Univers Solar Advanced Analytics: Candidate Problem

You are being provided one year of data for a single inverter located somewhere in the world. The dataset has the following features (columns):

- Time / date
- Wind speed (m/s)
- Ambient temperature (deg C)
- Cell temperature (deg C)
- POA Irradiance (W/m^2)
- AC Power (kW)
- Rainfall (mm) --- note: the value presented here is a daily total… not a 5-minute total.

Associated with the dataset are the following parameters:

- Module temperature coefficient = -0.0045 (deg C^-1)
- DC Power Rating = 80 kW
- AC Power Limit = 70 kW
- Module Tilt = 15 deg
- Module Azimuth = 180 deg
- DC-AC Inverter Efficiency = 100%

You are also assumed to know the following relationship between the features and the expected AC power for the inverter:

- Expected AC Power = DC-AC Inverter Efficiency * DC Power Rating / G * POA Irradiance * (1 – Module temperature coefficient * (Reference Temperature - Cell temperature))
- where G = 1000 W/m^2 and Reference temperature = 25 deg C

Please compute the following (in order of increasing importance):

1) Module soiling rate (%/day) for the year --- a single value!
2) Uncertainty in the measured module soiling rate (%/day) --- also a single value!
3) Lost energy due to soiling (kWh)
4) Non-rain wash event date (there is only one!)
5) BONUS: Where in the world is this module located? (Only address this question if you've provided valid answers for #1-4)

Notes:

Please provide clean & and succinct Python code (any IDE) that others can understand and follow good software practices as much as possible. Additionally, any plots and/or comments that could help understand your method & and solution would be welcome. You are welcome to use any public and/or non-proprietary resources available to you.

It is also preferred that the above quantities be computed, but if that's too challenging, specify how this computation would be done, or perhaps do your best via an alternative (simpler) method.

Consider that we will evaluate your accuracy, coding skills and solar knowledge, but also how you deal with problems like this one, how you express yourself through coding and how fast you come back to us with the appropriate answers. Please send the .py codes, report and/or any relevant material you estimate. Be creative!

If at any point you get seriously stuck, please reach out to us for assistance.

Good luck!