

## → POLINSAR 2013

The 6th International Workshop on Science and Applications of SAR Polarimetry and Polarimetric Interferometry

# Session report: Applications on Ocean Pollution monitoring & target detection

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- We had 5 oral presentations:
  - 2 relevant to oil slick monitoring
  - 3 relevant to ship observation
- Oil slick monitoring: the presentations clearly showed the unique benefits of polSAR data to both observe oil slicks and obtaining rough information on the surfactants properties. Moreover, the capability of polSAR to observe oil in ice infested areas was also addressed.
- Ship observation: the presentations showed different approaches to process polSAR data for ship observation purposes: a) a combined use of different polarimetric channels was proposed and extensively verified against actual data; b) a TF technique was presented to deal with ship observation in etherogeneous environments; c) an approach that exploits the different symmetry properties of man-made targets and sea surface was applied on TerraSAR-X data.

## Target detection:

- What are the unique benefits of polarimetric SAR data vs single-pol for ship observation?
- What are the best polSAR (quad-, dual-, compact/hybrid) configurations for ship observation ?
- Is the theoretical framework behind polSAR ship observation mature ? What are future trends (ship classification)?
- An operational full-pol SAR system to observe oil/ships at sea is significantly affected by the low spatial/temporal coverage: What is the current status of new technologies (e.g. compact/hybrid pol, digital beam forming) ?

There is a general consensus that polSAR measurements offer unique benefits for ship observation, providing: a) better detection, even of small targets; b) discrimination between targets and false alarms; c) Quad-pol SAR systems allows observing both oil slicks and ships.

However, wide area coverage is a fundamental aspect to make polSAR ship observation effective operationally.

- This application will benefit of the forthcoming CP SAR missions that allow combining polarimetric capabilities with wide area coverage.
- Ship classification is an important issue which can be addressed via polarimetric SAR.
- Scientific community pointed out that it is important to take advantage of key archival papers published in early days making an extensive literature review that includes some recommendations for the future.

## Oil pollution:

- What is the current status on new techniques based on multi-polarisation SAR/PolSAR/compact polarimetry for oil spill versus look-alike discrimination?
- What is the current status on new techniques based on multi-polarisation SAR/PolSAR for characterization (thickness, oil volume fraction etc) of oil spills?
- There is an increasing interest in remote sensing of oil in sea ice infested waters. How far can we get with current SAR/PolSAR techniques? What types of sensors do we need?
- An operational full-pol SAR system to observe oil at sea is significantly affected by the low spatial/temporal coverage: What is the current status of new technologies (e.g. compact/hybrid pol, digital beam forming) ? Can the polarimetric measurements be exploited to enhance the value of single-pol ones?

There is a general consensus that polSAR measurements offer unique benefits for oil slick observation. They allow both distinguishing oil from weak-damping look-alikes and providing rough information on the surfactant properties. Further developments are devoted to: a) developments of algorithms/models for oil detection in ice infested areas; b) finer characterization of oil properties.

- Scientific community underlines the importance for oil slick observation to ensure an high SNR even for the cross-pol channel.
- PolSAR missions are needed to make the oil spill observation scientific idea operational. The most important drawback is the lack of spatial/time coverage. A technological solution that combines the advantages of polSAR and enhances the spatial/temporal coverage is provided by the forthcoming SAR missions operating the CP mode.
- The integration of single-pol measurements and polSAR ones is important operationally