Flagging of missing rainfall events using surface soil moisture information

Motivation

Missing rainfall event is a common problem at weather stations that uses tipping bucket rain gauges. Existing methods usually fill missing records using data from surrounding stations. However, before one concludes that a missing rainfall has occurred and resort to filling it, there is a need to verify whether it is true that a missing rainfall event did actually occur. One method that has the potential to enable us flag missing rainfall events is in situ soil moisture information. Soil moisture content rises during a rainfall event before decreasing later on with time after the event and thus, soil moisture exhibits a positive relationship with rainfall. This relationship could be useful in verifying whether a rainfall event has occurred at a particular weather station.

Objective

Create a python function to flag missing rainfall events based on the changes in surface soil moisture storage.

Outcome

I want to create a python function that will provide a Yes / No response to the question of whether a rainfall has occurred at a particular weather station.

Sketch

Download raw daily rainfall and surface soil moisture data (.csv file)

Datasets without missing values

Import data and replace missing values

Export result to a new .csv file

Computed changes in moisture storage

Compute the changes in profile soil moisture storage

Create columns with date, storage change, rainfall occurrence