

« Identify before Detect »

model-based Automatic Target Recognition in
multi-perspective Synthetic Aperture Radar images

Dr. Luc VIGNAUD

SET-215 Chairman

ONERA

THE FRENCH AEROSPACE LAB

www.onera.fr

« Identify before Detect » concept

- Tracking radar & low observable targets :

« **Track before Detect** » (TbD) :

➔ use several observation frames to infer detections from tracks

- SAR & heavily cluttered scenes :

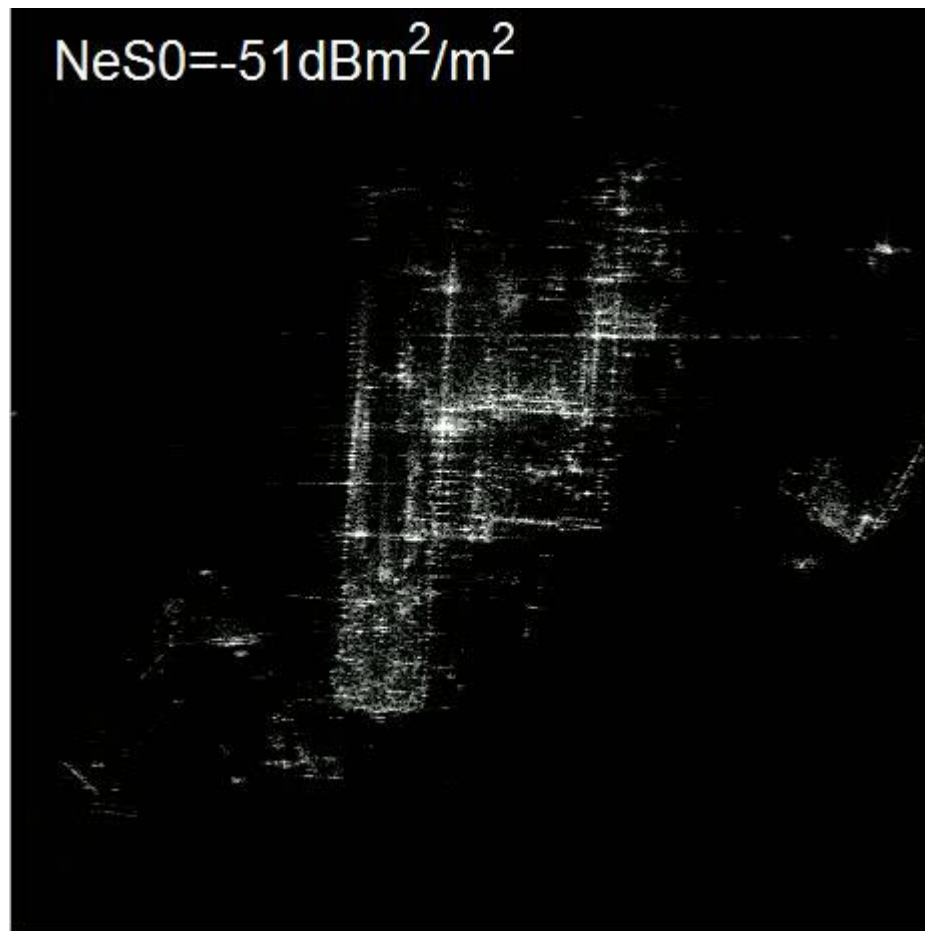
« **Identify before Detect** » (IbD) :

➔ use several SAR frames to postpone detections from the accumulation of Id scores

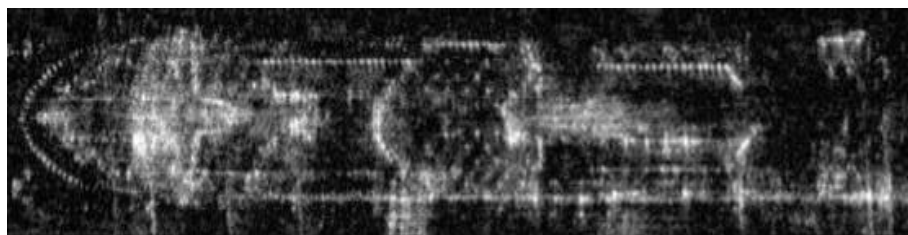
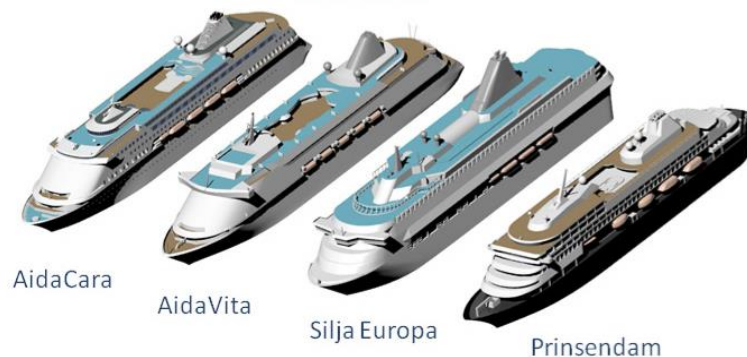
Detected targets location and orientation are IbD sub-products

Heavily cluttered SAR scenes

SAR images acquired by FFI PicoSAR :
spotlight mode @30cm over Oslo harbour



Targets of interest & SAR signature simulations

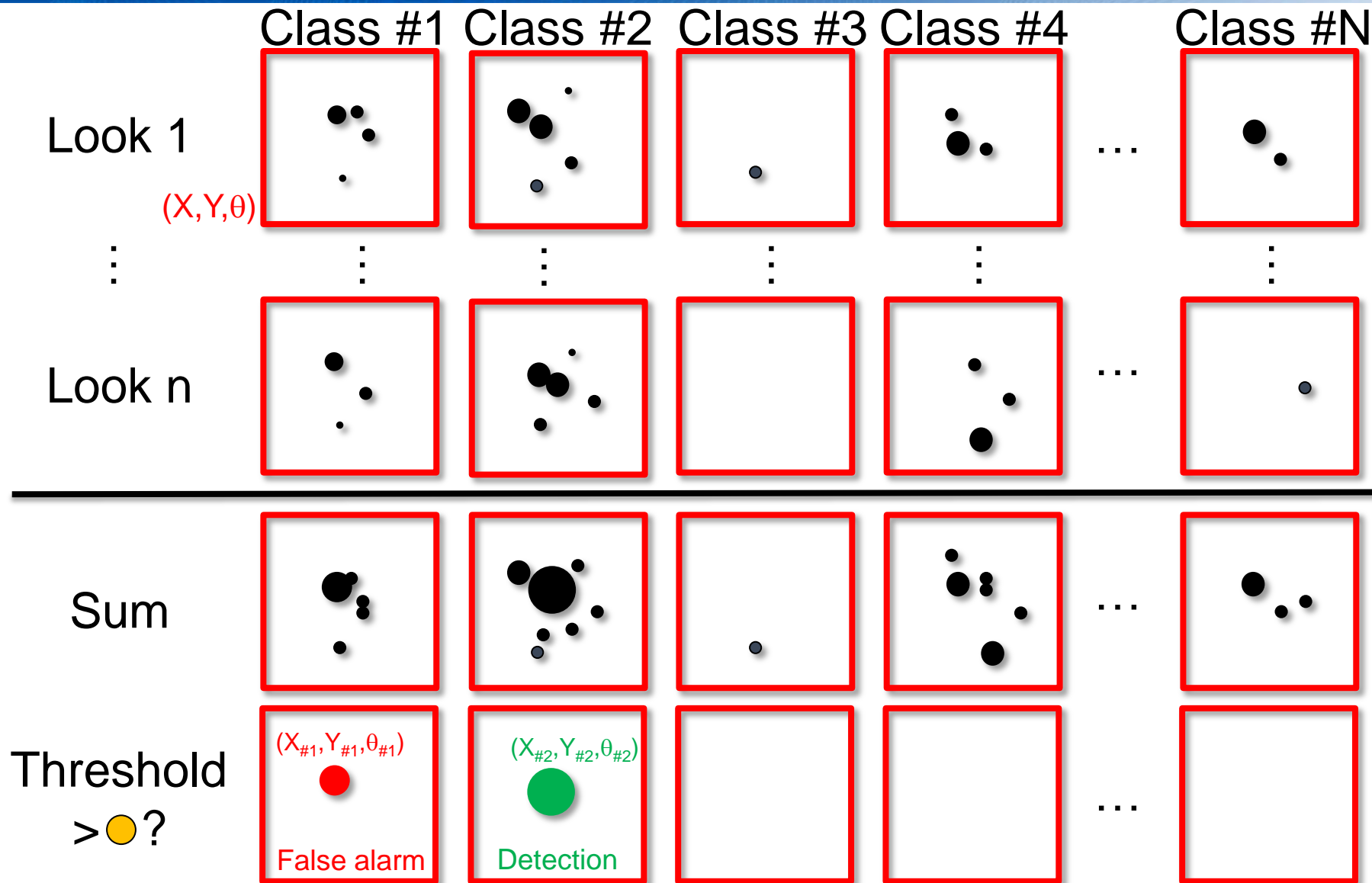


PicoSAR image



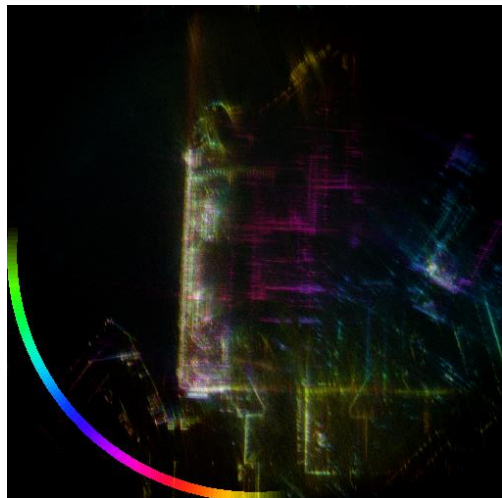
MOCEM simulated image

Id scores accumulation process in (X,Y, θ) space

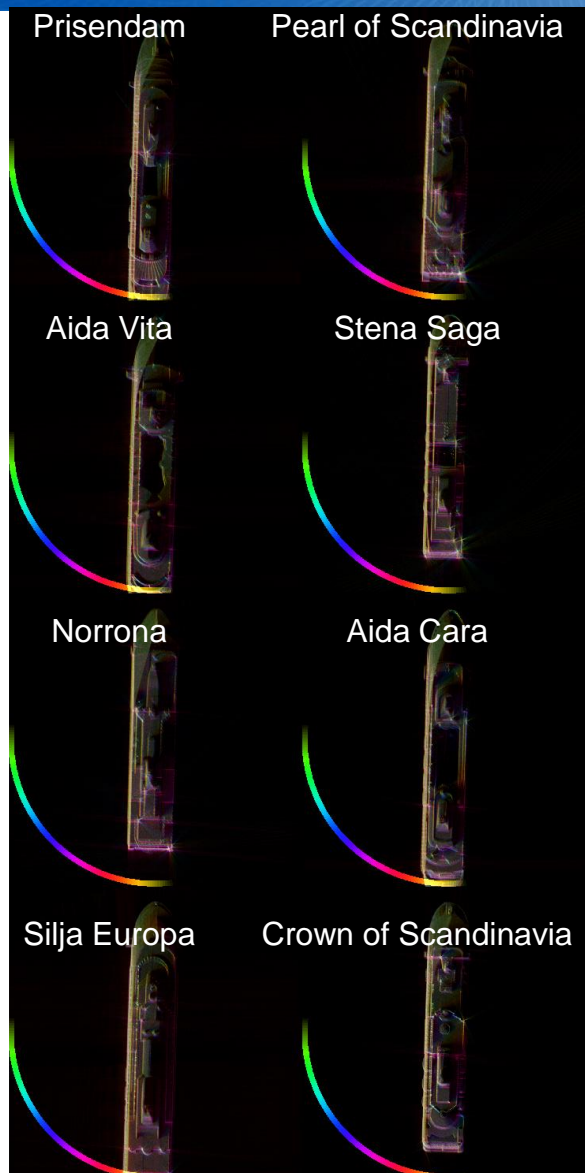


Ibd scores

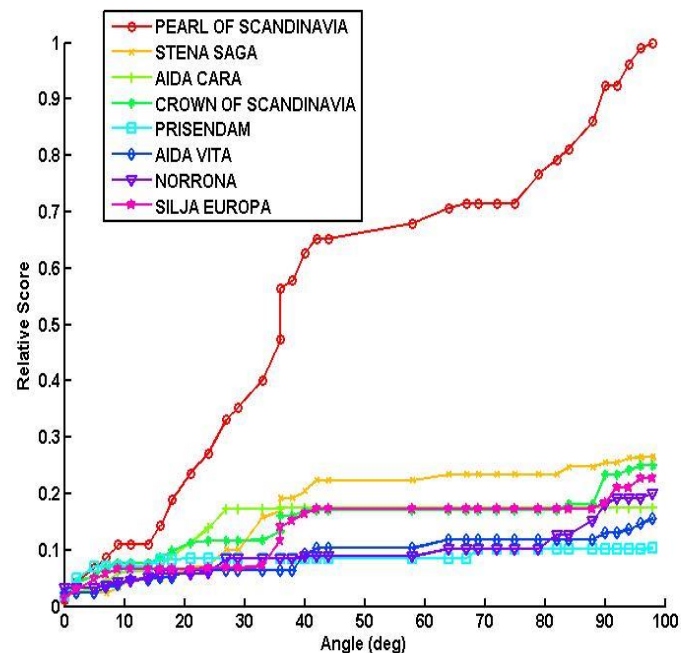
True class :
Pearl of Scandinavia



multi-perspective
PicoSAR
(angle/colour)



← # class
multi-perspective
MOCEM simulations



Max Ibd scores
for each # class

Detected target @ position & orientation found by IbD

Conclusions

- « **Identify before Detect** » concept :
detection is embedded in the identification process ;
a posteriori probability of detection increases with the
accumulation of identification scores among SAR
frames
- Applied to multi-perspective SAR using model based ATR
- Need more theoretical grounds
- No *a priori* constraint on identification algorithm, but needs
efficient strategies to reduce the ATR load