Netcdf Zarr Viewer

A Tool to Explore cloud data

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Making public NetCDF/Zarr Data Accessible to Everyone

🎯 What is Dash NCZarr Viewer?

- 📊 **Load and explore** NetCDF and Zarr datasets without coding
- 🔍 **Browse variables** and dimensions through a simple interface
- ✂️ **Subset data** by time, space, and other dimensions visually
- 📈 **Visualize results** with interactive plots (no ggplot2 needed!)
- 🌍 **Access cloud data** directly from S3 buckets
- 🚀 **Work with large datasets** efficiently
- 🐋 **Containerized** for easy deployment and sharing

🏗️ Architecture Overview

👤 User Interface → 🚀 Dash App → 🗄️ Data Engine

↓ ↓ ↓

🖥️ Web Browser 🐍 Python Core 📊 Xarray

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🎨 Interactive UI 🔧 Data Manager 📁 NetCDF/Zarr

🛠️ Technology Stack

- **Frontend**: Dash + Bootstrap Components
- **Data Processing**: Xarray + NumPy
- **File Formats**: NetCDF4, Zarr
- **Visualization**: Plotly, Matplotlib, Cartopy
- **Cloud Access**: S3FS, FSSpec (cloud storage access)
- **Marine Data**: Copernicus Marine Toolbox integration

🚀 Quick Start

```
# Option 1: Use Docker
docker run -p 8050:8050 samfooks/zarr-netcdf-viewer:latest

# Option 2: Local development (if you have Python)
git clone https://github.com/samuelfooks/dash_nczarr_viewer
cd dash_nczarr_viewer
pip install -r requirements.txt
python run.py
```


Access at: http://localhost:8050

💡 **Tip**: Think of this as "R Shiny for NetCDF data" - but already built for you!

Supported Data Sources

- **Local Files**: NetCDF, Zarr
- **Personal Cloud Storage**: Minio storage on EDITO
- **Marine Data**: Copernicus Marine Service (CMEMS)
- **EDITO Integration**: STAC catalogs and ARCO data

🔍 Core Features

Data Exploration

- **Variable Browser**: See all variables, dimensions, and metadata
- **Dimension Handling**: Time, depth, latitude, longitude
- **Data Subsetting**: Interactive selection of regions and time periods

Visualization

- **Interactive Maps**: Cartopy-based geographic plots
- **Time Series**: Plotly charts for temporal data
- **Statistical Analysis**: Basic stats, and summaries

Marine Data Examples

EDITO Integration

- **Biodiversity**: Species distribution data
- **Chemistry**: Water quality parameters
- **Geology**: Seafloor characteristics
- **STAC Access**: Browse collections and datasets

Copernicus Marine

- **Direct Access**: CMEMS credentials integration (you will need an account)
- **Multiple Formats**: NetCDF, Zarr (and others in future)
- **Real-time Data**: Latest ocean observations

🚀 Performance Features

- **Chunked Processing**: Handle datasets larger than memory
- **Lazy Loading**: Only load data when needed
- **Cloud Optimization**: Efficient S3 data access

🔧 Configuration & Deployment

Setup

To access CMEMS datasets you may need an account using Copernicus Marine Toolbox

```
# CMEMS credentials
CMEMS_USERNAME=your_username
CMEMS_PASSWORD=your_password
```

Docker Deployment

```
docker build -t nczarr-viewer .
docker run -p 8050:8050 nczarr-viewer
```

Live Demo Time!

Loading a NetCDF from your Minio bucket on EDITO

Live Demo Time!

Explore CMEMs data using a link to a zarr file, obtained from MyOceanViewer

Live Demo Time!

Explore data on your local PC you downloaded(boring)

🔮 Future Development

- **Advanced Analytics**: Statistical modeling tools
- **New ARCO Data types**: Parquet, Geoparquet
- **Collaboration**: Multi-user editing and sharing

Thank You!

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GitHub: https://github.com/EDITO-Infra/nczarr-viewer

Docker Hub: samfooks/zarr-netcdf-viewer

Questions?