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3D temporal evolution of displacements through the SISTEM method

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Differential interferometric SAR (DInSAR) is widely used for many ground deformation monitoring applications. However it is affected by two main limitations: temporal decorrelation and atmospheric heterogeneities. In order to overcome these drawbacks several techniques to study the temporal evolution of ground deformation have been developed [1-3]. These techniques provide mono dimensional time evolution of displacement measured along the Line Of Sight (LOS) of the satellite. The aim of this paper is to propose a strategy able to provide 3D temporal evolution of displacements. To this end, for a given multi-temporal dataset of SAR and GPS measurements, the SISTEM (Simultaneous and Integrated Strain Tensor Estimation from geodetic and satellite deformation Measurements) method [4] is used both to filter atmospheric effects (by a new iterative procedure) and to produce 3D ground deformation maps. Then a SBAS-like algorithm is used to "link" these maps and to provide 3D temporal evolution of deformations.
The proposed methodology was tested on both synthetic and experimental data.

References

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