Course Announcement – Fall 2016
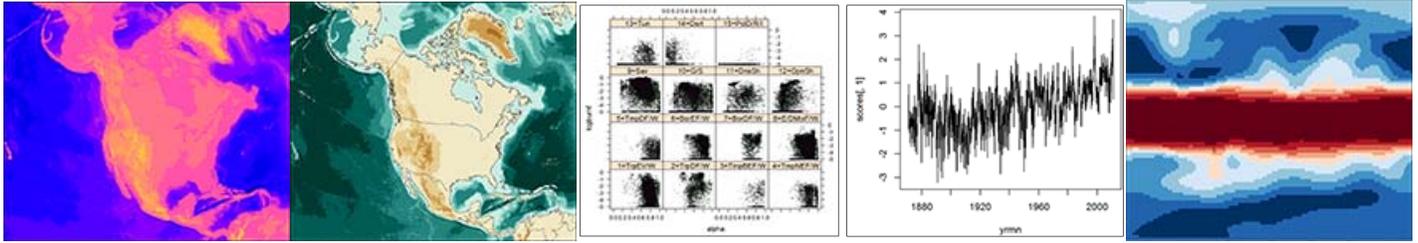

R for Earth-System Science

GEOG 4/590: Fall 2016, 12:00-13:20 Tues & Thurs, 207 Condon Hall
Instructor: Pat Bartlein, bartlein@uoregon.edu, 154 Condon Hall, 6-4967, office hours 2-3p W

Overview: Research in Earth-System Science (ESS) typically involves the analysis and display of large data sets from observations (including reanalysis data sets), satellite and other sources of remote-sensing imagery, or model output. A large array of tools and approaches exists for analyzing those data, and each has its own set of advantages and disadvantages. The R language and data-analysis environment is particularly well suited for analyzing Earth-system data because it includes a large number of analysis packages, many specifically adapted for coping with the characteristics of "big data" like high dimensionality and resolution. In addition, geospatial analyses, that previously required stand-alone GIS programs, are well integrated into R, and R also has the facility for reading, writing and managing netCDF and HDF data sets—the standard way of storing ESS data. This course will review the basic applications of R for data analysis and visualization, the management of large data sets, geospatial analyses, and some representative analysis of ESS data sets. We will also discuss the use of R Markdown for doing "reproducible research."

Prerequisite: GEOG 4/581, or consent of instructor (e.g. an introductory statistics or data-analysis course). The course will be run like a seminar/practicum, with students responsible for analyzing and presenting an analysis of a typical data set.

Potential topics include:

- R, RStudio, Microsoft R Open
- reproducible research with R Markdown
- basic data analysis and visualization
- data structure and reshaping
- Earth-system science data sets (netCDF and HDF)
- data sources (ESGF, Obs4MIPS, TDS and OPeNDAP, NOAA CDO, BADC)
- display and visualizatoin
- geospatial analyses
- multivariate methods for exploration and dimensionality reduction and clustering
- "statistical learning" and model building
- (other proposed topics are welcome)