Arkansas Department of Transportation
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 09/06/2017

PROJECT AREA: Materials

TITLE: Satellite InSAR Monitoring of Transportation Infrastructure in Arkansas

PROBLEM STATEMENT:

Recent satellite-based radar measurements indicate that transportation infrastructure in Arkansas is affected by subsidence, creep, or slope failure in numerous areas. Traditional surveying methods do not reveal the spatial extent of gradual ground motion. In contrast, Synthetic Aperture Radar Interferometry (InSAR) is a cutting-edge, cost-effective remote sensing technique capable of measuring ground motion across broad areas with millimeter-level accuracy. InSAR can be employed to investigate premonitory surface movements that may lead to slope failure, subsidence, creep, and sinkhole development, and thus may damage transportation infrastructure in Arkansas. Characterizing surface movements that may indicate areas of structural weakness across roads, bridges, railways, and surrounding embankments will allow engineers to determine necessary remedial actions in order to prevent further structural damage, and will support informed decisions regarding future planning.

OBJECTIVES:

(1) Employ space-borne InSAR to detect and measure the magnitude, extent, and pattern of ground motion across Arkansas, with emphasis on areas of interest to AHTD; (2) identify potential problematic areas that might impact transportation safety; (3) investigate the causes and modes of recent ground deformation events; and (4) integrate InSAR observations and Geographic Information Systems (GIS) to support informed decisions related remedial actions and future plans.

FORM OF RESEARCH IMPLEMENTATION:

InSAR observations will determine precisely the spatio-temporal pattern and rate of ground motion in areas that are subsiding, sliding, or creeping; consequently they will be used to identify areas at risk where maintenance will be required. Outputs will be provided in openly accessible format that can be incorporated into further research by AHTD to enhance future planning and decision-making.

Estimated Project Duration: 24 months

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Statement Combined with Statement Number(s)

Standing Subcommittee Ranking

Advisory Council Ranking

11 / 12

40 / 44

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