



Acronym	FORWARDS-3D
Full Title	An AI-Powered LiDAR Intelligence Layer for Scalable Forest Monitoring in the ForestWard Observatory
Partner(s)	University of Freiburg, Germany
Grant Theme	Knowledge to Practice: Develop applications and AI solutions utilizing the ForestWard Observatory
Start Date	July 2026
Duration	10 months
Description	European forests face increasing pressure from climate change, yet traditional forest inventories have too sparse coverage in space and time to capture related structural forest dynamics, limiting both local monitoring and large-scale calibration and validation (cal/val) of Earth Observation (EO) applications. Close-range LiDAR (including terrestrial, mobile, and drone-based platforms), combined with artificial intelligence (AI), can provide detailed forest inventories and key ecological metrics such as structural diversity and crown interactions at scale. FORWARDS-3D leverages 3Dtrees.earth, a newly emerging platform that combines crowd-sourced LiDAR data with AI-based analysis workflows, and integrates it with the ForestWard Observatory to deliver an AI-powered “intelligence layer” tailored to the needs of the FORWARDS consortium. We will enrich ForestWard by deploying LiDAR-based analytical services, such as tree instance segmentation, species classification, and structural diversity metrics, directly within its data pipeline and API ecosystem. Leveraging Galaxy Europe’s scalable compute infrastructure, these workflows enable non-expert users to process their own point clouds using state-of-the-art AI methods without requiring prior expertise or local computational resources, thereby democratizing high-performance LiDAR analytics. A central contribution is the development of a tailored data auditing and feedback system, ensuring that all integrated datasets meet FORWARDS standards for analysis-ready and research-grade data. Data standardization, provenance tracking (RO-Crates), and FAIR-compliant workflows will ensure transparent, reproducible, and interoperable data use. By mobilizing and crowd-sourcing European LiDAR datasets, FORWARDS-3D will create a critical “data treasure” for multi-scale forest monitoring and EO calibration/validation. Ultimately, the project enhances ForestWard’s capabilities, supporting climate-smart forest management with high-resolution, actionable intelligence.



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