

Fringe 2011: Methods: PSI/DInSAR

Summary

13 Talks

1. **Nico Adam** presented work from the Terrafirma project, aiming for PSI products over wide spatial areas. Challenges such as atmospheric delay and low PS density were discussed. This involves the use of a NWM (WRF). He was estimating error metrics and discussing error propagation
2. **Petar Marinkovic** discussed some TOPS implication for InSAR. He used ERS and TSX spotlight data to use the parts of the spectrum that would also be available in TOPS mode, and compared the characteristics. He recommended that ESA should provide some TOPS data sets to the science community to test and develop their algorithms.
3. **Luca Marotti** presented TOPS characteristics. He discussed the requirement of very accurate azimuth coregistration and presented TOPS-stripmap cross-interferograms. A discussion followed on whether azimuth coregistration will work in all cases, e.g. when there are moving subparts in the image.
4. **Zhong Lu** focused on estimating the 3D deformation, especially the North-South component. MAI was discussed and applied on Hawaii and on Haiti. Comparison with GPS seems very good. The errorbars for SAR MAI in north direction are large, but the estimates are relatively good. He analyzed the performance for Sentinel 1 and compared an ERS-2 pair and a simulated sentinel 1 pair, combining asc/desc. MAI allows 3D defo mapping with cm accuracy (2 -3 times better than offset based). For Sentinel-1 MAI could reach 10 cm
5. **Javier Duro** talked on Xband SAR data to detect and monitor motion. He was merging information from different sensors C/S and TSX, ERS, Envisat, and discussed what are the options of cross interferometry. He showed examples on a landslide with C/S and TSX

Continued

6. **Parwant Ghuman**: Bridge health monitoring: showing a good example of applications that benefit from the high resolution data.
7. **Kanika Goel** presented an advanced method to combine DS and PS, and an L1 norm SBAS approach. Demonstrated it on a gas storage site.
8. **Daniele Perissin** presented his processing method and how it was embedded in the Chinese situation. (a.o. different ways to connect points, such as 'the flowering tree'). Strong need for addressing temporally coherent points.
9. **Lei Zhang** presented his method to find coherent points using e.g. offset estimation and to evaluate motion of temporarily persistent scatterers
10. **Alessandro Ferretti** presented TRE's SqueeSAR method: a combination of using Persistent, Distributed and Temporary coherent scatterers.
11. **Piyush Agram**. Presented a noise covariance model for time series InSAR, and made a plea for using the entire covariance matrix. Better stochastics are needed.
12. **Alexander Schunert** showed different ways to assess the scattering mechanism of a building, and zoomed in on extracting maximum information from window lines of a building.
13. **Pooja Mahapatra** presented the use of radar transponders in cases no PS are available. She proved with a leveling experiment that for ERS-2 quality levels of 2.5 mm were obtainable. Temperature correction of the transponders was needed.

Summary one-liners

- Several studies **combining different types of scatterers (PS, DS, temporary)**
- More **detailed analyses**, up to the level of single constructions.
- **Better error models**
- **Wider geographic areas covered**
- **TOPS preparedness**
- Optimally using **multisensor data** (TSX, C/S, Envisat, Radarsat)

Recommendations

1. ESA should produce a concise note addressing the origins, the processing recommendations and the consequences of the high accuracy needs for azimuth coregistration (induced by the TOPS system).
2. ESA should distribute some sample TOPS data sets to allow the user community to prepare themselves for the new data types.
3. There is a need for an increased orbital tube to allow for better relative height estimation of scatterers. (The current 50 m tube will not allow for this, and as a result height precision is limited.) It should be investigated whether this should only be a limited period of the mission (say, at initialization) or continuous. In other words, the orbital tube needs to be revisited.
4. To facilitate the acquisition planning, ESA should make a webportal available where scientists/users can pose interest for acquisitions. The users should clearly identify the 'minimum requirements' for their proposed research (E.g not asking for ALL available acquisitions (asc/desc/adjacent) if this not strictly necessary). Make the process transparent.