

End-of-term project: Spectra and coherence

Preliminary work due Friday, December 11 (or earlier), which will allow me to provide you with feedback. Final write up and presentation due in final exam, Wednesday, December 16, 2020, 8:00-11:00. Both submissions need to be uploaded through Canvas, which will include Turnitin plagiarism review.

Grading: write up

1. **Spectra (20 points)**. Choose a pair of time series (or spatial records.) Plot the time series. Compute an estimate of the frequency (or wavenumber) spectrum for each of the data records. Describe the major characteristics of the spectra. Be sure to show your uncertainty estimate.
2. **Coherence (20 points)**. Now compute the coherence between the two records. Are the two records statistically coherent? What is the phase relationship between the two records?
3. **Bonus (optional, up to 10 points)**. Can you say anything further about the data?
4. **Presentation (10 points)**. Write up the method and results clearly and explain your conclusions.

Grading: presentation

1. **Presentation materials (10 pts)**. Prepare a set of slides to explain your results (and turn in a pdf version of the slides via Canvas.
2. **Oral presentation (10 pts)**. Explain your findings to your classmates.
3. **Response to questions (5 pts)**. Answer questions about your work.

General guidelines

Some comments about this assignment:

- You may choose any ocean or atmosphere data that you like. This could be data that you have looked at for research, or something that your current advisor suggests, or data that you simply pull from the internet. If you have doubts, please come talk to me.
- This exercise will make more sense if you choose data records that could plausibly have a physical connection: e.g. wind and upper ocean temperature, temperature at two different depths, air temperature and ocean temperature.)
- Some candidate data sets include (a) data from the Scripps pier, perhaps including some of the variables that we examined at the start of this quarter, (b) mooring data from the TAO, RAMA, or PIRATA arrays, (c) satellite or model fields. If you aren't sure what to do, please talk to me.

- The assignment comes in two parts. For December 11, please make a first pass at your analysis. This should be completed on your own, without collaborating with your classmates—probably not a big deal, since you should choose different data sets. I will provide feedback, and you should submit an updated version at the time of the final exam. The update should also not be collaborative.
- For the final exam time slot, on Wednesday, December 16, please prepare short a 5-10 minute presentation to share your data and interpretation with your classmates. Your presentation should explain the data that you chose, what you hypothesized you might find, and what your results show. You may talk to your classmates about the logistics of assembling an oral presentation.
- At least one person has already approached me about doing the final presentation early, on Friday, December 11. To keep December 16 from being too overwhelming, we could accommodate one to two additional people on December 11, so let me know if you'd like to present early. For early presenters, if you can share a preview of what you'll be presenting a few days in advance, I'll aim to get you feedback before your final presentation.