



Model Cards

For the AI models developed by Spheer AI B.V. and used in their webplatform Carto

Version: 15 april 2025
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1 Spheer Geospatial Foundation Model (GPAI)

Model Name:	Spheer Geospatial Foundation Model
Versions:	v1.0-alpha-NL and v1.0-alpha-Caribbean
Developer:	Spheer AI B.V.
Date of development:	September 2024
License:	Proprietary

1.1 Overview

This model is a general-purpose geospatial AI model trained on Sentinel-2 satellite time-series, designed to extract environmental, ecological, and spatial features. It is primarily used in environmental monitoring, land-use classification, and urban development analysis.

1.2 Intended Use

Target users are GIS analysts, data scientists, ecologists, environmental scientists, spatial planners, policy advisors.

Primary applications of the model are nature monitoring, land-cover classification, change detection.

Access to the model is provided either through the Carto web-based frontend or via the Carto backend API.

Exclusions: the model is not intended for use in life-critical applications (e.g., military, autonomous navigation, or disaster response without human validation).

1.3 Model Details

Architecture used is a multilayer Vision Transformer variant (proprietary).

Method of model training is self-supervised learning (proprietary).

Training dataset consists of ~250 GB of unlabeled multi-spectral satellite imagery timeseries (source Sentinel-2) of areas in The Netherlands (for the NL model), respectively The Caribbean (for the Caribbean model).

Compute used in training the model is estimated to be around $\sim 10^{17}$ FLOPs.

Capabilities of the model are semantic segmentation, object detection and temporal change recognition on the earth surface.

Limitations: The model possibly has limited accuracy in areas with very high cloud-coverage; The model was not trained for generative output. The model was only trained with Sentinel-2 satellite data, and was not in any way tested on other satellite data. The model is tested on use with long timeseries of approximately a year. Model accuracy might deteriorate for way shorter timeseries.

1.4 Risk Classification (EU AI Act)

Category: General Purpose AI without systemic risk.

Compliance is based on the fact that usage of the model is limited to non-critical domains, and that the compute with which the model was trained is well below the threshold for high impact capabilities ($\ll 10^{25}$ FLOPs).

Obligations under the AI Act are fulfilled with the publication of this Model Card.

1.5 Evaluation

Benchmarked on multiple ecological projects in The Netherlands, where the model was used as a basis for several finetuning models.

Metrics used in these projects are classification accuracy, F1-score, Mean Absolute Error, Spatial consistency.

Human oversight is always required for interpretation and decision-making.

Initial evaluation shows **minimal bias** across geographic regions.

1.6 Limitations & Warnings

- Results should not be interpreted without context or ground truth validation;
- Accuracy may degrade in unseen geographies or under extreme weather/climate conditions;
- Not intended for automated decision-making without human oversight.

2 System Card – Carto (Spheer AI System)

System Name:	Carto
Version:	Q2 2025
Developer:	Spheer AI B.V.
Description:	Carto is a geospatial intelligence platform that leverages the Spheer foundation model to deliver AI-powered insights from satellite data.

2.1 Overview

Carto allows users to detect, monitor, and classify land- and nature-based phenomena over time. It includes a visual interface, where it lets users provide annotated data (geopolygons with labels) to finetune small AI models on top of the Spheer Geospatial Foundation Model, and use these finetuned models to create prediction maps.

2.2 Intended Use

Target users are GIS analysts, data scientists, ecologists, environmental scientists, spatial planners, policy advisors.

Primary applications of the model are nature monitoring, land-cover classification, change detection.

Access to the model is provided either through the Carto web-based frontend or via the Carto backend API.

Exclusions: the model is not intended for use in life-critical applications (e.g., military, autonomous navigation, or disaster response without human validation).

2.3 AI System Classification (EU AI Act)

Risk Level of the system is 'low/minimal'.

Rationale of this risk level is that Carto does not perform automated decision-making nor does it operate in critical domains. Human oversight is built-in, since users have to actively provide label data to train AI-models with.

Obligations under the AI Act is to inform users when they are interacting with an AI-system, and to inform users who is responsible for decision-making.

Compliance steps taken are:

- Clear information when users are interfacing with AI-models;
- This model card;
- Terms of use clarify responsibility and prohibit blind trust in outputs.

2.4 Transparency & User Communication

Users are notified that Carto is an AI system via:

- UI labels (e.g., "Show Prediction", "Train model");
- Onboarding documentation;
- Explicit disclaimer in Terms of Service: *"Afnemer en diens eindgebruikers zullen het Platform niet als een orakel gebruiken en de uitkomsten van het Platform"*

ongecontroleerd en/of onafgewogen gebruiken in het kader van geautomatiseerde besluitvorming."

2.5 Performance

- AI modules: Classification, anomaly detection, change mapping;
- Human oversight: Required for interpretation and downstream decisions;
- Evaluation: Periodic model validation using user feedback and ground truth samples

2.6 Limitations

- Carto is not suitable for real-time critical systems;
- Results should not be interpreted without context or ground truth validation;
- Accuracy may degrade in unseen geographies or under extreme weather/climate conditions;
- Not intended for automated decision-making without human oversight.