STATISTICAL SOFTWARE FOR
TIME SERIES ANALYSIS

Paul Marshall and Daniel Swets
Augustana College
Sioux Falls, SD

ABSTRACT

Images derived from satellite sensors can provide a unique vantage point for studying global seasonal dynamics that have implications for global change issues, such as urbanization, drought monitoring, habitat changes, and land cover/land use changes. These two-dimensional spatial images are taken at regularly spaced, points in time, making a three-dimensional product that can be used for studying changes at a regional, national, or global scale. Trend analysis of temporal images is a fundamental tool in these studies. Statistical software, such as S-Plus and SPSS provide for sophisticated statistics on lower dimensional datasets, but are limited in their ability to provide for trend analysis on these stacks of two-dimensional images. The data volume and the format of the satellite imagery make adapting the commercial software packages untenable. On the other hand, sophisticated image processing software such as ENVI or Imagine lack the capability of sophisticated statistical tests. Statistical tests, like the Mann-Kendall test, provide a non-parametric approach to analyzing trends, such as increasing or decreasing trends in plant production as estimated from satellite imagery. In this project, we developed software to meet this need.

Continuity of vegetation index data derived from moderate resolution satellite imagery is critical to providing a context to compare data from future missions. The software contributed to the assurance that the transition from satellite system to system will be transparent, i.e., there will be no abrupt shifts in the data values collected from vegetation imagery between the sensors.