In [1]:

```
conda install -c conda-forge fbprophet
```

```
Collecting package metadata (repodata.json): ...working... done
Solving environment: ...working... done

## Package Plan ##

  environment location: C:\Users\Affinity\Anaconda3

  added / updated specs:
    - fbprophet


The following packages will be UPDATED:

  anaconda                                 custom-py37_1 --> 2019.03-py37_0

The following packages will be SUPERSEDED by a higher-priority channel:

  ca-certificates    conda-forge::ca-certificates-2019.6.1~ --> pkgs/main::ca-certif
icates-2019.1.23-0
  openssl            conda-forge::openssl-1.1.1c-hfa6e2cd_0 --> pkgs/main::openssl-
1.1.1b-he774522_1

The following packages will be DOWNGRADED:

  certifi                                2019.6.16-py37_1 --> 2019.3.9-py37_0


Preparing transaction: ...working... done
Verifying transaction: ...working... done
Executing transaction: ...working... done

Note: you may need to restart the kernel to use updated packages.
```

In [1]:

```
pip install fbprophet
```

```
Requirement already satisfied: fbprophet in c:₩users₩affinity₩anaconda3₩lib₩site-pac
kages (0.5)
Requirement already satisfied: pystan>=2.14 in c:₩users₩affinity₩anaconda3₩lib₩site-
packages (from fbprophet) (2.17.1.0)
Requirement already satisfied: lunardate>=0.1.5 in c:₩users₩affinity₩anaconda3₩lib₩s
ite-packages (from fbprophet) (0.2.0)
Requirement already satisfied: matplotlib>=2.0.0 in c:₩users₩affinity₩anaconda3₩lib
₩site-packages (from fbprophet) (3.0.3)
Requirement already satisfied: numpy>=1.10.0 in c:₩users₩affinity₩anaconda3₩lib₩site
-packages (from fbprophet) (1.16.2)
Requirement already satisfied: Cython>=0.22 in c:₩users₩affinity₩anaconda3₩lib₩site-
packages (from fbprophet) (0.29.6)
Requirement already satisfied: holidays>=0.9.5 in c:₩users₩affinity₩anaconda3₩lib₩si
te-packages (from fbprophet) (0.9.11)
Requirement already satisfied: setuptools-git>=1.2 in c:₩users₩affinity₩anaconda3₩li
b₩site-packages (from fbprophet) (1.2)
Requirement already satisfied: convertdate>=2.1.2 in c:₩users₩affinity₩anaconda3₩lib
₩site-packages (from fbprophet) (2.1.3)
Requirement already satisfied: pandas>=0.23.4 in c:₩users₩affinity₩anaconda3₩lib₩sit
e-packages (from fbprophet) (0.24.2)
Requirement already satisfied: cycler>=0.10 in c:₩users₩affinity₩anaconda3₩lib₩site-
packages (from matplotlib>=2.0.0->fbprophet) (0.10.0)
Requirement already satisfied: kiwisolver>=1.0.1 in c:₩users₩affinity₩anaconda3₩lib
₩site-packages (from matplotlib>=2.0.0->fbprophet) (1.0.1)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in c:₩users
₩affinity₩anaconda3₩lib₩site-packages (from matplotlib>=2.0.0->fbprophet) (2.3.1)
Requirement already satisfied: python-dateutil>=2.1 in c:₩users₩affinity₩anaconda3₩l
ib₩site-packages (from matplotlib>=2.0.0->fbprophet) (2.8.0)
Requirement already satisfied: six in c:₩users₩affinity₩anaconda3₩lib₩site-packages
(from holidays>=0.9.5->fbprophet) (1.12.0)
Requirement already satisfied: ephem<3.8,>=3.7.5.3 in c:₩users₩affinity₩anaconda3₩li
b₩site-packages (from convertdate>=2.1.2->fbprophet) (3.7.6.0)
Requirement already satisfied: pytz<2020,>=2014.10 in c:₩users₩affinity₩anaconda3₩li
b₩site-packages (from convertdate>=2.1.2->fbprophet) (2018.9)
Requirement already satisfied: setuptools in c:₩users₩affinity₩anaconda3₩lib₩site-pa
ckages (from kiwisolver>=1.0.1->matplotlib>=2.0.0->fbprophet) (40.8.0)
Note: you may need to restart the kernel to use updated packages.
```

In [2]:

```
import pandas as pd
import numpy as np

import tensorflow as tf
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
import os

from fbprophet import Prophet

```

```
WARNING: Logging before flag parsing goes to stderr.
E0814 22:37:30.955180  8616 plot.py:39] Importing plotly failed. Interactive plots w
ill not work.
```

In [3]:

```
1 data=pd.read_csv("fuku_data")
```

```
C:₩Users₩Affinity₩Anaconda3₩lib₩site-packages₩IPython₩core₩interactiveshell.py:3049:
DtypeWarning: Columns (2,3,4,5,6,7,8,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,2
6,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,5
4,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,8
2,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,10
7,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,12
8,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,14
9,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,17
0,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,19
1,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,21
2,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,23
3,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,25
4,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,27
5,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,29
6,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,31
7,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,33
8,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,35
9,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,38
0,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,40
1,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,42
2,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,44
3,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,46
4,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,48
5,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,50
6,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,52
7,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,54
8,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,56
9,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,59
0,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,61
1,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,63
2,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,65
3,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,67
4,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,69
5,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,71
6,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,73
7,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,75
8,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,77
9,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,80
0,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,82
1,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,84
2,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,86
3,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,88
4,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,90
5,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,92
6,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,94
7,948,949,950,951,952,953) have mixed types. Specify dtype option on import or set l
ow_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

In [4]:

```
colum=data.iloc[135792,0:9]
colum
data=data.iloc[:-1,0:9]
data.columns=[i for i in colum]

data.head()
data.tail()
```

Out[4]:

	Date	Time	MP-1(microSv/h)	MP-2(microSv/h)	MP-3(microSv/h)	MP-4(microSv/h)	MP-5(microSv/h)
135787	2019/08/10	23:10	0.194	0.174	0.297	0.281	0.274
135788	2019/08/10	23:20	0.195	0.173	0.297	0.279	0.273
135789	2019/08/10	23:30	0.192	0.173	0.297	0.278	0.271
135790	2019/08/10	23:40	0.191	0.173	0.300	0.281	0.270
135791	2019/08/10	23:50	0.194	0.174	0.299	0.282	0.274

In [5]:

```
data["DateTime"]=pd.to_datetime(data['Date'] + ' ' + data['Time'])

#data['DateTime'] = data['DateTime'].astype('datetime64[ns]')

data=data.drop(["Date","Time"],axis=1)

cols = data.columns.tolist()
cols = cols[-1:] + cols[:-1]
data=data[cols]

data.head()
```

Out[5]:

	DateTime	MP-1(microSv/h)	MP-2(microSv/h)	MP-3(microSv/h)	MP-4(microSv/h)	MP-5(microSv/h)	MP-6(microSv/h)
0	2017-01-01 00:00:00	0.39	0.239	0.404	0.376	0.34	0.194
1	2017-01-01 00:10:00	0.389	0.24	0.406	0.373	0.339	0.194
2	2017-01-01 00:20:00	0.39	0.239	0.403	0.375	0.341	0.194
3	2017-01-01 00:30:00	0.39	0.24	0.403	0.375	0.34	0.193
4	2017-01-01 00:40:00	0.39	0.24	0.404	0.375	0.34	0.194

In [6]:

```
data.describe()
```

Out[6]:

	DateTime	MP-1(microSv/h)	MP-2(microSv/h)	MP-3(microSv/h)	MP-4(microSv/h)	MP-5(microSv/h)	6(microS
count	135792	135792.00	135792.000	135792.000	135792.000	135792.000	135792
unique	135792	397.00	183.000	309.000	274.000	187.000	157
top	2017-04-19 18:30:00	0.34	0.192	0.312	0.297	0.279	0
freq	1	1935.00	4408.000	2430.000	2960.000	4392.000	5528
first	2017-01-01 00:00:00	NaN	NaN	NaN	NaN	NaN	
last	2019-08-10 23:50:00	NaN	NaN	NaN	NaN	NaN	

MP1

In [7]:

```

mp1=data[["DateTime","MP-1(microSv/h)"]].reset_index(drop=True)
mp1=mp1.rename(columns={ "DateTime" : "ds", "MP-1(microSv/h)" : "y"})
mp1.head()

mp1=mp1[mp1["y"] != '-']
# mp1=mp1.values

#sample=mp1.iloc[:500,:]
#sample.tail()
len(mp1)
mp1.head()
```

Out[7]:

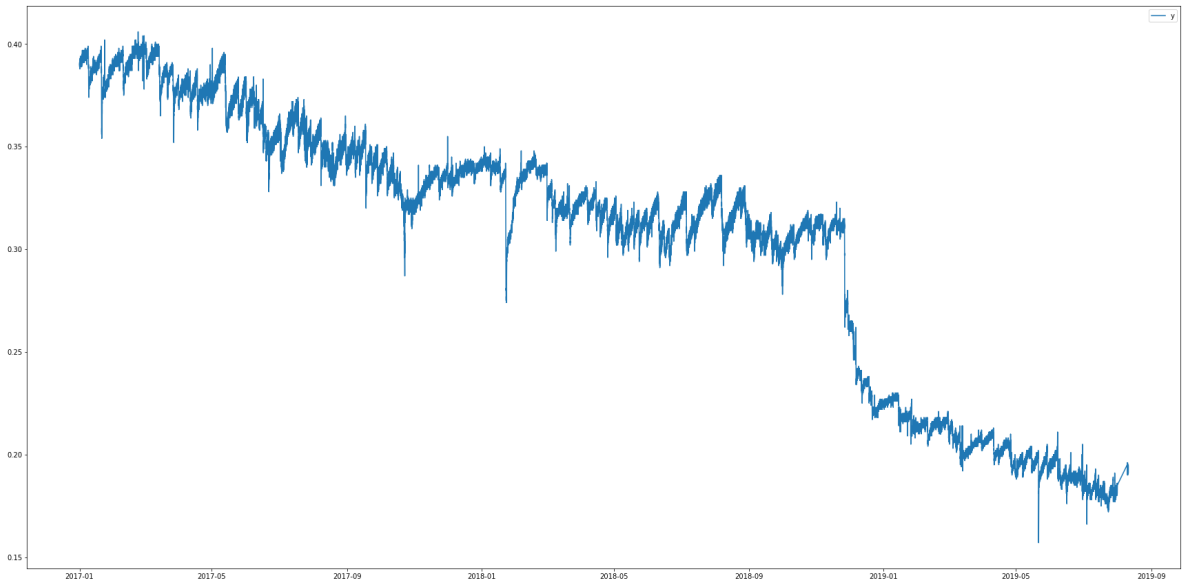
	ds	y
0	2017-01-01 00:00:00	0.39
1	2017-01-01 00:10:00	0.389
2	2017-01-01 00:20:00	0.39
3	2017-01-01 00:30:00	0.39
4	2017-01-01 00:40:00	0.39

In [8]:

```
#sample.plot( x= "DateTime", y="MP-1(microSv/h)", figsize=(16,8))

#plt.plot(mp1["ds"], mp1["y"])

fig=plt.figure(facecolor="white", figsize=(30,15))
ax=fig.add_subplot(111)
ax.plot(mp1["ds"], mp1["y"])
ax.legend()
plt.show()
```



Fit

In [9]:

```
model=Prophet()
model.fit(mp1)
```

```
C:₩Users₩Affinity₩Anaconda3₩lib₩site-packages₩pystan₩misc.py:399: FutureWarning: Con
version of the second argument of issubdtype from `float` to `np.floating` is deprec
ated. In future, it will be treated as `np.float64 == np.dtype(float).type`.
  elif np.issubdtype(np.asarray(v).dtype, float):
```

Out[9]:

```
<fbprophet.forecaster.Prophet at 0x1708d78c588>
```

Predict

In [15]:

```
future=model.make_future_dataframe(periods=180)

forecast=model.predict(future)

forecast.tail()
```

Out[15]:

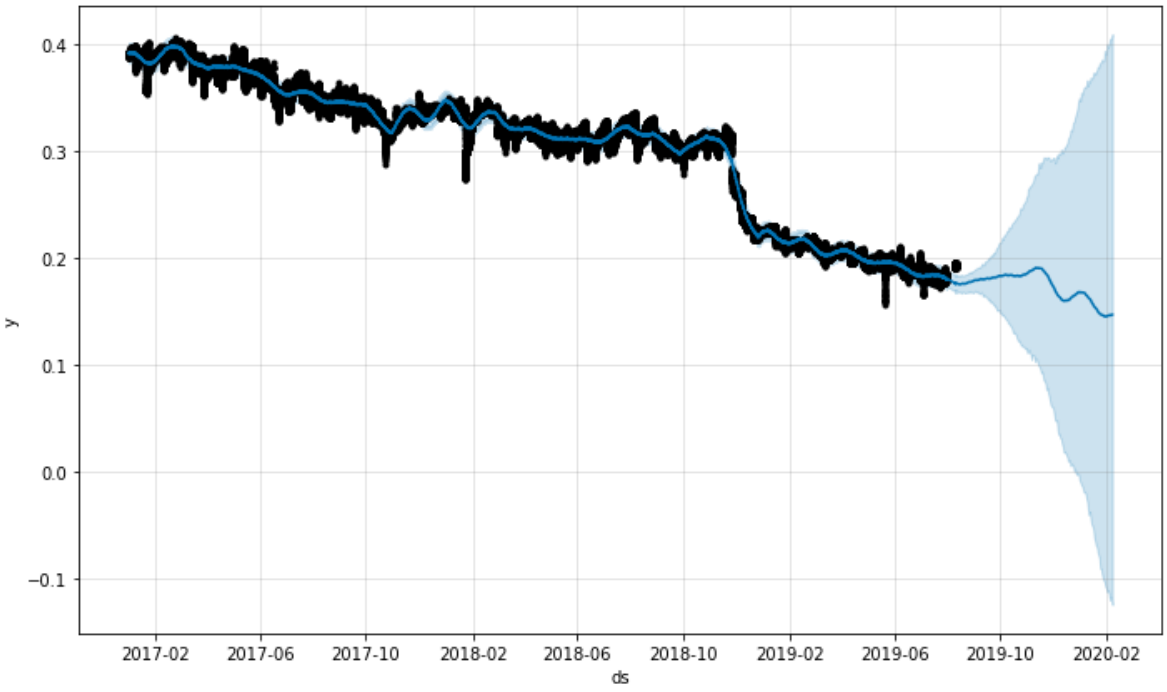
	ds	trend	yhat_lower	yhat_upper	trend_lower	trend_upper	additive_terms	a
135491	2020-02-02 23:50:00	0.151361	-0.114578	0.399930	-0.111156	0.406019	-0.004952	
135492	2020-02-03 23:50:00	0.151172	-0.120232	0.404737	-0.113291	0.408240	-0.005023	
135493	2020-02-04 23:50:00	0.150983	-0.117488	0.405862	-0.115426	0.410173	-0.004837	
135494	2020-02-05 23:50:00	0.150794	-0.120143	0.406021	-0.117561	0.413054	-0.003879	
135495	2020-02-06 23:50:00	0.150605	-0.124703	0.409610	-0.120311	0.414485	-0.003749	

5 rows × 22 columns

graph

In [16]:

```
1 fig1=model.plot(forecast)
```



In [17]:

```
1 fig2=model.plot_components(forecast)
```

In [ ]:

```
1
```