**Hybrid Genetic Algorithm for three dimensional phase unwrapping for simulation of volume change of shoreline**

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**Abstract:**

At present, the elevation models that are available for large parts of Earth are of low resolution, inconsistent or incomplete. Scientists addressed temporal, geometric and atmospheric decorrelations are most critical limitations. In this context, two main categories of advanced DInSAR techniques for deformation time-series generation have been proposed in literature, often referred to as Persistent Scatterers (PS); and Small Baseline (SB) techniques, respectively. Objective: The main objective of this work to uitilize hybrid genetic algorithm for three-dimensional phase unwrapping. **Methods:** The three dimensional phase unwrapping is performed using three-dimensional best-path avoiding singularity loops (3DBPASL) algorithm. Then phase matching is implemented with 3DBPASL using Hybrid Genetic Algorithm (GHA). Further, the combination between GHA and 3DBPASL is used to eliminate the phase decorrelation impact from the interferograms. **Results:** The study shows that InSAR produces discontinues interferogram pattern because of the high decorelation. On the contrary, the three-dimensional sorting reliabilities algorithm generated 3-D coastline deformation with bias of -0.06 m, lower than ground measurements and the InSAR method. Therefore,3DBPASL algorithm has a standard error of mean of ± 0.03 m, lower than ground measurements and the InSAR method. Consequently, the 3D-SRA is used to eliminate the phase decorrelation impact from the interferograms. The study also shows the performance of InSAR method using the combination of HGA and 3DBPASL is better than InSAR procedure which is validated by a lower range of error (0.04±0.22 m) with 90% confidence intervals. **Conclusion:** In conclusion, HGA algorithm can be used to solve the problem of decorrelation and produced accurate 3-D coastline deformation using ENVISAT ASAR data.