D1 – Downstream User Requirement Report

Deliverable Overview

Lead(s)	AWI
Contributor(s)	GFZ, DLR, UFZ
Work Package	WP 1 (Downstream requirement consolidation)
Stage	Foundation Stage (I)
Duration	PM 1 (05/2024) – PM 3 (07/2024; planned), PM 12 (07/2025; revised)
Dependencies	None
Outcome (Type)	Report
Link	
Status	☐ To be done ☐ In progress ☒ Completed

Executive Summary

The Downstream User Requirement Report for the *3D-ABC: Towards Global 3D Above and Below Ground Carbon Stocks* project provides a comprehensive outline of the data inputs and technical details for the development of a multimodal foundation model (FM) aimed at terrestrial carbon stock estimation. Part of the Helmholtz Foundation Model Initiative, the 3D-ABC FM integrates satellite-based remote sensing data, lidar, climate models, and domain-specific datasets to provide high-resolution (30 m) carbon stock estimates at a global scale.

Results

This report outlines the downstream user requirements for the 3D-ABC Foundation Model used for carbon stock estimation. It identifies key data dependencies and technical requirements that shape the model's development. Each downstream task requires domain-specific data to ensure accurate carbon stock predictions. Instead of formal user surveys, requirements were derived from expert knowledge and literature reviews, aligning with Earth observation, climate science, and carbon cycle research priorities. The report provides a detailed rationale for what is need to improve the current state of the art for each of the downstream tasks to address specific user needs. The report also discusses the technical aspects of model architecture and data integration.