

→ **POLINSAR 2013**

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

Polarimetry & DInSAR, Polarimetry & PSI

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Papers presented in the session:

Assimilation of Distributed Targets and PS Information for a Scene-Based Monitoring of the Polarimetric Data Distortion (*Iannini, L.; Monti Guarnieri, A.; Tebaldini, S.*)

- Use of PS as alternative to traditional polarimetric calibration

Performance Comparison between Dual Polarimetric and Fully Polarimetric Data for DInSAR Subsidence Monitoring (*Monells, D.; Iglesias, R.; Mallorqui, J. J.*)

- Higher density of PSs obtained with fully polarimetric data compared with dual pol data

Polarimetric adaptative Speckle Filtering driven by temporal Statistics for PSI Applications (*Navarro-Sanchez, V. D.; Lopez-Sanchez, J. M.*)

- Selection and combination of PSs and distributed targets based on polarimetric criteria

Phase Quality Optimization Techniques and Limitations in Polarimetric Differential SAR Interferometry (*Iglesias, R.; Monells, D.; Fabregas, X.; Mallorquí, J. J.; Aguiasca, A.; López-Martínez, Carlos*)

- Polarimetric optimization allows to improve de density of PSs

Question 1: *About the use of distributed targets*

Subsidence monitoring has been classically considered in terms of point targets, either selected from amplitude or coherence information. Which is the role of distributed targets in subsidence monitoring ?

Does dual-/full-polarimetry improve accuracy, and in case of a positive answer, how much ?
Does coherence provide a suitable measure to qualify distributed targets for subsidence monitoring ?

Comments:

- Distributed targets play an important role in DInSAR & PSI as they help to improve the estimation accuracy of subsidence phenomena. **Nevertheless, a research effort is necessary in the characterization of distributed targets with PolSAR.**
- The capability of polarimetry to discriminate targets could get a great gain in DInSAR if properly used.
- Coherence may be not the figure-of-merit to be maximized. More research is needed.

Question 2: *About the use of polarimetric data. Answer to seed questions n.3 and n.4 of PolInSAR 2013 recommendations*

Are there statistics on the stability of scattering matrix for PSI ? Which polarization is mostly stable or less affected by noise ?

It is demonstrated that optimization techniques improve phase quality. Should these optimization approaches be adapted specifically to the DinSAR&PSI problem?

Would it be necessary set-up a campaign, with collection of ground-truth data, to assess the benefit of polarimetry?

Comments:

- Polarimetry is useful as it allows to increase the density of PSs, separate targets and resolve confusions and better retrieval of orbital errors.
- A careful separation of interferometric and polarimetric aspects in the signal needs to be considered. **Also, the concept of polarimetric stability should be clarified.**
- Polarimetric optimization plays an important role on increasing the density of PSs with high coherence and lower phase std. dev., but it must be demonstrated that it is not obtained at the expense of introducing biases. **It should be also clarified what it is done with optimization in terms of the scattering mechanisms.**
- There is a clear lack of a PolSAR dataset dedicated to DInSAR&PSI with simultaneous ground-truth. A possible solution is to have proper simulation tools and strategies.

Question 3: *About the use/comparison of single-, dual- and full-pol data. Answer to seed question n.4 of PolInSAR 2013 recommendations*

Could it be possible to compare quantitatively the gain of full-pol data in front of single- and dual-pol data?

Is it expected an improvement in the use of Sentinel1 dual-polarization scheme with respect to single polarization ? Which combination do we recommend

Comments:

- Additional criteria should be defined specially regarding the accuracy of the quantitative estimation of the subsidence phenomena.
- In case of Sentinel 1, dual-polarization data is better than single polarization data as the former achieve larger PSs density. HV or VH channels are important in urban environments. Nevertheless, attention must be paid to the scattered power in HV or VH with respect to the noise floor. This should be low to make possible the use of HV or VH. **In case of distributed targets, NESZ < -30dB.**

Question 4: *About temporal homogeneity*

Nowadays, do we have a clear understanding of the temporal behavior, the statistical characterization and indeed about the concept of homogeneity of temporal polarimetric data for their use in DInSA&PSI applications?

Comments:

- Temporal studies are important to be able to study and to characterize the dynamics of the scene.