

Workshop 3_Timeseries Models

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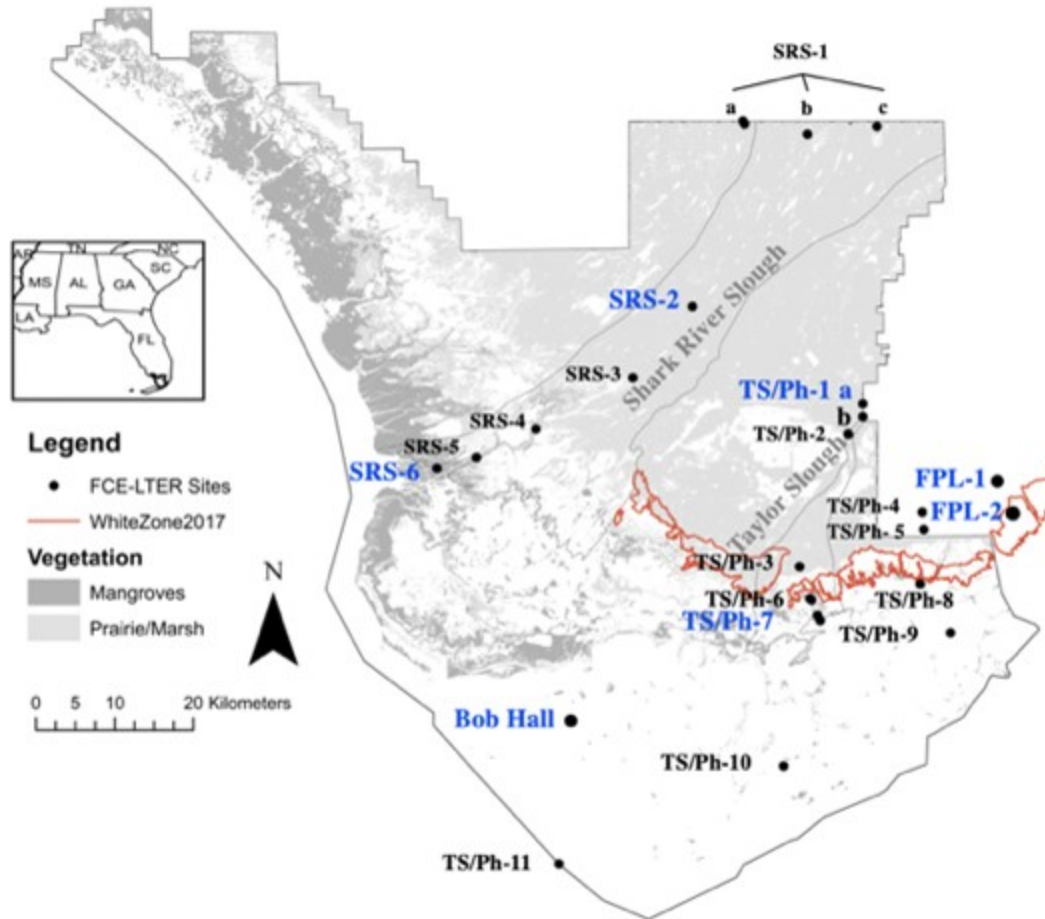
Objectives

The primary objectives of this analysis are to 1) examine the seasonality of net ecosystem exchange and 2) correspond abiotic parameters towards the phenology of the response variable.

Methods

Site Information

The study location is a mangrove shrub forest in the Florida Everglades. Sample locations are located along the Shark River and Taylor sloughs. The specific location of this study is TS/Ph-7 (Fig. 1). The Florida Everglades experiences two seasons (Wet and Dry) that has a significant effect on the temperature and salinity of the water.



Location of the current study within the Florida Everglades

Statistical Analysis

To assess the seasonality of net ecosystem exchange within the sample location, the dataset must first be converted into a time series. Outliers are removed prior to model decomposition to remove unrealistic values from the dataset. The variable is tested for stationarity to verify that is suitable for time series analysis. The model is then fit to a time series.

Once the seasonality of the net ecosystem exchange is established, environmental parameters are tested. maximum daily salinity, salinity anomalies, and maximum daily water temperature were chosen as environmental parameters to compare to our model. The same steps were taken to first evaluate the seasonality of the environmental parameters to verify they also follow assumptions.

Results (minimum of 1 plot and one table)

The original net ecosystem exchange had a single outlier that was removed prior to analysis (Fig. 2). Incorporating changes in salinity did not improve the model, but only considering salinities greater than 25ppt improved the model. The best model of those examined was that which included water temperature as the explanatory variable (Fig. 3; Table 1).

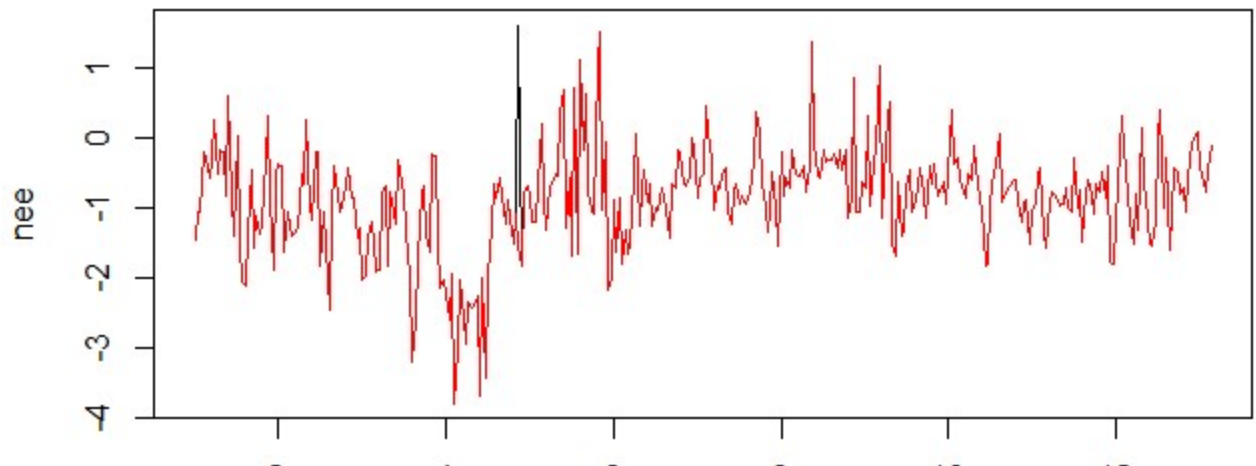
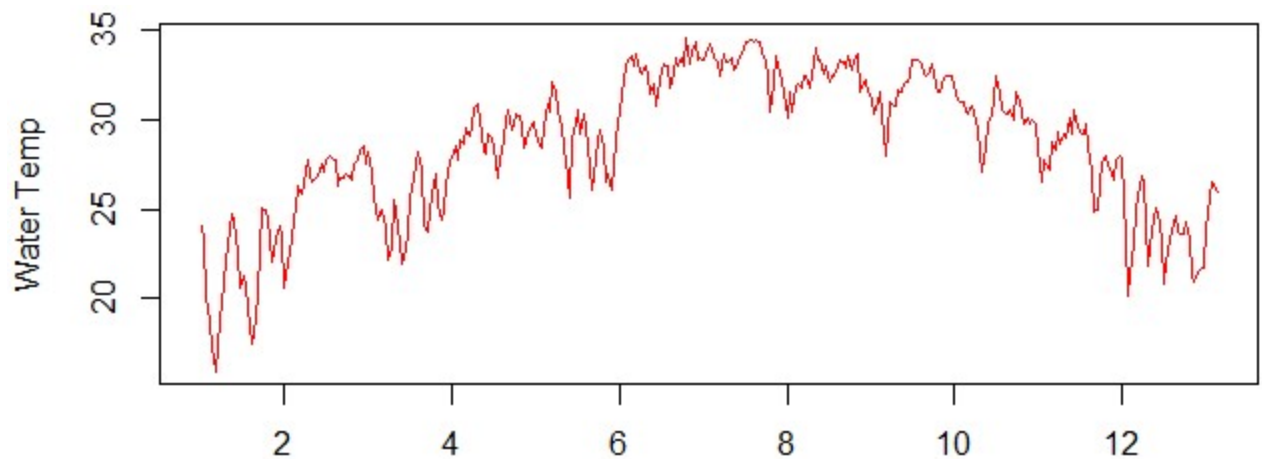


Figure 2. The net ecosystem exchange over time including the original dataset (black) and removed outliers(red).



The maximum daily water temperature over time showing seasonality

Model	df	AIC
NEE only	18	704.77
Salinity	12	706.19
Salinity > 25 ppt	9	700.57
Water Temp	9	698.22

Discussion (1 paragraph)

The Florida Everglades experiences wet and dry seasons, which influences the ecosystem services. Salinity and water temperature change on a seasonal basis, but water temperature produces the best model. Water temperature has a well-defined phenology and a wide range of values on an annual basis. The relationship between both water temperature and salinity over time is likely caused by the seasonal differences in precipitation that the ecosystem experiences. Therefore, both parameters

should improve the model in the same way. Adding more than one year to the time series may allow for an interannual comparison of net ecosystem exchange to environmental parameters, providing a more comprehensive analysis of the seasonality of NEE.