ForestSAT 2026

Association for Forest Spatial Analysis Technologies

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Title: Introduction to Interferometric Synthetic Aperture Radar and Its Application in Forestry and Sinkhole Mapping

Instructors/Affiliation:

- Dr. Chunli Dai

Department: School of Forest, Fisheries, and Geomatics Sciences (FFGS), University of Florida, Gainesville, FL 32603.

- Dr. Changhyun Choi

Department: Research Institute of Agriculture and Life Sciences, Seoul National University, South Korea.

- Dr. Sanduni Disanayaka Mudiyanselage

Department: School of Forest, Fisheries, and Geomatics Sciences (FFGS), University of Florida, Gainesville, FL 32603.

Description: This workshop will provide a brief introduction to Interferometric Synthetic Aperture Radar (InSAR) and its application for forest canopy height estimation. Participants will learn the fundamental principles of InSAR, including SAR geometries and the relationships between range change, phase change, and topography. InSAR preprocessing steps will be demonstrated such as coordinate conversion, coregistration, and terrain correction. The workshop will also introduce a range of SAR data sources and portals, including the Alaska Satellite Facility, to guide users in acquiring relevant datasets. Various InSAR techniques have been explored in the literature for mapping forest canopy height, including multi-polarization method, multi-baseline method, SAR tomography, as well as single-baseline single-polarized method. Case studies for forest height estimation will be demonstrated. Additionally, the workshop will demonstrate InSAR's application in detecting land surface deformation, with case studies focused on sinkhole mapping in Florida.

Learning Objectives:

- Understand the basic principles of Synthetic Aperture Radar (SAR) and InSAR.
- Interpret SAR imaging geometries and the relationship between phase change and surface characteristics.
- Explore and access InSAR datasets from public portals.
- Apply basic InSAR preprocessing steps using available software tools.
- Understand and compare different InSAR techniques for forest canopy height estimation.
- Assess case studies on the application of InSAR in forestry and sinkhole detection.

Target audience: Graduate students, researchers, GIS/remote sensing professionals, and environmental scientists interested in radar remote sensing, forest monitoring, and land surface deformation detection.

Format & Activities:

- Short lectures with visual demonstrations
- Live data processing demonstrations
- Case study presentations
- Q&A and group discussion

Expected outcomes: Participants will gain a practical understanding of InSAR theory and workflows and will leave with resources to further explore InSAR applications in environmental science. They will also be able to identify appropriate SAR datasets and understand preprocessing workflows required for height estimation and deformation mapping.

Language: English

Requirements: Computer and HiPerGator Account.

Schedule: December 3rd, 8:00 AM – 1:00 PM (EST)

Duration: 4 hours.

Instructor Biography:

Dr. Chunli Dai is an assistant professor at the University of Florida's School of Forest, Fisheries, and Geomatics Sciences. Her research focuses on radar remote sensing, satellite imagery for geophysical applications. She has worked on various projects involving land surface deformation, coastline mapping, and natural hazards. Dr. Dai has extensive

experience processing and analyzing SAR datasets and has published in leading journals in the field. She is passionate about making complex radar technologies accessible to researchers and practitioners through workshops and training programs.

Dr. Changhyun Choi is a postdoctoral researcher at the Research Institute of Agriculture and Life Sciences, Seoul National University. He earned his PhD in Remote Sensing (specializing in SAR and LiDAR) from ETH Zurich in 2022. He was a former PhD researcher at German Aerospace Center, Deutsches Zentrum für Luft- und Raumfahrt (DLR) in Oberpfaffenhofen, Germany. Choi's research focuses on the retrieval of forest structural parameters from interferometric SAR data and LiDAR.

Dr. Sanduni Mudiyanselage is a postdoctoral researcher at the School of Forest, Fisheries, and Geomatics Sciences (FFGS), University of Florida. Dr. Mudiyanselage earned her BS in Civil Engineering (University of Moratuwa, Sri Lanka), her MS in Coastal Engineering (TU Delft, The Netherlands), and her Ph.D. in Geomatics (University of Florida). Dr. Mudiyanselage has extensive experience in developing machine learning and deep learning workflows using optical, lidar, and Synthetic Aperture Radar (SAR) datasets for several coastal applications. Her current work involves InSAR time-series analysis of precursory ground deformation signal detection for sinkholes in Florida.

Agenda

Eastern Time (ET)	**Topic**	**Instructor**
8:00 – 8:15 AM	Welcome and Introduction	Chunli Dai
8:15 – 9:00 AM	Applications in Forestry: Canopy Height Estimation	Changhyun Choi
9:00 – 9:45 AM	Forestry Case Study Demonstrations	Changhyun Choi
9:45 – 10:00 AM	Break	
10:00 – 10:45 AM	Fundamental Principles of SAR and InSAR	Chunli Dai
10:45 – 11:30 PM	InSAR Preprocessing Demos	Chunli Dai
11:30 – 11:45 PM	Break	
11:45 – 12:30 PM	Applications in Geohazards: Sinkhole Mapping in Florida	Sanduni Disanayaka Mudiyanselage
12:30 – 1:00 PM	Q&A and Wrap-up	Chunli Dai