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The limitations in current commercial satellite-based Synthetic Aperture RADAR (SAR) datasets are being partially emphasized by a specialized (dual-frequency, polarimetric, and interferometric) ground-based real-aperture RADAR (GBIR) instrument developed by a team from University of Missouri (MU) in conjunction with GAMMA Remote Sensing. This MU GBIR possesses high temporal and spatial resolution, which make it well suited for measuring small and relatively fast-acting surface deformation.
Simulation of single look complex (SLC) imagery and interferograms of a study site allows one to test and evaluate new methods or techniques under known conditions. A simulation of MU GBIR SLCs and interferograms is investigated in this document. The simulation accounts for the fluctuating, non-fluctuating, electromagnetic shadowing, system phase noise, and other noise components. Given a digital elevation model (DEM) and a MU GBIR position, the simulated imagery can be generated. For this study, we investigated several conditions of our Blue Springs, Missouri study site. Qualitatively the measurement SLC imagery compares well with the large-scale trends of the simulated SLCs imagery.
Simulated interferograms for various refractivity change cases and noise scenarios (i.e. noisy and low noise) were explored. The noisy-scenario large-scale phase trends are similar to the low-noise scenarios. There are some small-scale differences in the phase scenarios, which are mainly associated with vegetative land cover. The phase fringes are preserved well on the dam structure and other persistent like structures.