

# ART3MIS-AI

## (Augmented Real-Time 3-D Mapping with Integrated Sensing Artificial Intelligence)

ART3MIS-AI is a geospatial AI platform built to leverage varied sources of input data to extract refined geospatial information with embedded mission metrics.

### What does ART3MIS-AI do?

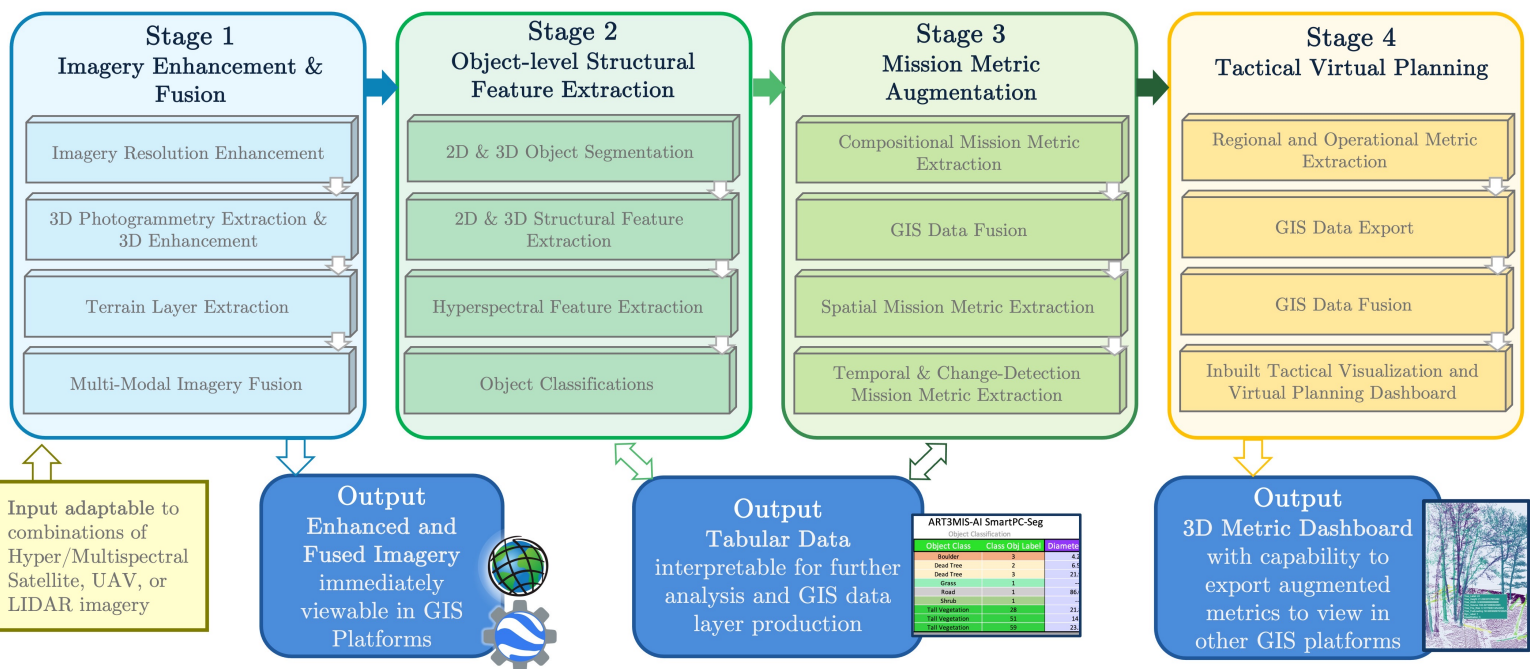
- Transfers geospatial AI research capabilities into stakeholder missions adapting to stakeholder sensing constraints and existing geospatial workflows
- Links multiple geospatial & AI research capabilities and advancements as modules to automate the enhancement, fusion, and extraction of key structural metrics with object detection from multi-modal imagery sources
- Rapidly & autonomously extracts and transforms structural features to extract mission critical 2D & 3D features, metrics, and representations, accelerating the rate of actionable information to decisionmakers
- Outputs the AI-augmented imagery & metrics in accessible format for easy decisionmaker tactical visualizations and extensible use across missions

### Why ART3MIS-AI?

- ✓ Backend software accessible and interpretable through modular python/C++ design, Frontend integrates with existing GIS platforms
- ✓ Adaptable to available inputs, ex: hyper/multispectral satellite imagery, Unmanned Aerial Vehicle (UAV) imagery, or LiDAR
- ✓ Modular system design allows users to use, modify, and add relevant tailored components to the pipeline - This may translate to using initial modules for improving satellite imagery resolution, or using full pipeline to extract point clouds with embedded metrics

### ART3MIS-AI System Architecture

Each Module utilizes swappable AI & Physics-Based Components



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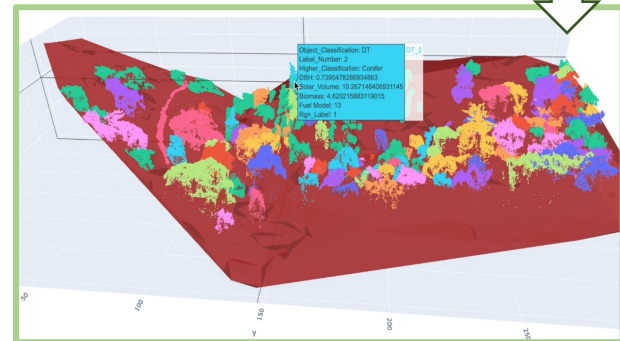
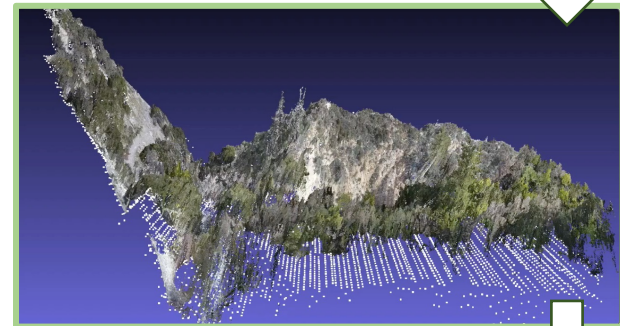
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# ART3MIS-AI Application: Tactical Forestry Remote Sensing & Wildfire Mitigation

## ART3MIS-AI to Support Forestry Mitigation Managers & Deployment

In 2022, natural disasters cost the U.S. \$165 billion, with wildfires burning over 7.5 million acres. Remote Sensing (RS) technologies are critical to close the widening gap between the area coverage necessary and physical personnel limitations. However, forestry RS deployments lack capture of key vertical structure and classification metrics necessary for responsive decision support in mitigation fuel mapping, risk analysis, and virtual planning.

The ART3MIS-AI leverages forestry RS research advances within a novel AI cascade for a cost-efficient rapid response solution architected for agency infrastructure integration. With adaptable multi-modal sensing input, ART3MIS-AI utilizes a four-stage pipeline to extract 'Smart' georeferenced point clouds with fused augmented hyperspectral information, vegetation & species classification, and structural/high-value mission metrics to an individual tree scale (crown and bolar metrics, fuel loading and biomass, timber metrics, proximity risk to critical infrastructure, etc.)



## What is ART3MIS-AI's tactical utility in the forestry domain?

### Stage 1: Enhance Imagery

*Leverage AI & photogrammetry to extract enhanced 2D imagery & high-quality point clouds from satellite/UAV imagery*

### Stage 2: Extract Metrics and Features

*Leverage AI object detection & classification to automate species identification and extraction of vegetation structural features*

### Stage 3: Wildfire Mitigation Missions

*Compute fuel & biomass values for each vegetation object and leverage previous structural features & smart database design to automatically extract fire risk estimates - can be swapped with other forestry missions*

### Stage 4: Visualization Dashboard

*System design provides both high-resolution 2D and 3D output integration in existing visualization software with user manipulation and operability*

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