a. Shell and CDO

CDO is a collection of command line operators to manipulate and analyse Climate and NWP model output. Supported output formats are among others netCDF and GRIB. It is very useful for postprocessing e.g. ICON output by selecting parts of the model output that are of interest to the user. Beyond that, it can also be used for further analysis of the output. On Mistral, you can load it via

```
module load cdo/1.9.8-gcc64
```

You can use

```
module avail
```

to view all available CDO versions. It would make sense to load the most current version.
If the output is very large, it can be useful to allocate an exclusive computation environment via the SLURM workload manager.
An interactive possibility for this would be the salloc method. For example, you can ask for an exclusive node on some partition, say compute/compute2 with 1 node, for some duration, say 4 hours, and the computational resources will be charged to the specified project account (PROJECTNAME):

```
salloc -N 1 -p compute,compute2 -A PROJECTNAME -t4:00:00 -- /bin/bash -c
'ssh -X $SLURM_JOB_NODELIST'
```

This will open up a new shell from which interactively individual CDO commands or shell scripts with multiple CDO commands can be executed. See the Mistral documentation for information about the high performance computing (HPC) environment. When you are done using the allocated resources, you can close the shell by simply logging out and then your allocated resources will be closed.

For different ways of utilizing the HPC environment on Mistral (for example of how to submit batch scripts), see running-jobs. Also the bash script example under Pot Pourri shows an example of how to use the SLURM workload manager for executing a script with multiple commands on an exclusive node.

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