Seed question 1: What is in the future for Compact Polarimetry?

Pertinent papers

(2) Raney; (5) Touzi; (7) Attwood; (10) Toutin; (11) Villa; (12) Villano

Discussion

Experience with compact-pol data is spreading, with mixed results. Comparative analyses derived from quad-pol based emulations are encouraging. Flight systems have been imperfect (Mini-SAR, Mini-RF, RiSAT-1) posing challenges. Future systems anticipated (RCM, ALOS0-2, SAOCOM-1). Formal analysis basis yet to be established. Sensitivity to SNR and in-flight calibration issues remain.

Recommendations

- Establish a unified theoretical basis for CP Pol-InSAR, in the same spirit as the founding basis for (quad-pol) Pol-InSAR
- "Require" multi-PI objective quantitative comparisons of CP vs MP, DP, and FP for all Super Sites, including open availability of in situ data
- Work system-engineering analyses of CP issues (e.g., required dynamic range, impact of imperfect transmit polarization, SNR, cross-talk, ambiguity levels vis-à-vis H&V quad-pol, etc.)

Seed question 2: What are the challenges for models & interpretive tools?

Pertinent papers

(1) Kojima; (3) López-Martinez; (4) Le; (6) Besic; (8) Alonzo-Gonzales; (9) Alvarez-Perez; (10) Toutin

Discussion

- The development of models and interpretative tools is still ongoing and much remains to be still done.

- The understanding what polarimetry can provide is still in the beginning and need to be further developed

Recommendations

- Extend the texture model to the polarimetric case, which by implication means that a significantly different texture parameter should obtain for each polarimetric channel.

- Develop model-based decomposition schemes for application-specific physics (biomass + topography for example).

- Continue initiatives to make analysis and interpretive software tools validated, and integrated into user-friendly application resources.

Seed question 3: What is to be gained, and through which strategies, in pursuit of higher-order statistics, and non-Gaussian models?

Pertinent papers:

(1) Kojima; (3) López-Martinez; (6) Besic; (8) Alonzo-Gonzalez

Discussion:

Is Eigen-value based methodology sub-optimum? If so, what are promising alternatives? It has not yet been shown that the usual suite of quad-pol analysis tools are "optimum"? If not, then there is a huge opportunity for a theoretical contribution to respond to this question.

Recommendations:

- Increase reliance on quantitative objective norms for comparing the performance of alternative analysis and decomposition paradigms
- Develop a rigorous theoretical construct for the optimal backscattering information extraction from quad- (full-) pol data ensembles.

What are the applications with a high maturity based on PolSAR?

Domain	Application / Product	Application Maturity (Polarimetry)
Forestry	Above Ground Biomass	Medium
	Stand Height	High
	Vertical Structure	Medium
	Thematic Maps	High
	Change Detection	High
Agriculture	Crop Type Mapping	Medium
	Soil Moisture	High
	Phenology Determination	Medium
	Wetland Delineation	Medium
	Flooding Mapping	Medium
Cryosphere	Snow Volume	Medium
	Land Ice Extinction	Low
	Sea Ice Surface Char.	Low
Urban	Mapping / Classification	Medium
	3D Rendering	Medium
	Subsidence	Medium
Ocean	Oil Slick Detection	Medium
	Metallic Targets	Medium