GCM Data Download

1. Byun Paper: <http://onlinelibrary.wiley.com/doi/10.1002/joc.5388/full>
2. Data Distribution Centre (DDC) of IPCC <http://www.ipcc-data.org/>
3. On left panel > Data: Simulations
4. Under “Data from computer simulations and projections” > “Global climate model output” > “Results from GCM-Runs for the Fifth Assessment Report (AR5)” (<http://www.ipcc-data.org/sim/gcm_monthly/AR5/index.html>)
5. Under “AR5 GCM data” > “(ii) the DDC Reference snapshot.” (<http://www.ipcc-data.org/sim/gcm_monthly/AR5/Reference-Archive.html>)
6. Under “Long-term Projections: Centennial and longer Scenarios” you will see the various centers and their model and control parameters/runs available. For example, scroll down to the Chinese FIO-ESM model. Click on “rcp85” under the rcp column. (<https://cera-www.dkrz.de/WDCC/CMIP5/Compact.jsp?acronym=FIFIr8>)
7. Under “Data Access,” it shows that you will need to make an account with CERA account to actually download the data.
8. Click on the CERA link under “Data Access” (<https://cera-www.dkrz.de/WDCC/ui/cerasearch/>) Here, you can find the datasets that we want. Under search, type “FIO rcp85 co2” (<https://cera-www.dkrz.de/WDCC/ui/cerasearch/entry?acronym=FIFIr8MAAco2111v120524>)
9. The first link is the dataset that we will want (“cmip5 output1 FIO FIO-ESM rcp85 mon atmos Amon r1i1p1 v20120524 co2”) This is the global monthly data for “r1i1p1”, which is the version of the simulation that Kyuhyun used.
10. Alternatively, you can also click on the “Detailed Metadata” > WDCC Metadata link, which will bring you to a “cera” site and then click on the “find data” tab. This will bring you to the same place.
11. Download netCDF format. This can get imported into R or matlab, assuming to included Lat long, and variable (mole\_fraction\_of\_carbon\_dioxide\_in\_air [1e-6]). We probably only need 1-2 2 degree grid cells
12. The one issue that I found with this is that from my brief search, I could only find 2 co2 air concentrations for 6 of our models, but there is quite a few searches and variables that I did not try. It was not straight forward. Alternatively, after search for RCP scenarios, we came upon this database for the c02 concentration forcing (<https://tntcat.iiasa.ac.at/RcpDb/dsd?Action=htmlpage&page=about>)
13. Under “download”, it appears that “1) historical atmospheric concentrations as well as concentrations for the RCPs (2005-2100) and their extension to 2300 (ECPs). In total, atmospheric concentration of the following gases are provided: CO2, CH4, N2O, all flourinated gases controlled under the Kyoto Protocol (HFCs, PFCs, and SF6), and ozone depleting substances controlled under the Montreal Protocol (CFCs, HCFCs, Halons, CCl4, CH3Br, CH3Cl).” You could register and request this data, as we could force our model for the same CO2 concentrations in the air for all. This kind of defeats the purpose of the feedback that each climate model may have for concentration gradients, but I wonder how different atm concentration is between the model outputs.
14. I will keep looking some on the GCM database websites for the other. I hope this document helps you navigate. Let me know if you come across any issues.

**GCM Data OUTPUT Format**

1. As an example, under search, type “FIO rcp85 co2” (<https://cera-www.dkrz.de/WDCC/ui/cerasearch/entry?acronym=FIFIr8MAAco2111v120524>)
2. Under “General Summary”, click “more ..”
3. With that added data, the “List of output variables: <https://pcmdi.llnl.gov/mips/cmip5/datadescription.html>” link will bring you to the “CMIP5 – Data Description”
4. Looking at the “standard\_output.pdf” (<https://pcmdi.llnl.gov/mips/cmip5/docs/standard_output.pdf?id=56>), page 25 is where the “mole\_fraction\_of\_carbon\_dioxide\_in\_air” variable and other closely related variables are located. In the notes show some output differences between models as well as model authors questioning the output format, etc.
5. Another path forward for digging into these details is through the “Summary” section on the cera website (<https://cera-www.dkrz.de/WDCC/CMIP5/Compact.jsp?acronym=NGEMc1>). The “Experiment design: <https://pcmdi.llnl.gov/mips/cmip5/experiment_design.html>” brings you to a somewhat messy summary of the CMIP5 Experiment Design. From this, it appears that the CMPI5 runs had: “calibration type runs with 1% per year CO2 increase to diagnose transient climate response (TCR), an abrupt 4XCO2 increase experiment to diagnose equilibrium climate sensitivity and to estimate both the forcing and some of the important feedbacks, and there are fixed SST experiments to refine the estimates of forcing and help interpret differences in model response.” (<https://pcmdi.llnl.gov/mips/cmip5/docs/Taylor_CMIP5_22Jan11_marked.pdf?id=90>)
6. I’m not sure if that means that some models have co2 feedbacks and some have fixed co2 concentrations with projected increases of 1-4% annually, or something different all together. We may want to look into this a little more, and comparing the two models that I believe have the outputs with CO2 that we want could help (GFDL-ESM2M: <https://cera-www.dkrz.de/WDCC/ui/cerasearch/entry?acronym=NGEMr8MAAco2111v111228> & FIO-ESM: <https://cera-www.dkrz.de/WDCC/ui/cerasearch/entry?acronym=FIFIr8MAAco2111v120524>)