Week 4 Exercise, due Wed wk 5

- Write a Matlab function which takes a (real) time series array of length N (can be any number of columns, fft will work on each), a timestep size dt, a shortest period pmin, and a longest period pmax, and returns a Fourier filtered version of those time series, in which only periods pmin to pmax are retained.

- Download the dataset filter_ex.mat from Vital (described as Week 4 Exercise data file), and load into Matlab - load('filter_ex.mat'). Make an image of it (with colorbar for scale).

- That dataset is artificial data containing a combination of noise, and a propagating signal which may be at period near 20 or 50 days. It is 1000 samples (one per day) at 100 positions (one per km).

- Try filtering the data to pass various bands of periods (including both broad and narrow ranges), and plot images of the results (with colorbars for scale).

- Identify the approximate period of the signal in the noise, and estimate its propagation speed.

- Discuss the qualitative results of applying filters of different widths, for periods where there is no signal, only noise, with illustrations from your experiments.