Homework 3 - Applying Empirical Models
ESM 237 Spring 2020

You have now successfully presented your conceptual model to your team, and it was a huge success! You are chosen by your organization to lead more detailed assessments of climate change impacts in relevant regions. Congratulations! Your first task in your new position is to determine the likely outcome of climate change in affecting a system of importance to your organization. This means combining data from both *climate models* and *empirical models* and presenting the results in a concise format so your bosses/stakeholders can use then efficiently.

Choose a human or natural system of interest as your case study (e.g. California's energy sector, human health or economic impacts, ecosystem health, etc.). This DOES NOT need to be the same as either your target for conceptual modeling or your final project. The only requirements are that the system:
a) have previously been modeled empirically;
b) that the empirical model has been published in a reputable, peer-reviewed journal;
c) and that the model makes use of variables that are also represented in climate models (e.g. temperature, precipitation, winds, etc.)
You may use one of the empirical models presented in class, but are not required to - feel free to study whatever system you find most interesting.

1. Describe your chosen system.
   - Why is it important?
   - What are the major impacts you expect due to climate change?

2. Describe your chosen empirical model.
   - Where was it published? Provide a description of the journal where you found the model, and an assessment of its reputability.
   - How does it work? Describe the types of relationships the model uses, the data sources used to create it, and assess whether you expect it to continue to be reliable under future climate change.

3. Download data from climate models relevant to your empirical model.
   - Describe the data source you used to retrieve the model output, the spatial/temporal region it covers, and your choice of output variables.

- Use output from multiple models or ensemble members, since they may give different answers; use at least 3 datasets in total.

4. Write a script in R or other language to apply your empirical model to climate model output.

5. Plot the results! This could be a time series, a bar chart, or (if you're really ambitious!) even a map…

6. Then describe what the results mean for your application.

You may work individually, or in groups of 2-3; then summarize the results in a two-page report including an introduction, figures/tables, and discussion.