

BIOS 737 Fall 2019
Project 1
Comparing Patterns in Anasazi Settlements on Northern Black Mesa
due October 2

Background

The Anasazi (or Ancestral Puebloans) represent an ancient group of Native Americans who thrived in the American Southwest during the period from approximately 1000 B.C.E. to 1050 C.E. Their descendants make up many of the Pueblo tribes of today including the Hopi and Zuni. The Anasazi are often known as “cliff dwellers” due to elaborate structures built in to canyon walls and cliffs (e.g., Mesa Verde in Colorado), but ranged widely over New Mexico, Arizona, Colorado, and Utah. Many archeological studies of their past residential sites reveal a sharp growth in population between 1000 C.E. to a sudden and fairly simultaneous abandonment of most sites around 1050 C.E. There is great interest into possible patterns in the growth and subsequent dispersal of the Anasazi during this period.

In northwestern Arizona, the Peabody Coal Company obtained a lease to mine for coal in an area known as Black Mesa. U.S. legislation requires survey and study of historic and prehistoric resources before they are disturbed by major construction, mining projects, etc. Consequently, in the fall of 1975, a site inventory was conducted on the Peabody lease site. The survey involved teams covering the entire area and mapping any settlement sites. While some past settlements (particularly those predating the widespread use of ceramics) likely escaped detection, more than 700 sites were found. Sites were dated by pottery types (for those with ceramic artifacts) and tree-ring dating (dendrochronology). We are interested in about 500 of these site locations from two different time periods, one prior to the sudden population growth, and one spanning the time from the population growth to the abandonment of settlements around 1050 C.E.

You may work with others in the class. Each person must write up her/his own report and list all of those working together

The Data

There are two data sets on Canvas:

- `anasazi.old.txt` contains site locations dated between 850 and 949 C.E.
- `anasazi.new.txt` contains site locations dated between 950 and 1050 C.E.

Goals

Your goal, as a consulting spatial statistician, is to compare the spatial patterns in the two sets of sites and test hypotheses regarding whether the two patterns are the same. Questions of particular interest include:

- Do the sites appear to be (uniformly) randomly distributed in the study area?
- If the patterns are significantly different, where are they different?
- What is the spatial scale of any observed clustering or regularity? (You don't need to provide an exact statistical estimate, but rather a description of distances at which you observe clustering and/or regularity)

What to turn in.

Write a report with the following sections:

- Introduction **10 points** (2-3 paragraphs outlining the data set and questions).
- Methods **20 points** (3-4 paragraphs describing the questions you want to answer and what statistical methods you will use to answer them)
- Results **20 points** (Give and describe maps of the two sets of points, and graphs and results of your analyses.)
- Conclusions **20 points** (2-3 paragraphs summarizing what you found)
- Appendix. **10 points** A listing of your **R** code.