

# 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 f





## 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

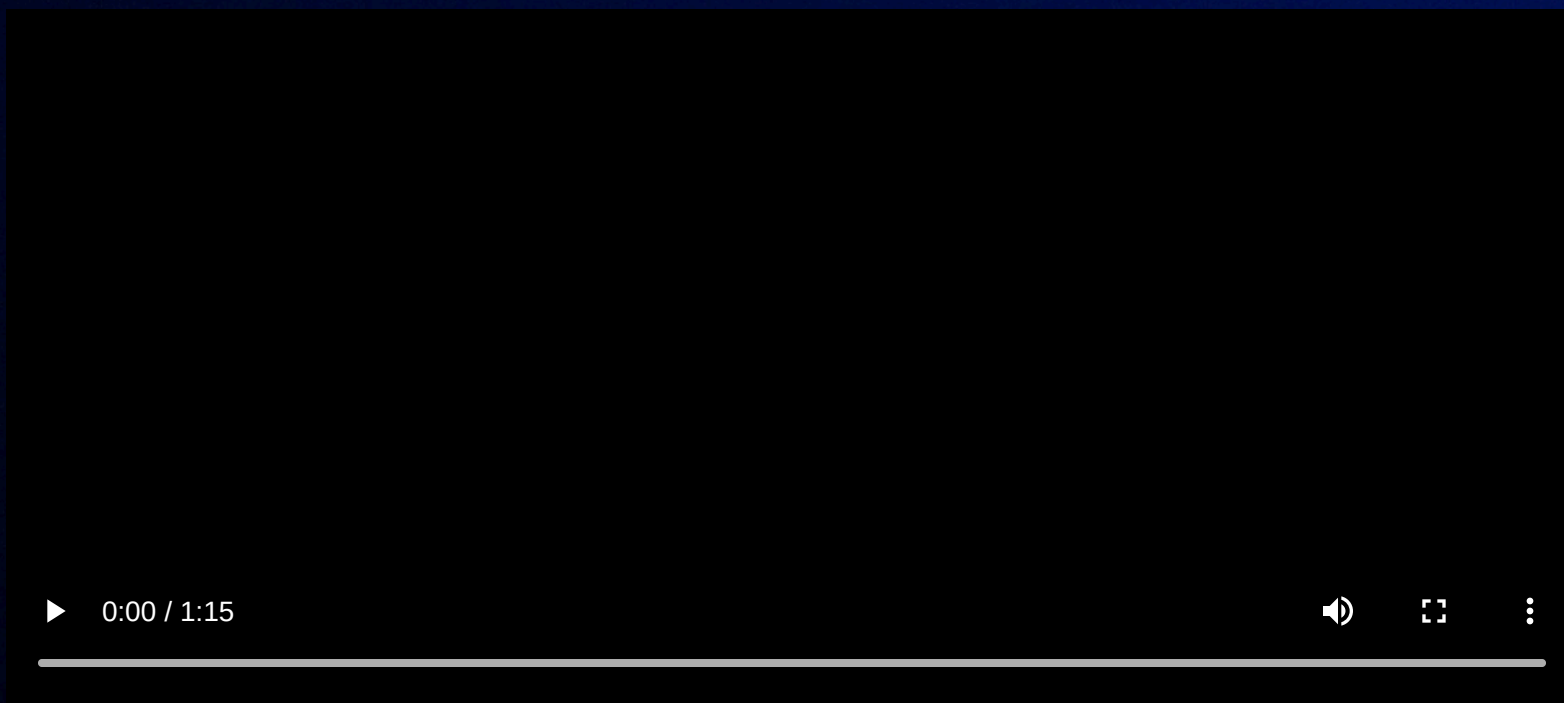
August 30, 2025:  $1 \times 1 \times 1800 \times 3600$

↓ Spatial subset

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

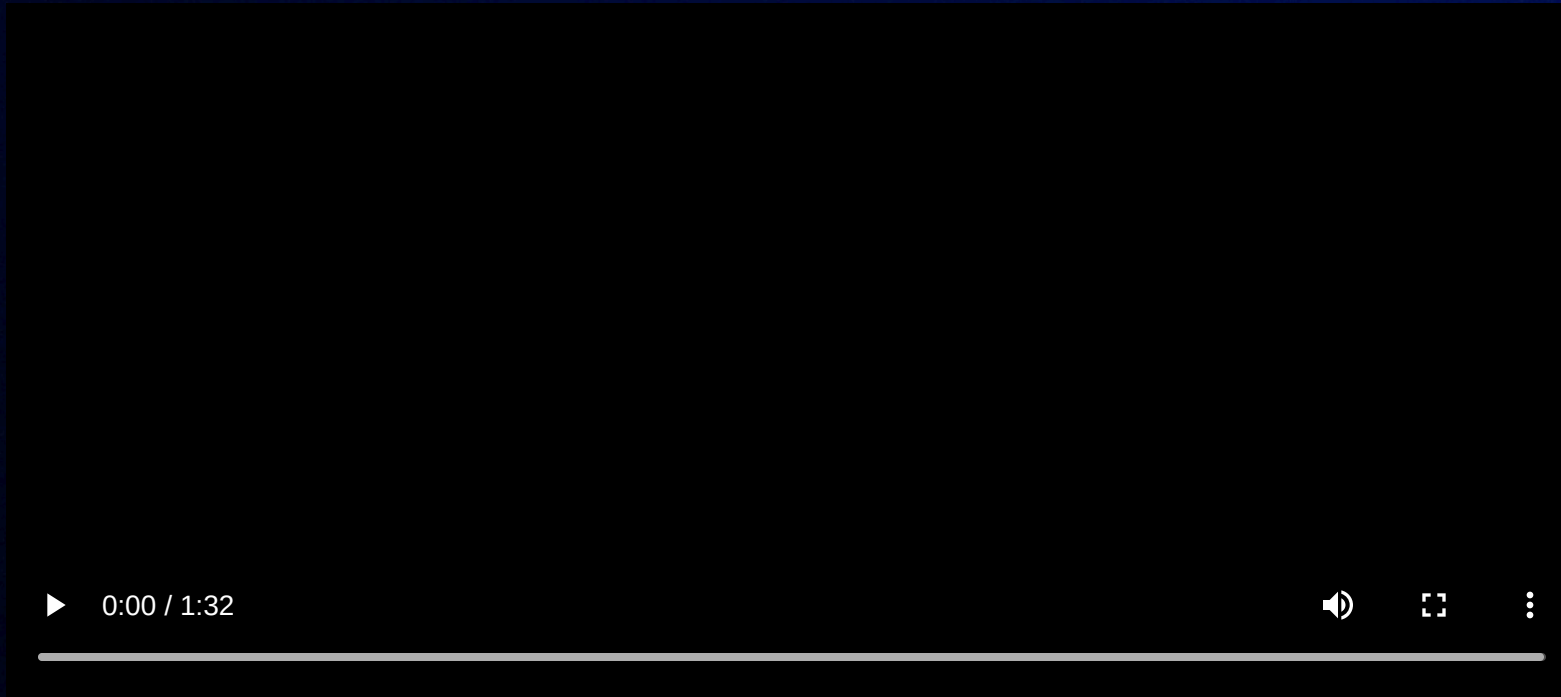


# Use the NCZarr Viewer locally or on EDITO



[Video link](#)

## Explore a NetCDF from your Minio bucket on EDITO

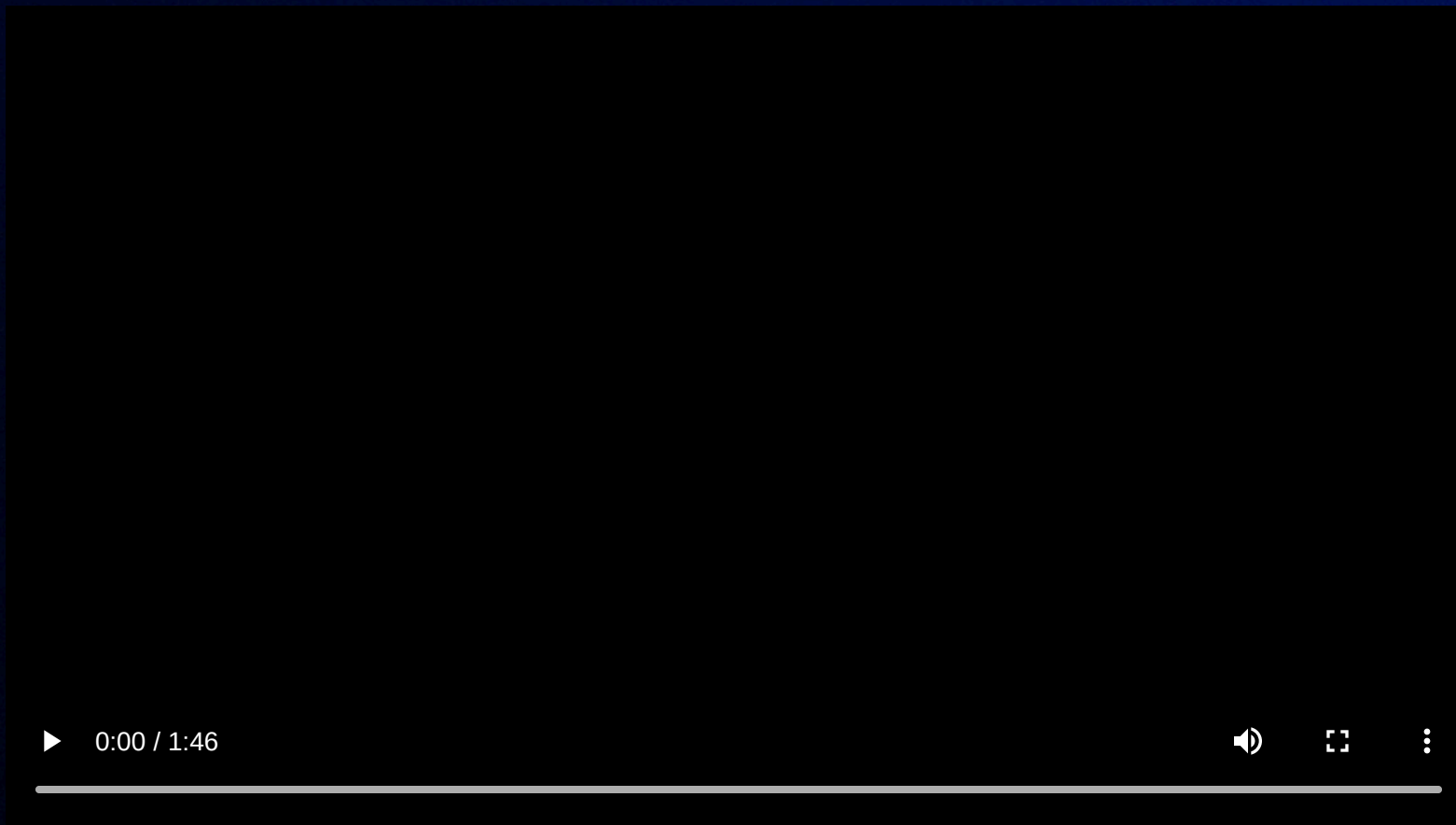


[Video link](#)



# 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](mailto: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?**