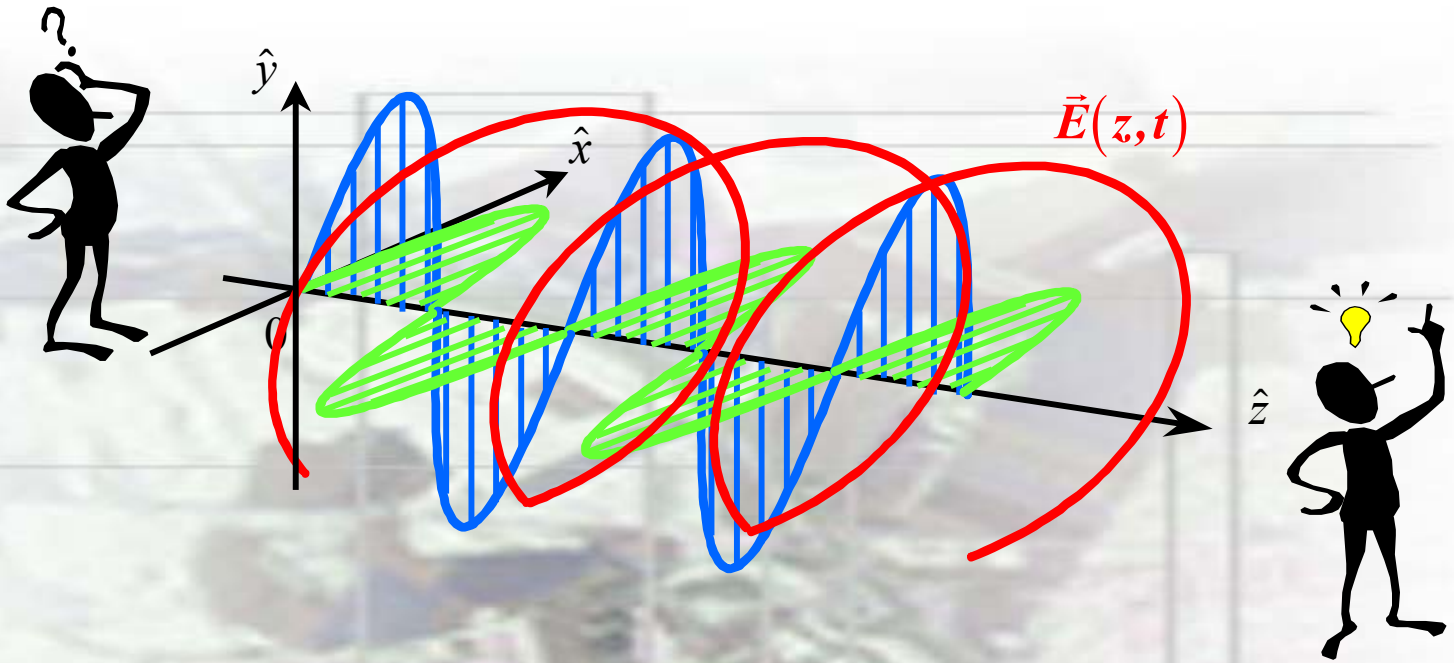
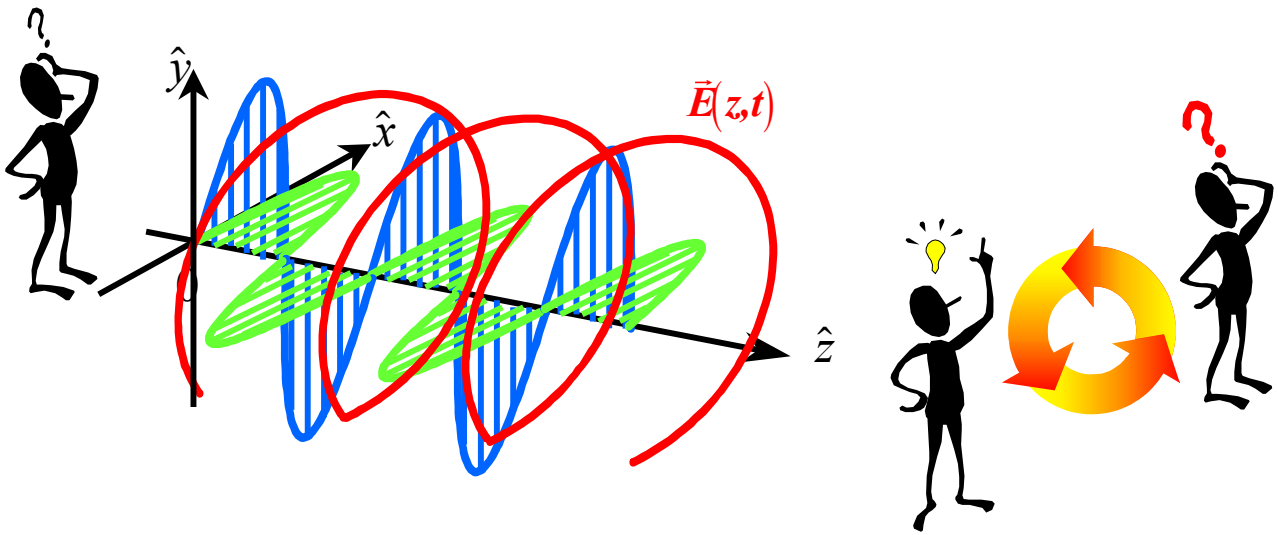


CONCLUSION

CONCLUSION



ADVANCED CONCEPTS IN BASIC THEORY

A LOT OF WORK HAS TO BE DONE :

- **Establish Unambiguously Defined Standards for multi-static Polarimetry and transformations.**
- **Relate scattering and propagation formulations of multi-static polarimetry and develop a general multi-static scattering theory.**

CONCLUSION

POLARIMETRIC REMOTE SENSING

SPECKLE FILTERING

DECOMPOSITION THEOREMS

COMPLEMENTARY TOOLS FOR POL-SAR IMAGE ANALYSIS - INTERPRETATION

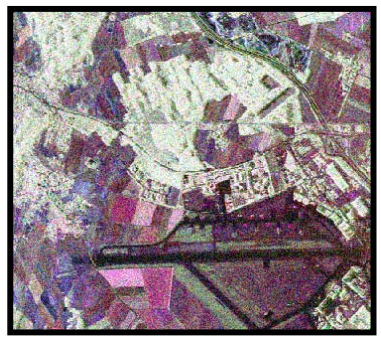
VISUAL ASPECT IMPROVEMENT

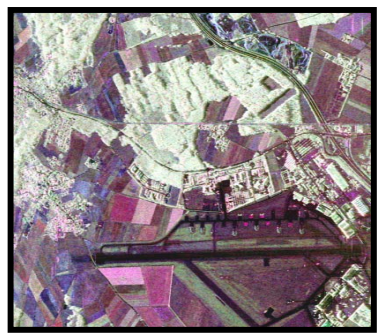
QUALITATIVE ANALYSIS OF THE CLUSTER CENTERS

CONCLUSION

POLARIMETRIC SPECKLE FILTERING IS NOT AN « EXACT SCIENCE »
(SUBJECTIVE and IMAGE DEPENDENT)

A LOT OF WORK HAS TO BE DONE





Quantitative Criteria (J.S. Lee - IGARSS 98)

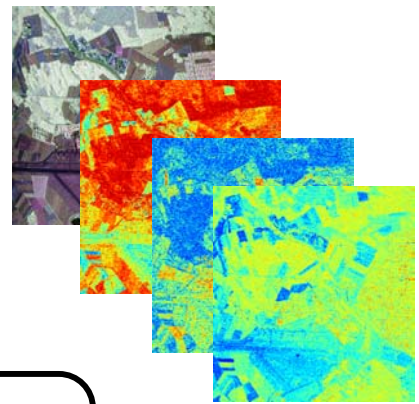
- Speckle Reduction (E.N.L)
- Edge Sharpness Prepreservation
- Line and Point Target Contrast Preservation
- Retention of Mean Values in Homogeneous Regions
- Retention of Texture Information
- Retention of Polarimetric Information (co, cross-correlations)
- Computational Efficiency
- Implementation Complexity

THE POLARIMETRIC LEE SPECKLE FILTER IS TODAY A GOOD COMPROMISE

CONCLUSION

POLARIMETRIC DECOMPOSITION THEOREMS

- Huynen Decomposition: Target Identification
- Freeman Decomposition: Modem Based
- Eigenvectors Decomposition
  - S.R. Cloude : Main Mechanism
  - H / A / $\underline{\alpha}$: Mean Mechanism
    Physical Discriminators
    and Extractors



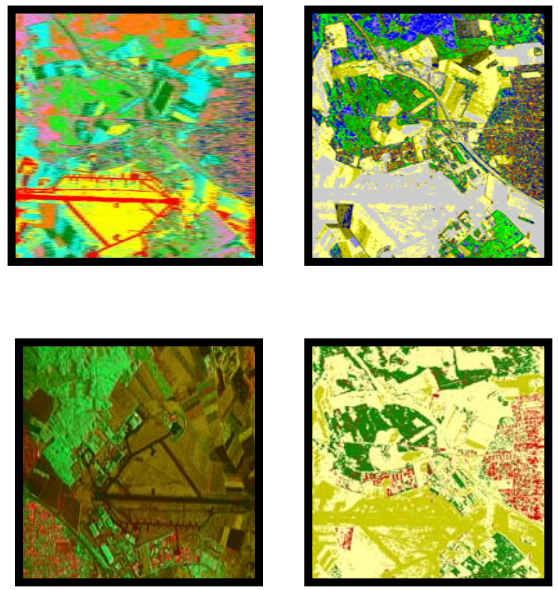
**A LOT OF WORK HAS TO BE DONE
TO EXTEND THE QUALITATIVE ANALYSIS
TO A QUANTITATIVE ANALYSIS
(Physical Parameters Extraction)**

**DIRECT SCATTERING MODEL WILL ANSWER
ON THE « BEST » DECOMPOSITION THEOREM
TO BE USED**

CONCLUSION

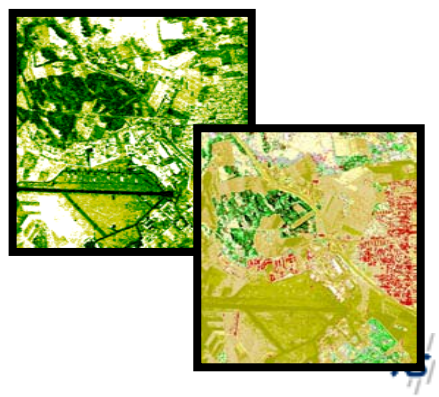
POLARIMETRIC CLASSIFICATION PROCEDURE

- Supervised Wishart segmentation procedure
- Unsupervised Wishart H-A- α segmentation procedure
- Unsupervised Wishart Freeman segmentation procedure
- Identification of the basic scattering mechanisms



POLARIMETRIC INTERFEROMETRIC CLASSIFICATION PROCEDURE

- Segmentation of the optimum coherence spectrum
- Unsupervised 6 x 6 Wishart H-A-α segmentation procedure



MERGING OF INTERFEROMETRIC AND POLARIMETRIC INFORMATION

COMPLEMENTARITY AND MUTUAL CORRECTIONS

CONCLUSIONS

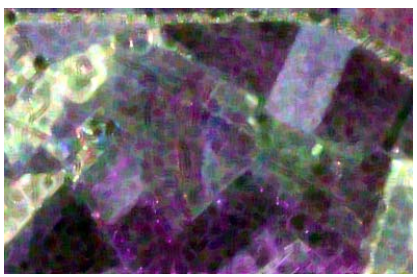
NON STATIONARY POLARIMETRIC SCATTERING MECHANISM

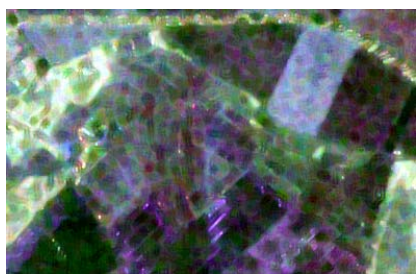
Bragg resonance $\Rightarrow$ extreme values for H and $\underline{\alpha}$

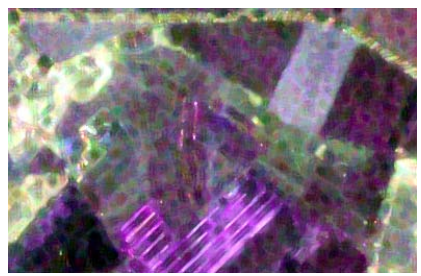
$\Rightarrow$ modification of the full resolution image

Non-stationary media discrimination

- ML ratio test applied over R sub-aperture images
- Detection of non-stationary pixels in each sub-aperture
- Coherent image restoration





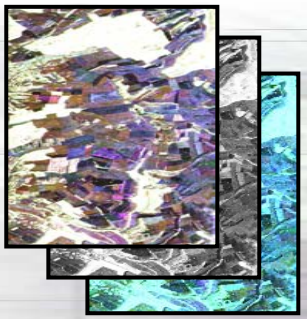


CONCLUSIONS

NON STATIONARY POLARIMETRIC SCATTERING MECHANISM

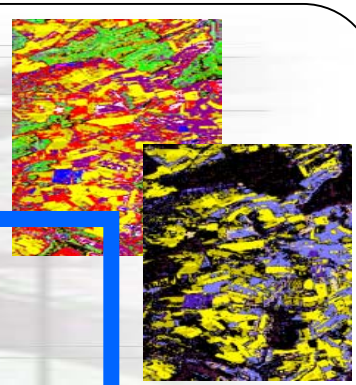
- **Resonant surface characterization** : Period, Height, Shape
- **SAR image restoration** : elimination of non-stationarities
- Polarimetric variations theoretical formulation
- Non-stationary polarimetric scattering mechanism
    - Aspect angle ϕ_d (azimuth)
    - Observation frequency , f_{rg} (range)
- Characterization in the (f_{rg},f_{az}) domain $\Rightarrow$ enhanced description
    - Adaptive decomposition $\Rightarrow$ wavelets
    - Fast implementation $\Rightarrow$ filter banks

DATA INVERSION - APPROACH



POLARIMETRIC
SAR DATA SET(S)

POLSAR - POLINSAR
DATA
PROCESSING



QUALITATIVE ANALYSIS

POLARIMETRIC
DESCRIPTORS
EXTRACTION

TWO-STEP INVERSION PROCEDURE

BIO and GEO PHYSICAL
PARAMETERS

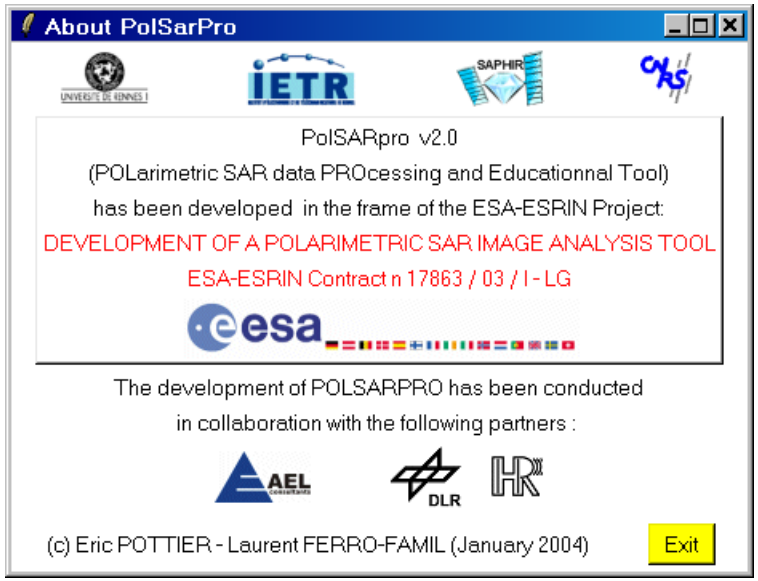
MODEL-BASED
PHYSICAL PARAMETER
INVERSION

QUANTITATIVE ANALYSIS

POLSARPRO


Polarimetric SAR Data Processing and Educational Tool ...
IETR
UNIVERSITE DE RENNES 1
CNRS
SA.P.H.I.R.
PolSARpro v2.0
Polarimetric SAR data Processing and Educational Tool
esa
Run
Exit

POLSARPRO



LANGUAGE :

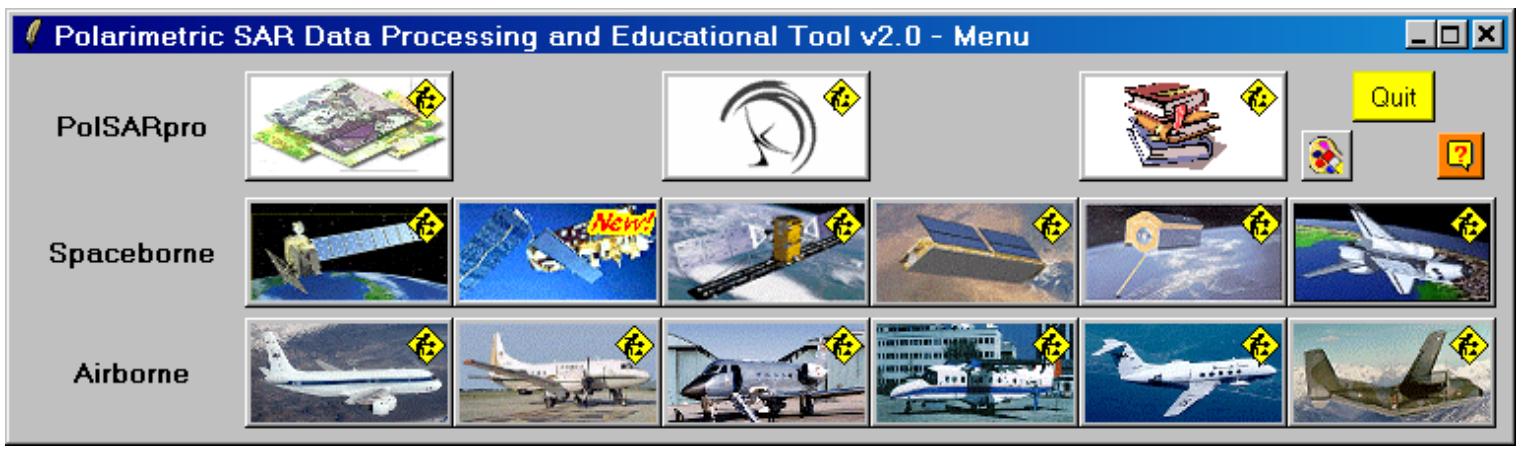
TCL-TK (Freeware) : GUI 63520 lines

C Applications : PROCESS 152 programs

SYSTEM PLATFORMS : Windows, Linux, Mac

POLSARPRO


Polarimetric SAR Data Processing and Educational Tool ...
PolSARpro v2.0
Polarimetric SAR data Processing and Educational Tool
Run
Exit


Polarimetric SAR Data Processing and Educational Tool v2.0 - Menu
PolSARpro
Spaceborne
Airborne
Quit
New!

POLSARPRO


Polarimetric SAR Data Processing and Educational Tool v2.0 - Menu
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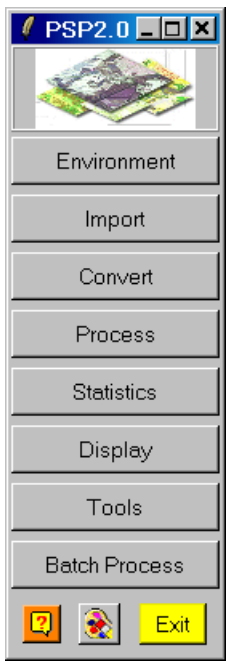
Spaceborne
Airborne
Quit
New!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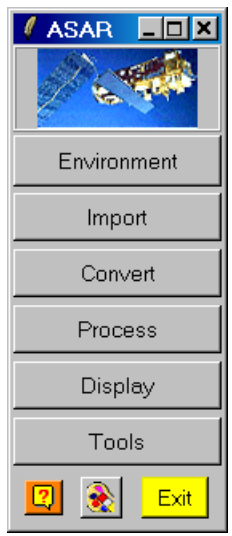
Environment
Import
Convert
Process
Statistics
Display
Tools
Batch Process
Exit


ASAR
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Tools
Exit


PV3.0
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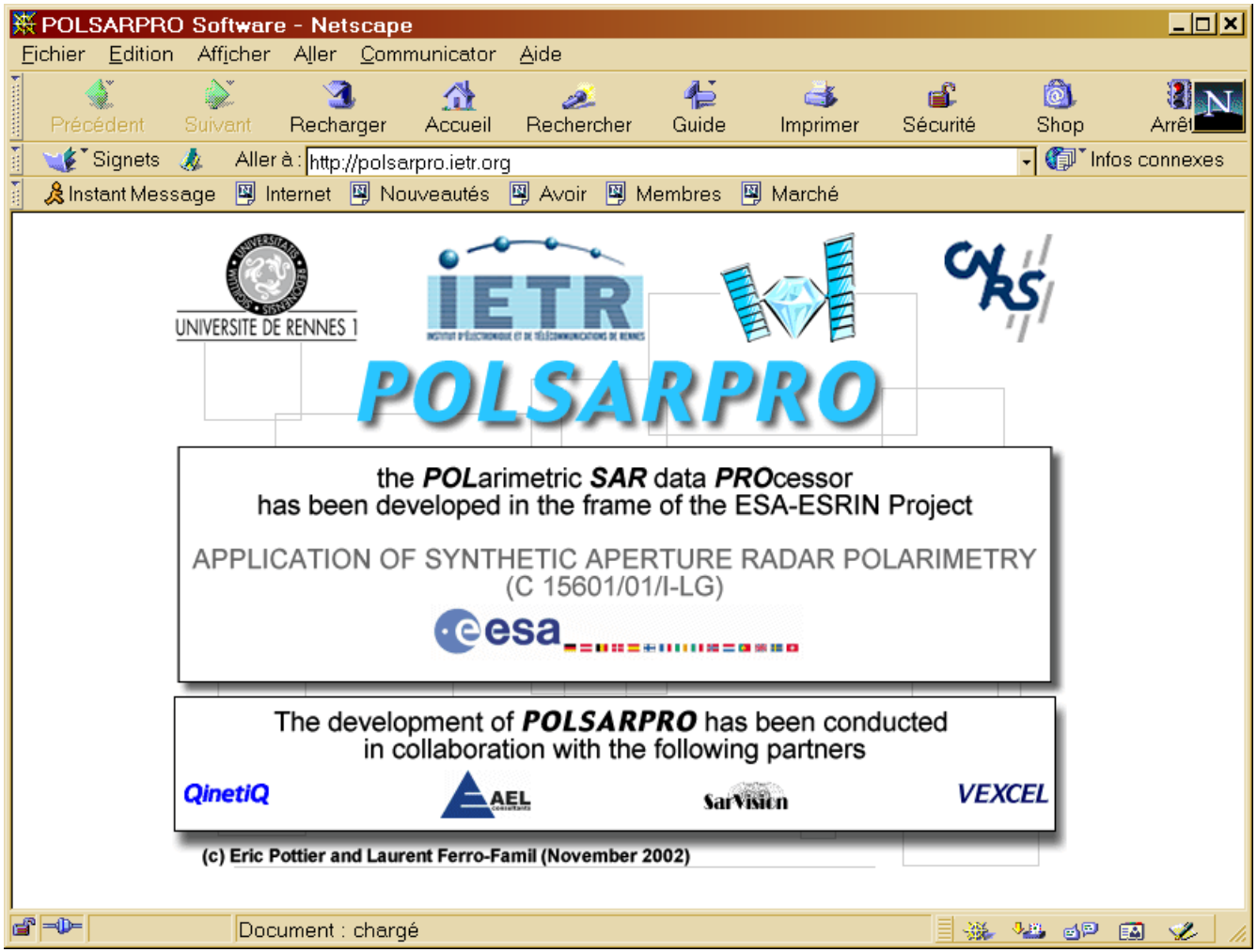
Color
Tools
Color Map
Exit

POLSARPRO



http://polsarpro.ietr.org

THANKS

PARTNERSHIPS

Pr W.M. Boerner

Dr S. Cloude
Dr K. Papathanassiou

Long, permanent, continuous and fruitful interactions since the last century, and for a long time …