Analysis of Environmental Data: Introductions

Prof - Michael Nelson  
Office Hours  
Tues/Thurs 1 PM – 2 PM  
By appointment

TA - Anastasis

Learning Objectives Assessment due September 10th (Friday) worth 5% of grade, participation only

Course is about modeling and model thinking

Data  
 How to record data  
 Data types/scales  
 messy, noisy, incomplete data

Statistics  
 Dual Model Paradigm  
 Deterministic functions  
 Probability distributions  
 Quantifying uncertainty  
 The constellation of statistical models

Model Thinking

A model is a simplified version of reality

e.g.  
Sunrise/sunset times  
Seasons: expected phenology  
Tides and moon phase predictions  
Weather forecasts  
Mental geospatial models:  
 Layout of home/apartment  
 Streets of hometown  
Social cues  
Language?

System definition:  
a group of related natural objects or forces. A group of interacting bodies under the influence of related forces

Conceptual Model

Useful to identify important components and hypothesize interactions

Don’t have to be quantitative

Flow chart or conceptual diagram can be conceptual model

Phenomenological Model

Use quantitative tools to *describe* observed patterns

The form doesn’t have to reflect the structure of the underlying system

Mechanistic Model

Use quantitative tools to *describe* observed patterns

Use a known or hypothesized structure of the underlying system to specify the model form

Computing for Scientists

Key concepts:

File systems  
Path  
Graphical and text interfaces  
File formats

Key terms:

Files and directories  
absolute path, relative path  
home directory, working directory  
text files, binary files, archive files  
file extensions and application associations  
Operating system: Graphical user interface and command line interface

A **file system** is kind of like a map that your computer uses to organize files and directories on a data storage device.

**Directories**, aka folders, are containers that can hold files or other directories

A **file** is a collection of information that is stored as a single, discrete unit on your computer

An *absolute* path gives your computer the map to find a file starting from the *root directory* of your storage medium. It is never ambiguous

A *relative* path provides a map starting at the current *working directory*. A working directory is just the directory is just the directory that a program is currently pointing to.