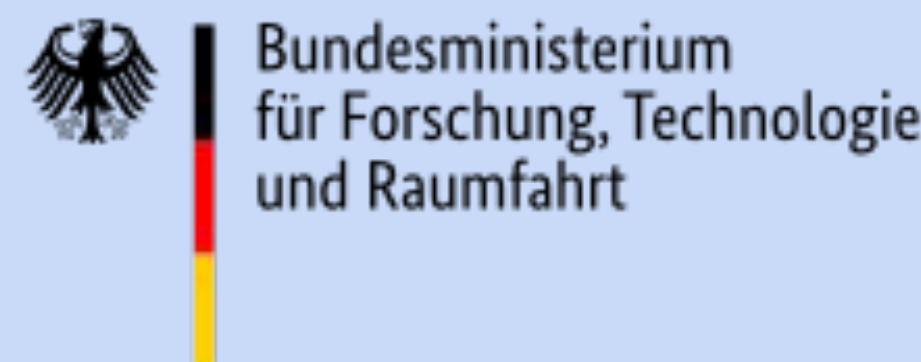
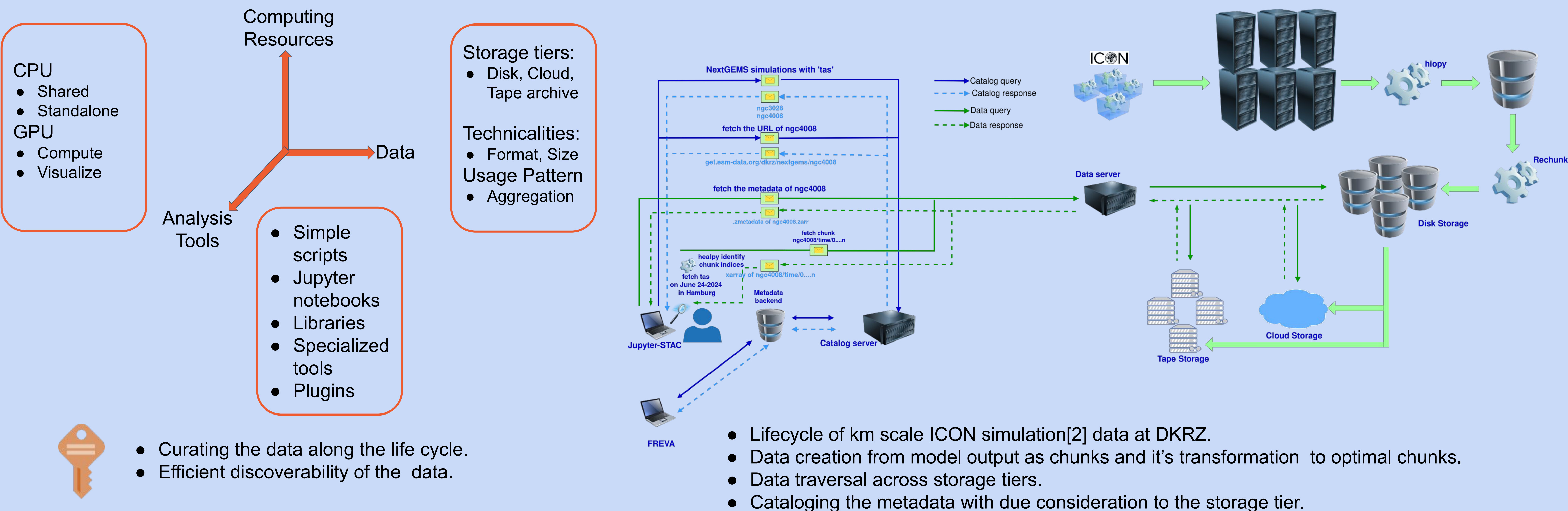


Curating km scale earth system model simulation data along its lifecycle

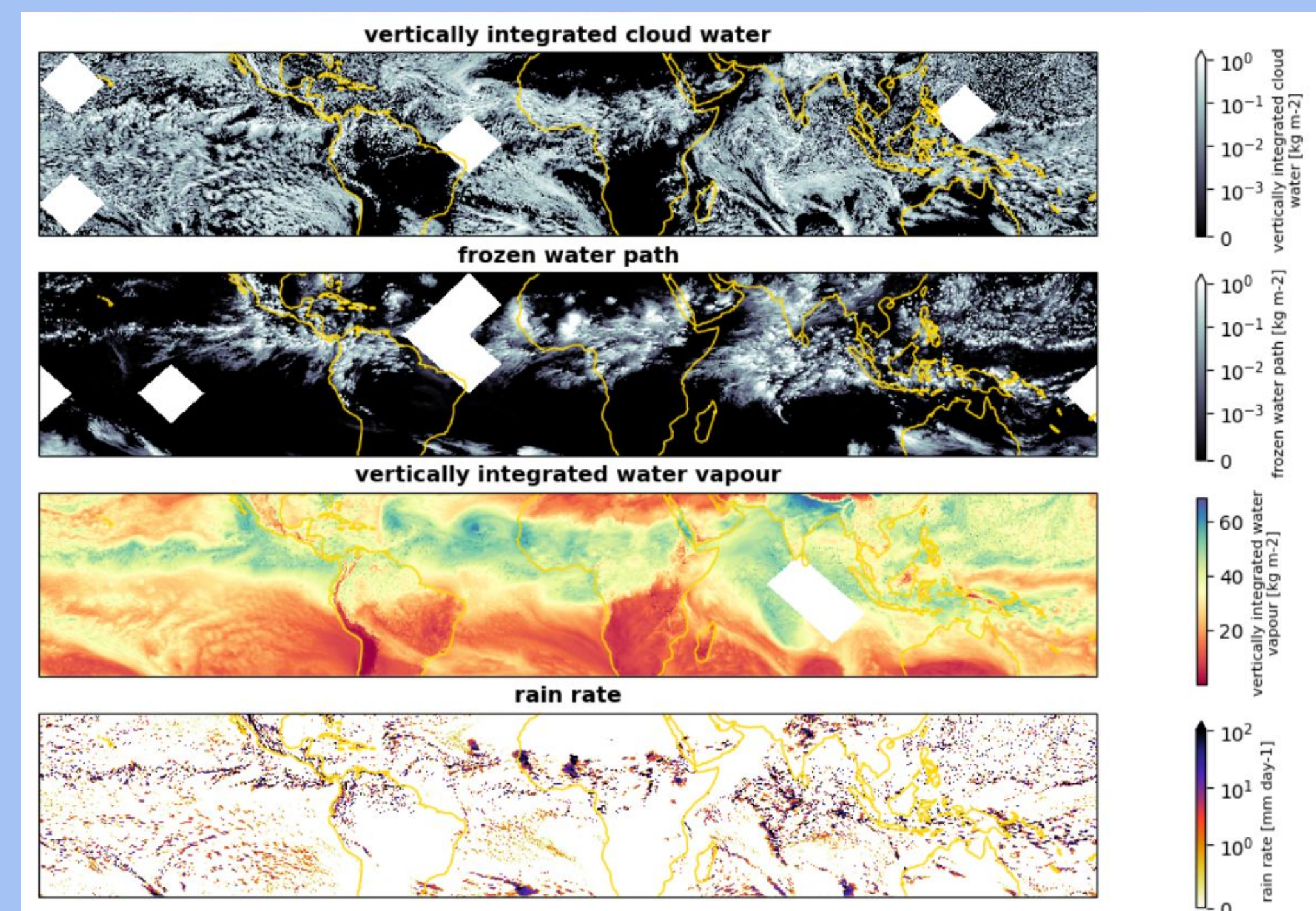
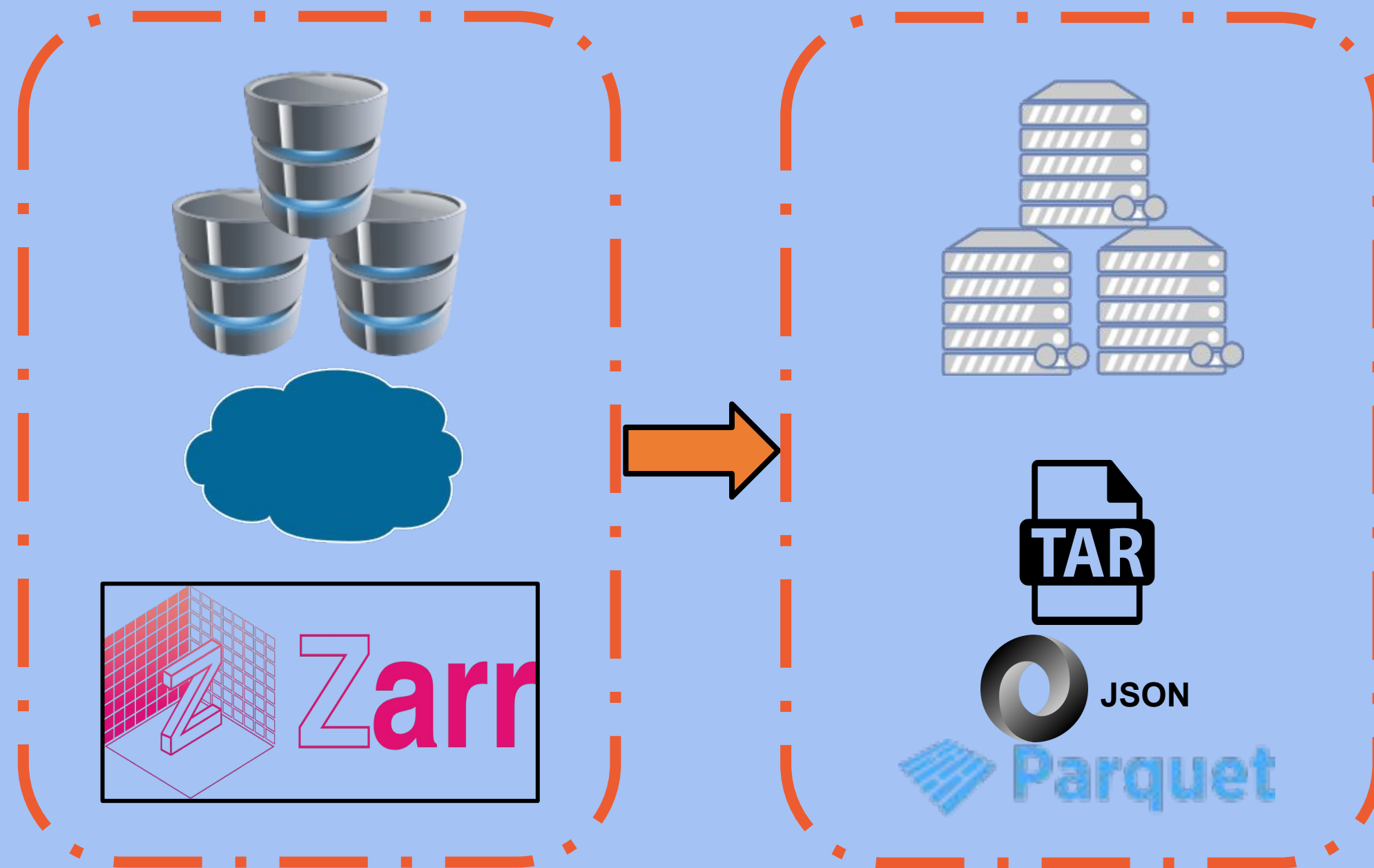
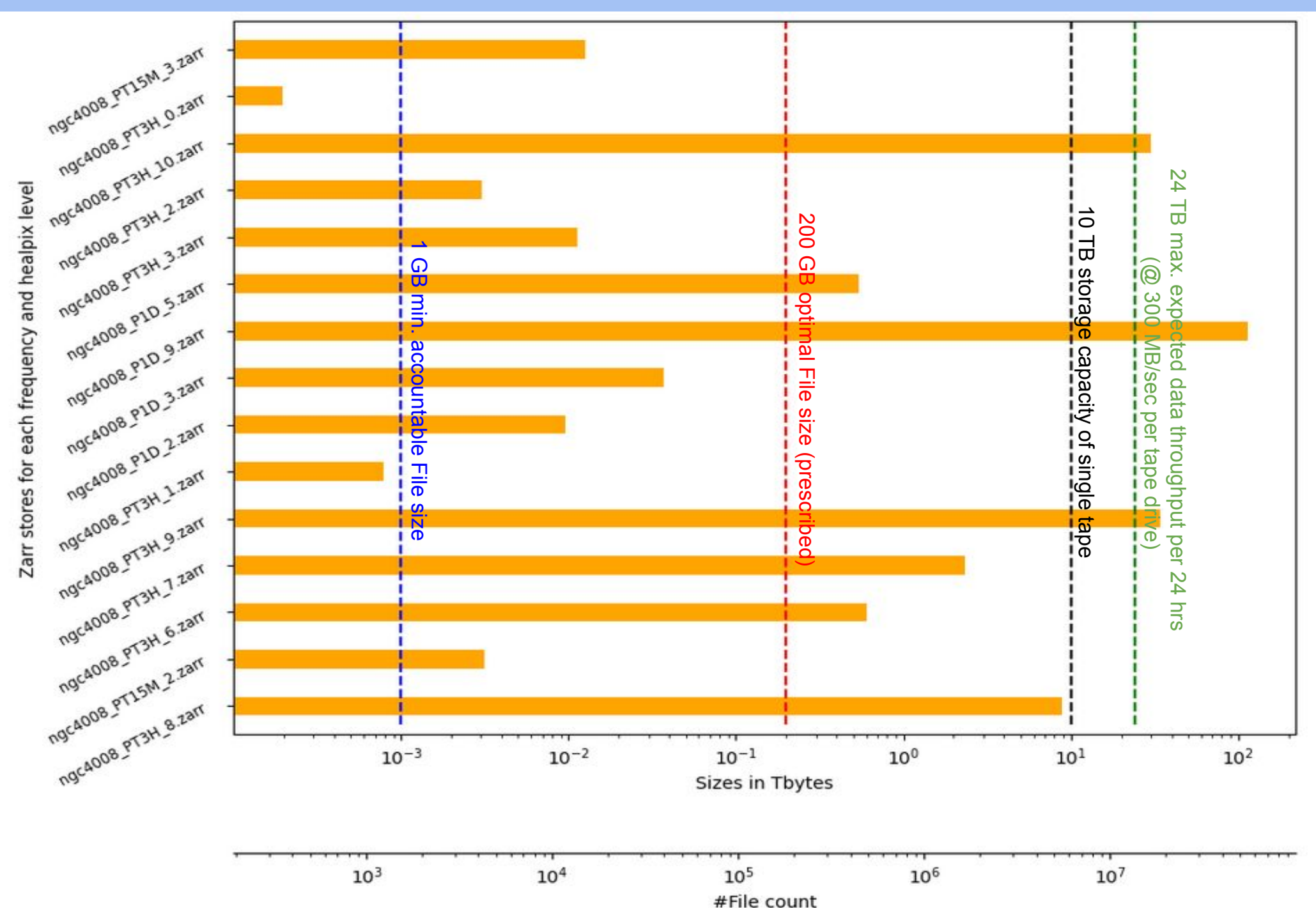
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The Big Picture



Delve into the details



- Simulation output stored in Zarr[3] and HEALPix[1] grids.
- One zarr store per frequency and HEALPix zoom level.
- Total simulation output provided in three frequencies and 11 zoom levels.
- Simulation output as Data trees for next generation simulations.

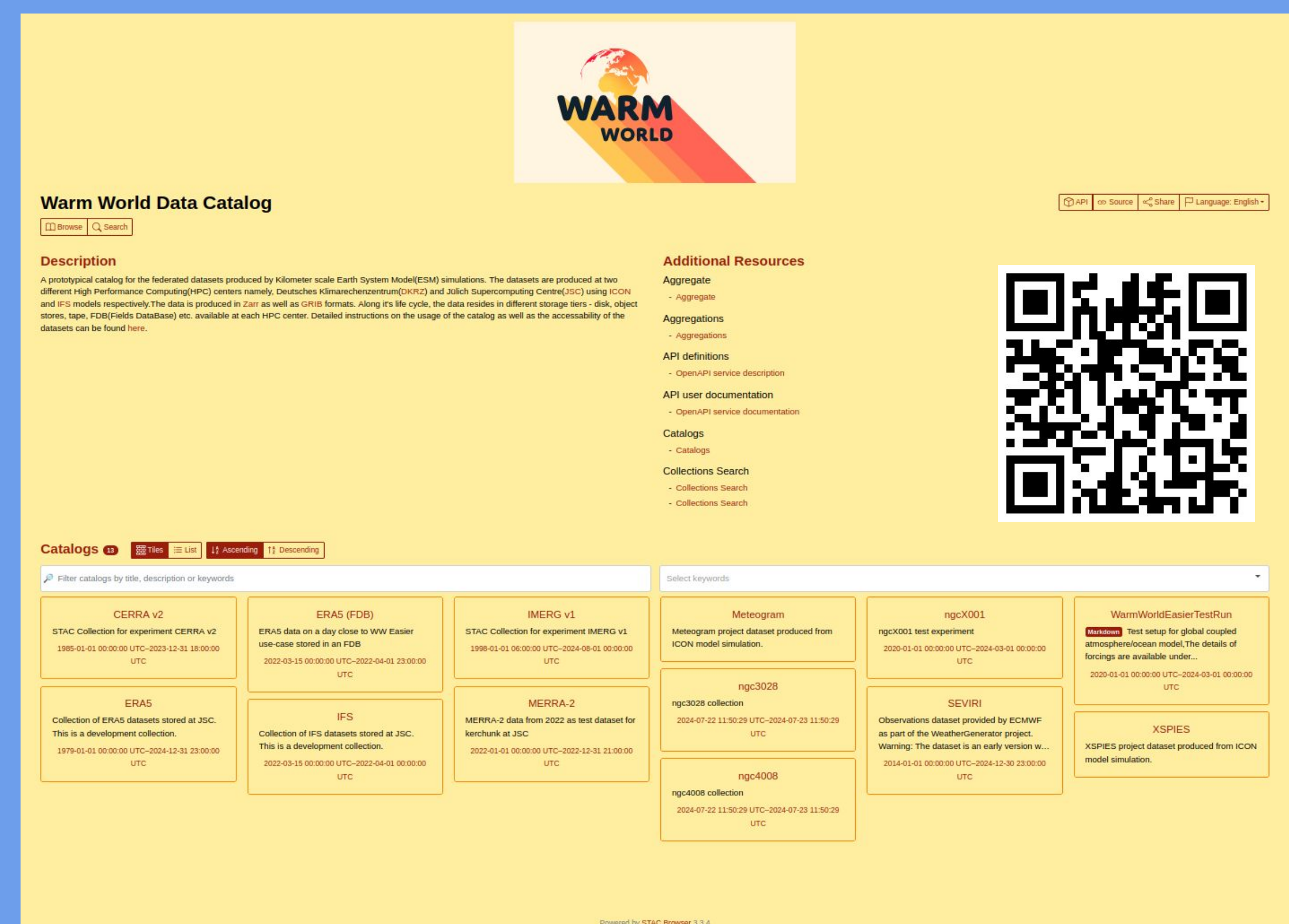
- Simulation output in its original format (zarr) is incompatible with storage tiers like tape archive.
- Data integrity checks subsequent to each movement across storage tiers.
- Periodic checks for ascertaining data integrity.
- Auxiliary information(zarr⇒tar⇒tape mappers) to aid efficient retrieval.

- Example dataset with missing chunks.
- Source: https://github.com/fsenf/nbook.2026-06_extreme_precip_paper/blob/main/nbooks/02-Plot-Precip-Segmentation-Example.ipynb

Zarranalyzer - The Solution

- Gain insight into the characteristics of the data.
- Visualize the characteristics of the data.
- Checks for the integrity of the data.
- Handles data located in different storage tiers(disk, object store etc).
- Facilitates the transformation of the data before transferring across storage tiers.

Check it out



References

1.Górski,K.M et al, HEALPix: A Framework for High-Resolution Discretization and Fast Analysis of Data Distributed on the Sphere, The Astrophysical Journal, 622-759, <https://doi.org/10.1086/427976>, 2005.

2.Hohenegger, C. et al (2023). ICON-Sapphire: simulating the components of the Earth system and their interactions at kilometer and subkilometer scales. Geosci. Model Dev., 16, 779–811, <https://doi.org/10.5194/gmd-16-779-2023>.

3.Miles, A., jakirkham, M. Bussonnier, J. Moore, D. P. Orfanos, A. Fulton, J. Bourbeau, et al.,2023,zarr-developers/zarr-python:v2.14.1:Zenodo, <https://doi.org/https://doi.org/>.