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*Using ICESat-2 and Landsat to Map Forest
Aboveground Biomass in the Southern US
By: Lana Narine, Sorin Popescu and
Lonesome Malambo*

About Me

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SCHOOL OF FORESTRY
AND WILDLIFE SCIENCES

Work focus areas: Remote sensing and GIS applications in natural resources and forestry

Team members:

Sorin Popescu, Professor, Department of Ecology and
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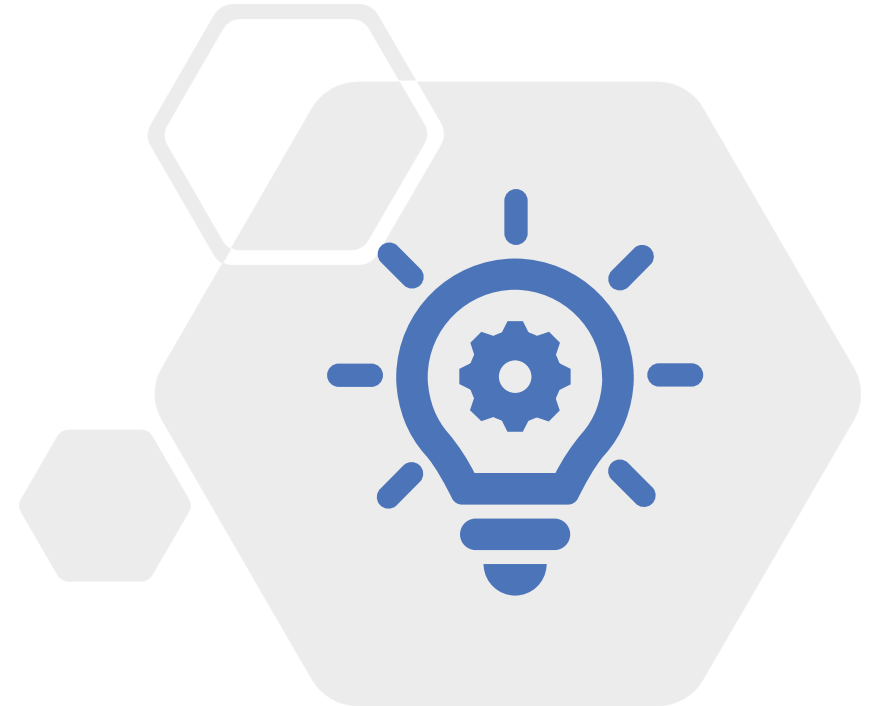
The Idea



- **Title of Proposed Idea: Using ICESat-2 and Landsat to Map Forest Aboveground Biomass in the Southern US**
- **Scope of Idea: Regional**

The Idea

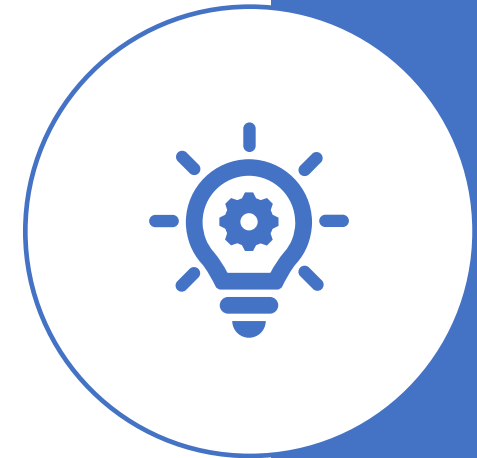
- Title of Idea: Using ICESat-2 and Landsat to Map Forest Aboveground Biomass in the Southern US
- Abstract of idea - One of four key research areas highlighted at the first USFS-NASA Joint Applications Workshop was vegetation condition, with functional areas that included vegetation structure and function, forest health and carbon monitoring. With NASA's ICESat-2 capturing measurements over vegetated areas, indicators of ecosystem health and a key surrogate of carbon, forest aboveground biomass (AGB), can be derived. Our idea proposes the use of available data provided by ICESat-2 and Landsat to map AGB over the southern US. We also propose the integration of airborne lidar data from USGS 3D Elevation Program (3DEP) and available field inventory data, such as FIA data. Thus, leveraging the capability of existing airborne lidar, which has been shown to accurately estimate field measured AGB, we propose a multi-source, multi-scale approach for achieving regional coverage. Methods would entail using airborne lidar to estimate ground AGB, processing ICESat-2 data and relating metrics from the processed data with airborne lidar-estimated AGB. Machine and deep learning algorithms would then be investigated for integrating with Landsat to achieve wall-to-wall AGB.



Issue(s) being addressed

- Wildfire hazard
- Fuel loading
- Wildfire impacts
- Forest health
- Water and aquatic resources
- Climate and drought
- Soil moisture
- Vegetation mapping
- Carbon emissions and flux
- Rangeland management
- Other

The Idea



Issues Addressed

What EO data does your idea utilize?

- Landsat
- Sentinel-1
- Sentinel-2
- MODIS
- VIIRS
- ECOSTRESS
- SMAP
- ICESat-2
- GOES-R
- JPSS
- SRTM
- High spatial resolution R-G-B-NIR
- LiDAR
- Imaging Spectroscopy
- UAVSAR
- Uncertain - looking for guidance

The Idea



The Idea – Outcomes / Societal Benefits



- Expected management and/or decision support outcomes: Up-to-date biomass maps for the southern US; information on the quantity and distribution of biomass to support decision-making for the sustainable management of forests
- How does this idea benefit the Forest Service and other land management agencies? – Serves to address one of the four key research areas highlighted at the USFS-NASA Joint Applications Workshop, vegetation condition, with functional areas that include vegetation structure and function, forest health and carbon monitoring.



Thank You!

