Python-based Multidimensional Climate Model Data Analysis in ECAS

The ENES Climate Analytics Service (ECAS) allows end-users to perform server-side processing on climate data.

- Earth system data are massive. Server-side climate data analysis reduces efforts retrieving and storing the data.
- We offer a JupyterHub (at jupyterhub.dkrz.de) with access to the full CMIP datapool.
- Two simulation models (out of 21 CMIP6 + CORDEX) comprising all scenario data and additional high resolution output data.

Introduction: Key features of xarray
- is an open source software, freely available to everyone,
- good for multi-dimensional handling of data and builds on top of pandas, a data processing python library.

Basic operations: opening, inspecting, selecting data.
- opening: work locally with example files (proof-of-principle) or use intake or (for massive data analysis) or do both!
- inspecting: explore your data! How can I access the variables? What do I need to plot? How to make a plot that a colleague can understand?
- selecting: How can I efficiently handle my data, ie. how do I use the concepts of concatenation, the groupby mechanism and data aggregation?

Hierarchical indexing
- is an important feature of pandas which allows you to work on higher dimensional data in a lower dimensional form.

Outlook and conclusions
- Use this tutorial as template if you want to make such a plot.
- Include Dask [5] for more and faster computing!
- Stay tuned for more pythonic fun!