

Felipe Carlos

FULL-STACK DEVELOPER

Full-stack engineer working across the full Earth Observation lifecycle, processing data, preserving knowledge, and building AI tools that help people explore the EO landscape.

STACK

Orchestration

LangGraph · LangChain · MCP · Celery

Providers

Anthropic · OpenAI · Ollama · vLLM · llama.cpp

Infra

Docker · Terraform · AWS · pgVector · Pinecone · Cohere · OpenSearch

Web

Flask · FastAPI · React · Tailwind

Data

pandas · polars · numpy · xarray · pydash

Geospatial

sits · GDAL · GEOS · terra · rasterio · leaflet

Languages

Python · TypeScript · R · C++

EDUCATION

National Institute for Space Research (INPE)

M.Sc., Applied Computing
2020 – 2022

Technology College of São Paulo (FATEC)

Tech., Systems Analysis & Development
2016 – 2019

AWARDS

Academic Merit Award (best student performance)

Technology College of São Paulo (FATEC) · 2019

LANGUAGES

Brazilian Portuguese
English

EXPERIENCE

Various organizations

Feb 2024 – Present

Consultant Full-Stack Engineer · Remote

Consult across organizations to strengthen their digital preservation and search capabilities. Build platforms, design metadata standards, and develop agent-based architectures, paired with RAG systems (Semantic Search, ReRankers) and modern search backends like Typesense and Neo4J, to improve how people interact with preserved data and knowledge.

Python · Flask · InvenioRDM · LangChain · LangGraph · MCP · RAG · llama.cpp / vLLM · OpenSearch · pgVector · React · Tailwind / Shadcn UI

e-sensing

Feb 2024 – Present

Open-Source Software Developer · Remote

Maintainer of the sits R package, contributing across the full codebase. My work includes implementing algorithms for classification, clustering, and aggregation, among many other features. We manage cloud infrastructure to process Big EO data. I also maintain the package's Python wrapper and help build the project's AI-powered documentation assistant, making it easier for users to explore sits' capabilities.

R · Python · C++ · Time-series · EO Datacubes · STAC · ML/DL · GPU Computing · AWS · Azure · RAG

Group on Earth Observations (GEO)

Mar 2022 – Apr 2024

Consultant Full-Stack Developer · Remote

Core developer of the GEO Knowledge Hub (GKH), an InvenioRDM-based digital library serving the GEO community. Designed the platform from the ground up and implemented its core modules, including the Knowledge Package management system, comments and feedback, spatial search, and React-based interfaces. Beyond the main GKH, I supported the conceptualization and development of the National GKH, a dedicated tool that helps countries build their own GKH instances.

Python · Flask · InvenioRDM · Semantic UI · React · PostgreSQL · OpenSearch · Preservation · Geospatial · Next.js · Tailwind / Shadcn UI

Brazil Data Cube · INPE

Jan 2020 – Feb 2022

Associate Collaborator · São Paulo, Brazil

Reproducibility maintainer for the project's research outputs. Maintained shared JupyterHub and RStudio environments and authored technical documentation across the Brazil Data Cube stack.

JupyterHub · RStudio · Reproducibility

Selected Projects

01

PRODUCTION · 2022-2024

GEO Knowledge Hub - Digital library for the GEO Community

PROJECT	Open digital library serving the Group on Earth Observations (GEO). Preserves Knowledge Packages, reproducible bundles of data, papers, code, and makes them discoverable, citeable, and reviewable.
ROLE	Core developer. Designed the platform from the ground up on top of InvenioRDM and implemented the custom modules that distinguish it from a generic repository.
CUSTOM MODULES	<ul style="list-style-type: none"> — Knowledge Package management system — Comments and feedback — React pages and spatial search — National GKH module
STACK	Python · Flask · InvenioRDM · React · PostgreSQL · OpenSearch · Next.js · Typescript

02

OSS · 2022-PRESENT

sits - Satellite Image Time Series Analysis for Earth Observation Data Cubes

PROJECT	An end-to-end toolkit for land use and land cover classification using big Earth observation data. Used in production by national space agencies and research institutions.
ROLE	Contributor across the entire codebase, which includes R API, C++ internals, Python wrapper (pysits).
ACTIVITIES	<ul style="list-style-type: none"> — Implementation and enhancement of algorithms available in the package — Performance improvements using C++ — pysits Python wrapper via rpy2 and arrow
STACK	R · Python · C++ · terra · arrow · ggplot · GDAL

03

RESEARCH · 2025-PRESENT

sitsrag - Agentic RAG over the sits R package

PATTERN	Retrieval-augmented agent over the documentation and source of the sits R package, created using LangChain, FastAPI + Agent Protocol, Shadcn, and Next.js
STATE	User question → retrieved doc chunks (dense + lexical) → reranked context → grounded answer with citations.
WHY A GRAPH	Routes between retrieval, clarifying questions, and tool-mediated lookups against package internals. Answers stay grounded in the actual sits codebase.
PROVIDERS	Anthropic · OpenAI · Cohere



◆ Detailed Information ◆

PUBLICATIONS · JOURNALS

Bayesian inference for post-processing of remote-sensing image classification <i>Remote Sensing</i>	2024
Hybrid semi-analytical algorithm for chlorophyll-a in lower Amazon floodplain waters <i>Frontiers in Remote Sensing</i>	2022
Platform for land use and land cover data integration and trajectory analysis <i>Int. J. of Applied Earth Observation and Geoinformation</i>	2022
Integrating Open Data Cube and Brazil Data Cube for land use and cover classifications <i>Revista Brasileira de Cartografia</i>	2021

PUBLICATIONS · CONFERENCE PAPERS

On Benchmarks For Satellite Image Machine Learning (Accepted) <i>International Geoscience and Remote Sensing Symposium (IGARSS) 2026</i>	2026
Sharing and preserving GEO community applications through the GEO Knowledge Hub <i>AGU Fall Meeting 2022</i>	2022
Accessing and processing Brazilian Earth Observation data cubes with the Open Data Cube platform <i>ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences</i>	2021

OPEN REPRODUCIBLE PAPERS

- [brazil-data-cube/wlts-paper](#) — Companion repository for 'A platform for land use and land cover data integration and trajectory analysis'
- [brazil-data-cube/compendium-harmonization](#) — Companion repository for 'A reproducible and replicable approach for harmonizing Landsat-8 and Sentinel-2 images'

OPEN-SOURCE COLLABORATIONS

SITS R Package

- [e-sensing/sits](#) — Satellite image time series in R
- [e-sensing/pysits](#) — Satellite image time series in Python
- [e-sensing/sitsrag](#) — Agentic RAG for the SITS Documentation

GEO Knowledge Hub project

- [geo-knowLedge-hub/geo-knowLedge-hub](#) — Digital library main repository
- [geo-knowLedge-hub/geo-national-hub](#) — Digital library main repository

Brazil Data Cube project

- [brazil-data-cube/rwlts](#) — R client for the Land Trajectory Service
- [brazil-data-cube/rLCCS](#) — R client for the Land Cover Classification System service
- [brazil-data-cube/wlts.py](#) — Python client for the Land Trajectory Service

TALKS & PRESENTATIONS

2026

- Governance, Licensing & Ethics for Earth Intelligence · *GEO Data and Knowledge Webinar series*
- Youth Webinar: What is the GEO Knowledge Hub? · *GEO Data and Knowledge Webinar series*

2025

- GEO Knowledge Hub webinars (6 episodes) · *GEO Knowledge Hub Webinar Series*
- GEO Knowledge Hub, Status of the Art · *GEO Knowledge Hub Webinar Series*
- Onboarding webinars for new GEO Work Programme activities · *GEO Knowledge Hub Webinar Series*
- GEO Knowledge Hub for GEO Work Programme Activities · *GEO Knowledge Hub Webinar Series*
- GEO Knowledge Hub for Youth · *GEO Knowledge Hub Webinar Series*
- Open Data Open Knowledge Workshop 2025 · *Organizer · Rome, Italy*

2024

- Open EO Applications for Food Security - focus on CropWatch · *Open EO Applications Webinar Series*
- Open EO Applications for Food Security - focus on GLAM · *Open EO Applications Webinar Series*
- WaPOR - monitoring water productivity through open EO data · *FAO Webinar*
- Open Data Open Knowledge Workshop 2024 · *Organizer · Hangzhou, China*

2023

- GEO Week 2023 · *Speaker · Cape Town, South Africa*
- Open Data Open Knowledge Workshop 2023 · *Organizer · Geneva, Switzerland*
- Open EO Applications for Food Security - focus on ASAP · *Open EO Applications Webinar Series*
- Open EO Applications for Food Security - focus on Crop Monitor · *Open EO Applications Webinar Series*

2022

- GEO Week 2022 · *Speaker · Accra, Ghana*

