Assignment 6

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1 Answering Questions

Q: What is the average annual precipitation?
A: Average annual precipitation = 88.35 mm/year

Q: Do you notice any trends in the time series for air temperature and/or precipitation?
A: For air temperature: there is a cyclical, seasonal, trend due to the seasons (summer and winter) and for the precipitation: the only observable trend is that precipitation is most likely to happen at the winter solstice

Q: How reliable do think the data on precipitation and air temperature are? Discuss whether one might be more reliable than the other.
A: I think air temperature data is much more reliable compared to the precipitation data, specially that it is easy to get in-situ air temperature data almost anywhere as well as temperature exists everywhere, so data is available and the availability can make for good model validation. However, Saudi Arabia is considered a dry area in which rainfall doesn't occur as much, so I would assume precipitation data is lacking in comparison to temperature.

Q: What is the mean annual PE in mm/year?
A: Mean annual PE = 1819.9 mm/year

Q: Based on the mean annual PE, what is the volume of water potentially lost from the reservoir through evaporation annually?
A: Based on mean annual PE, the reservoir is losing 1.8199e-3 km/year, and since the area of the reservoir = 1.6 km squared.
So the volume lost is = 1.6 x 1.82e-3
= 2.91 km cubed / year
Q: Do you think evaporation from open water is generally higher or lower than evaporation from a grass surface?
A: I think evaporation from open water is generally higher due to the surface area that is exposed to sunlight. In open water environment, more water is exposed directly to sunlight leading to higher heat abosrption which promotes evaporation

Q: Do you consider 1.6 km2 to be a good estimate for the average area of the reservoir?
A: I think 1.6 km2 is a bit of overestimate, I measured the reservoir during the peak (dec) and supposedly minimum (aug) and the reservoir is always around 1.24 km2, but it is a very close estimate.
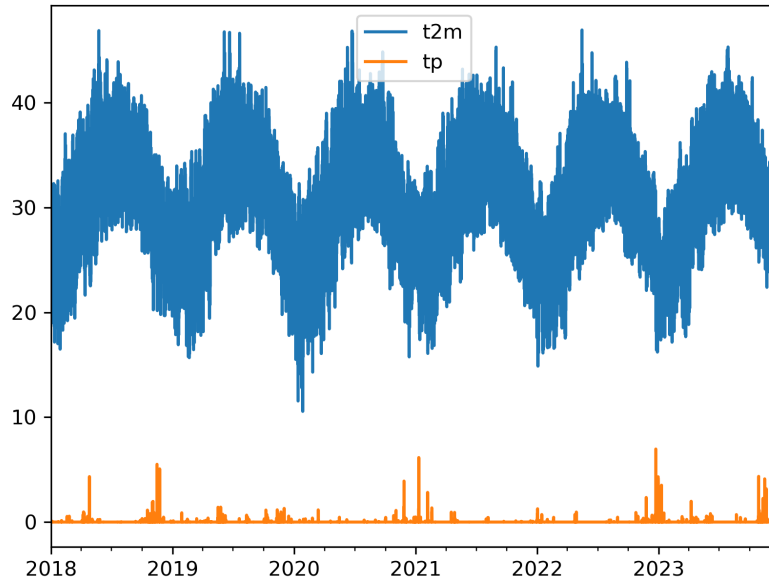
2 Plots

Figure 1: Hourly data of air temperature (t2m) measured in degree celsius, and precipitation (tp) measured in mm/hr
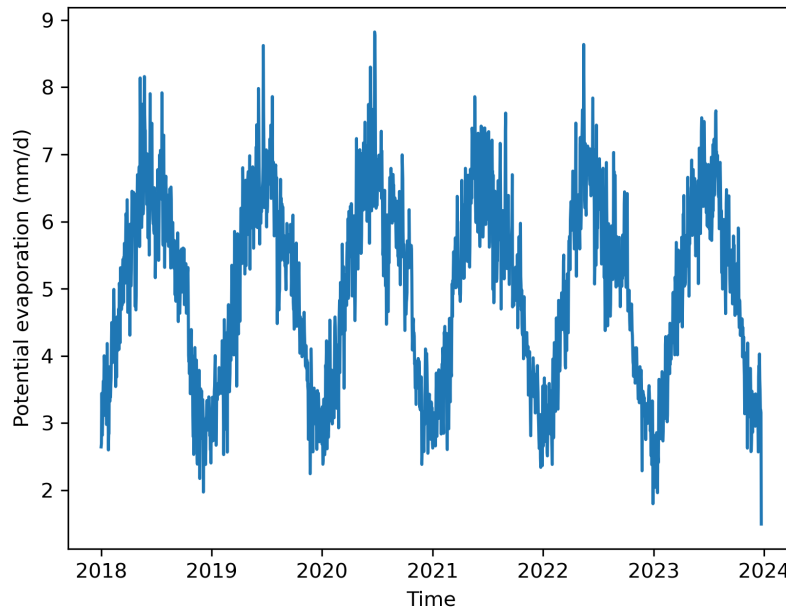

Figure 2: Daily data of potential evaporation from 2018 to 2024 calculated based on Hargreaves and Samani (1985) method; it is important to note that this calculation has not been adjusted using surface coefficient for simplicity

3   Additional info

Additional information and the code provided can be found on my Github account.

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Github

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