# Final Project Instructions

The goal of the final project is to practice what you have learned on a real data and a real problem. You can either **implement existing methods** on your data to answer questions of interest, or you can **propose your own methods** to solve the problem if you are bored with other methods. Below are guidelines for working on the final project and writing the report:

1. Find a spatial or spatiotemporal dataset that you are mostly interested in. For example, you can download a dataset from one of the websites attached in the end. There are massive data in those websites. You may just download a piece of it that is either spatial or spatiotemporal. For both CMIP5 and Argo, there are tons of research based on these two datasets. You may google search interesting papers to read.

2. Give a clear description of the data including what are the spatial domain and spatial locations, what are the time span and temporal resolution, what do the data measure, and why the study of this data set is of interest (may need Dr. Google again to learn this). You may use maps and plot to show the spatial domain and the data in the report.

3. State clearly what are the questions you want to answer with this data, and why are those questions of interest?

4. Any methods you learn or in existing literatures are useful to solve your problem? Give a literature review of relevant methods.

5. Optional: If you argue that none of the existing methods is sufficient to solve your problem and you want to propose your new method, you are welcome to do that, but this is not required.

6. Give a clear description and demonstration of your method, whether they already exist or are new.

7. Optional: if it is new method, you may need theory or simulation to show your method indeed works and/or outperforms some existing methods.

8. Apply the method to your data, use plots and/or tables to show the results, interpret the results, and clearly state your conclusion or answers to your original questions based on the results.

9. Summarize what you have done, emphasize the main points you have learned from this data or the accomplishments you have made, and list any further thoughts you may have on improving the method or advancing the knowledge you could learn from the data.

**Data source examples**:

Argo data: http://www.argo.ucsd.edu

CMIP5 data: https://esgf-node.llnl.gov/projects/cmip5/

Climate data:

    https://www.ncdc.noaa.gov/cdo-web/

    https://climatedataguide.ucar.edu/climate-data

    https://www.worldclim.org

**Remarks**:

* There will be no specific page requirement for the report. Typically around 10 pages will be good.
* The final project will count as 30% of the final grade.
* The TA and the instructor may offer general advice when needed, but the students are responsible for all detailed work. In situations where the student takes her/his research project as the final project and the student needs extra help on that, co-authorship for helpers may be offered.