September 26, 2006: NCEAS Spatial Analysis Use Case (formerly Case Study) List Ver 2.0

Based on discussions with NCEAS Informatics teammates and NCEAS associates, here is a revised set of Use Cases for the Geospatial Data Analysis seminar.

1) **Cartography and publication-quality map production: comparison of open source and commercial GIS packages**
    - **Objective: Produce a "ready for publication" map (displaying your data).**
    - **Demonstrate map design/production using four common analytical tools (compare and contrast the map quality available through each tool):**
        a. **ArcMap GIS**
        b. **GRASS GIS**
        c. **MATLAB**
        d. **R**
2) **Spatial Covariates for Invasive Species migration study.**
    - **Based on: Bill Morris / Biotic Interactions / Invasive Species dataset**
    - **Identify and acquire relevant spatial data sets: 5 Northwestern states**
    - **Objective: Demonstrate construction and use of vector-based GIS database on two platforms**
    - **Construct a geospatial database using varied data sources.**
    - **Select and use spatial analysis methods to compute new data layers (e.g., land use cover statistics).**
3) **Analysis of NOAA *SeaWIFS* satellite imagery: Measure location of coral reefs in nutrient upwelling areas. Techniques:**
    - **GIS Database construction using Remote Sensing data**
    - **Information extraction algorithms for measurements from RS imagery**
4) **Spatial Statistics 1: Center the example on Spatial Regression**
    - **Details TBA**
5) **Spatial Statistics 2: Center the example on Spatial Autocorrelation**
    - **Details TBA**
6) **Acoustic krill signature along transect: Data display and analysis**
    - **Based on: Jim Lovvorn / Marine birds' food sources**
    - **Objective: display and analysis of specialized non-standard spatial dataset**
    - **Creating and adapting tools for visualization and analysis of such data**

7) Drainage Network Modeling using GIS

- **Based on: Marjorie Brooks stream habitat research.**
- **Demonstrate calculation of basic metrics on a (stream) network data set**
  - **Extendable to other types of network (line) data types**
- **Compare ESRI, GRASS, MATLAB, R tools**

8) Species Habitat analysis with Voronoi polygons. Techniques:

- **Objective: using analytical software package to model a spatial process**
- **Based on: John Drake invasive species distribution model (central US)**
- **Use R language to create new vector (polygon) data layer from point measurements**
- **Use R geospatial methods to measure and analyze the polygon data set**
- **Note: Geospatial analysis WITHOUT using GIS software.**

9) Computer simulation of two-dimensional spatial processes

- **Objective: Implement spatial modeling algorithms with custom-designed software (when standard packages like MATLAB don't work)**
- **Brad McRae: CIRCUITSCAPE genetic migration code OR**
- **Tomasso Zillo: Forest cover propagation simulation**

10) Integrate RDBMS with Geospatial / GIS databases

- **Objective: Show when necessary, and how to augment GIS database component with a full-featured RDBMS**