

# Unsupervised SAR Images Change Detection With Hidden Markov Chains On a Sliding Window

SPIE-RS'07

Florence, Italy

17-22 September 2007

Z. Bouyahia

L. BenYoussef

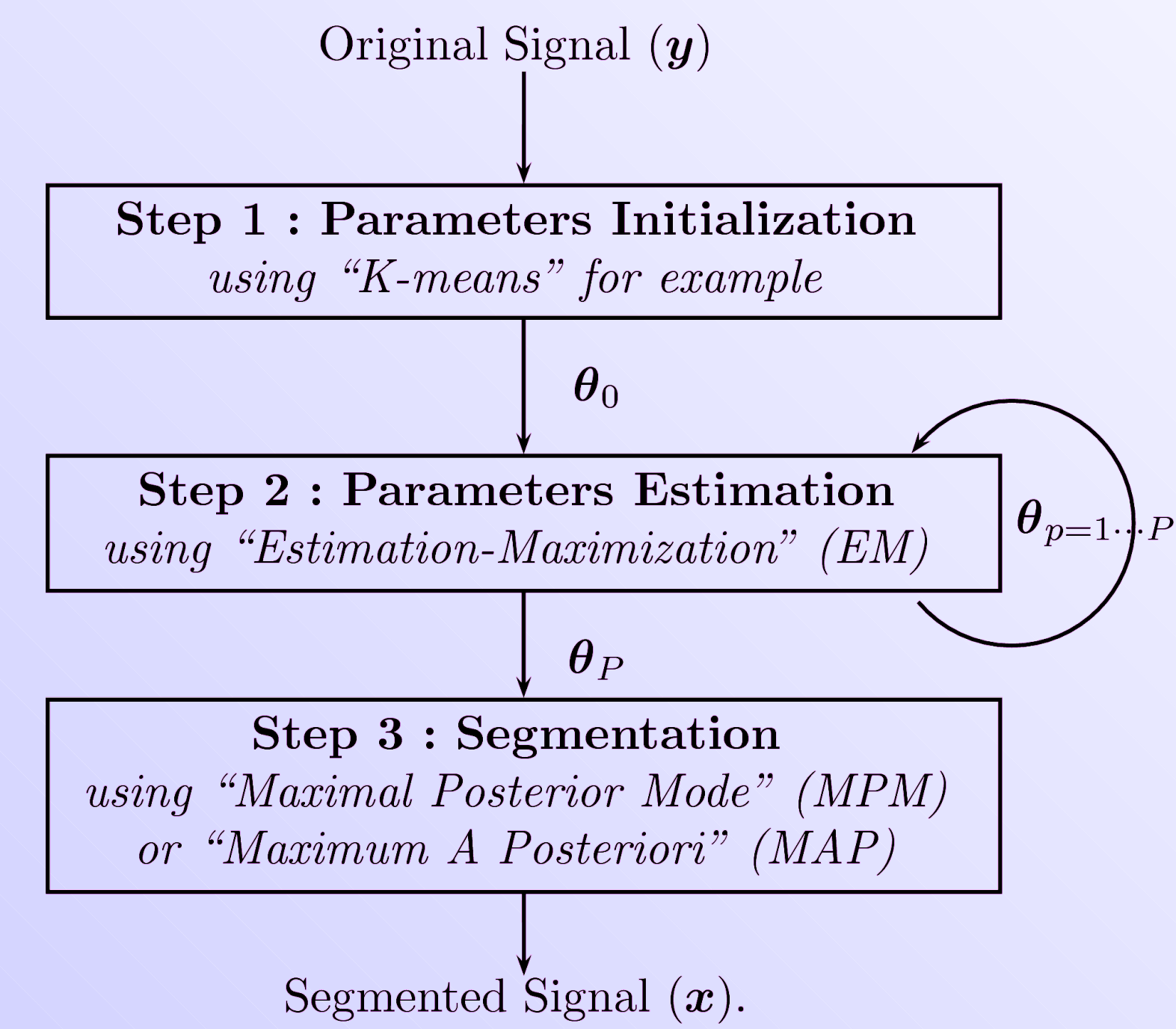
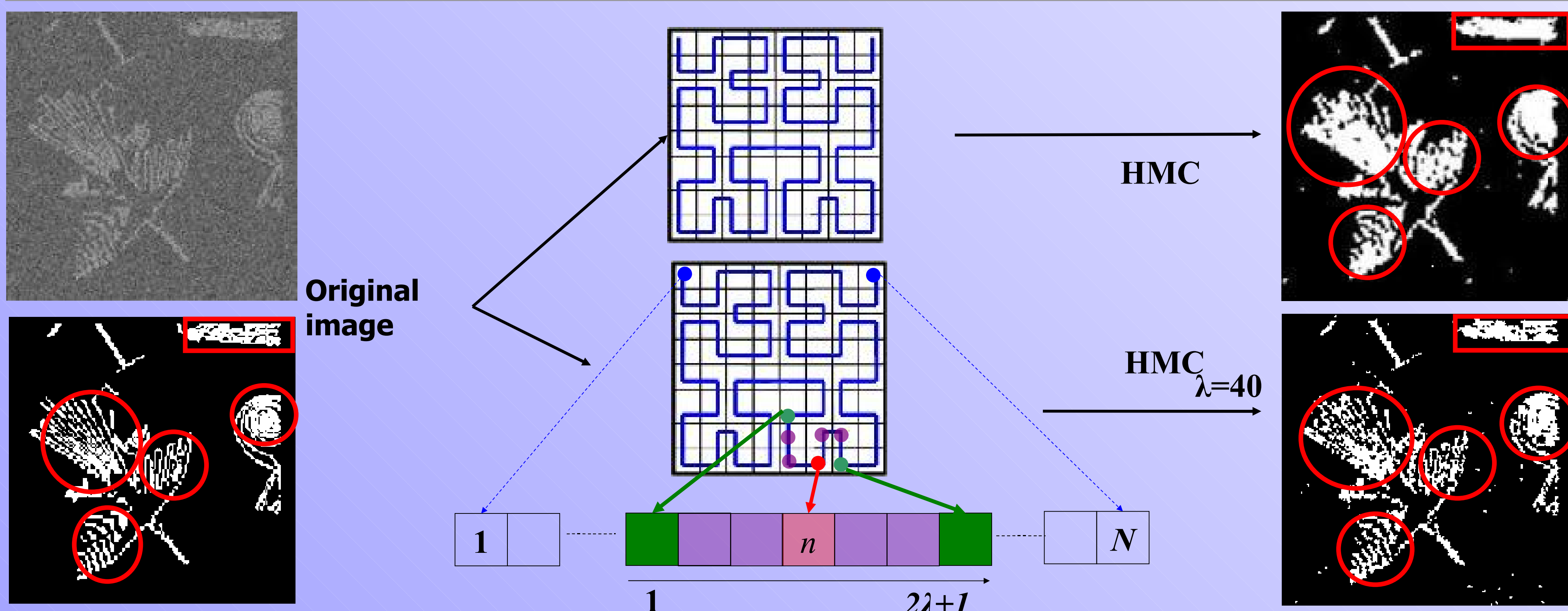
S. Derrode

bouyahiazied@yahoo.fr

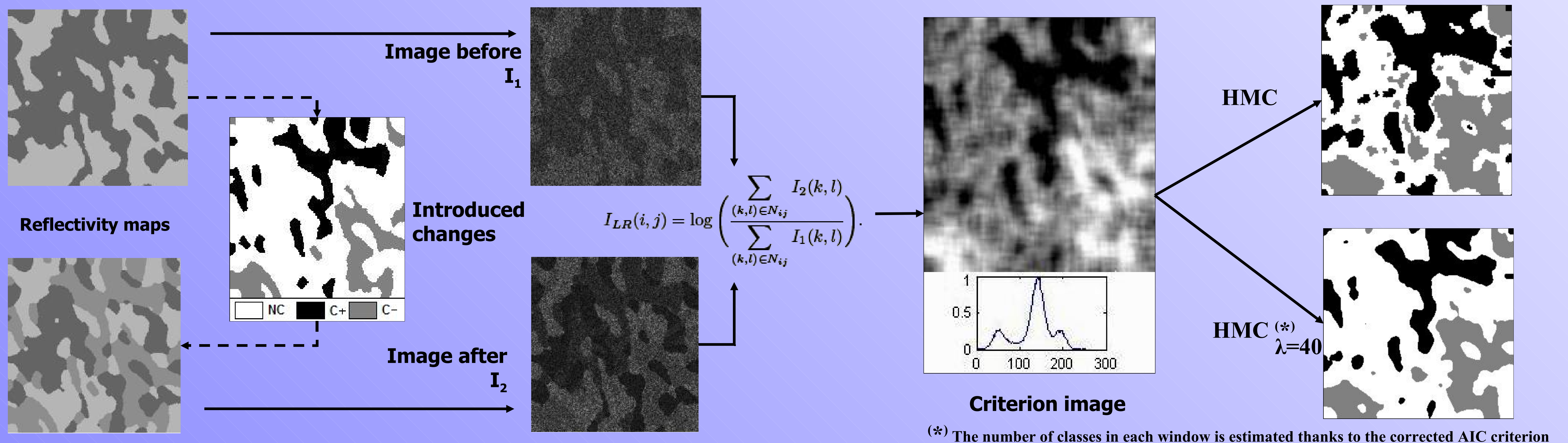
lamia.benyoussef@ec-marseille.fr

stephane.derrode@ec-marseille.fr

## HMC on a sliding window

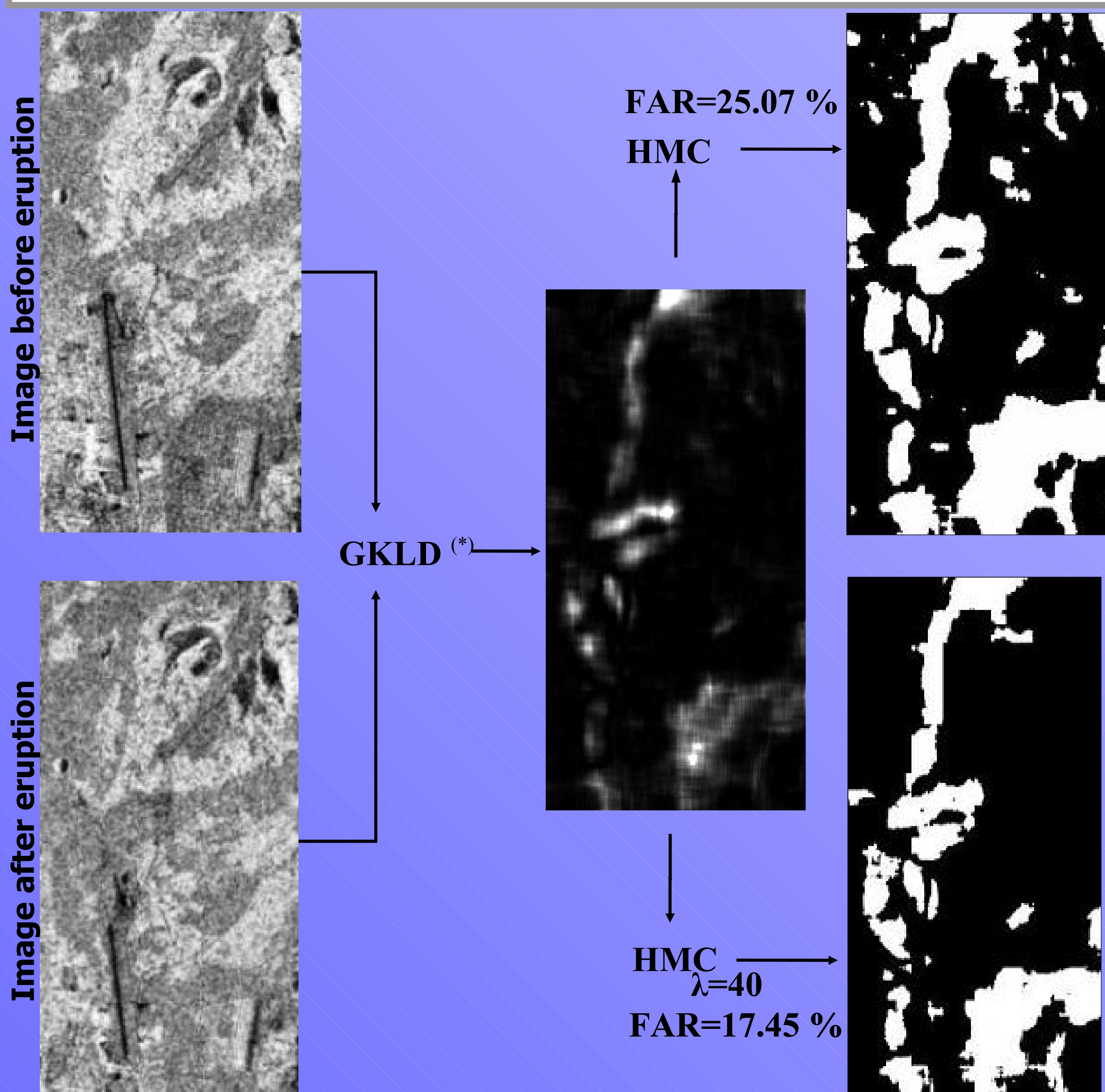


## Change detection on simulated SAR images



(\*) The number of classes in each window is estimated thanks to the corrected AIC criterion

## Change detection on real SAR images lava path of Nyiragongo volcano (RDC) eruption - January 2002



(\*) Gaussian Kullback-Leibler Distance

## Conclusion

### ✓ Main contributions of this work

- Overcoming stationary constraint of classical HMC model in unsupervised image segmentation.
- Application in unsupervised change detection on bi-dates SAR images.

### ✓ Further work

- Studying optimal size of the sliding window.
- Studying model selection criteria for small sample.

## References

- [1] J. Inglada and G. Mercier, A new statistical similarity measure for change detection in multitemporal SAR images and its extension to multiscale change analysis, *IEEE TGRS* 19(5), pp. 465-475, 2007.
- [2] W. Skarbek, Generalized Hilbert scan in image printing, in *Theoretical Foundations of Computer Vision*, Akademik Verlag, Berlin, 1992.
- [3] S. Derrode, L. Benyoussef, and W. Pieczynski, Contextual estimation of hidden Markov chains with application to image segmentation, in *IEEE ICASSP'06*, Toulouse (France), 14-19 May 2006.
- [4] C. M. Hurvich and C.-L. Tsai, Regression and time series model selection in small samples, *Biometrika* 76(2), pp. 297-307, 1989.