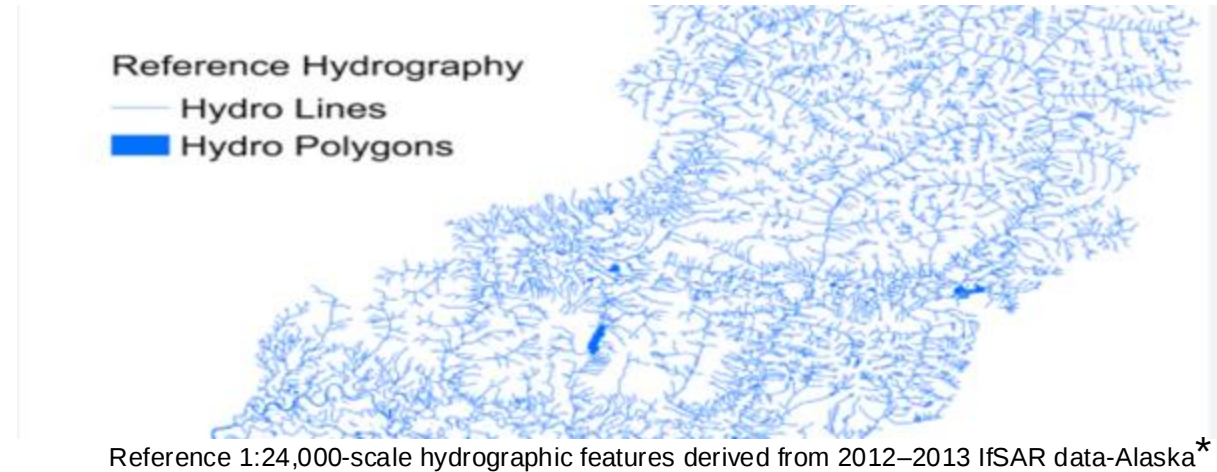


An Integrated CyberGIS and Deep Learning Framework for Scalable Hydrographic Mapping

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Objective:

- Make a critical contribution to understanding how to adapt deep-learning approaches to scalable land cover mapping by resolving data and computational intensity
- Advance efficient spatial queries with large quantities of LiDAR samples by combining innovative computational and spatial strategies with cutting-edge deep learning methods for 3D feature extraction from LiDAR in the context of hydrographic mapping
- Achieve computational and geographic scalability simultaneously by overcoming the difficulties of intensive computational workloads that exceed the limit of conventional GIS approaches



Approach:

- Establish a scalable cyberGIS and deep learning framework for hydrographic mapping with high accuracy using LiDAR or IfSAR big data and exploring the representative issue of samples
- Achieve scalable LiDAR and IfSAR data preprocessing (reprojection, denoising, and normalization), processing (point cloud extraction, rotation, cropping, and voxelization), and spatial indexing for efficient spatial queries with large quantities of LiDAR samples
- Adapt transfer learning and multi-task learning methods to geospatial big data for achieving computational and geographic scalability simultaneously

Key Dates:

- 06/22 Award start
- 06/23 Co-authored “Building Cyberinfrastructure for the Reuse and Reproducibility of Complex Hydrologic Modeling Studies.” *Environmental Modelling and Software*, v. 164.
- 12/23 Award end
- 1/24 Co-authored “HydroShare Retrospective: Science and Technology Advances of a Comprehensive Data and Model Publication Environment for the Water Science Domain.” *Environmental Modeling and Software*, v. 172.

*Detail of Figure from “Extensibility of U-Net Neural Network Model for Hydrographic Feature Extraction and Implications for Hydrologic Modeling.” L. Stanislawski, S. Wang, et al. *Remote Sensing* 13(12):2368.

Collaborators/Co-I's/Partners:

- V. Sagan, Saint Louis University;
- USGS Center of Excellence for Geospatial Information Science (CEGIS)