Exam 2: Once you've selected your driver time-series data, review the time-series analyses tutorials and run one model (unless you have really long-term data with no gaps, it will probably be the 'quantmod' peaks & valleys model). If you select 'quantmod', you have to set an ecologically meaningful threshold for your driver, and that threshold is a slope (magnitude change per unit time interval of your data). Play around with this, but chose a threshold that either makes intuitive sense or is something you can reference from a publication. For example, in the tutorial, Dr. Rudgers uses 20 mm per day of rainfall as a threshold because in the deserts of New Mexico this amount of rainfall induces plant physiological responses. Whatever threshold you chose sets the basis for the model to determine your peaks and/or your valleys. Valleys could be used for low-water and low-temperature events (e.g., droughts, cold snaps). The last part of the exam asks you to interpret your data (1-2 paragraphs) and describe the characteristics of your time-series pulses. I have provided a link to a paper that we haven't yet read but will later in the semester. It is an approachable paper that I believe will give you the background and vocabulary to explain some of your data trends. Here's the link to the Jentsch & White (2019) paper.

Analyze long-term data to test a question of your choice.

Instructions.

1) Choose a site from the LTER NetworkLinks to an external site. and identify a long-term driver dataset on climate (temperature, precipitation) or physicochemical (e.g., discharge, water level/depth, water chemistry, soil chemistry, elevation). Sign up and put links to the dataset here: https://docs.google.com/spreadsheets/d/11-LWXqQLkEOZ62dAS0I2Dz8RXVMZnT1Y3b6PyvvTQ1w/edit#gid=649090928.

2) Review the three time-series modules (videos, R scripts, example data) in the class Google Drive. The example data I shared are from the FCE LTER. https://drive.google.com/drive/folders/1U\_s0C\_s-W1rTeyl9hAwtOI1na7jZnafT?usp=share\_link

3) Try out the Peaks & Valleys module first, especially if your data are not continuous and daily. Try the Fourier module if you have continuous daily data (no gaps). Wavelets and Cross-Wavelets will be part of the Final Presentation & Write-Up and will include and analysis of both driver and response data of your choosing from the LTER site you select.

4) 10 points. Develop a question or questions that motivate the time-series analysis of the data you chose.

5) 50 points. Use a time-series model to analyze the data (pick one of the three models, or you may chose to use more than one model). Include the data, the R scripts, figures, and model output.

6) 40 points. Interpret the results of your data (in 1-2 paragraphs) using descriptions of the model output (qualitative and quantitative) and characteristics of pulse dynamics described in Jentsch and White (2019). https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecy.2734Links to an external site.

7) Upload your exam to Canvas as one file.