D7 – Technical Model Validation and Downstream Demonstration v1

Deliverable Overview

Lead(s)	HZDR, FZJ
Contributor(s)	
Work Package	WP5.2 (Model Validation and sensitivity Analysis, AI side)
Stage	Foundation Stage (I)
Duration	PM 1 (05/2024) – PM 12 (04/2025; planned), PM 24 (04/2026; revised)
Dependencies	D11 and D15 depend on this deliverable
Outcome (Type)	Report
Link	
Status	☐ To be done ☐ In progress ☒ **Completed**

Executive Summary

This deliverable documents the technical validation and downstream application of the 3D-ABC regional foundation model. It covers the environment setup, data preprocessing workflows, model configuration, tokenization pipeline, and inference procedures for Above-Ground Biomass Density (AGBD) estimation using the BioMassters benchmark dataset.

Results

The finetuned 3D-ABC foundation model was evaluated for Above-Ground Biomass Density (AGBD) estimation on the BioMassters benchmark dataset using Finnish boreal forest data. The model, based on the 4M architecture and pretrained on TanDEM-X SAR and HLS optical data over the Amazon region, was tested for cross-domain generalization.

Results indicate that the current 3D-ABC model does not yet outperform the Prithvi 100M baseline. This performance gap is likely due to output normalization issues, limited pretraining duration, and domain shift between tropical and boreal forest environments.

To address these limitations, the output normalization pipeline will be revised, pretraining will be extended to at least 100 epochs with improved stability, and the updated 4M model version will be integrated. The code is being reviewed in collaboration with colleagues at FZJ and HZDR and will be made available through D12 (Technical model validation and downstream demonstration v2).