Alice Ren

Data I

November 9, 2017

HW 6

Collaborators: This week, I spoke with Channing Prend and Bobby Sanchez to complete the assignment. I also changed my viewpoint after discussion section with Dr. Sarah Gille.

1. The empirical error bars from the Monte Carlo process match the degrees of freedom of the number of segments + overlapping segments that I have. In this case, I had 20+19 = 39 segments. This was equivalent to 78 degrees of freedom. This is less than the 80 degrees of freedom that might be expected from using overlapping segments. However, it intuitively makes sense that with 39 close to independent segments (with the Hanning window emphasizing the middle of each segment, thus reducing the data that overlap from each segment), I could have 2\*39 = 78 degrees of freedom. The use of overlapping segments theoretically would not increase my degrees of freedom, since the same information is repeated in the overlapping segments. However, using overlapping 50% overlapping segments appears to reduce effects of having edges on each segment. The error was reduced when just using overlapping segments compared to no overlapping segments (no windowing). Neither table is great to use. Some attempts at testing ratios are presented in the Matlab code. [8/3 \*20] is miraculously close to the value of 39\*2, the number of degrees of freedom from independent and overlapping segments. The results should not change if I considered red noise. I think that the windowing impacts the error, but is not related to the shape of the spectrum.
2. For looking at roughly one month of pressure data taken at 361 second intervals, taking 2 segments or using a Hanning window is fairly comparable to using the entire record in terms of identifying the diurnal and semidiurnal peaks. Both the Hanning window (6 degrees of freedom) and 2 segments (4 degrees of freedom) are presented in figures.