How to access Global Climate Model (GCM) data of the CMIP5 Initiative?

The Coupled Model Intercomparison Project, Phase 5 (CMIP5) is a collaborative climate modelling process coordinated by the World Climate Research Programme (WCRP). Latest versions for all experiments are available in the Earth System Grid Federation (ESGF). For corrections of data sets published under later versions please look at the errata page hosted by PCMDI. Further information on CMIP5 can be found on this page.

Getting started:
In order to download data you will be required to register (i.e. create an account). Your account will be valid for browsing all data served by the ESGF—CMIP5 and more (e.g. CORDEX). Because different restrictions are placed on different datasets served by ESGF, you must also enroll in one of the two "CMIP5 groups" and agree to the terms of use established for CMIP5. All CMIP5 Model output can be accessed via any of several websites serving as portals to the ESGF archive (e.g. NSC: https://esg-dn1.nsc.liu.se/projects/esgf-liu/, DKRZ: http://esgf-data.dkrz.de).

1) Visit the ESGF portal at https://esg-dn1.nsc.liu.se/projects/esgf-liu/
2) Create an account. You will get an openID, in the form https://pcmdi9.llnl.gov/esgf-idp/openid/[*your user name*]. You will use later this new openID and your password.
3) Register in the CMIP5 group and agree to the terms of use.

Download data on the ESGF portal:
1) Visit the ESGF gateways e.g. https://esg-dn1.nsc.liu.se/projects/esgf-liu/
2) From the table 'Search Data', select CMIP5
3) Tick the box 'Show all Replicas'
4) Select different categories for data search on the left column

Model	e.g. EC-EARTH
Experiment	e.g. historical, rcp45, rcp85
Time Frequency	e.g. day
Variable	e.g. tas (surface air temperature), pr (precipitation)

5) Add all displayed datasets to cart
6) Choose tab Data Cart and select the download of a wget script for all marked records (click 'WGET All Selected')
   These steps will lead to a wget script which should be ready to use for download inside any UNIX system.

A more general ESGF users guide may be found here

Direct download of data using the python script 'download_CMIP5.py':
Alternatively to downloading data from the ESGF portal, one may download data directly using the following python script. To do so insert in the command line your openID and password (see orange markers in the script) and information on the model (e.g. MPI-ESM-LR), the experiment (e.g. rcp45), the time frequency (e.g. day), the ensemble (e.g. r1i1p1) and the variable (e.g. tas for surface air temperature), then let the python script runs: ./download_CMIP5.py tas rcp45 MPI-ESM-LR r1i1p1 day

Download_CMIP5.py:

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-

import sys
import os
import subprocess

variable = sys.argv[1]
variable_get = ""
experiment = sys.argv[2]
experiment_get = ""
driving_model = sys.argv[3]
driving_model_get = ""
ensemble = sys.argv[4]
ensemble_get = ""
time_frequency = sys.argv[5]
time_frequency_get = ""

node_gcm = ['http://esg-dn1.nsc.liu.se/esg-search/wget?', \
'http://esgf-index1.ceda.ac.uk/esg-search/wget?', \
'http://pcmdi9.llnl.gov/esg-search/wget?', \
'http://esgf-data.dkrz.de/esg-search/wget?', \
'http://esgf.nci.org.au/esg-search/wget?']

realm = ""
realm = "atmos"
node = node_gcm
extras = "latest=true&replica=true&limit=10000&project=CMIP5"

i = 0
while i < len(variable.split(" ")):
   variable_get = variable_get + "&variable=" + variable.split(" ")[i]
   i = i + 1
   print "hej"
i = 0
while i < len(experiment.split(" ")):
   experiment_get = experiment_get + "&experiment=" + experiment.split(" ")[i]
   i = 0 + 1
i = 0
while i < len(driving_model.split(" ")):
   driving_model_get = driving_model_get + "&driving_model=" + driving_model.split(" ")[i]
   i = 0 + 1
i = 0
while i < len(ensemble.split(" ")):
   ensemble_get = ensemble_get + "&ensemble=" + ensemble.split(" ")[i]
   i = 0 + 1
i = 0
while i < len(time_frequency.split(" ")):
   time_frequency_get = time_frequency_get + "&time_frequency=" + time_frequency.split(" ")[i]
   i = 0 + 1

for n in node:
  wget_command = n + extras + time_frequency_get + "&realm=" + realm + "&model=" + driving_model + experiment_get
+ ensemble_get + variable_get
  subprocess.check_call("wget -O url \"" + wget_command + '"', shell=True)
  p = subprocess.Popen(["bash", "-x", "url"], stdin=subprocess.PIPE, stdout=subprocess.PIPE)
  p.communicate("your-Openid\nPassword\n")
  if p.returncode == 0:
    break
```