Data processing with CDO

And how to integrate it into your Python workflow

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Agenda for today

- Install & get started: https://code.mpimet.mpg.de/projects/cdo
- CDO functionality
  - Averaging (temporal/spatial)
  - Merging, subsetting etc.
  - Arithmetics
  - Regridding
  - Interpolation
  - Operator chaining
- Python integration: https://code.mpimet.mpg.de/projects/cdo/wiki/Cdo%7Brbpy%7D

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- Install & get started: https://code.mpimet.mpg.de/projects/cdo

For today's tutorial, we set up an environment with

```
mamba create -n cdo_demo
mamba activate cdo_demo
mamba install cdo python-cdo netcdf4 xarray matplotlib cmocean
```

Live demo

	CDO	Xarray
Averaging (temporal)	✅	✅
Averaging (spatial)	✅ (automatic area weighting)	✅ (better for complex masks)
Merging	✅	✅ (but slow for many small files)
Arithmetics	🟨 (simple operations only)	✅ (arbitrary ufuncs)
Regridding	✅	❌ (external packages)
Keeps history	✅	❌
CF-compliant output	✅	❌
Many dimensions	🟨 (only up to 3D+time)	✅
Interactive data handling+plotting	❌	✅
Community	🟨	✅
Data formats	NetCDF, GRIB (natively)	NetCDF, HDF5, Zarr (natively) GRIB, GeoTIFF (via extensions)