Oil Slick Study

Prof. Chris Oliver, CBE

In this study we show an example of the use of techniques for detecting and delineating oil slicks using Maximum Likelihood processing of polarisation data, developed with Prof P Lombardo , University of Rome. The example uses L-band SIR-C data. The segmentation -based procedure outperforms conventional methods.

Figure 1 shows the original data; for typical oil slicks, the signal-to-clutter ratio is relatively poor.

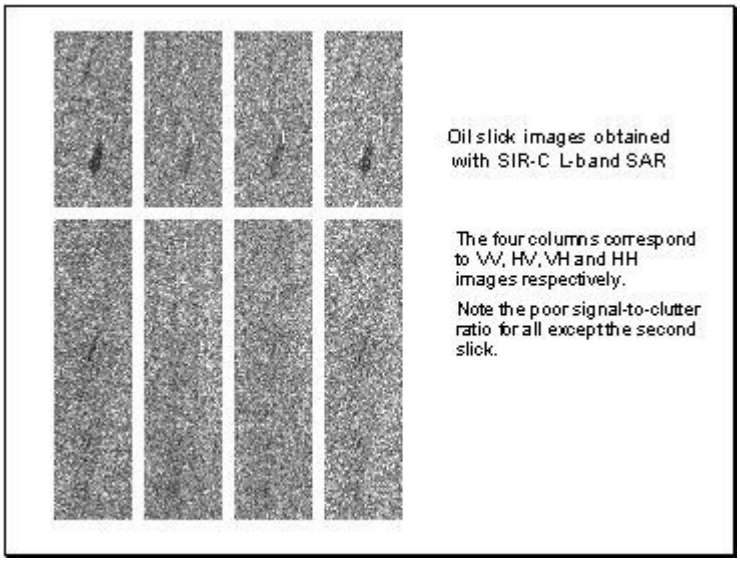

Fig. 1

The second and third figures show results obtained using segmentation with a number of measures described in detail in the referenced paper, and using one or more of the available polarisation images. Segmentation is used throughout the study since it provides the greatest sensitivity for discriminating between changes in image property because it achieves a filter window matched to the homogeneous regions in the image. The best results are obtained using all polarisations with the MTSEig procedure. Figure 4 treats these results as "ground truth" and compares this with results obtained from segmenting different polarisation measures.

- using all polarisations is the most important factor
- optimised polarisation measures, such as MTSEig and ML, outperform span by a factor of about two.

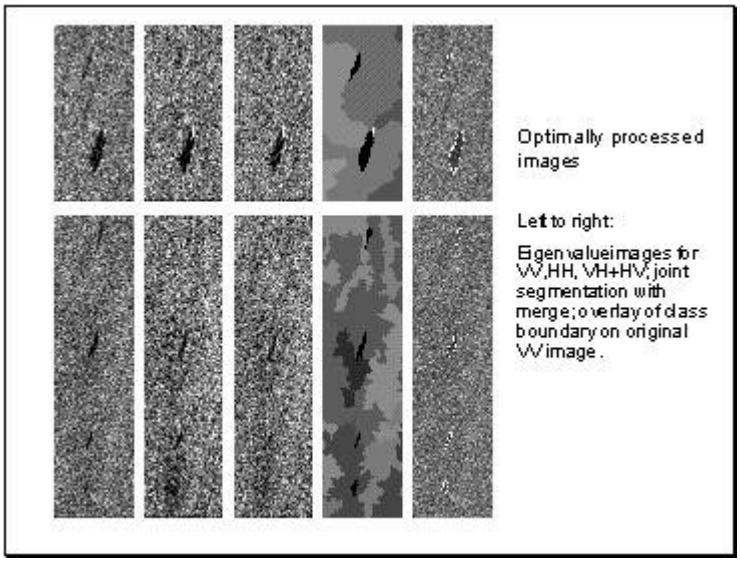
Optimally processed images
Left to right:
Eigenvalue images for VV,HH, VH+HV; joint segmentation with merge; overlay of class boundary on original VV image.

Fig. 2

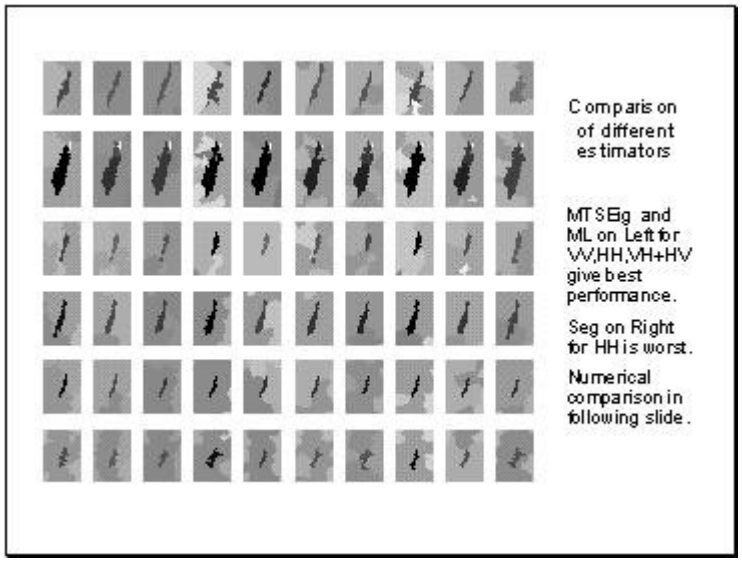
Comparison of different estimators
MTSEig and ML on Left for VV,HH,VH+HV give best performance.
Seg on Right for HH is worst.
Numerical comparison in following slide.

Fig. 3

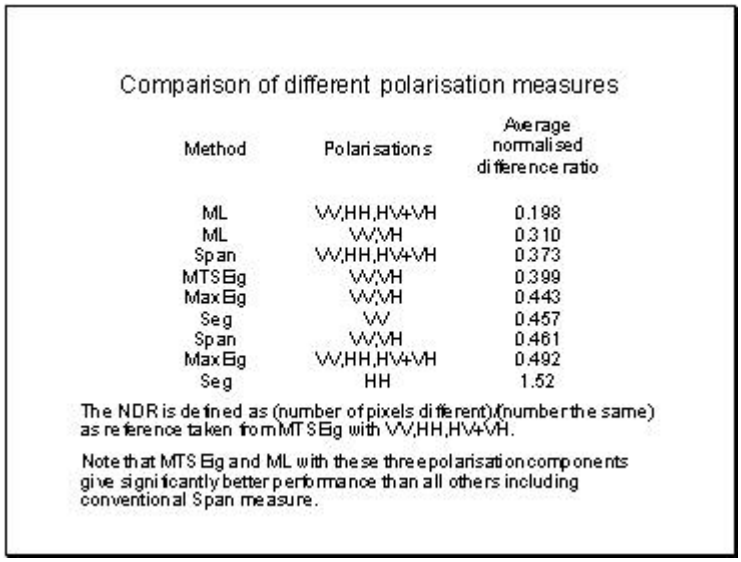

Fig. 4

Reference:

P. Lombardo, C.J. Oliver, Optimum Detection and Segmentation of oil-slicks using polarimetric SAR data, IEE Proceedings on Radar, Sonar and Navigation, Vol. 147, No. 6, December 2000, pp. 309-321.