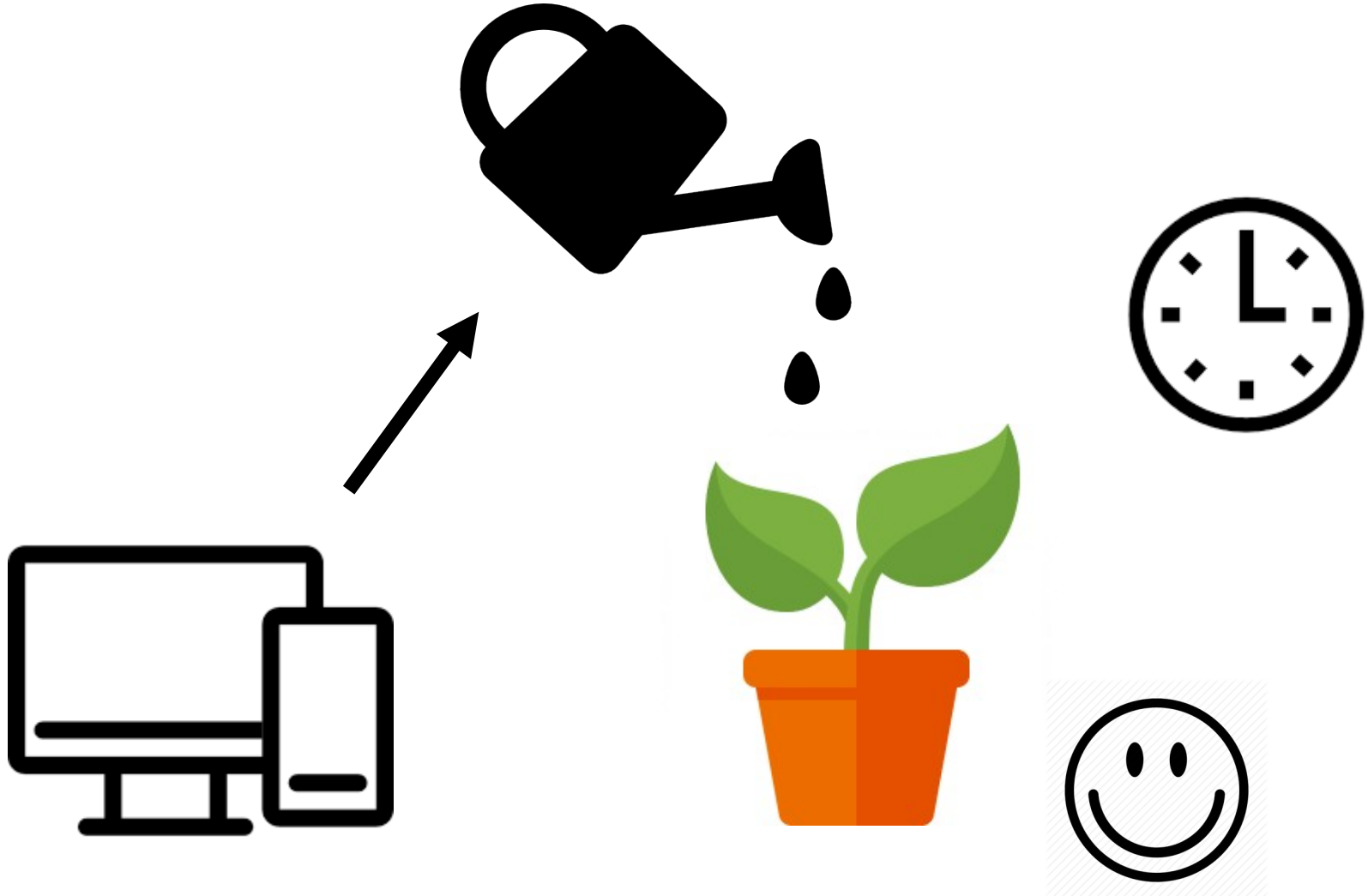
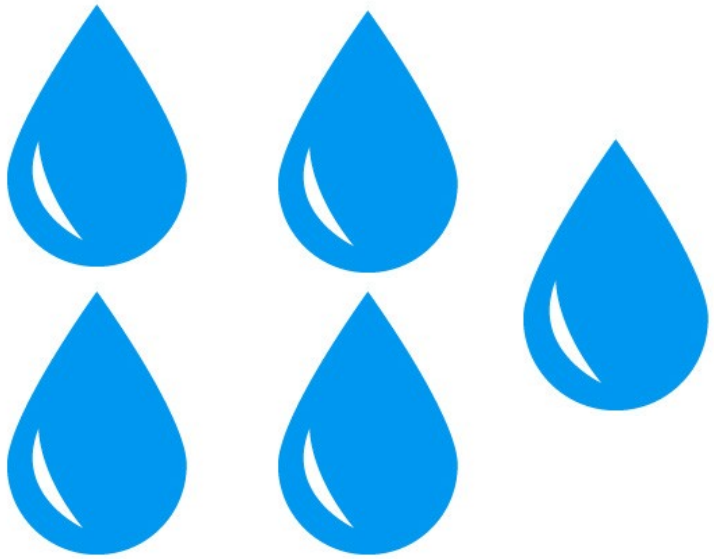
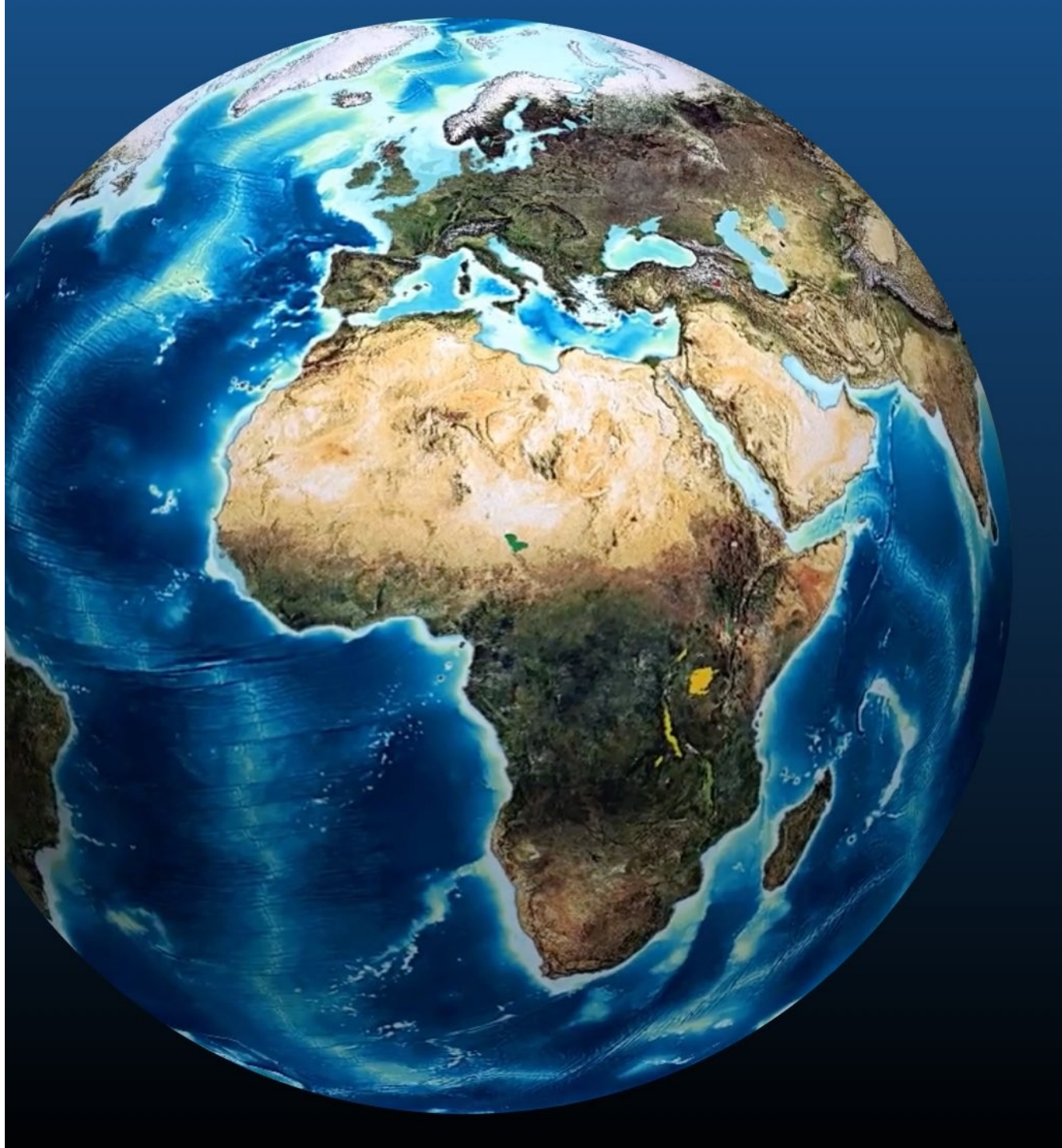
Water World

Adrien Chabert



200’000 km^3 of fresh water





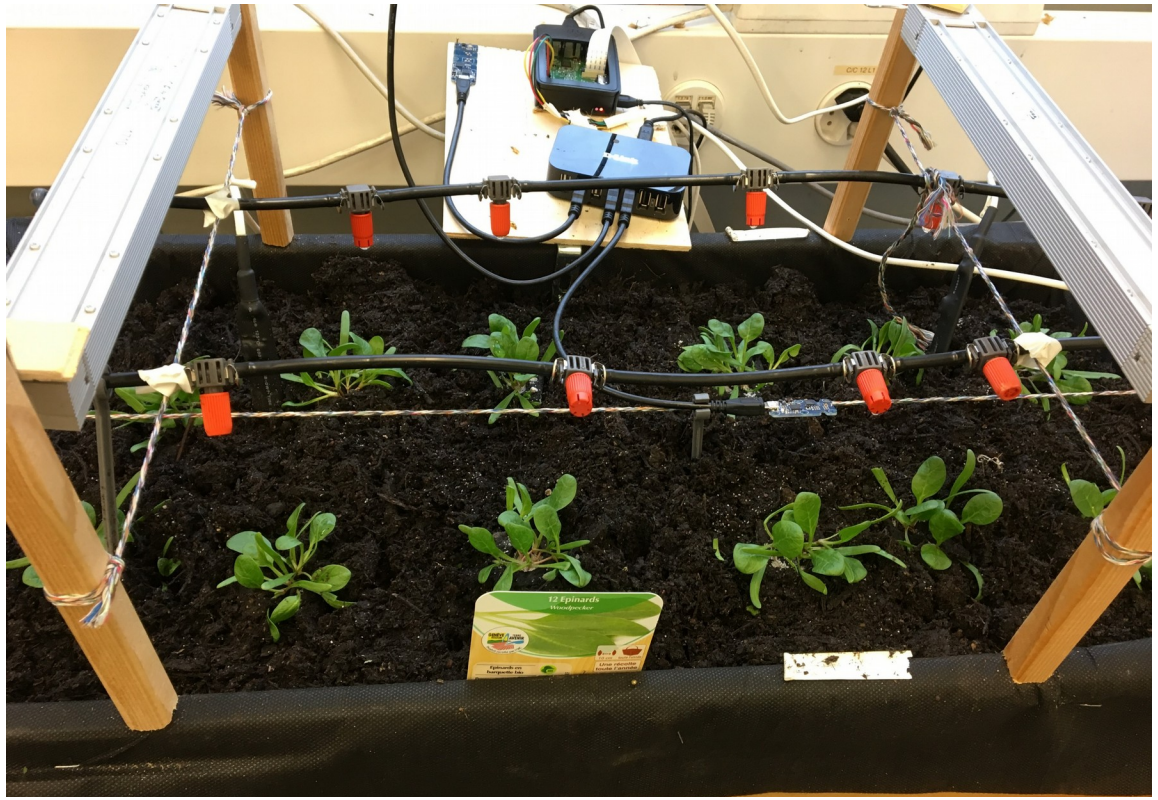
Research of Literature

Collect Data

Integration of Machine Learning Algorithm

Test our result

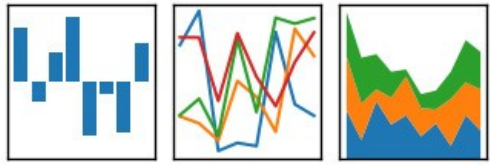
Create a watering program

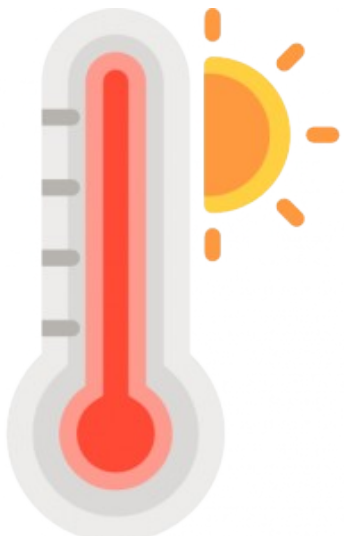


Basilic, onion, spinach

pandas

$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$





What I did with my data

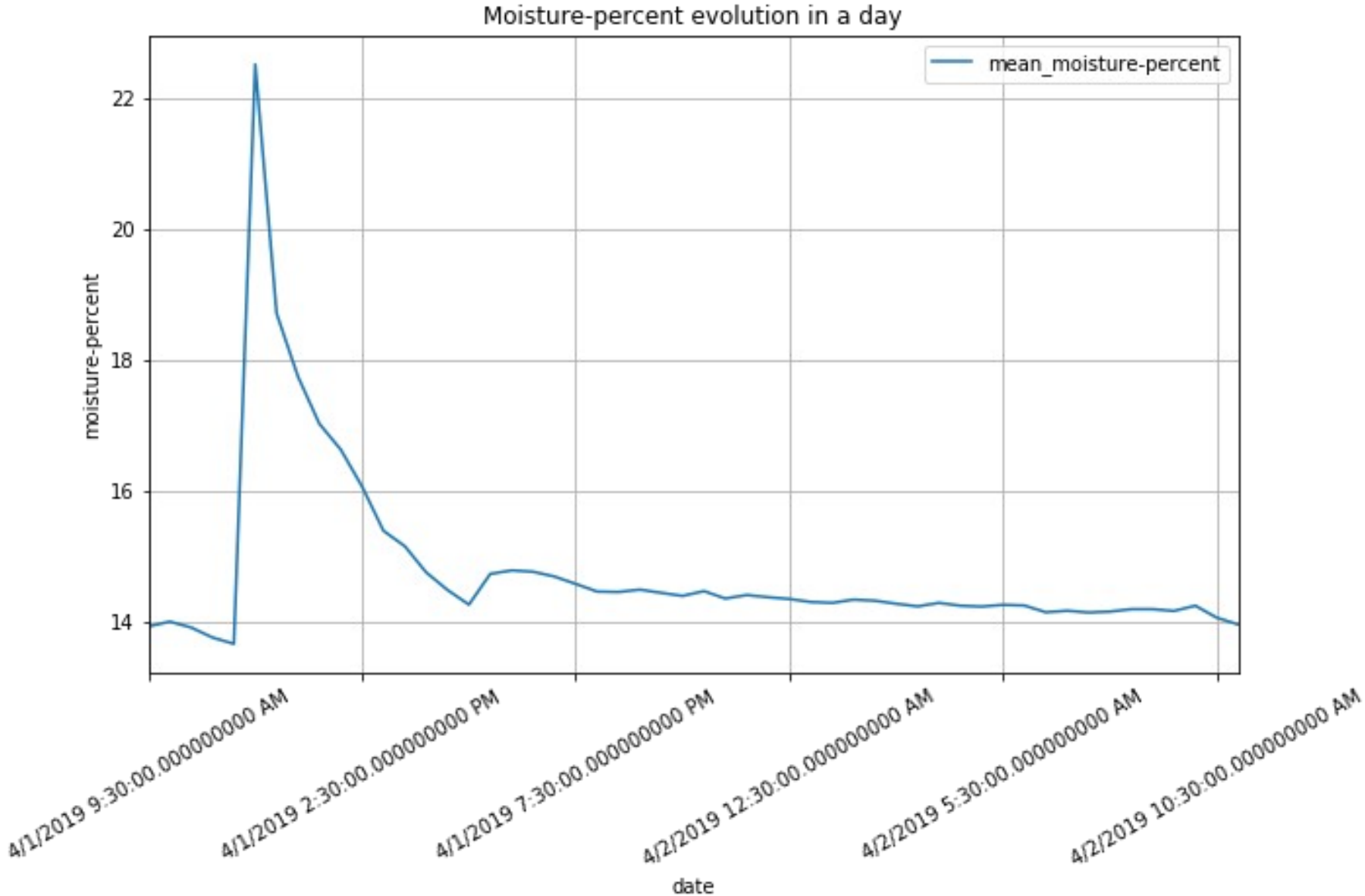
Reading data in dataframe

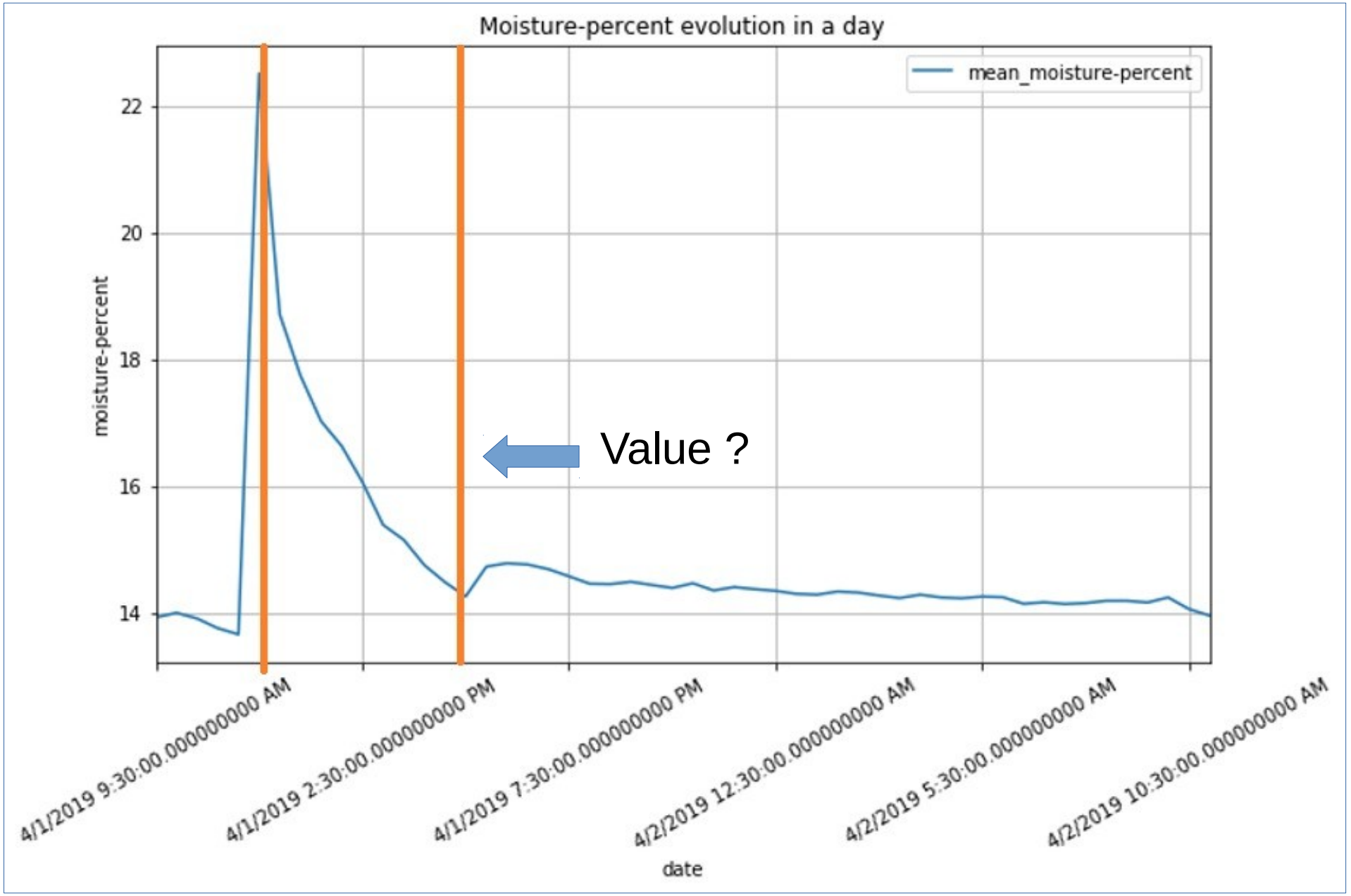
Add information on my dataframe

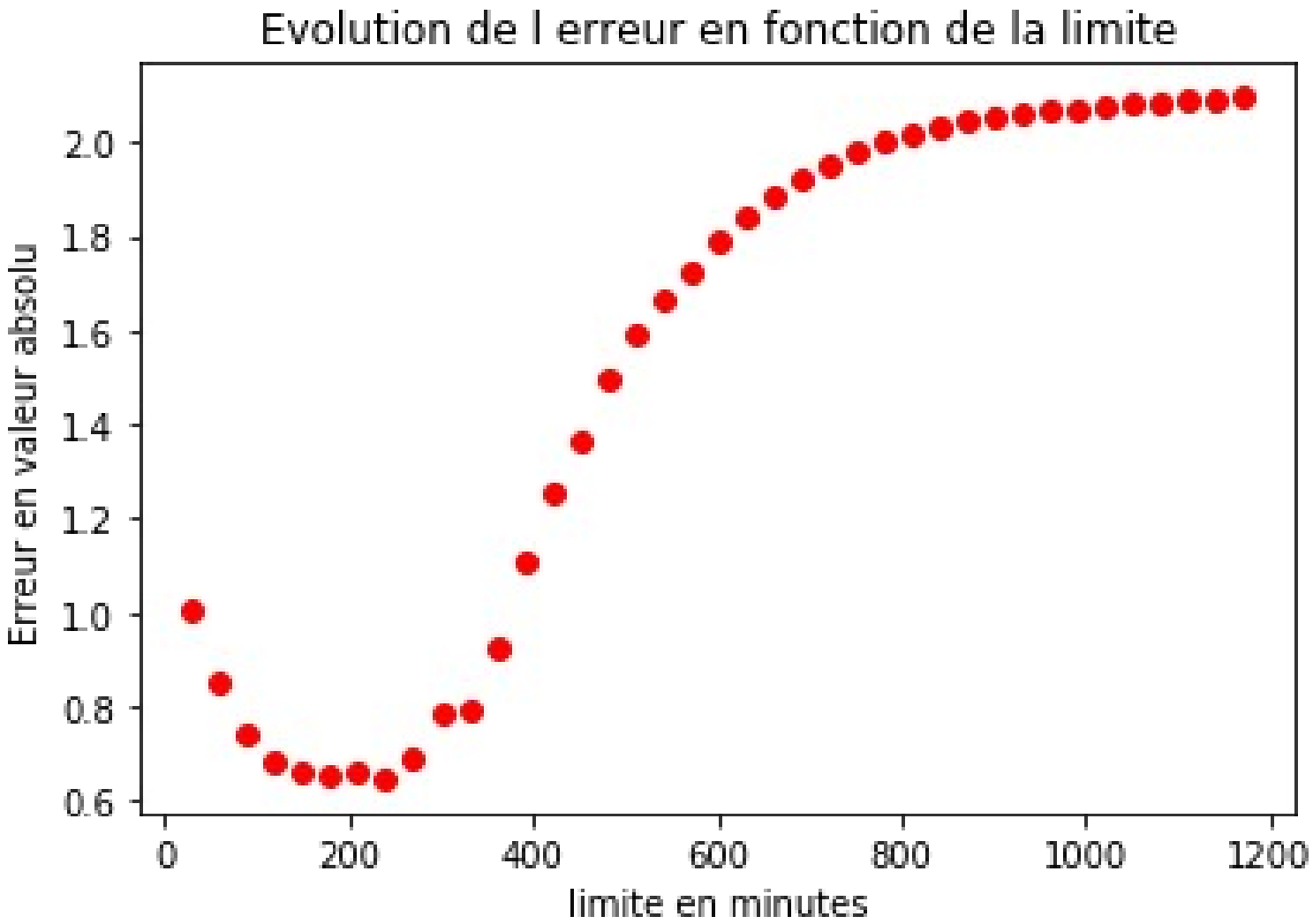
Eliminate NaN value

Implement some different strategy

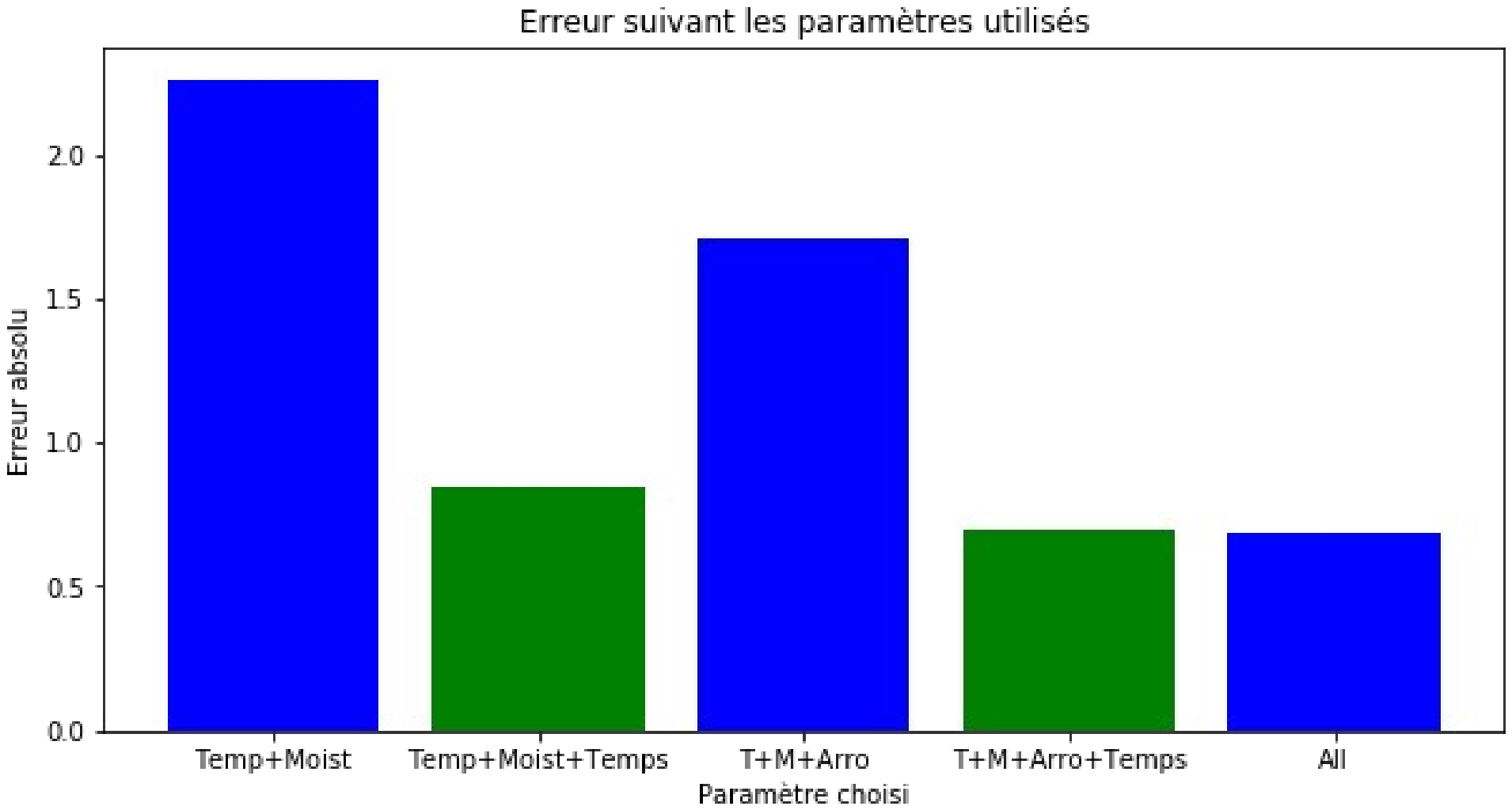
Analyse result


Moisture-percent evolution in a day
mean_moisture-percent
moisture-percent
22
20
18
16
14
4/1/2019 9:30:00.000000000 AM
4/1/2019 2:30:00.000000000 PM
4/1/2019 7:30:00.000000000 PM
4/2/2019 12:30:00.000000000 AM
4/2/2019 5:30:00.000000000 AM
4/2/2019 10:30:00.000000000 AM
date


Moisture-percent evolution in a day
mean_moisture-percent
moisture-percent
22
20
18
16
14
Value ?
4/1/2019 9:30:00.000000000 AM
4/1/2019 2:30:00.000000000 PM
4/1/2019 7:30:00.000000000 PM
4/2/2019 12:30:00.000000000 AM
4/2/2019 5:30:00.000000000 AM
4/2/2019 10:30:00.000000000 AM
date

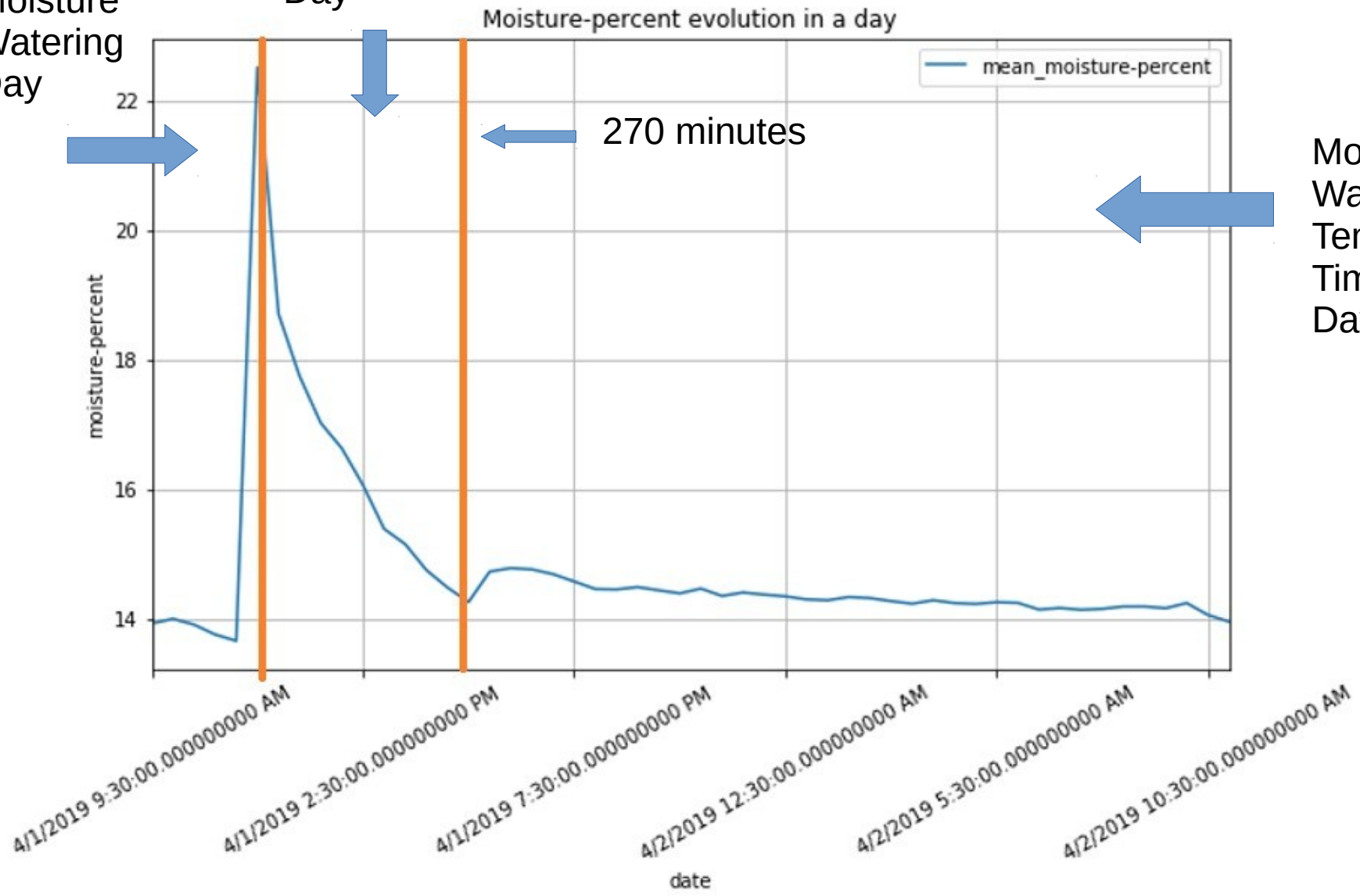

Evolution de l erreur en fonction de la limite
Erreur en valeur absolu
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0
200
400
600
800
1000
1200
limite en minutes

	date	mean_moisture-percent	mean_temperature	moistureAdd	temperatureAdd	Arrosage	TAfterArrosage	ArrosageHist	index
150	3/10/2019 10:30:00.000000000 AM	31.476667	24.918333	5.533333	0.161667	10	0	10	4
151	3/10/2019 11:00:00.000000000 AM	37.010000	25.080000	-1.550000	0.186667	0	30	10	4
152	3/10/2019 11:30:00.000000000 AM	35.460000	25.266667	-0.663333	0.968333	0	60	10	4
153	3/10/2019 12:00:00.000000000 PM	34.796667	26.235000	-0.223333	-0.628333	0	90	10	4
154	3/10/2019 12:30:00.000000000 PM	34.573333	25.606667	-0.250000	-0.285000	0	120	10	4
155	3/10/2019 1:00:00.000000000 PM	34.323333	25.321667	-0.440000	0.306667	0	150	10	4
156	3/10/2019 1:30:00.000000000 PM	33.883333	25.628333	-0.423333	1.411667	0	180	10	4


Erreur suivant les paramètres utilisés
Erreur absolu
2.0
1.5
1.0
0.5
0.0
Temp+Moist
Temp+Moist+Temps
T+M+Arro
T+M+Arro+Temps
All
Paramètre choisi

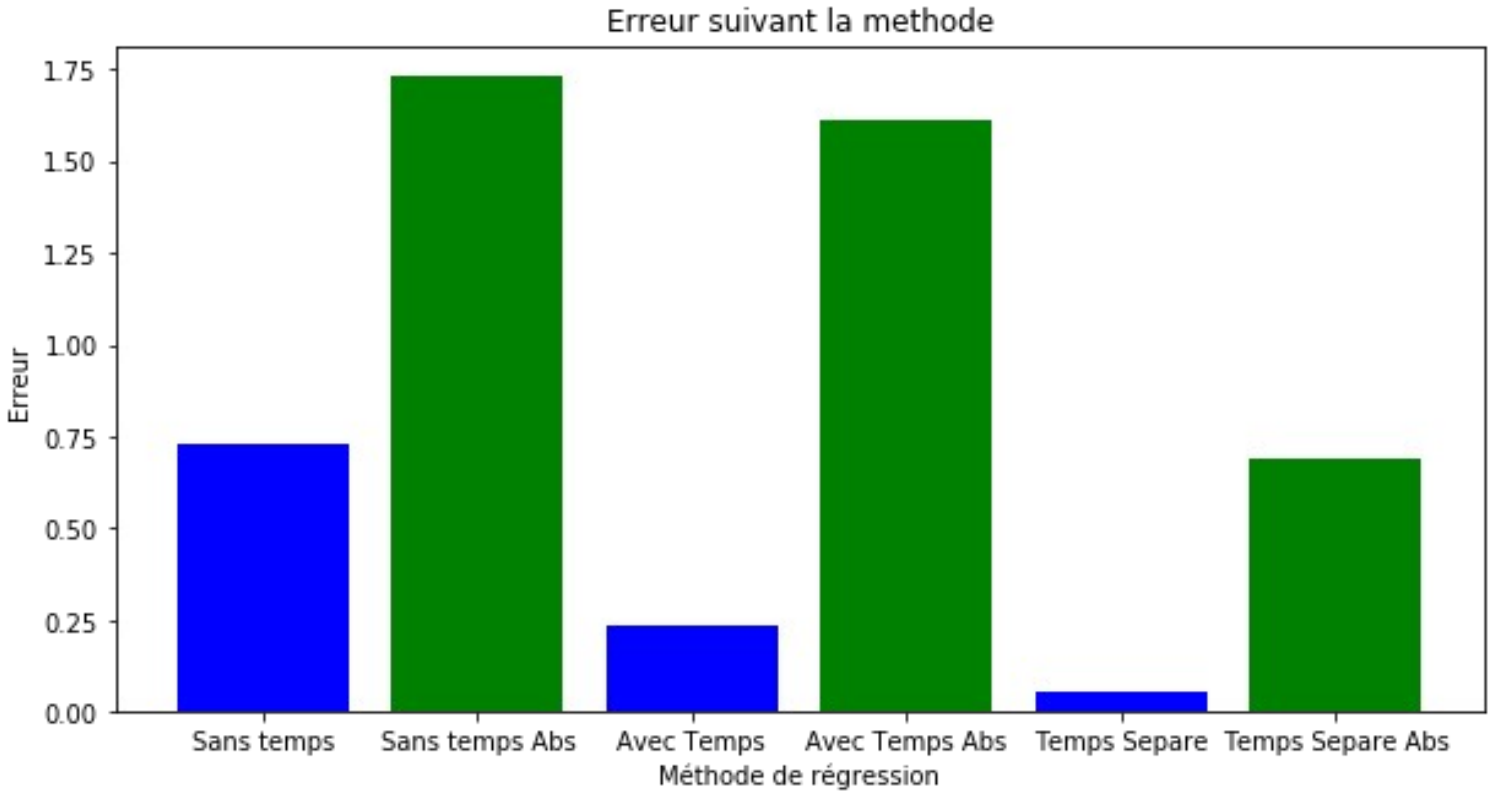
Moisture
Watering
Temperature
Time after watering
Day

Moisture
Watering
Day

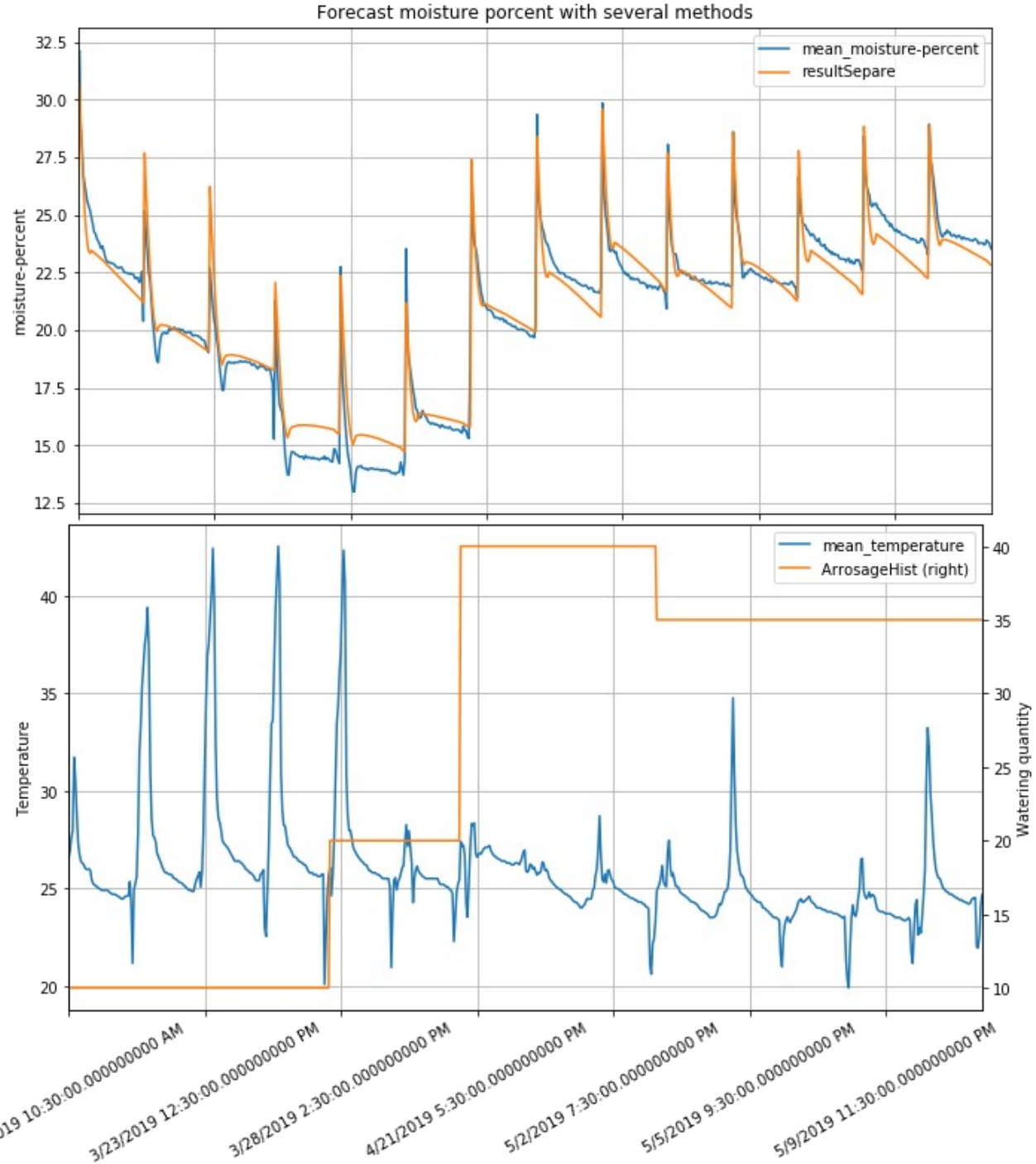


270 minutes

Moisture
Watering
Temperature
Time after watering
Day




```
Sans le temps :  -0.72907607234
Sans le temps absolue :  1.72805282656
Avec le temps :  -0.237446447338
Avec le temps absolu :  1.61026013894
Avec Temps Séparé :  -0.0575398672782
Avec Temps Séparé absolu :  0.690294389607
```


Forecast moisture porcent with several methods
mean_moisture-percent
resultSepare
moisture-percent
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
mean_temperature
ArrosageHist (right)
Temperature
Watering quantity
40
35
30
25
20
15
10
3/17/2019 10:30:00.000000000 AM
3/23/2019 12:30:00.000000000 PM
3/28/2019 2:30:00.000000000 PM
4/21/2019 5:30:00.000000000 PM
5/2/2019 7:30:00.000000000 PM
5/5/2019 9:30:00.000000000 PM
5/9/2019 11:30:00.000000000 PM

```
limite = 270
dfArrosage = df.loc[df['TAfterArrosage'] == 0]
tmp = df.loc[df['TAfterArrosage'] > 0]
dfStabilisation = df.loc[df['TAfterArrosage'] > limite].copy()
dfEvaporation = tmp.loc[df['TAfterArrosage'] <= limite].copy()
```

```
regLinearAro = linear_model.LinearRegression()
regLinearAro.fit(dfArrosage[['mean_moisture-percent','Arrosage','index']],dfArrosage.moistureAdd)
regLinearAro.intercept_
regLinearAro.coef_
```

```
array([ 0.00441217,  0.14478363, -0.09671637])
```

```
# Pour faire le régression linear sur le moment d'arrosage
regLinearEva = linear_model.LinearRegression()
regLinearEva.fit(dfEvaporation[['mean_moisture-percent','mean_temperature','TAfterArrosage','ArrosageHist','index']],
regLinearEva.intercept_
regLinearEva.coef_
```

```
array([-0.0138635 , -0.03098848,  0.00688307, -0.0071598 ,  0.00657351])
```

```
# Pour faire le régression linear sur le moment d'arrosage
regLinearSta = linear_model.LinearRegression()
regLinearSta.fit(dfStabilisation[['mean_moisture-percent','mean_temperature','TAfterArrosage','ArrosageHist','index']
regLinearSta.intercept_
regLinearSta.coef_
```

```
array([ -3.82657552e-03,   1.28949302e-02,   7.92834630e-07,
        -1.47368500e-03,   1.23629427e-03])
```

Watering Plan

Date	Demeter	Ceres
6-Mar	10 s/j	10 s/j
13-Mar	10 s/j	10 s/j
20-Mar	10 s/j	10 s/j
27-Mar	20 s/j	15 s/j
3-Apr	20 s/j	15 s/j
10-Apr	20 s/j	15 s/j
17-Apr	40 s/j	30 s/j
24-Apr	40 s/j	30 s/j
1-May	40 s/j	30 s/j
3-May	35s/j	20 s/j
9-May	35s/j	20 s/j
16-May	35s/j	20s/j
23-May	45s/j	10s/j
30-May		

Planning for the next 3 weeks

To move on with my final written report

To find a solution for temperature and high moisture

To create a watering programme

- Have a better presentation
- Be more flexible

Project Planning