D3 – A First Model Run Using Prithvi

Deliverable Overview

Lead(s)	FZJ, HZDR
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Work Package	WP3 (HPC, scaling)
Stage	Foundation Stage (I)
Duration	PM 1 (05/2024) – PM 4 (08/2024; planned), PM 11 (03/2025; revised)
Dependencies	None
Outcome (Type)	Test result
Link	
Status	☐ To be done ☐ In progress ☒ **Completed**

Executive Summary

Within the scope of D3, we conducted the first model run using the NASA Prithvi v1 framework. Our goal was to retain the original spatial resolution of each dataset and employ a multi-resolution paradigm across different modalities of the 3D-ABC FM, as follows: ALS (30 m), GEDI (25 m), and TanDEM-X (20 m). The motivation behind this experiment was to preserve the maximum information from each dataset. To conduct a timely experiment without delaying the project, we fine-tuned our model on five exemplary tiles over the Amazon region.

Results

We conducted four different experiments to assess resampling loss by training two models: one at ground sample distance (GSD) 20 m and one at GSD 30 m. Each model was then tested on datasets with both GSD 20 m and GSD 30 m. We performed a pixel-wise regression task using a pre-trained Prithvi encoder, while the decoder head was trained for canopy height estimation. A new data loader was created to ingest all datasets during fine-tuning and validation. After applying min-max normalization, the datasets were split into training, validation, and test sets.

None of the four experiments showed a significant advantage over the others. As a result, we adopted a multi-resolution paradigm, preserving each dataset's original resolution. This setup ensures that the model learns from high-resolution data while avoiding unnecessary information loss due to resampling.