Damage Mapping Using Interferometric Coherence

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Abstract

Interferometric coherence in repeat–pass interferometry can be interpreted in terms of temporal change that has occurred between the radar acquisitions. We use three different interferograms spanning the earthquake that devastated Bam (Iran) on December 26, 2003 to map the structural damage to buildings. A coherence change index is defined as the ratio between a reference coherence and the coherence of an interferogram spanning the event. By analyzing the average coherence change index in different areas we determine a damage level. The approach is robust for a wide range of interferometric baselines. Temporal changes not related to the earthquake cause small biases in the interferograms spanning longer time periods but do not preclude the analysis in the Bam area.

Using current and future sensors this method could in principle be used for damage mapping within hours to days following a major earthquake or other damaging event in areas that do not suffer from extremely rapid decorrelation under normal circumstances.