OPeNDAP-based access for PCR-GLOBWB input files
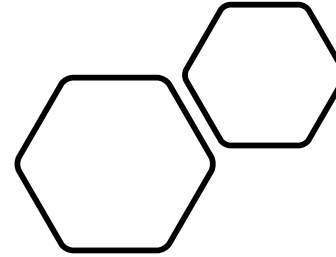
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Background

- PCR-GLOBWB (Sutanudjaja et al., 2018) is a global hydrology and water resources model developed at the Department of Physical Geography, Utrecht University, Netherlands.

- It is OPEN SOURCE (https://github.com/UU-Hydro/PCR-GLOBWB_model).

- Yet, the total size of a complete set of PCR-GLOBWB input files is huge (about 250 GB if they are uncompressed; 45 GB if compressed, see e.g. https://doi.org/10.5281/zenodo.1045338).

- Consequently, sharing and downloading them are difficult, even for a user that wants to run the model for a limited and specific catchment area only.

OPeNDAP access for PCR-GLOBWB

Now PCR-GLOBWB input files are available on the 4TU.ResearchData server, https://opendap.4tu.nl, that supports OPeNDAP protocol (https://www.opendap.org)

Allowing users to access files from a remote server without the need to download the entire 250 GB data files.

This includes inspection of the metadata enabling subsampling specific ranges of the data (over space and time).

OPeNDAP is especially suited to netCDF files, and, therefore, we have ensured compatibility of PCR-GLOBWB input files in the correct netCDF format, i.e. following CF conventions, before uploading the files to the remote server.

Running PCR-GLOBWB using opendap files

```
1  [globalOptions]
2
3  # Please set the pcrglobwb output directory (outputDir) in an absolute path.
4  # - Please make sure that you have access to it.
5  outputDir      = /scratch/depfg/edwin/pcrglobwb2_output/05min_demo_egu2020/
6
7  # Please set the clone map file (cloneMap), which defines the spatial resolution and extent of your study
   area.
8  # - Please make sure that the file is stored locally in your computing machine.
9  # - The file must be in the pcraster format.
10 cloneMap       = /home/edwin/data/clone_landmask_maps/RhineMeuse05min.clone.map
11 #~ cloneMap = /home/edwin/data/clone_landmask_maps/clone_global_05min.map
12
13
14 # Set the input directory map in an absolute path. The input forcing and parameter directories and files
   will be relative to this.
15 # - The following is an example using files from the opendap server.
16 inputDir       = https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/
17
18 #~ # - The following is an example using input files stored locally in your computing machine.
19 #~ inputDir = /home/edwin/data/pcrglobwb2_input_release/version_2019_11_beta/pcrglobwb2_input/
20
21
```

- PCR-GLOBWB users can run the model by simply adjusting the input directory location (inputDir) of the configuration file (.ini) to the following opendap address (see the snapshot above for illustration):
  https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/

- (and, therefore, without having to download the entire input files)

- Catalogue for PCR-GLOBWB input files (useful for searching individual files):
  https://opendap.4tu.nl/thredds/catalog/data2/pcrglobwb/catalog.html
  https://doi.org/10.4121/uuid:e3ead32c-0c7d-4762-a781-744dbdd9a94b

```
2020-05-04 02:10:11,220 virtualOS DEBUG read file/value: 0.1
2020-05-04 02:10:11,220 virtualOS DEBUG read file/value: 0.05
2020-05-04 02:10:11,221 landCover DEBUG Obtaining the land cover parameters that are fixed for the entire simulation.
2020-05-04 02:10:11,221 virtualOS DEBUG read file/value: global_30min/landSurface/landCover/naturalTall/minf_tall_permafrost.nc
2020-05-04 02:10:11,222 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_30min/landSurface/landCover/naturalTall/mi
_tall_permafrost.nc
2020-05-04 02:10:11,222 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_30min/landSurface
andCover/naturalTall/minf_tall_permafrost.nc
2020-05-04 02:10:11,274 virtualOS DEBUG reading variable: minf_tall_permafrost_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_30
n/landSurface/landCover/naturalTall/minf_tall_permafrost.nc
2020-05-04 02:10:11,375 virtualOS DEBUG Resample: input cell size = 0.5 ; output/clone cell size = 0.08333333333333333
2020-05-04 02:10:11,385 virtualOS DEBUG read file/value: global_30min/landSurface/landCover/naturalTall/maxf_tall.nc
2020-05-04 02:10:11,386 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_30min/landSurface/landCover/naturalTall/ma
_tall.nc
2020-05-04 02:10:11,386 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_30min/landSurface
andCover/naturalTall/maxf_tall.nc
2020-05-04 02:10:11,424 virtualOS DEBUG reading variable: maxf_tall_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_30min/landSur
ce/landCover/naturalTall/maxf_tall.nc
2020-05-04 02:10:11,521 virtualOS DEBUG Resample: input cell size = 0.5 ; output/clone cell size = 0.08333333333333333
2020-05-04 02:10:11,530 virtualOS DEBUG read file/value: global_05min/landSurface/landCover/naturalTall/rfrac1_tall.nc
2020-05-04 02:10:11,531 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSurface/landCover/naturalTall/rf
c1_tall.nc
2020-05-04 02:10:11,532 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSurface
andCover/naturalTall/rfrac1_tall.nc
2020-05-04 02:10:11,567 virtualOS DEBUG reading variable: rfrac1_tall_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landS
face/landCover/naturalTall/rfrac1_tall.nc
2020-05-04 02:10:12,598 virtualOS DEBUG read file/value: global_05min/landSurface/landCover/naturalTall/rfrac2_tall.nc
2020-05-04 02:10:12,599 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSurface/landCover/naturalTall/rf
c2_tall.nc
2020-05-04 02:10:12,599 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSurface
andCover/naturalTall/rfrac2_tall.nc
2020-05-04 02:10:12,636 virtualOS DEBUG reading variable: rfrac2_tall_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landS
face/landCover/naturalTall/rfrac2_tall.nc
2020-05-04 02:10:13,875 virtualOS DEBUG read file/value: 1.0
2020-05-04 02:10:13,876 virtualOS DEBUG read file/value: global_05min/landSurface/landCover/naturalTall/vegf_tall.nc
2020-05-04 02:10:13,877 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSurface/landCover/naturalTall/ve
_tall.nc
2020-05-04 02:10:13,879 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSurface
andCover/naturalTall/vegf_tall.nc
2020-05-04 02:10:13,914 virtualOS DEBUG reading variable: vegf_tall_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/landSu
ce/landCover/naturalTall/vegf_tall.nc
2020-05-04 02:10:14,970 landCover DEBUG The parameter arnoBeta is approximated from the minSoilDepthFrac and maxSoilDepthFrac values.
2020-05-04 02:10:14,978 virtualOS DEBUG read file/value: 0.0
2020-05-04 02:10:14,979 virtualOS DEBUG read file/value: 0.2
2020-05-04 02:10:14,979 virtualOS DEBUG read file/value: global_05min/routing/ldd_and_cell_area/cellsize05min.correct.nc
2020-05-04 02:10:14,980 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/routing/ldd_and_cell_area/cellsize05
n.correct.nc
2020-05-04 02:10:14,981 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/routing/ldd
nd_cell_area/cellsize05min.correct.nc
2020-05-04 02:10:14,981 virtualOS DEBUG reading variable: cellsize05min_correct_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_0
in/routing/ldd_and_cell_area/cellsize05min.correct.nc
2020-05-04 02:10:15,127 virtualOS DEBUG read file/value: global_05min/waterUse/abstraction_zones/abstraction_zones_60min_05min.nc
2020-05-04 02:10:15,128 virtualOS DEBUG read netcdf file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/waterUse/abstraction_zones/abstracti
_zones_60min_05min.nc
2020-05-04 02:10:15,129 virtualOS DEBUG reading variable: automatic from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/global_05min/waterUse/ab
raction_zones/abstraction_zones_60min_05min.nc
2020-05-04 02:10:15,129 virtualOS DEBUG reading variable: abstraction_zones_60min_05min_map from the file: https://opendap.4tu.nl/thredds/dodsC/data2/pcrglobwb/version_2019_11_beta/pcrglobwb2_input/
obal_05min/waterUse/abstraction_zones/abstraction_zones_60min_05min.nc
```

a run using files from 4TU.ResearchData opendap server
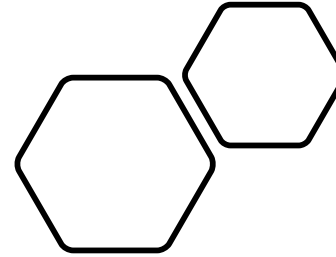
Do you want to test it by yourself?

Please go to: https://github.com/UU-Hydro/PCR-GLOBWB_model

Follow the instructions given in the file README.md

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with a lot of helps from

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