

Purpose:

This assignment looks at the portion of precipitation that is lost as evapotranspiration in a watershed. The area of interest is in Albuquerque, New Mexico, a dry and arid climate region that is highly different from the temperate forested Fall Creek, Ithaca, New York area. Theoretically, the evapotranspiration from this area should be quite low considering the precipitation is also low; there is not much precipitation for the watershed to evapotranspire.

Method:

USGS streamflow data is obtained for the Albuquerque region from 1950-2016. Daily volumetric flow values were converted into flow depth in mm/day using the surface area of the watershed. Using a precipitation dataset from the NOAA NCDC land based stations, evapotranspiration is calculated.

$$S = P - ET - Q \quad (1)$$

Assuming S_t is 0 for a watershed over the course of a year,

$$ET = P - Q \quad (2)$$

Where:

S is storage of the watershed

P is precipitation

ET is evapotranspiration

Q is streamflow

A third parameter of the ratio of evapotranspiration to precipitation is calculated by simply dividing ET/P . In the figures that follow, a parameter of precipitation, evapotranspiration, or ET/P is plotted against time and a linear model is fitted to the data. The p-value for the data in Figure 1 below is 0.04211, statistically significant given our threshold of 0.1.

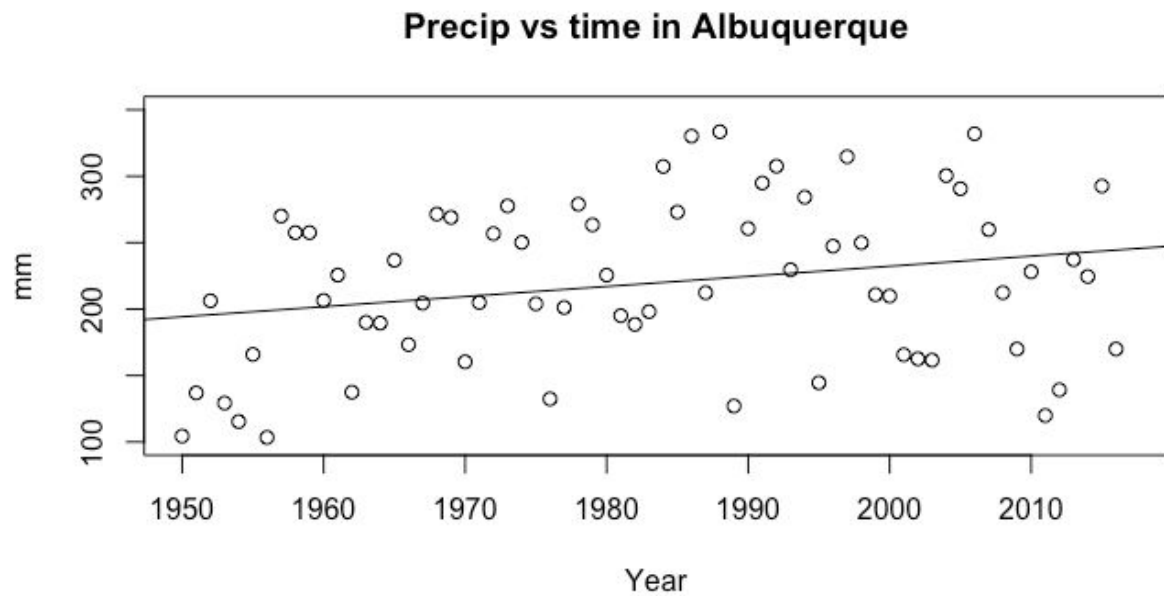


Fig 1. Precipitation vs. time in Albuquerque from 1950-2016

The p-value for the data in Figure 2 below is 0.04772, statistically significant given our threshold of 0.1.

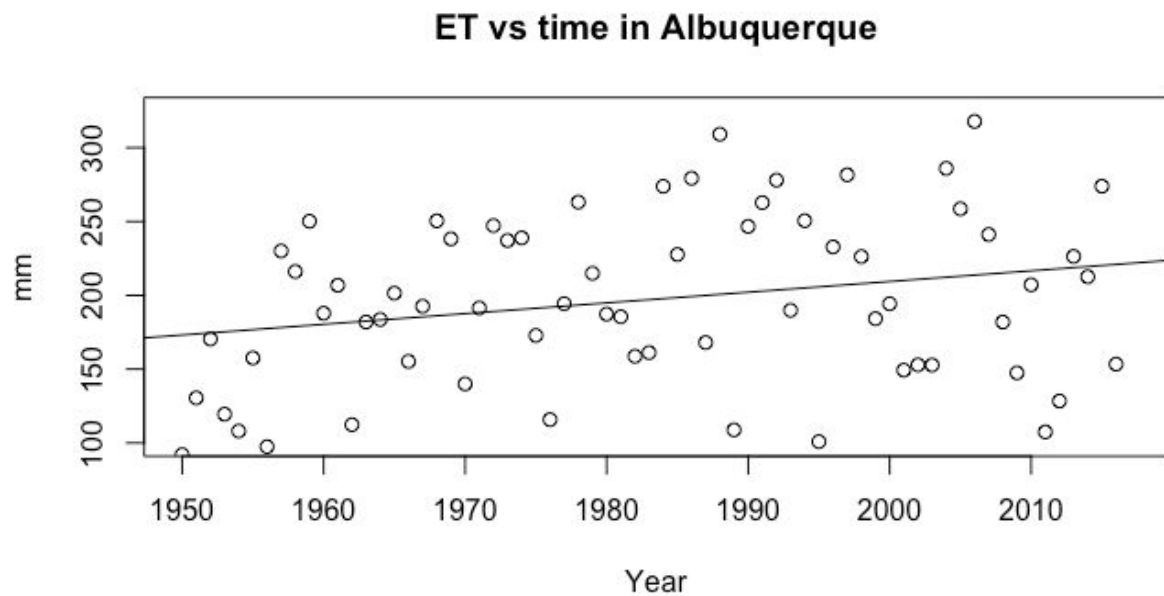


Fig 2. Evapotranspiration vs. time in Albuquerque from 1950-2016

The p-value for the data in Figure 1 below is 0.9262, which is not statistically significant given our threshold of 0.1.

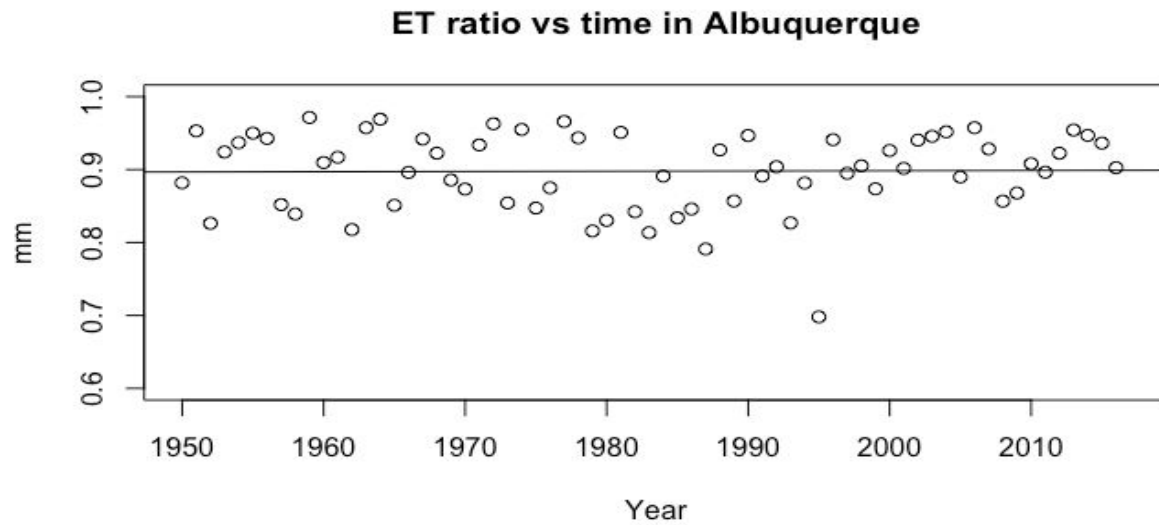


Fig 3. Evapotranspiration/Precipitation vs. time in Albuquerque from 1950-2016

Conclusion:

It is not accurate to fit a linear model to the precipitation, evapotranspiration, and ET/P data. The simple use of an F-test may not properly reflect larger patterns that the hydrologic regime is showing. Additionally, although the p values reflect that there is a correlation between the data vs time, the data is also very noisy. It is also curious how precipitation and evapotranspiration vs time are statistically significant but the trend in ET/P is not, given that it is a function of the previous two parameters.

