Session: "COSMO-SkyMed Mission: Status and Results"

Proposal Title:

Quantitative analysis of Stripmap and Spotlight SAR Interferometry with COSMO-SkyMed constellation

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Abstract

This work is focused on the phase validation of interferograms obtained by combining COSMO-SkyMed SAR images acquired by a single satellite (temporal baseline coincident with the orbital repeat cycle) or even by two satellites of the SAR constellation in equi-phased configuration on the orbital plane (temporal baseline: 8 days), thus minimizing the temporal decorrelation. Both qualitative and quantitative analyses have been therefore carried out for HIMAGE (stripmap, single polarization) and S2 (enhanced spotlight) imaging modes, in order to proof whether or not COSMO-SkyMed constellation is well suited for SAR interferometry.

COSMO-SkyMed InSAR appears to be very promising in the monitoring of man-made structures, such as buildings, bridges, railways and highways, thanks to the high spatial resolution (~3m for HIMAGE, ~1m for S2 imaging mode), thus enabling new potential applications (urban applications, precise DEM, etc.). For a quantitative validation of the InSAR measurements, independents height measurements are required, provided by other InSAR acquisitions or other traditional techniques (ground truths). Thanks to the high spatial resolution, it is possible to choose, much more accurately than with traditional SAR satellite missions in C- & L-band, the interferogram pixels corresponding to targets well recognizable on the ground, thus allowing an easy and reliable comparison with ground measurements.

A set of test sites with different topography and ground coverage has been processed. Where more than only two acquisitions were available, a simple approach (instead of more complex Permanent Scatterers technique) for multi-temporal analysis has been adopted. To avoid the presence of atmospheric artefacts, a possible way to validate quantitatively the InSAR phase reliability is to consider phase difference between neighbouring pixels, i.e. at distance short enough to filter out the atmospheric contribution.

The processing improvements required in X-band for a proper interferogram generation are depicted, from the image coregistration and resampling in master geometry to the flattening of the interferometric phase.