→ FRINGE 2015 WORKSHOP

Advances in the Science and Applications of SAR Interferometry and Sentinel-1 InSAR Workshop

Coherence Exploitation Session

Session Summary

23–27 March 2015 | ESA–ESRIN | Frascati (Rome), Italy

European Space Agency

Presented Papers 1/2

On the Estimation and Interpretation of Sentinel-1 TOPS InSAR Coherence

Wegmüller, Urs; Santoro, Maurizio; Werner, Charles

Gamma Remote Sensing AG, Switzerland

Analysis of the Time Evolution of Temporal Coherence using COSMO-SkyMed HH and VV data

Balbarani, Sebastián (1); Euillades, Pablo Andrés (1); Euillades, Leonardo Daniel (1); Riveros, Natalia Cecilia (2)

1: Instituto CEDIAC - FI - Universidad Nacional de Cuyo & CONICET; 2: Instituto CEDIAC - FI - Universidad Nacional de Cuyo

Tree Height Analysis in TanDEM-X Data Using Frequency Domain Coherence

Bollian, Tobias (1); Thiele, Antje (2,3); Hinz, Stefan (2); Meyer, Franz Josef (4)

1: European Space Research and Technology Centre (ESTEC), The Netherlands; 2: Karlsruhe Institute of Technology (KIT), Germany; 3: Fraunhofer Institute of Optronics, System Technologies and Image Exploitation (IOSB), Germany; 4: University of Alaska Fairbanks (UAF), USA

Presented Papers 2/2

Moving from Temporal Coherence to Decorrelation Time of Interferometric Measurements Exploiting ESA's SAR Archive

Foumelis, Michael (1); Mitraka, Zina (2); Cuccu, Roberto (3); Desnos, Yves-Louis (4); Engdahl, Marcus (4)

1: RSAC c/o ESA-ESRIN, Italy; 2: Foundation for Research and Technology – Hellas (FORTH), Greece; 3: ESA Research and Service Support, Italy; 4: ESA, Italy

Interferometric Coherence for Rapid Disaster Response

Yun, Sang-Ho (1); Milillo, Pietro (2); Simons, Mark (3); Owen, Susan (1); Webb, Frank (1); Fielding, Eric Jameson (1); Hua, Hook (1); Milillo, Giovanni (4); Coletta, Alessandro (4); Rosen, Paul (1); Dini, Luigi (4)

1: NASA - JPL, United States of America; 2: University of Basilicata, Italy; 3: California Institute of Technology, United States of America; 4: Italian Space Agency (ASI), Italy

Seed Questions 1/3

- Are there open issues in the coherence definition and estimation?

  Discussion: Coherence is already well defined characterizing InSAR phase quality. Assumptions are necessary for its “estimation” from SAR data, which underline the need to understand what it is really measured.

  → Recommendations: The ceiling for coherence estimation has been reached with already available algorithms. Coherence should be estimated from original InSAR data. No need to optimize the estimation through filtering or pixel selection procedures within the estimation windows as this might result in altering of true properties of the land surface.

- The understanding of temporal coherence? (e.g. on/off versus gradual temporal decorrelation; the role of the time interval)

  Discussion: Diverse approaches for temporal coherence estimation are followed especially in PS-like processing.

  → Recommendations: Might be of interest to homogenize the temporal coherence estimation approaches. Less effects are expected for deformation related studies compared to analysis of land cover/use temporal behavior.

Seed Questions 2/3

- S1 IWS coherence compared to ERS and ENVISAT coherence (role of spatial resolution? time interval? TOPS mode? baseline?)

  Discussion: Comparisons between ERS/ENVISAT and Sentinel-1 coherence estimates should be performed to understand what is potentially gained using S1.

  → Recommendations: ?

- What is the information content of single pass (e.g. TDX) coherence?

  Discussion: Contains thematic information, however, the exploitation of low coherence values should be handled with care.

  → Recommendations: S1A 12-days coherence is less suited to discriminating between short vegetation and forest. Optimal configuration having 1-3 days repeat cycle, but maybe we can do better with S1B in orbit (6-days revisit).

Seed Questions 3/3

- Analysis of coherence time series? (temporal behavior of land use/cover classes, advance classification schemes)

  Discussion: Sentinel-1 will allow systematic monitoring of coherence providing additional temporal information. Observed variations might be linked to random changes (e.g. agricultural lands)

  → Recommendations: ?

- Operational use of coherence products from Sentinel-1? (e.g. multi-temporal change detection algorithms)

  Discussion: No anomalies identified in S1 coherence estimation. IW TOPS mode coherence is suited for operational concepts (temporal sampling and spatial coverage).

  → Recommendations: Operational processing chains should/shall be developed. Sentinel-1 data wherever/whenever possible, taking advantage of the large swath and the dual polarization capability.