

NCZarr Viewer

Exploring and Subsetting Zarr & NetCDF Data

2 Sept 2025

Samuel Fooks — VLIZ



NCZarr Viewer

-  **Load and explore** Analysis Ready Cloud Optimized(ARCO) NetCDF and Zarr datasets
-  **Browse variables** and dimensions through a simple interface
-  **Subset data** by time, space, and other dimensions visually
-  **Visualize results** with interactive plots
-  **Containerized** for easy deployment and sharing
- [In EDITO Datalab!](#)

Technology Stack

- **Frontend:** Dash + Bootstrap Components
- **Data Processing:** Xarray + NumPy
- **File Formats:** NetCDF4, Zarr
- **Visualization:** Plotly, Matplotlib, Cartopy

Quick Start

On EDITO

OR

```
# Use Docker
docker run -p 8050:8050 samfooks/nczarr-viewer:latest
```

OR

```
# Local development (if you have Python)
git clone [https://github.com/EDITO-Infra/nczarr-viewer)](https://github.com/EDITO-Infra/nczarr-viewer)
cd 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



Supported Data Sources

- **ARCO data on EDITO:** Analysis Ready Cloud Optimized datasets from the EDITO STAC
- **Personal Cloud Storage:** [Minio storage](#) on EDITO
- **Local Files:** NetCDF, Zarr

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 STAC

- **Chemistry:** Water quality parameters
- **Geology:** Seafloor characteristics
- **Biodiversity:** Species distribution data

Copernicus Marine

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

🔍 Subsetting ARCO Data: Core Concepts

Multidimensional Data Structure

ARCO Dataset
Variables: temperature, salinity, oxygen, etc.
Dimensions: time, depth, latitude, longitude
Shape: (time: 365, depth: 50, lat: 1800, lon: 3600)

Subsetting Operations

- **Variable:** Pick specific parameters
- **Temporal:** Select specific dates
- **Spatial:** Choose latitude/longitude boundaries

Subsetting in Practice

Example: Extract Surface Temperature for North Sea

```
import xarray as xr

# Load ARCO dataset
ds = xr.open_zarr("s3://arco-data/ocean-temp.zarr")

# Variable: surface temperature
temp_surface = ds['temperature'].sel(depth=0)

# Temporal: August 30
august30_data = temp_surface.sel(
    time='2025-08-30'
)

# Spatial bounds: North Sea region
north_sea = august30_data.sel(
    latitude=slice(51.0, 61.0), # 51°N to 61°N
    longitude=slice(-5.0, 15.0) # 5°W to 15°E
)
```

Visual Representation

Original: $365 \times 50 \times 1800 \times 3600$

↓ Variable selection

Surface: $365 \times 1 \times 1800 \times 3600$

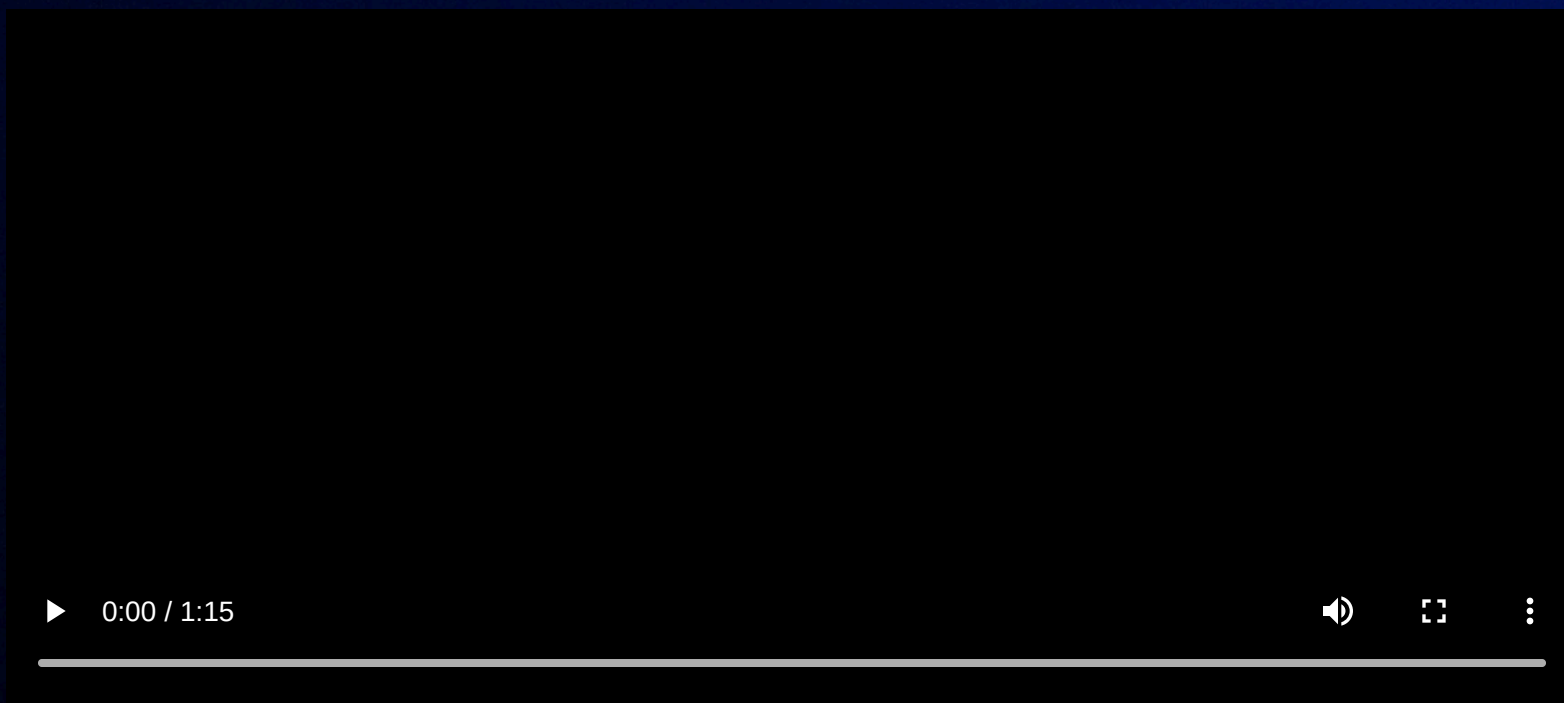
↓ Temporal subset

August 30, 2025: $1 \times 1 \times 1800 \times 3600$

↓ Spatial subset

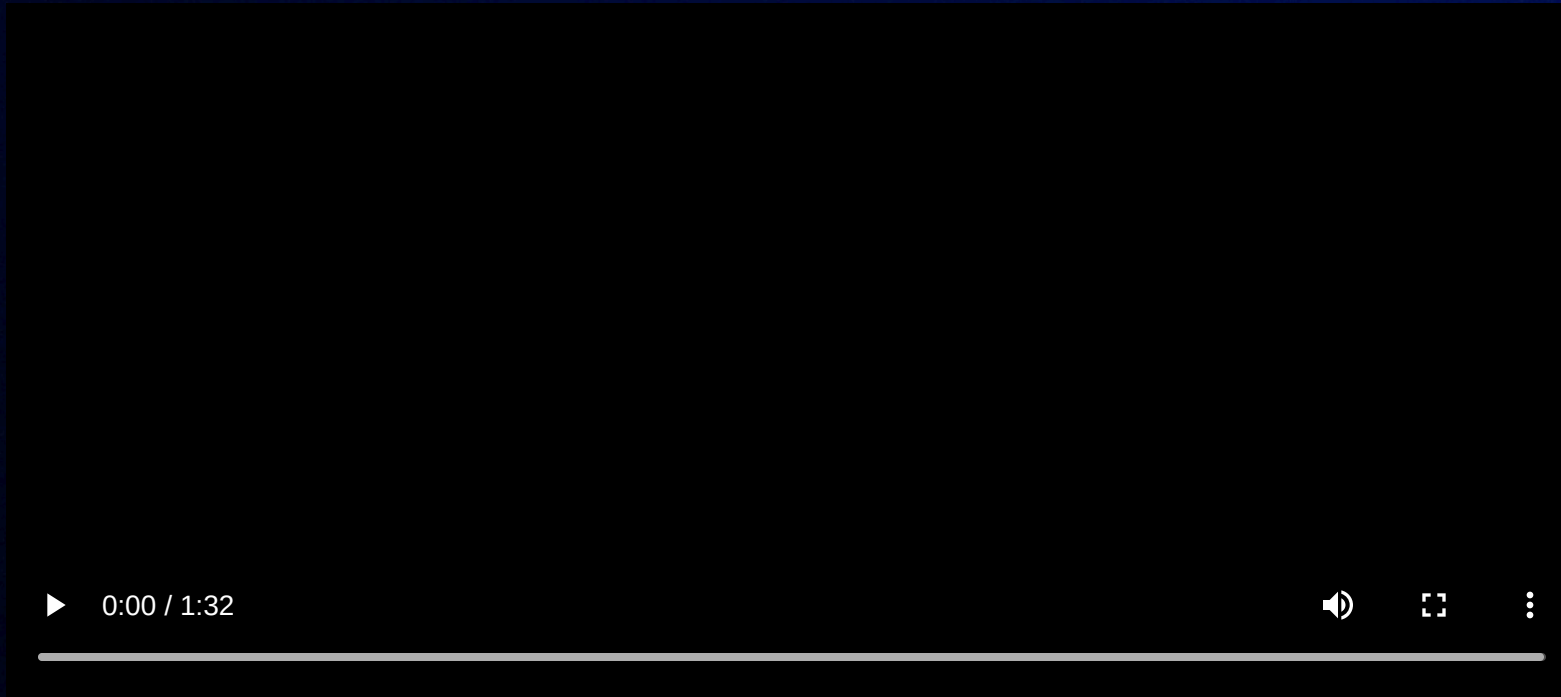
North Sea region: $1 \times 1 \times 100 \times 200$

Use the NCZarr Viewer locally or on EDITO



[Video link](#)

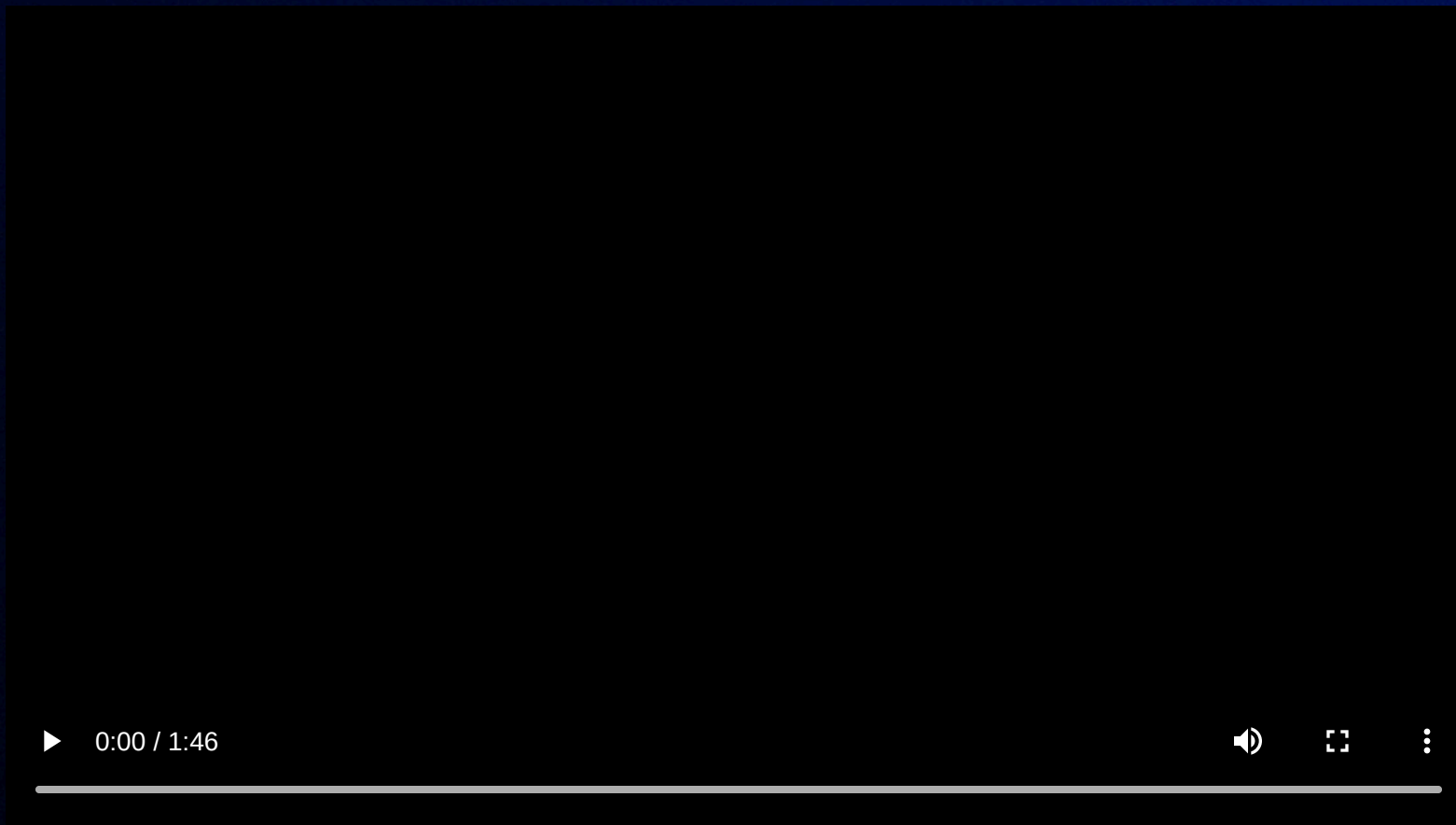
Explore a NetCDF from your Minio bucket on EDITO



[Video link](#)

Live Demo Time!

Explore CMEMs dataset using zarr link from EDITO STAC



Video link

Future Developments

- **More Interactive Visualization:** More interactive global maps and plots
- **Advanced Analytics:** Statistical modeling tools/plugins
- **New ARCO Data types:** Parquet, Geoparquet
- **Collaboration:** Multi-user editing and sharing

Thank You!

Samuel Fooks - samuel.fooks@vliz.be

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

Docker Hub: [samfooks/nczarr-viewer:latest](https://hub.docker.com/r/samfooks/nczarr-viewer)

Questions?