

Automate Reference Points Selection for InSAR Time Series Analysis on Segmented Wetlands in California

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Abstract

Interferometric Synthetic Aperture Radar (InSAR) time series analysis is a powerful technique to estimate long-term water level changes in wetlands ecosystems. However, few studies have applied InSAR on wetlands that are highly segmented by canals and levees due in part to the challenge of selecting qualified reference points to minimize unwrapping errors, which, by contrast, is a relatively easy task for unsegmented wetlands. Here we developed a new method to automatically select the optimal reference point for InSAR time series analysis. The method selects reference points by considering temporal behaviors of coherence and InSAR phase connectivity from each reference point to its wetland of interest. We tested the method on six managed and highly segmented wetland units within the Sacramento National Wildlife Refuge in the Central Valley, California. We validated the InSAR measurement against water depth gauge measurements during a low water depth (< 0.05) for five out of six units and similar RMSE for the remaining one. This new automatic method enables us to maximize the performance of InSAR to predict water depth and could be applied to other types of InSAR applications as well.