Introduction, but actual motivation for tutorial:

To many, mosquitos are nothing more than a seasonal annoyance. However, mosquitos are important for their role in the transmission of human diseases. For example, the species *Aedes albopictus* is notable in North America for its ability to spread the West Nile Virus and its association with human inhabited urbanized environments (Rochlin et al. 2013). As the environment changes in response to global warming, it is likely that the ranges and habits of mosquitos like *Aedes albopictus* will also change. Differences in mosquito habits over time could put an increased number of people at risk for contracting mosquito-borne diseases, so it is important to investigate the various facets of mosquitos interacting with their environments.

This tutorial will provide a preliminary look at three different avenues of investigation. First, we will examine whether there is a relationship between mosquito species richness and latitude in the United States. The latitudinal diversity gradient (LDG) has been explored in other species such as shore fishes and African birds, but little work has been done on LDGs for mosquitos. Findings seem to suggest that factors such as the mid-domain effect and average temperature were useful predictors for LDGs. A study on African birds also found that examining species richness in latitudinal bands could be misleading on a continental scale (Jetz and Rahbek 2001, Mora et al. 2005). In this tutorial we will transform NEON data to construct preliminary models of mosquito species richness in relation to latitude. A second aspect of mosquito data under consideration is the Julian date of first occurrence for certain species of mosquitos. In particular in this tutorial we will be examining the species *Aedes albopictus* and *Culex tarsalis* because of their abilities to transmit diseases and their relative presence in the NEON data. Part of our analysis will focus on whether these two species of mosquitos are invading new areas of the United States and visualizing our results. Our third vignette will then focus on the abundance of mosquitos over time. As the environment changes in response to rises in temperature or changes in land use, it is possible that the number of mosquitos in these areas could also change. So to investigate this possible phenomenon, we will be creating preliminary models and visualizations.