

Mapping of Ionizing and Non-Ionizing Radiation with an Unmanned Aerial Vehicle Using Open-Source Software

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Introduction and Motivation

- Out of date and limited resolution satellite images
- Geographically coordinated data visualization from aerial photography
- Explore applications of Unmanned Aerial Vehicles for collection and mapping of radiation measurements
- Provide more detailed and up-to-date aerial images for accurate radiation mapping

Mission Relevance

- Applications in monitoring and response
- Opportunities for student research
- STEM education in nuclear engineering

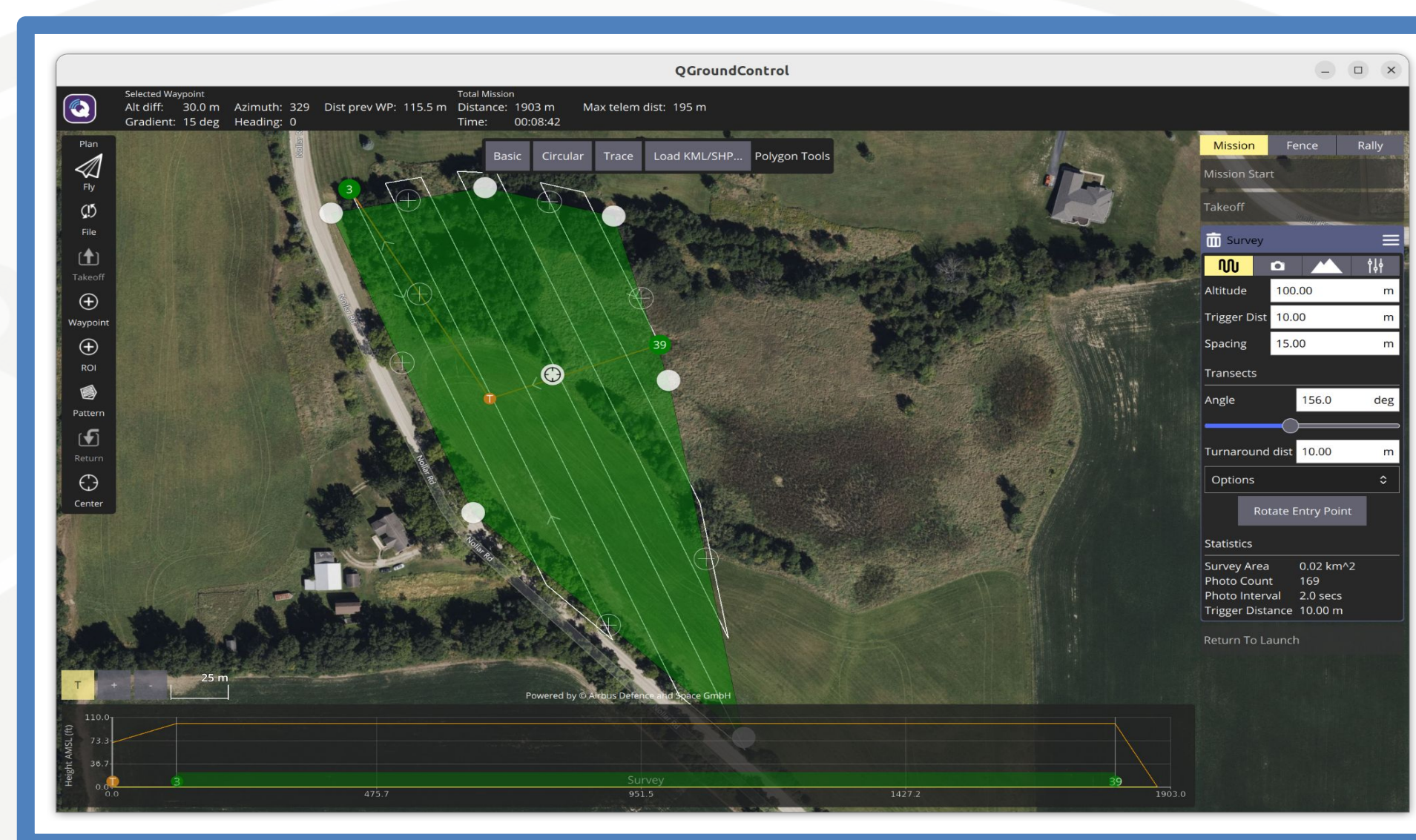
Technical Approach

- Inspired Flight IF1200 Heavy Lift Hexacopter carries camera payload for image collection
- Survey planning with QGroundControl
- OpenDroneMap used to create orthophoto and 3D point cloud
- Low-quality images manually sorted out of dataset before running OpenDroneMap
- Fine-tuning drone flight speeds and image timing

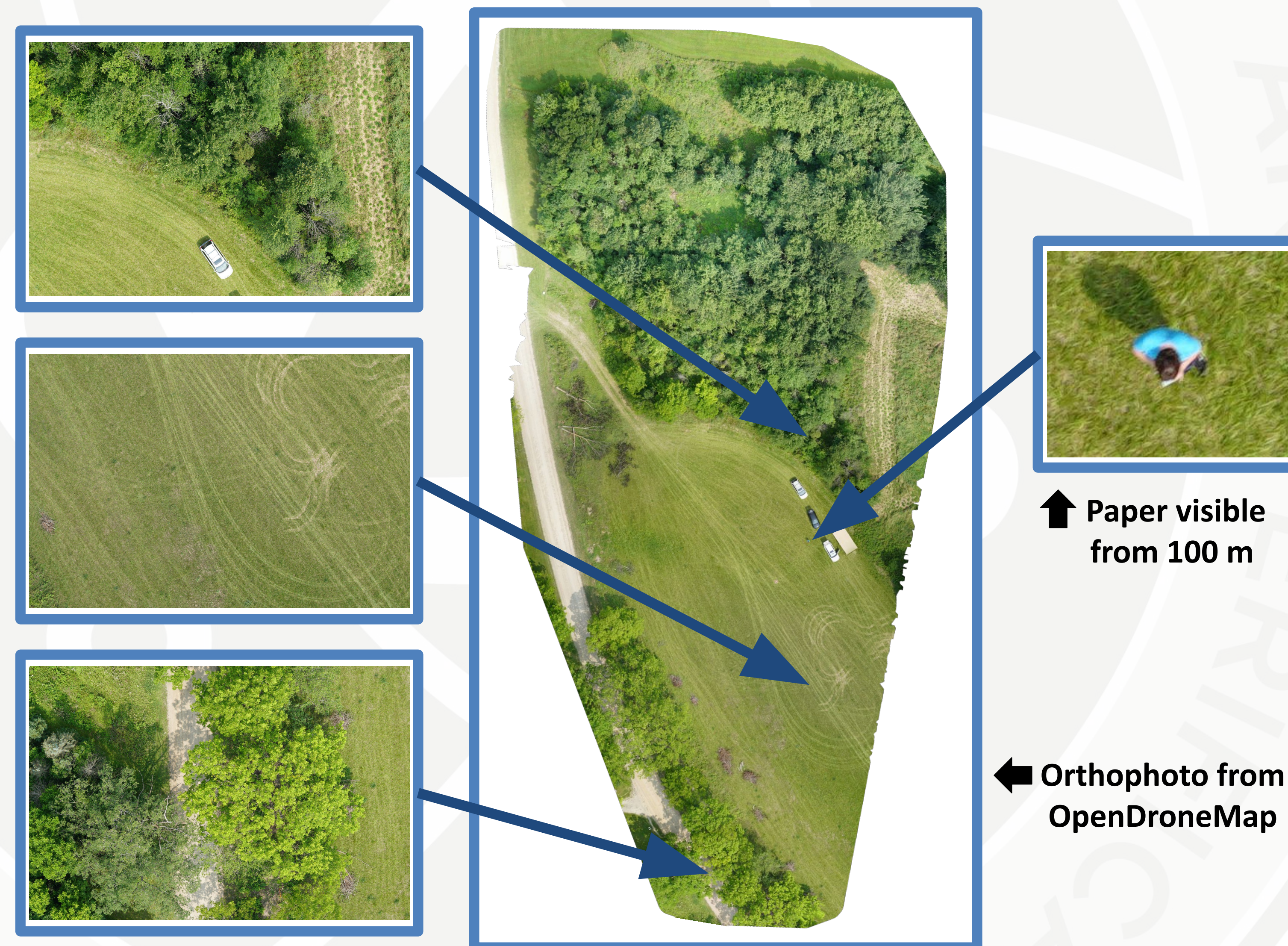


↑ Inspired Flight IF1200 Heavy Lift Hexacopter

Results



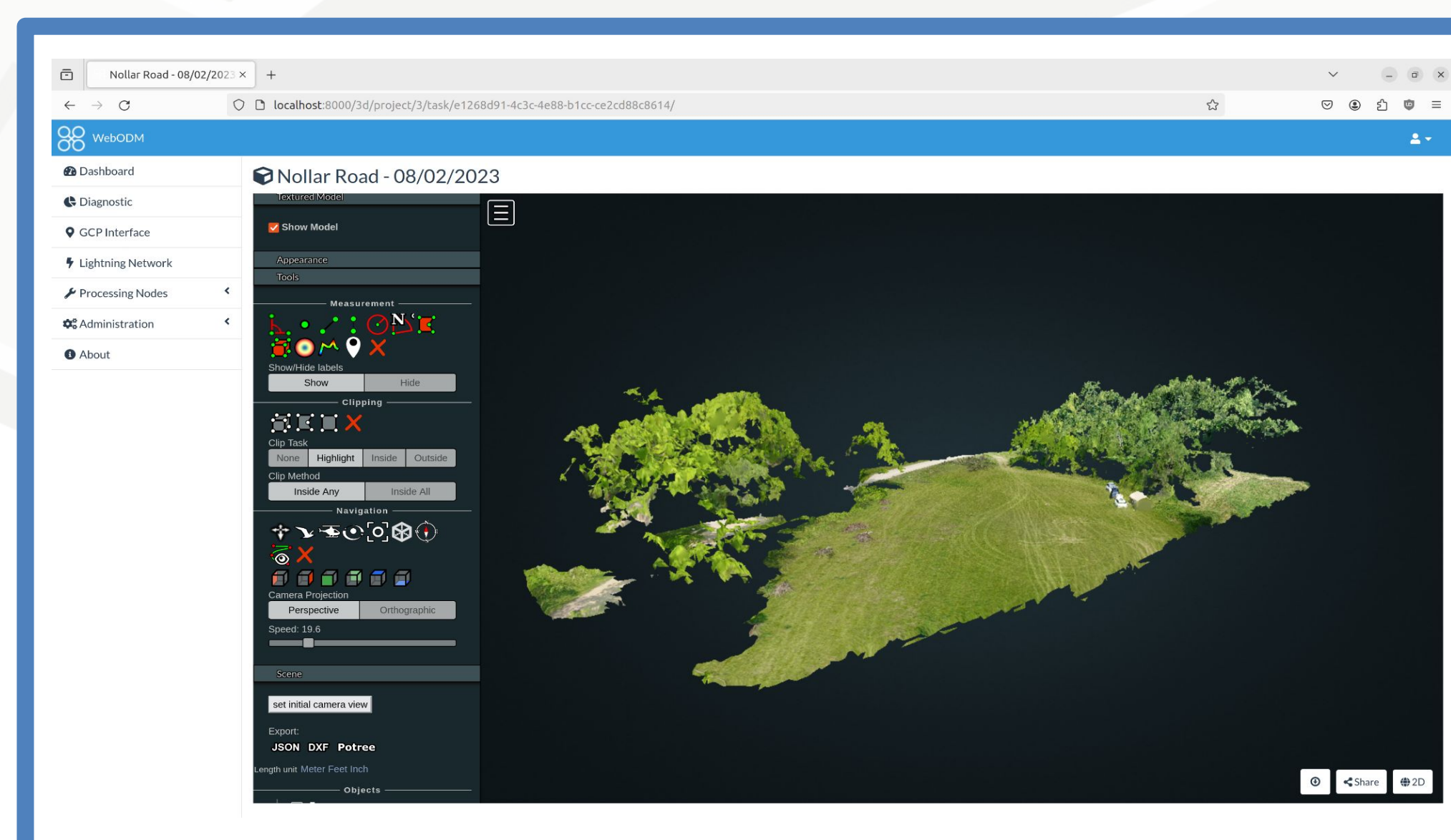
↑ Example flight plan in QGroundControl



Images from dataset →

↑ Paper visible from 100 m

← Orthophoto from OpenDroneMap



← View of 3D point cloud and textured model in WebODM

Expected Impact

- Provide more relevant aerial photos than are available from satellite imaging
- Demonstrate feasibility of open-source tools for aerial mapping and surveying
- Displaying multispectral and ionizing radiation data on a single map

MTV Impact

- Research experience
- Workshop presentation opportunity
- Student research funding

Conclusion

- High quality aerial photos processed and combined into orthophoto
- Open-source tools yield satisfactory and promising results without expensive licensing
- Small objects identifiable from aerial photos

Next Steps

- Thermal imaging payload for multispectral mapping
- Ionizing radiation detection payloads
- Larger image datasets

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