



D5 – Trained Regional Model Publicly Available in Trusted Repository

Deliverable Overview

Lead(s)	HZDR, FZJ
Contributor(s)	
Work Package	WP4.1 (Regional model 1, development & training)
Stage	Foundation Stage (I)
Duration	PM 1 (05/2024) – PM 12 (04/2025; planned), PM 17 (11/2025; revised)
Dependencies	WP4.1 (D5) depends on this deliverable
Outcome (Type)	Repository
Link	https://github.com/EricYu97/3DABC-MODEL
Status	<input type="checkbox"/> To be done <input type="checkbox"/> In progress <input checked="" type="checkbox"/> Completed

Executive Summary

This deliverable presents the first trained regional foundation model (FM) for the 3D-ABC project. The model’s technical environment, configuration, and data workflows are openly available in a trusted GitHub repository. Built on the MMEarth benchmark and Apple-EPFL’s 4M framework, it demonstrates early scalability of 4M-style multimodal modeling for Earth Observation. Pretraining used Harmonized Landsat and Sentinel (HLS) and TanDEM-X tiles, establishing a foundation for integrating additional modalities such as GEDI, DEM, and ERA5 in the final 3D-ABC FM.

Results

Deliverable D5 presents the first regional foundation model (FM) developed under 3D-ABC for estimating global above- and below-ground carbon stocks. Trained in an ml-4m-compatible setup and released through the 3DABC-MODEL GitHub repository, the model applies the 4M “any-to-any” framework to align TanDEM-X SAR and HLS optical inputs through tokenization and masking. Amazon-region tiles were processed into more than 340,000 valid 256×256 patches per modality. Training involved (1) modality-specific tokenizers using vector-quantized tokens and (2) an autoregressive transformer that reconstructs multimodal tokens. The repository provides weights, tokenizer checkpoints, and configurations for reproducibility. Learned embeddings showed strong SAR–optical transfer, confirming the approach’s robustness and demonstrating the scalability of 4M-style architectures for the upcoming full multimodal 3D-ABC model.