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Automated Imagery Analysis tool (GAIA): incorporating time-series satellite data to detect changing site conditions

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In order to reduce uncertainties and improve confidence in analyses of potentially anomalous events, accurate event locations are required. However, event location/relocation and replicability can be difficult due to a number of factors, e.g., variability in seismic data processing and spatially sparse network coverage. By leveraging commercially available, high-fidelity satellite data as a supporting data stream, time-separated images could (1) build confidence in seismic data analyses and (2) identify specific areas where change has occurred, such as building construction/demolition or road/facilities improvements. We summarize a novel geospatial processing tool – GAIA: Geospatial Automated Imagery Analysis – that automates image orthorectification and change detection of time-separated images. GAIA is an easy-to-use, ArcGIS-based toolbox with a standardized workflow for image analyses and change detection that significantly reduces geospatial processing time (from hours to <5 minutes). We present the GAIA functionality through relevant exemplar cases with a focus on underground explosions at the Nevada National Security Site (U.S.A.). The use of GAIA in monitoring and verification applications could support event analyses through effective and consistent use of commercially-available satellite imagery. GAIA shows promise for identifying locations of anomalous change and reducing uncertainty in event locations.

Promotional text

This proposed SnT 2021 presentation is aligned with T3.5 Data Analysis Algorithms and will demonstrate an easy-to-deploy monitoring and verification technique that augments event analyses through effective use of commercially-available satellite imagery.

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