System Architecture for Climate Data

Retrieve

Allow users to visualize, download, and request data.

STAC Browser
Open source Vue UI browser for STAC catalog

QGIS STAC Plugin
Meet internal GIS users where they're at by providing direct integration with QGIS

STAC API
Open source spatiotemporal API queries against all indexed data
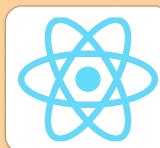
Customer Facing UI
Build custom web portals for external clients

Standard Ingestion API
Specify geo-temporal range, data type, and processing...

FastAPI

QGIS

Catalog

Make data discoverable using a SpatioTemporal Asset Catalog

SpatioTemporal Asset Catalog (STAC)
Index all data along spatial and temporal dimensions using open standards.

STAC

Storage

Once processed, data is stored in PostGIS and as flat cloud files

Flat Files Stored in Cloud-Native Formats
COGs, FlatGeoBuf, COPC

Vector Assets in PostGIS
Add spatial index for faster query time

COG

PostGIS Spatial PostgreSQL

Processing

Raw data is standardized using geospatial processing, then processed using predefined, versioned algorithms.

Geospatial Processing
Standardize CRS to WGS84 for global applications or UTM for high precision applications, ensuring data sources are interoperable and consistent. May use PyProj, GDAL, Geopandas, etc

Versioned Processing Algorithms
Post-process data, for example to compose images, interpolate missing data, or de-noise.

GeoPandas

GDAL

PYPROJ

Flyte

Flyte
Use a DAG workflow runner like Flyte, Airflow, etc to define ingestion and processing steps.

Ingestion

Raw data is collected from diverse sources using custom adapters and a standardized interface.

Raster data are ingested as tiles at a standard zoom level.

Climate Data Store API

NASA Worldview

NOAA Environmental Information

web scrapers

External STAC

Standardized Ingestion Interface
Translates user requests into specific adapter calls

Morecantile
Tile raster data upon ingestion for easy standardization & indexing.