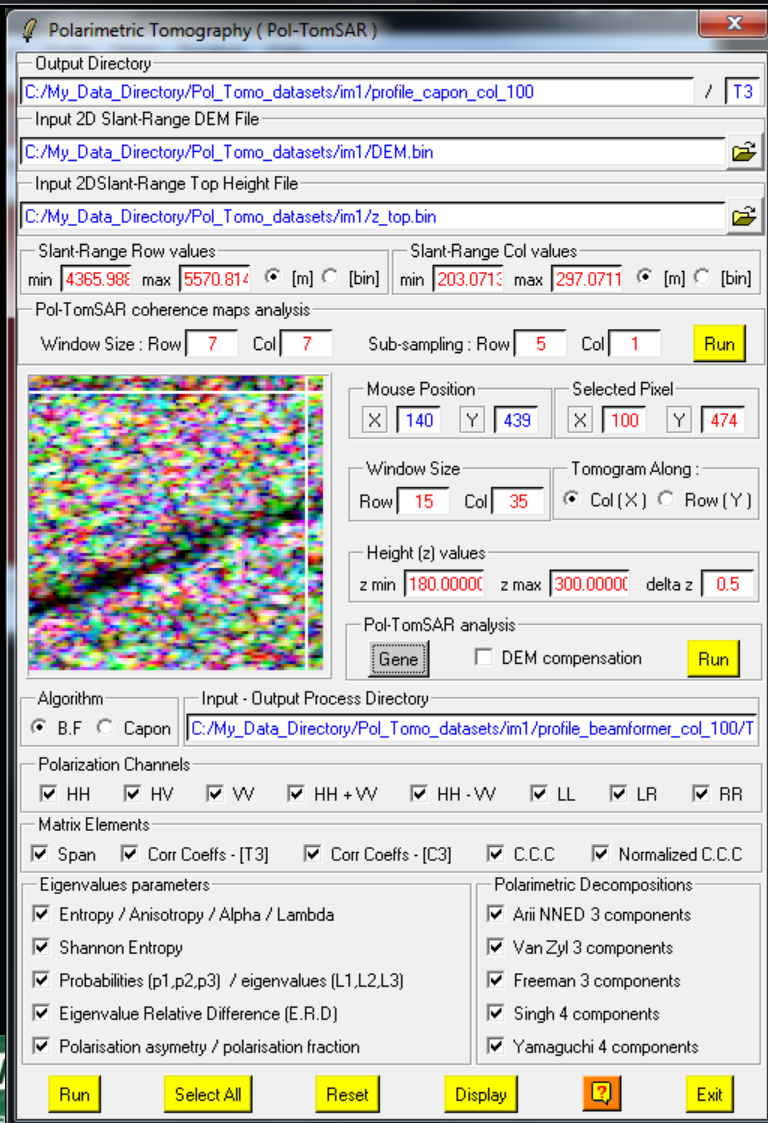
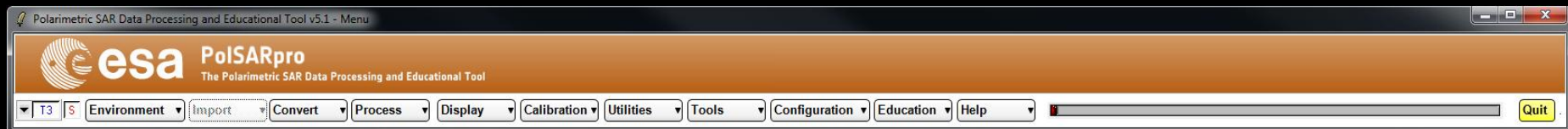
Run Select All Reset Display ? Exit

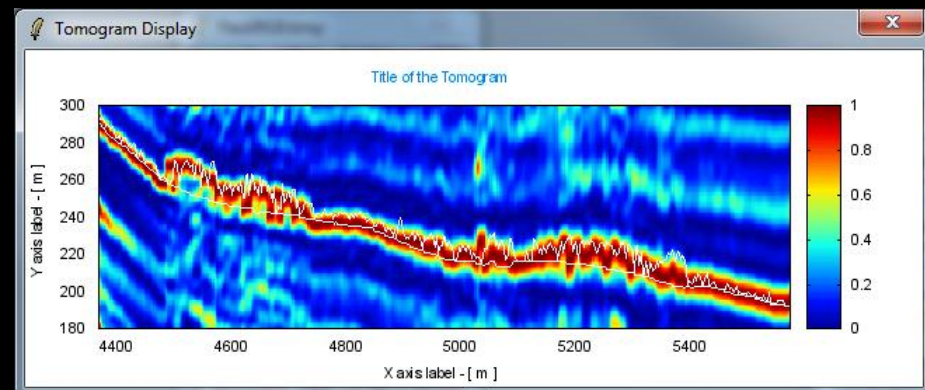
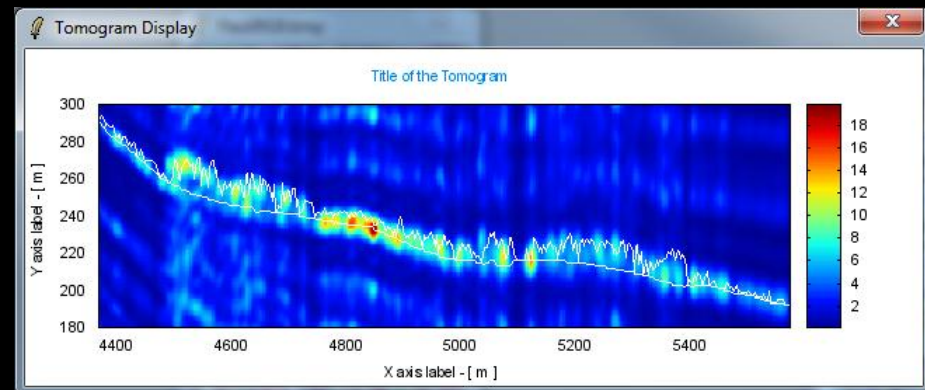
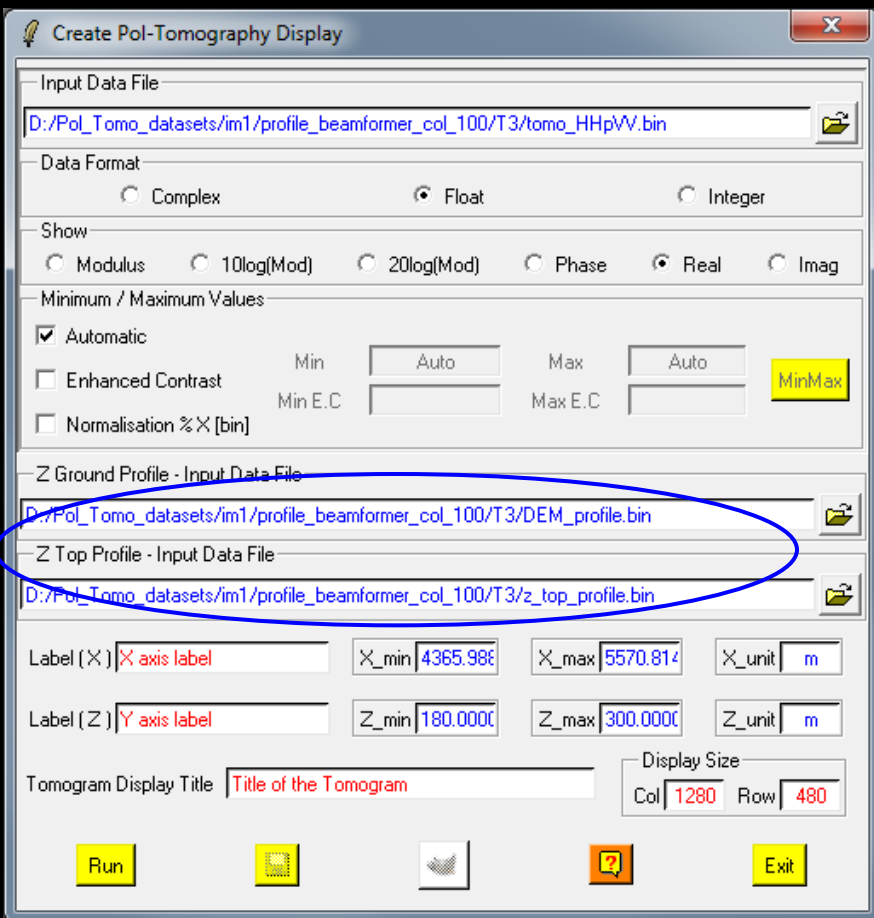
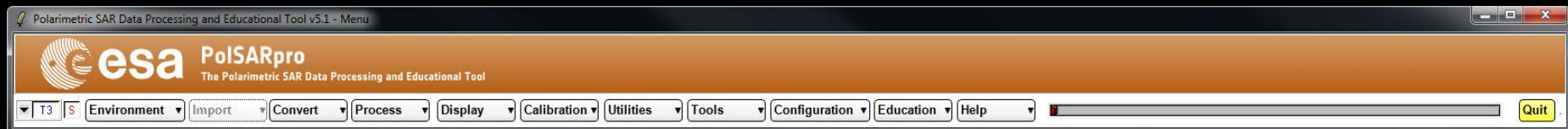
TE SENSING



Step 3 :
Run additional
polarimetric data
processing

Step 4 :
Display Results





Questions ?

