Assessing Climatological Impacts of Precipitation and Temperature at the NCAR Marshall Field Site from 1994-2018

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Introduction

The Marshall Field Site, located about ten miles southeast of Boulder, Colorado, is home to various precipitation and wind testing instruments to create data for the National Center for Atmospheric Research (NCAR).

Precipitation data has been recorded for nearly 30 years using three main types of instruments, the Ott Pluvio II rain gauge (2012), the Geonor Single Alter gauge (1994), and the Geonor double fence intercomparison reference (DFIR, 1999) gauge located in the southern region of the Marshall Site.

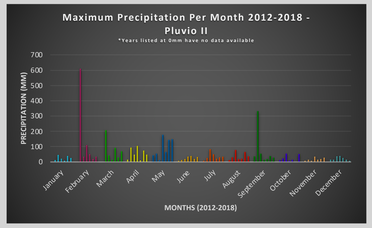
Methods

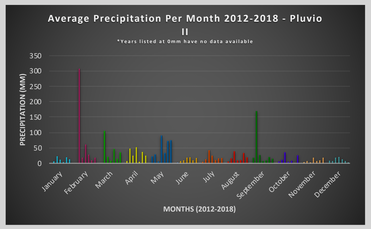
To further understand what trends the precipitation has caused over the years, data will be compared for each month of each year side by side to show the patterns that have occurred over the last three decades.

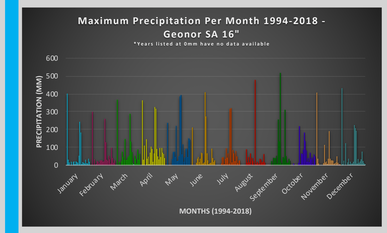
The data from the devices is sent to the Marshall site database, where the precipitation amounts are recorded in a Microsoft Excel spreadsheet and organized into charts.

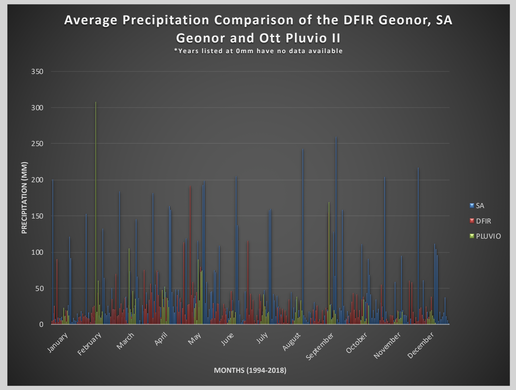
Two graphs will be created for each device showing both the maximum amount of precipitation and the average amount of precipitation. One graph will also be created displaying the 3 devices used stacking on top of each other to show the accuracy of the devices.

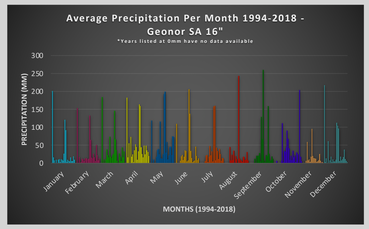
Visualization

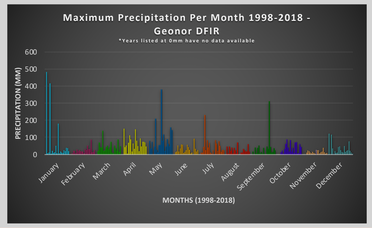


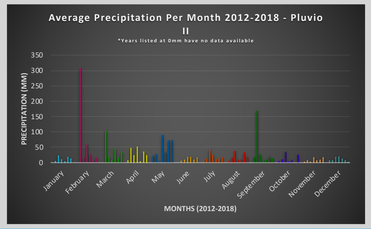












Instruments

Double fence intercomparison reference (DFIR)[2]

Geonor all-weather precipitation gauge [1]

Ott Pluvio gauge [3]

Conclusions

Average and maximum precipitation in each month has decreased steadily over the years.

While this is only a region covering northern Colorado, similar climates will have shown similar results.

The DFIR Geonor has the most accurate results of the three instruments, due to its protective wind shield.

What's Next?

Further data could show the trend the precipitation follows over the next 10 to 20 years, including more years of data from the Ott Pluvio II.

A script could be written for every single data point recorded on the Marshall database to find a more accurate average for each month.

Work to improve the reliability of the instruments at the Marshall field site.

References

[1] Geonor all-weather precipitation gauge. Retrieved from https://ral.ucar.edu/projects/marshall/Instruments/Geonor.html

[2] Double fence intercomparison reference (DFIR). Retrieved from https://ral.ucar.edu/projects/marshall/Shields/DFIR.html

[3] Ott Pluvio gauge. Retrieved from https://pubs.usgs.gov/wri/wrir034167/wrir034167.pdf

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