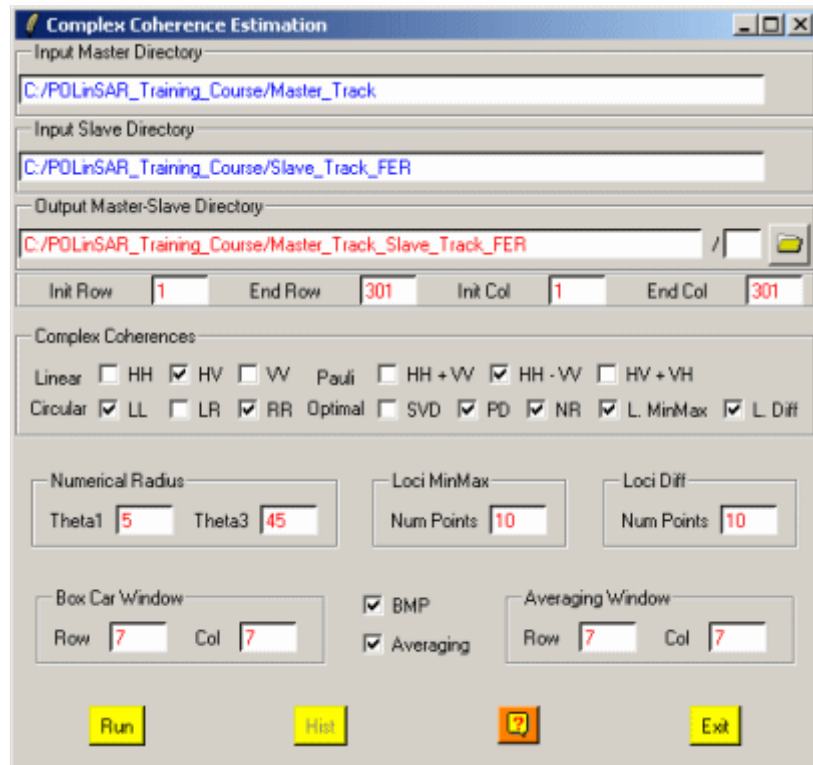


Complex Coherences Estimation



The screenshot shows the 'Complex Coherence Estimation' software window. It features several input fields for directories: 'Input Master Directory' (C:/POLinSAR_Training_Course/Master_Track), 'Input Slave Directory' (C:/POLinSAR_Training_Course/Slave_Track_FER), and 'Output Master-Slave Directory' (C:/POLinSAR_Training_Course/Master_Track_Slave_Track_FER). Below these are fields for 'Init Row' (1), 'End Row' (301), 'Init Col' (1), and 'End Col' (301). A section titled 'Complex Coherences' contains checkboxes for various methods: Linear (HH, HV, VV, Pauli, HH+VV, HH-VV, HV+VH), Circular (LL, LR, RR, Optimal, SVD, PD, NR, L.MinMax, L.Diff), and others. There are also input fields for 'Numerical Radius' (Theta1: 5, Theta3: 45), 'Loci MinMax' (Num Points: 10), and 'Loci Diff' (Num Points: 10). A 'Box Car Window' section has 'Row' (7) and 'Col' (7) fields. Checkboxes for 'BMP' and 'Averaging' are present. An 'Averaging Window' section also has 'Row' (7) and 'Col' (7) fields. At the bottom are buttons for 'Run', 'Hist', a help icon, and 'Exit'.

Description:

Creates complex coherences binary files to generate interferograms and interferometric coherences.

Users have the opportunity to generate complex coherence binary files at any possible polarization states, including the Lexicographic (Linear), Circular, Pauli basis, optimal polarization states derived from Cloude and Papathanassiou coherence maximization procedure., phase diversity (PD), numerical radius (NR), Min/Max of Phase/magnitude over coherence boundary (L.MinMax) and max Phase/Magnitude Difference over coherence boundary (L.Diff).

An option may be set to simultaneously create the corresponding bitmap image files

Reference: M. Lavallo, D. Solimini, E. Pottier, Y.-L. Desnos, "Comparison of Models of InSAR/PolInSAR coherence for forest height retrieval using PolInSAR Simulated Data," Proceedings of Fringe 2007 Workshop, ESA-ESRIN, Frascati, Italy, 25-30 November 2007

Comments:

Parameters written in Red can be modified directly by the user from the keyboard.

Input/Output Arguments:

Input Master Directory	Indicates the location of the considered Master Main Directory (M-MD) containing the polarimetric data sets to be processed.
Input Slave Directory	Indicates the location of the considered Slave Main Directory (S-MD) containing the polarimetric data sets to be processed.
Output Master-Slave Directory	Indicates the location of the processed data output directory. The default value is set automatically to : Master-MD_Slave-MD (M-MD_S-MD) .

Output Image Number of Rows/Columns:

The output image numbers of rows and columns are initialised to the input data set dimensions.

Users wishing to process a sub-part of the initial image can modify the **Init** and **End** values of the converted images rows and columns.

Note: init and end values have to remain within the range defined by the input image dimensions.

Complex Coherences:

Several channels may be processed at a time.

- **Linear** : Linear representation of the considered complex coherences,
Output file names : **cmplx_coh_HH.bin**, **cmplx_coh_HV.bin**, **cmplx_coh_VV.bin**
- **Circular** : Circular representation of the considered complex coherences,
Output file names : **cmplx_coh_LL.bin**, **cmplx_coh_LR.bin**, **cmplx_coh_RR.bin**
- **Pauli** : Pauli representation of the considered complex coherences,
Output file names : **cmplx_coh_HHpVV.bin**, **cmplx_coh_HHmVV.bin**, **cmplx_coh_HVpVH.bin**
- **Optimal SVD**: Optimal polarization state representation of the considered complex coherences,
Output file names : **cmplx_coh_Opt1.bin**, **cmplx_coh_Opt2.bin**, **cmplx_coh_Opt3.bin**
- **Optimal PD**: Phase diversity algorithm (Tabb et al.),
Output file names : **cmplx_coh_PDHigh.bin**, **cmplx_coh_PDLow.bin**
- **Optimal NR**: Numerical Radius algorithm (Colin et al.),
Output file names : **cmplx_coh_Opt_NR1.bin**, **cmplx_coh_Opt_NR2.bin**, **cmplx_coh_Opt_NR3.bin**
- **Optimal L MinMax**: Min/Max of Phase/magnitude over coherence boundary algorithm,
Output file names : **cmplx_coh_MaxMag.bin**, **cmplx_coh_MinMag.bin**, **cmplx_coh_MaxPha.bin**, **cmplx_coh_MinPha.bin**
- **Optimal L Diff**: Max Phase/Magnitude Difference over coherence boundary algorithm,

Output file names : [cmplx_coh_maxdiff_PhaLow.bin](#),
[cmplx_coh_maxdiff_PhaHigh.bin](#), [cmplx_coh_maxdiff_MagLow.bin](#),
[cmplx_coh_maxdiff_MagHigh.bin](#)

The selection of the BMP option enables the creation of output bmp files. Output file names are [cmplx_coh_XX_mod.bmp](#) corresponding to the coherence amplitudes and [cmplx_coh_XX_pha.bmp](#) corresponding to the coherence phases and where **XX** stands to the different polarimetric channel as defined before.

Note: Complex format corresponds to 4 bytes interlaced real and imaginary parts.

Processing parameters:

Numerical Radius Theta1	Angle corresponding to one of the maximum point defining the extension of the coherence loci in the complex plane..
Numerical Radius Theta3	Angle corresponding to the second maximum point defining the extension of the coherence loci in the complex plane..
Loci MinMax Num Points	Iteration number of points
Loci Diff Num Points	Iteration number of points
BoxCar Window Row	Users have to set the size of the sliding window along the Row direction used to compute the local estimate of the average matrix. The default value is set to 7 .
BoxCar Window Col	Users have to set the size of the sliding window along the Col direction used to compute the local estimate of the average matrix. The default value is set to 7 .
Averaging	System and estimation procedure effects affect the estimation of the complex coherences. Appropriate calibration / estimation procedures have to be applied in order used to reduce this bias to negligible level. A basic bias reduction procedure is proposed and users have thus the possibility to compare original and processed coherence. This basic bias reduction procedure consists on processing estimated complex coherences through an additional averaging procedure consisting of a smoothing filter. Users have then to set the size of the (N*M) sliding window used to compute the local estimate of the average complex coherence. The default output file name is set to cmplx_coh_avg_XX.bin where avg stands for average and where XX corresponds to the polarimetric channel as defined before.
Averaging Window Row	Users have to set the size of the sliding window along the Row direction used to compute the local estimate of the average matrix. The default value is set to 7 .
Averaging Window Col	Users have to set the size of the sliding window along the Col direction used to compute the local estimate of the average matrix. The default value is set to 7 .
