ABSTRACT

Landscape stability and resilience can be conceived as the ability of ecosystems to maintain stable states over time and to respond to disturbances. In this study, we investigated the temporal distributions of four variables: NDVI, PDSI (the Palmer Drought Severity Index), climatic data, and spatiotemporal data on vegetation productivity. We used a combination of spatial and temporal analyses to investigate the highly variable landscape of the Mogollon Rim area. This area is characterized by a complex interplay of human and natural factors that influence vegetation productivity.

INTRODUCTION

The images below show the process of using kriging and semivariograms to determine the level of spatial autocorrelation in the NDVI Diversity map. The distance at which spatial autocorrelation occurs is a measure of the distance one would have to go to find absolutely no correlation in diversity values. The first image shows the NDVI Diversity map as an autocorrelation plot. Since each displayed considerable seasonal variation, I used SYSTAT’s “SEASONADJ” routine to remove seasonal effects from the data (using a 12 month periodicity.) New autocorrelation plots were then generated, and first order temporal lags removed from the data. For each variable pair, I then generated cross correlation values as shown in the PcP time series plot to the left.

TIME SERIES ANALYSIS (TSA):
Determining Temporal Lags of Relevant Variables

Mean Palmer Drought Severity Index

Averaged Monthly NDVI in Study Area

Climate Change
Figure: shows the process of using kriging and semivariograms to determine the level of spatial autocorrelation in the NDVI Diversity map. The distance at which spatial autocorrelation occurs is a measure of the distance one would have to go to find absolutely no correlation in diversity values. The first image shows the NDVI Diversity map as an autocorrelation plot. Since each displayed considerable seasonal variation, I used SYSTAT’s “SEASONADJ” routine to remove seasonal effects from the data (using a 12 month periodicity.) New autocorrelation plots were then generated, and first order temporal lags removed from the data. For each variable pair, I then generated cross correlation values as shown in the PcP time series plot to the left.

PROSPECTS FOR FUTURE STUDY

This study is an initial step in investigating the spatial and temporal variability in vegetation productivity as measured by satellite NDVI to determine the underlying patterns in the data that are the output of principal components analysis. The results show that the principal components are not random and that the patterns are not due to chance. However, further analysis is needed to determine the underlying patterns in the data that are not due to chance.

DeSERTS AND CONCLUSIONS

The results of this study are encouraging, and the following steps can be taken to improve the data analysis and interpretation. First, vegetation productivity should be measured using a combination of different methods, such as field observations and remote sensing. Second, the data should be standardized to remove the effects of anthropogenic and natural disturbances. Third, the spatial patterns should be compared to other datasets, such as climate and soil data, to determine the underlying patterns in the data that are not due to chance.

PICTURES

This graph displays the diversity of archaeological sites with respect to Mean NDVI and NDVI Diversity by biotic community. The significance test demonstrated that archaeological sites pattern non-randomly with respect to productivity stability as measured by NDVI diversity from satellite data.