# Lab 7 - climate trend analysis

Due Friday 4/14/2023; 15 pts total

In this lab you are going to work with weather / climate data from the MSU weather station that has data from 1892 - now. You will use the Mann-Kendall test to determine if there are significant trends in various climate data and will also calculate the slope of any trend using the Sens's slope.

## Summary questions and deliverable

For this lab you will answer the following questions and submit your lab on D2L as a word doc. Insert tables and figures into your word doc as appropriate. Always provide a caption for any tables and figures.

1. Describe what the Mann-Kendall (MK) test does and what the Sen's slope is and why they are appropriate for climate data. (5 pts)

2. Provide a table (Table 1) of MK p-values and Sen's slopes over the entire period (1900 – 2022). (2 pts)

Table 1. **Provide a caption and fill in the units in the rows for the climate variables**. Indicate which values are significant by listing them in **bold** in the table.

|  |  |  |
| --- | --- | --- |
| **1900 - 2022** | Sens’s slope (per year) | p-value |
| Total P () |  |  |
| Min\_min T() |  |  |
| Max\_min T () |  |  |
| Min\_max T () |  |  |
| Max\_max T () |  |  |
| Avg T () |  |  |

3. For the average temperature provide a figure that has time on the x and average T on the y. Fit a stat\_smooth to this data "stat\_smooth(method = "lm")" (1 pt).

4. Provide a table (Table 2) of MK p-values and Sen's slopes **over the climate normal period 1990 – 2020**. Compare and contrast this to what you found (p-value and Sen’s slope) over the entire period from table 1. (2 pts)

Table 2. **Provide a caption and fill in the units in the rows for the climate variables**. Indicate which values are significant by listing them in **bold** in the table.

|  |  |  |
| --- | --- | --- |
| **1990 - 2020** | Sens’s slope (per year) | p-value |
| Total P () |  |  |
| Min\_min T() |  |  |
| Max\_min T () |  |  |
| Min\_max T () |  |  |
| Max\_max T () |  |  |
| Avg T () |  |  |

5. In this lab we have evaluated significance (i.e., MK p-values) in trends in climate data. For the data in Table 1, communicate: A) What this tells you about climate at the MSU weather station over the past 122 years. B) Describe any similarities and/or differences in the statistics (MK p-value and Sen's slope) for the entire record (1900 - 2022) vs. the normal period (1990 - 2020). (5 pts)