

Zarr

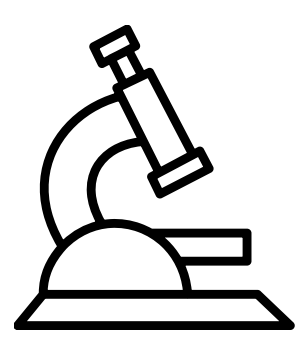
Chunked, Compressed N-Dimensional Arrays

Josh Moore

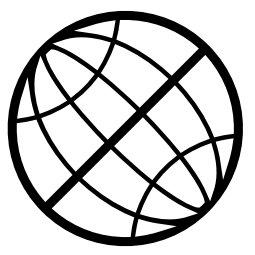
German BioImaging e.V.
(NFDI4BIOIMAGE)

 @notjustmoore

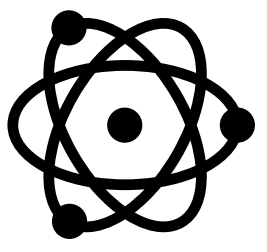
 josh@openmicroscopy.org



bioimaging



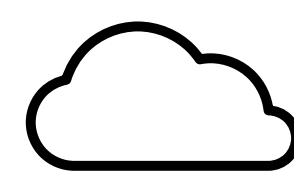
geospatial



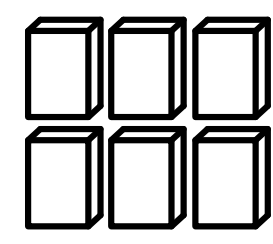
data science



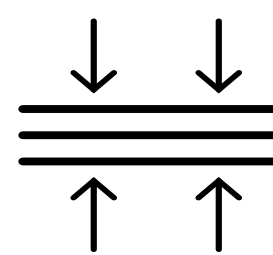
Zarr



distributed and cloud storage

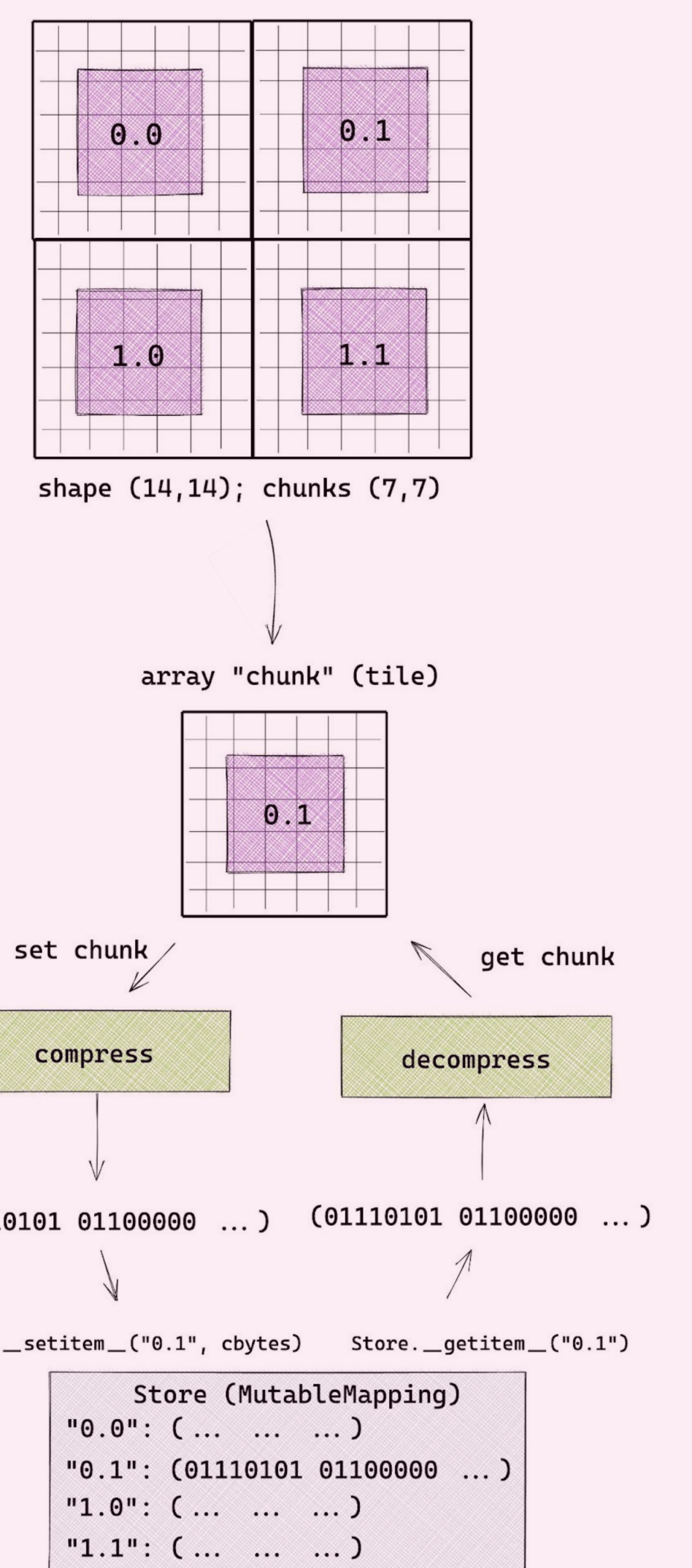


chunked storage allows parallelized
access and computation



built-in compression

Chunking and Compression

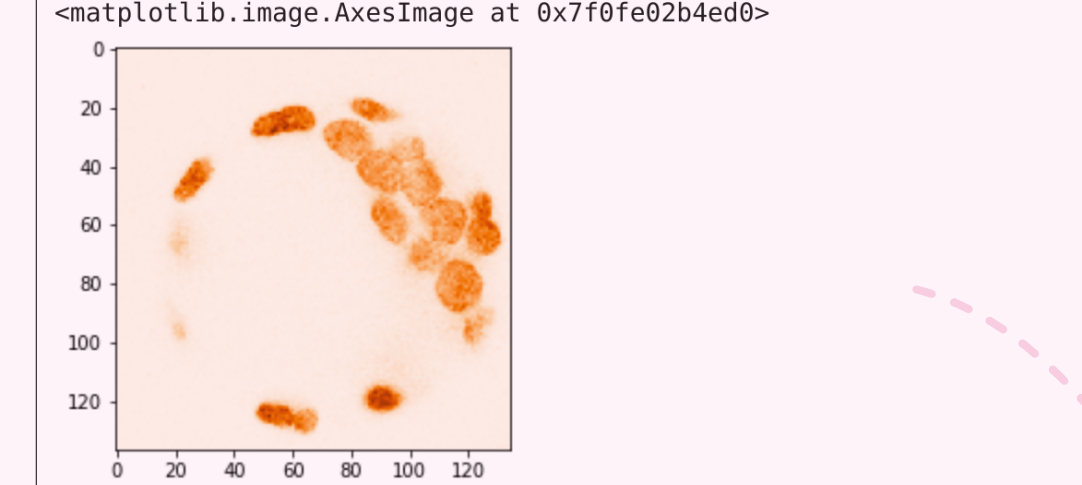


compatible with  NumPy  xarray  dask

Usage Examples

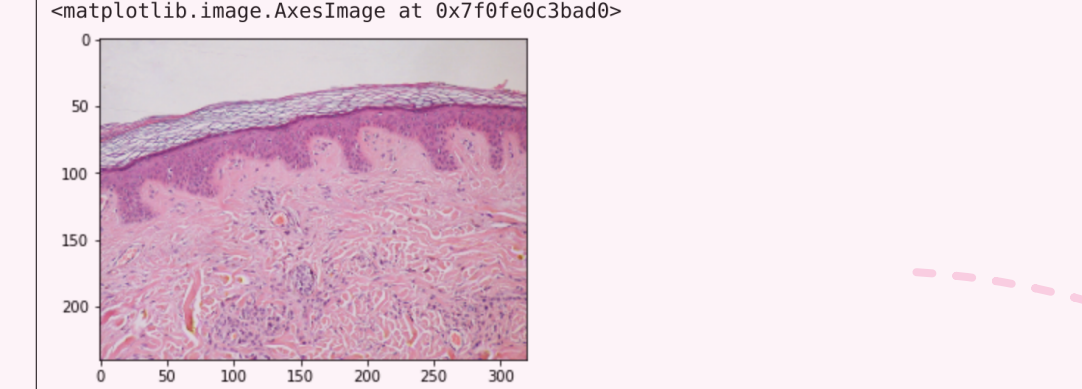
Confocal imaging of mouse blastocysts

```
z = zarr.open_array(
    "https://uk153.embsay.ac.uk/idr/zarr/v0.1/6001240_zarr/1"
)
print(z.shape)
plt.imshow(z[0, 1, 100, :, :], cmap="Oranges")
(1, 2, 236, 137, 135)
<matplotlib.image.AxesImage at 0x7f0fe2b4ed0>
```



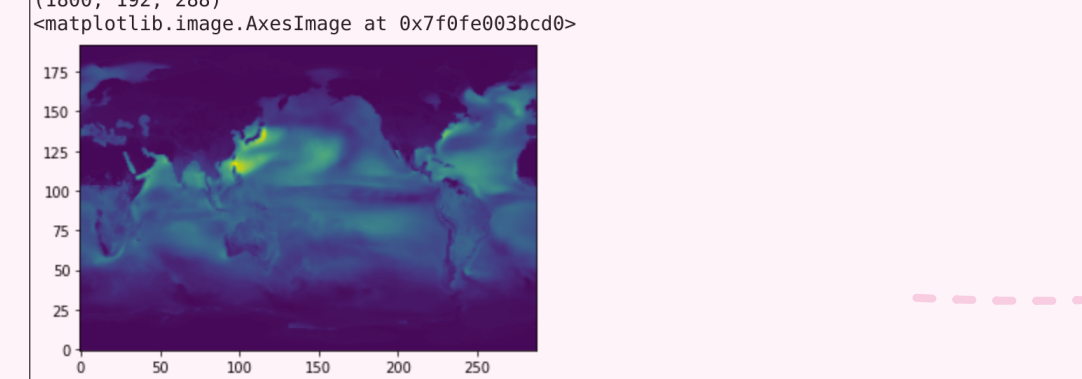
Skin Layers Dermis and Epidermis

```
z = zarr.open_array(
    "https://data.humans.webkossos.org/data/zarr/scalable_minds/skin/color/4.4.1"
)
print(z.shape)
plt.imshow(z[:, :, :, 0])
(3, 320, 240, 1)
<matplotlib.image.AxesImage at 0x7f0fe2b4ed0>
```

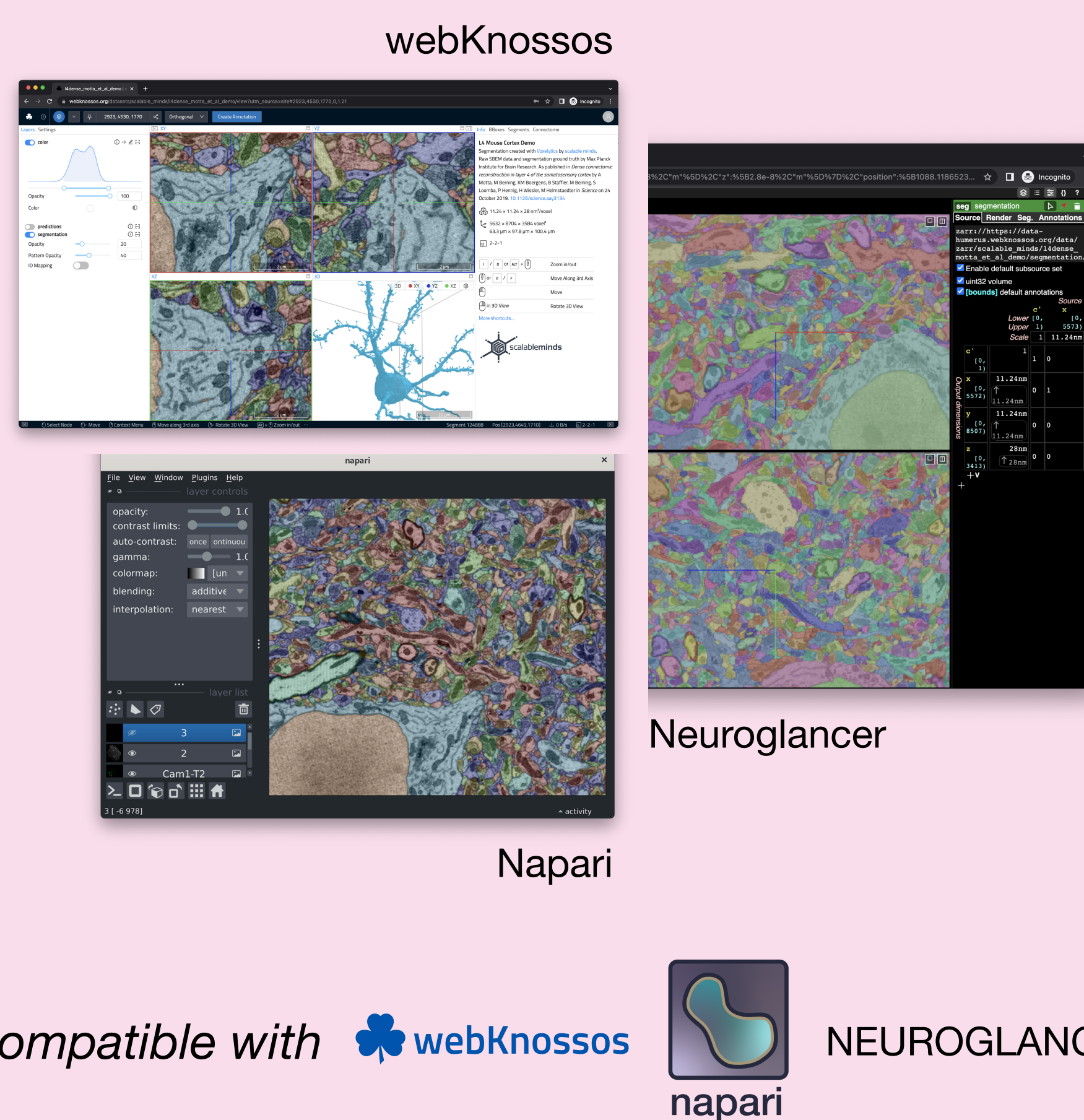


Atmospheric Conditions from the Coupled Model Intercomparison Project Phase 6 (CMIP6)

```
g = zarr.open_group(
    "s3://cmip6-pds/CMIP6/CMIP/AS-RCRC/TaiESM1/spc102/r11ip1f/mon/hits/gn/v20200225/"
)
print(list(g.keys()))
z = g["hits"]
print(z.shape)
plt.imshow(z[0:100], origin="lower")
{'hits': 'lat', 'lat_bnds': 'lon', 'lon_bnds': 'time', 'time_bnds': 'lon_bnds'}
(1000, 100, 200)
<matplotlib.image.AxesImage at 0x7f0fe2b4ed0>
```



Example of a Bioimaging Dataset Streamed with Zarr



Broad Compatibility, based on a Common Specification




Governance process

The Zarr specification and implementations are governed by an **open process**. Specification changes are suggested via Zarr **enhancement proposals** (ZEP).

Those are reviewed and voted on by the Zarr **Implementors Council** (ZIC) and Zarr **Steering Council** (ZSC).

<https://zarr.dev/zeps>



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Zarr is a Sponsored Project of



INTERACTIVE
NOTEBOOK
<https://bit.ly/3Qsm11M>



<https://zarr.dev>
 zarr-developers
 @zarr_dev