delhi_radiosonde

October 22, 2020

1 ATMS Instrumentation Lab

Analysis of University of Wyoming Radiosonde data for the Delhi region for the time period for 13th October 2020 : 00UTC This is to the study the Diurnal variation of atmospheric variables and other important parameters over the Delhi region. Work done by Aditya Sengupta (Roll No. - 420AS2068)

[1]:
```
import numpy as np
import pandas as pd

import matplotlib.pyplot as plt
import requests

import seaborn as sns
import scipy.stats as stats
plt.style.use('seaborn-pastel')
sns.set_theme(style="whitegrid")

from descartes import PolygonPatch
import statsmodels.api as sm

%matplotlib inline
```

[2]:
```
data00 = pd.read_csv('delhi_radiosonde_data00.csv')
data00.head()
```

[2]:

	PRES(hPa)	HGHT(m)	TEMP(C)	DWPT(C)	RELH(%)	MIXR(g/kg)	DRCT(deg)	\
0	1000.0	36	NaN	NaN	NaN	NaN	NaN	
1	973.0	216	20.8	16.8	78.0	12.52	0.0	
2	960.0	349	26.8	19.8	66.0	15.39	42.0	
3	956.0	391	26.6	18.6	61.0	14.32	55.0	
4	942.0	538	27.2	16.2	51.0	12.45	102.0	

	SKNT(knot)	THTA(K)	THTE(K)	THTV(K)
0	NaN	NaN	NaN	NaN
1	0.0	296.3	332.6	298.5
2	5.0	303.5	349.4	306.3
3	7.0	303.6	346.4	306.2

```
4        12.0    305.5    343.1    307.8
```

[3]:
```
data12 = pd.read_csv('delhi_radiosonde_data12.csv')
data12.head()
```

[3]:
```
   PRES(hPa)  HGHT(m)  TEMP(C)  DWPT(C)  RELH(%)  MIXR(g/kg)  DRCT(deg)  \
0     1000.0       23      NaN      NaN      NaN         NaN        NaN
1      973.0      216     32.8     20.8     49.0       16.17        0.0
2      969.0      258     31.2     19.2     49.0       14.67       13.0
3      961.0      342     30.4     18.4     49.0       14.06       39.0
4      938.0      585     28.6     17.9     52.0       13.95      115.0

   SKNT(knot)  THTA(K)  THTE(K)  THTV(K)
0         NaN      NaN      NaN      NaN
1         0.0    308.4    357.7    311.3
2         0.0    307.1    351.6    309.8
3         1.0    307.0    349.7    309.6
4         2.0    307.3    349.7    309.9
```

[4]:
```
col00 = []
for index in data00.index:
    col00.append("00UTC")

data00["Time"] = col00

#Similarly
col12 = []
for index in data12.index:
    col12.append("12UTC")

data12["Time"] = col12
```

[43]:
```
data = pd.concat([data00,data12])
data.set_index('HGHT(m)')
data.head()
```

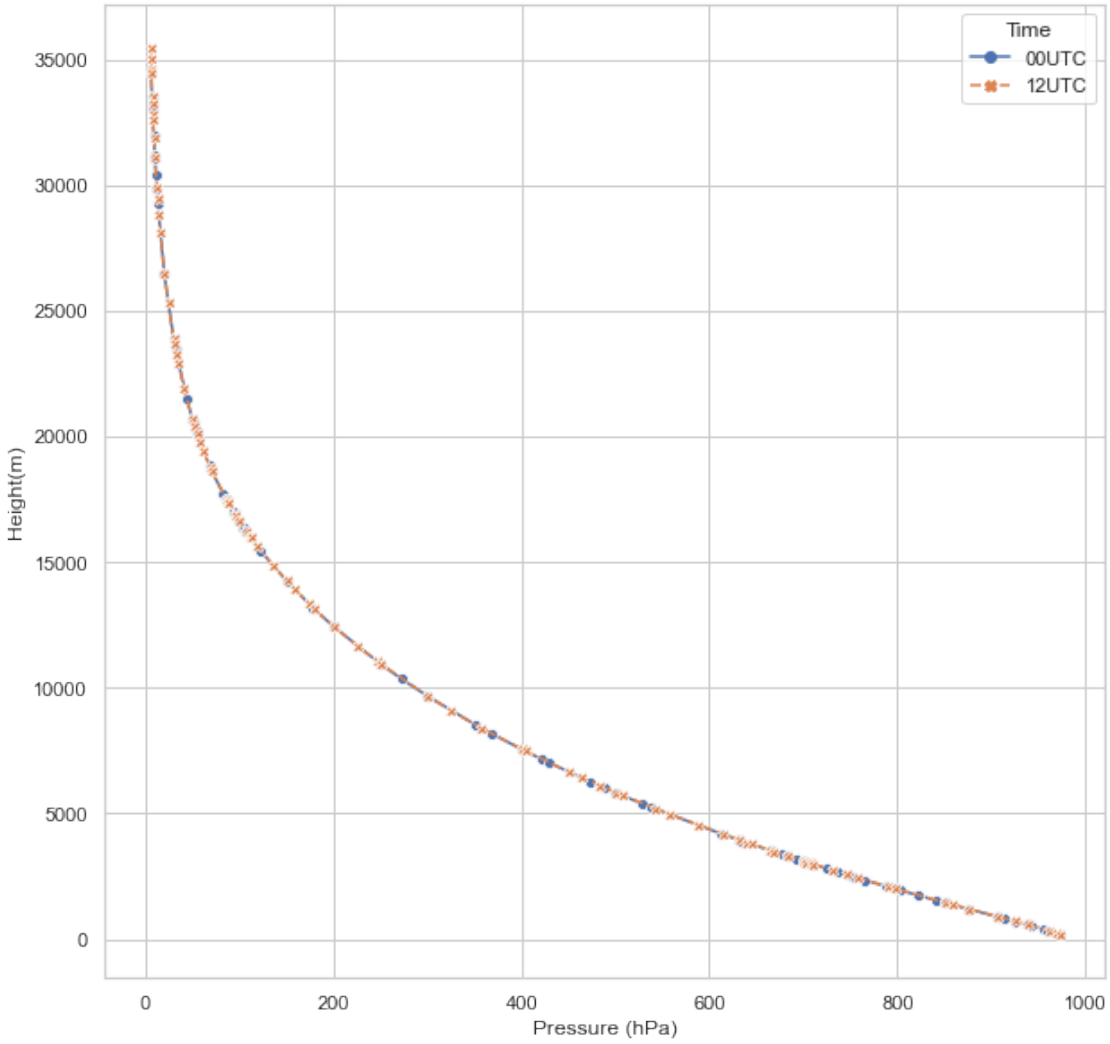
[43]:
```
   PRES(hPa)  HGHT(m)  TEMP(C)  DWPT(C)  RELH(%)  MIXR(g/kg)  DRCT(deg)  \
0     1000.0       36      NaN      NaN      NaN         NaN        NaN
1      973.0      216     20.8     16.8     78.0       12.52        0.0
2      960.0      349     26.8     19.8     66.0       15.39       42.0
3      956.0      391     26.6     18.6     61.0       14.32       55.0
4      942.0      538     27.2     16.2     51.0       12.45      102.0

   SKNT(knot)  THTA(K)  THTE(K)  THTV(K)   Time
0         NaN      NaN      NaN      NaN  00UTC
1         0.0    296.3    332.6    298.5  00UTC
2         5.0    303.5    349.4    306.3  00UTC
```

```
3          7.0    303.6    346.4    306.2  00UTC
4         12.0    305.5    343.1    307.8  00UTC
```

1.0.1 Pressure Vertical Profile

[44]:
```
plt.figure(figsize=(10,10))
sns.lineplot(data = data.dropna(), x='PRES(hPa)', y='HGHT(m)', hue='Time',␣
 ↪style='Time', markers=True)
# sns.lineplot(data = data, x='date_ist', y='Tc', hue='season')
#plt.xticks(rotation= 10)
plt.xlabel('Pressure (hPa)', fontsize=12)
plt.ylabel('Height(m)', fontsize=12)
```

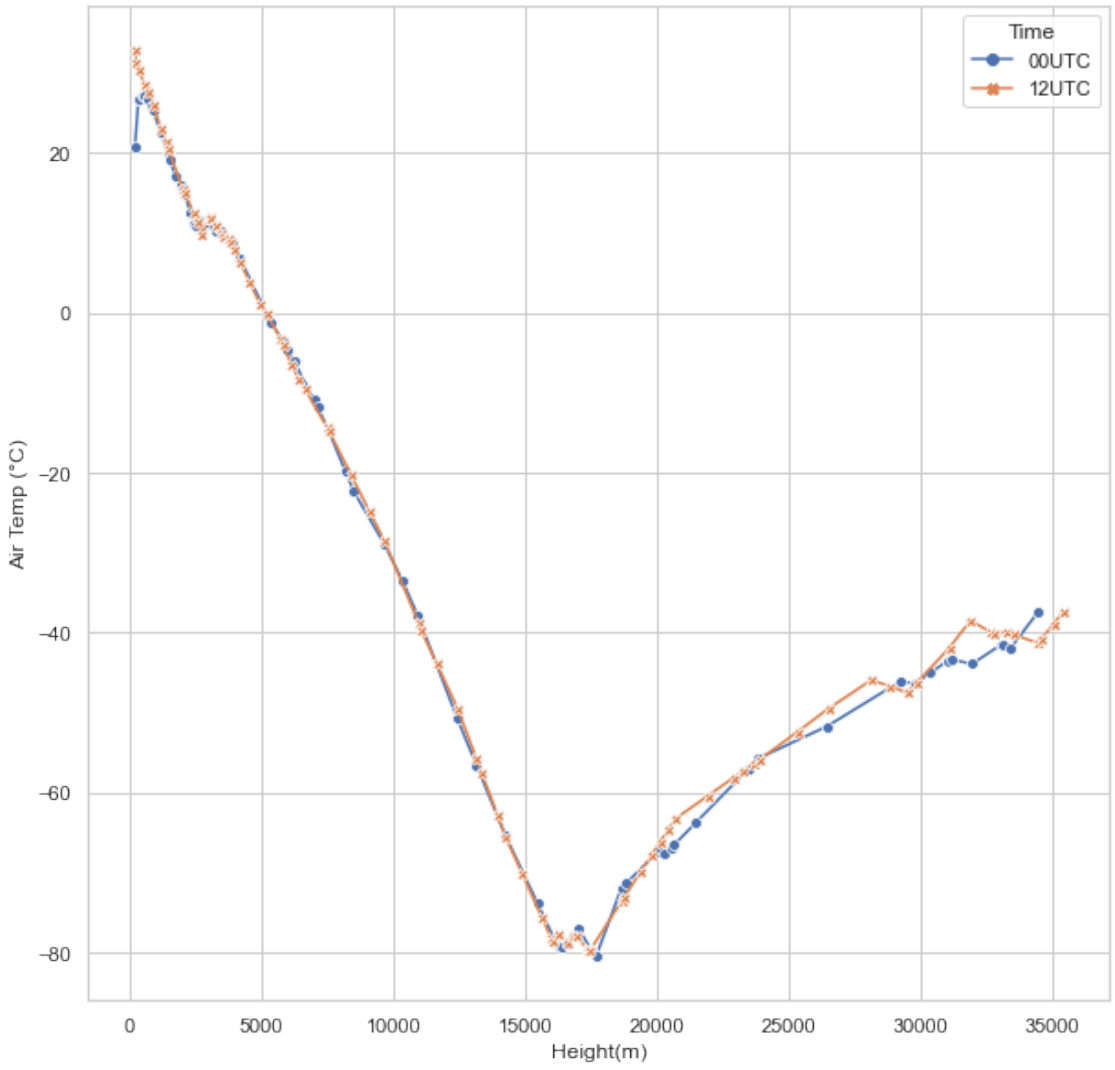
[44]:
```
Text(0, 0.5, 'Height(m)')
```



1.0.2 Temp Vertical Profile

[57]:
```
plt.figure(figsize=(10,10))
sns.lineplot(data = data.dropna(), x='HGHT(m)', y='TEMP(C)', hue='Time',␣
↪style='Time', markers=True, dashes=False)
#sns.lineplot(data = data, x='date_ist', y='Tc', hue='season')
#plt.xticks(rotation= 10)
plt.ylabel('Air Temp (°C)', fontsize=12)
plt.xlabel('Height(m)', fontsize=12)
```

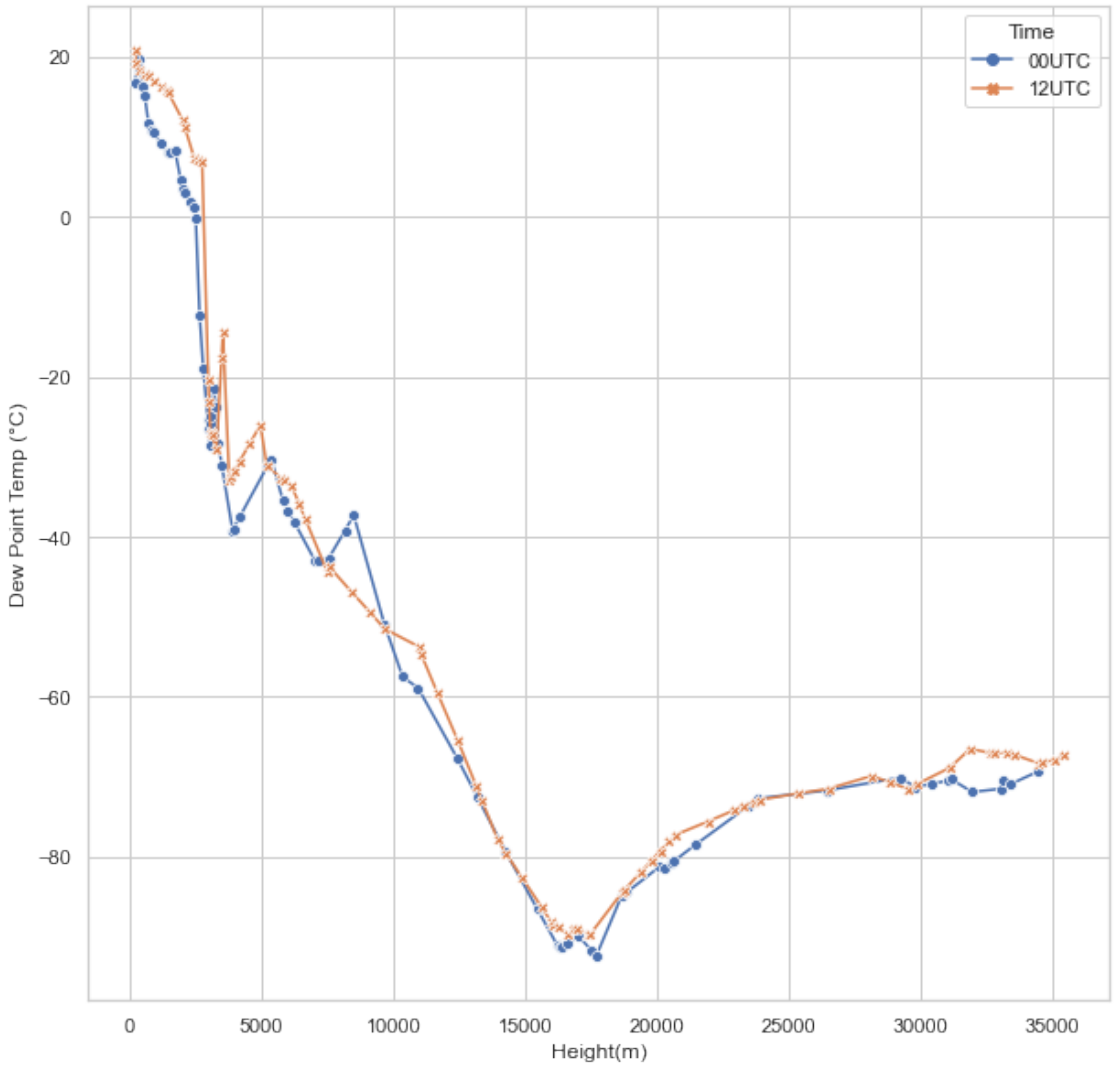
[57]:
```
Text(0.5, 0, 'Height(m)')
```



1.0.3 Dew Point Temp vertical profile

[34]:
```
plt.figure(figsize=(10,10))
sns.lineplot(data = data.dropna(), x='HGHT(m)', y='DWPT(C)', hue='Time',␣
↪style='Time',markers=True, dashes=False)
#sns.lineplot(data = data, x='date_ist', y='Tc', hue='season')
#plt.xticks(rotation= 10)
plt.ylabel('Dew Point Temp (°C)', fontsize=12)
plt.xlabel('Height(m)', fontsize=12)
```

[34]:
```
Text(0.5, 0, 'Height(m)')
```



1.0.4 RELH Vertical Profile

[35]:
```
data.head()
```

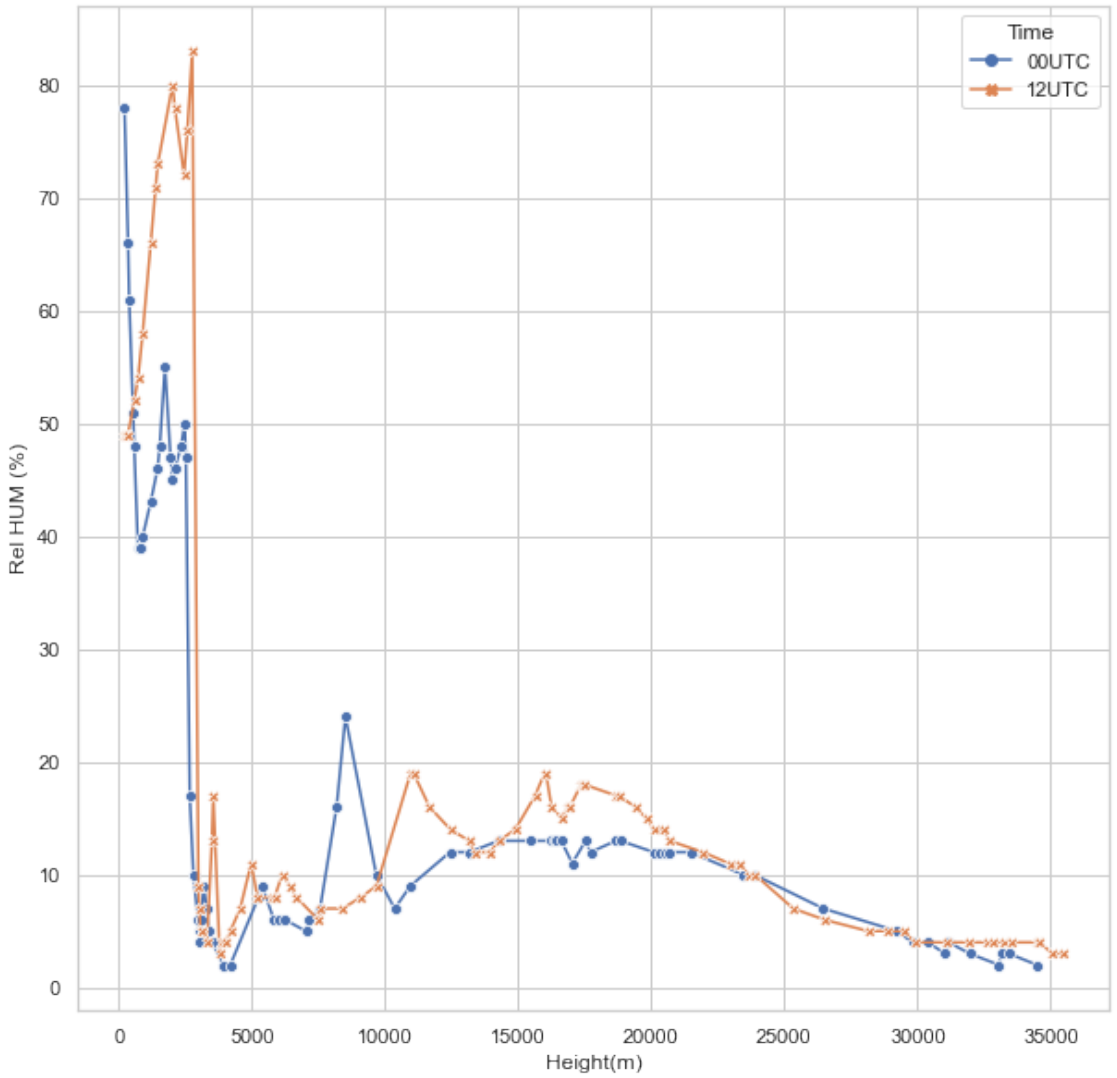
[35]:

	PRES(hPa)	HGHT(m)	TEMP(C)	DWPT(C)	RELH(%)	MIXR(g/kg)	DRCT(deg)	\
0	1000.0	36	NaN	NaN	NaN	NaN	NaN	
1	973.0	216	20.8	16.8	78.0	12.52	0.0	
2	960.0	349	26.8	19.8	66.0	15.39	42.0	
3	956.0	391	26.6	18.6	61.0	14.32	55.0	
4	942.0	538	27.2	16.2	51.0	12.45	102.0	

	SKNT(knot)	THTA(K)	THTE(K)	THTV(K)	Time
0	NaN	NaN	NaN	NaN	00UTC
1	0.0	296.3	332.6	298.5	00UTC
2	5.0	303.5	349.4	306.3	00UTC
3	7.0	303.6	346.4	306.2	00UTC
4	12.0	305.5	343.1	307.8	00UTC

[36]:
```
plt.figure(figsize=(10,10))
sns.lineplot(data = data.dropna(), x='HGHT(m)', y='RELH(%)', hue='Time',␣
↪style='Time', markers=True, dashes=False)
#sns.lineplot(data = data, x='date_ist', y='Tc', hue='season')
#plt.xticks(rotation= 10)
plt.ylabel('Rel HUM (%)', fontsize=12)
plt.xlabel('Height(m)', fontsize=12)
```

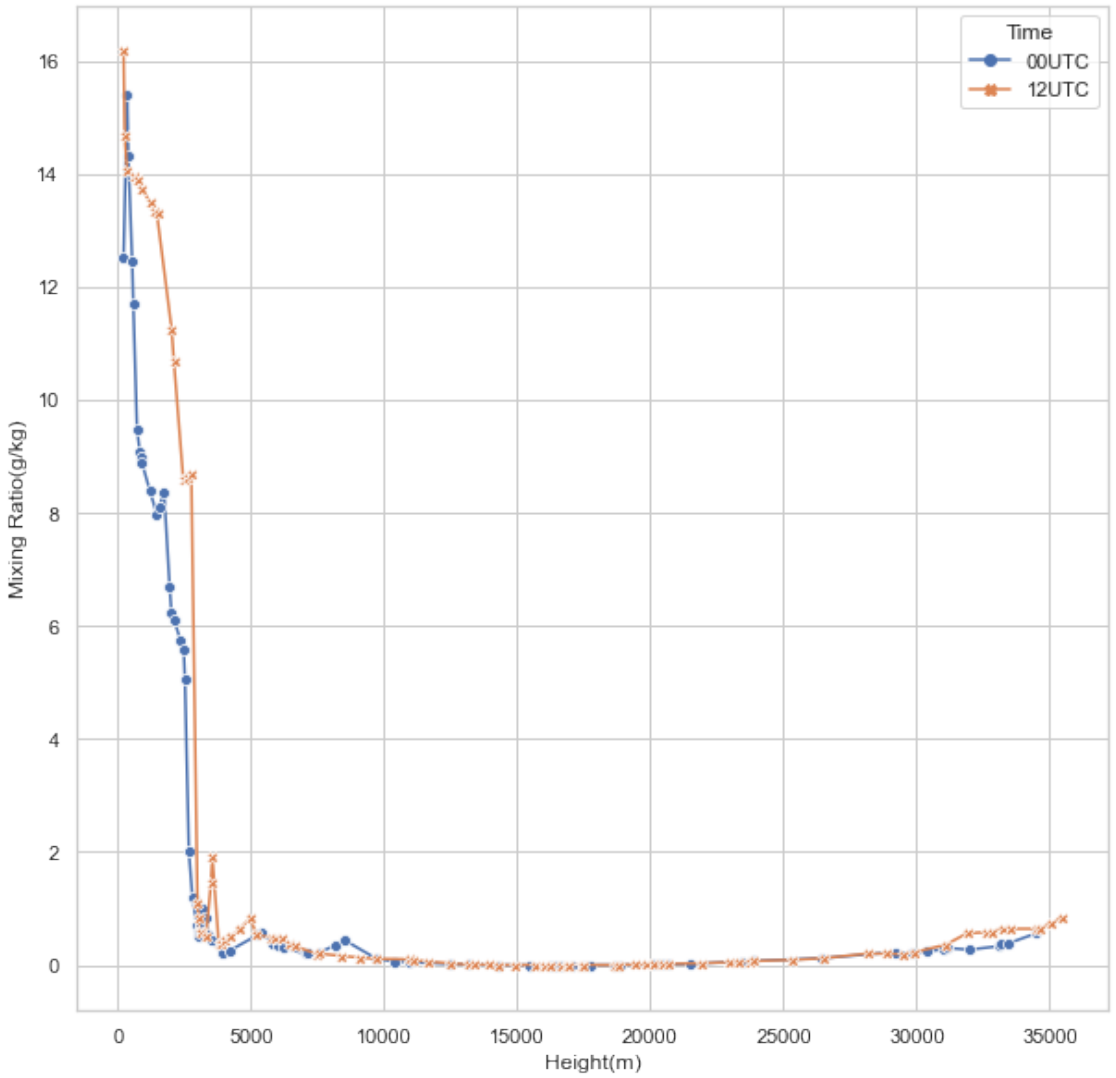
[36]:
```
Text(0.5, 0, 'Height(m)')
```



1.0.5 Mixing Ratio vertical profile

[37]:
```
plt.figure(figsize=(10,10))
sns.lineplot(data = data.dropna(), x='HGHT(m)', y='MIXR(g/kg)', hue='Time',␣
↪style='Time', markers=True, dashes=False)
#sns.lineplot(data = data, x='date_ist', y='Tc', hue='season')
#plt.xticks(rotation= 10)
plt.ylabel('Mixing Ratio(g/kg)', fontsize=12)
plt.xlabel('Height(m)', fontsize=12)
```

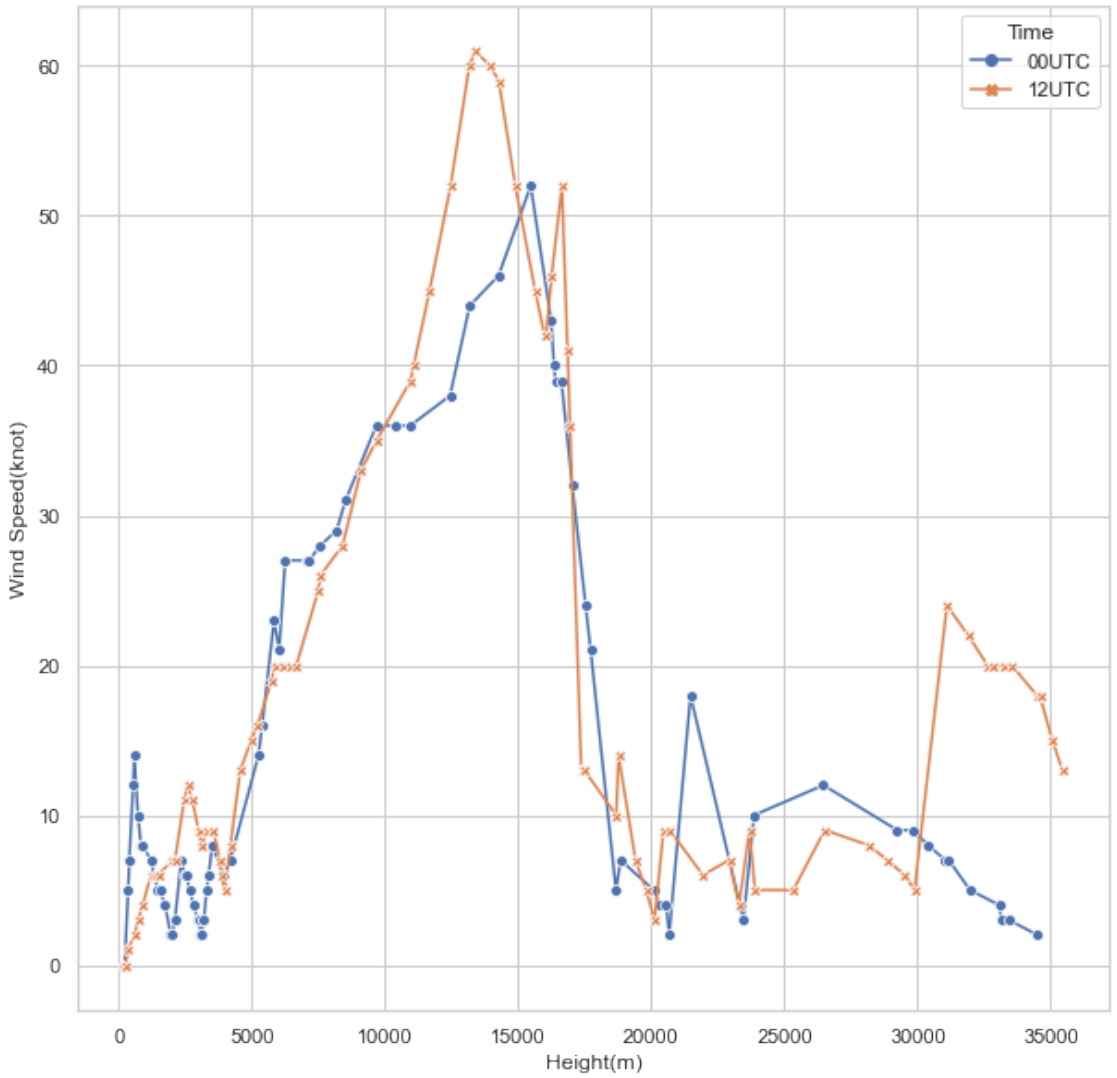
[37]:
```
Text(0.5, 0, 'Height(m)')
```



1.0.6 Wind Speed vertical profile

[38]:
```
plt.figure(figsize=(10,10))
sns.lineplot(data = data.dropna(), x='HGHT(m)', y='SKNT(knot)', hue='Time',␣
↪style='Time', markers=True, dashes=False)
#sns.lineplot(data = data, x='date_ist', y='Tc', hue='season')
#plt.xticks(rotation= 10)
plt.ylabel('Wind Speed(knot)', fontsize=12)
plt.xlabel('Height(m)', fontsize=12)
```

[38]:
```
Text(0.5, 0, 'Height(m)')
```


Time
00UTC
12UTC
Wind Speed(knot)
Height(m)
0
10
20
30
40
50
60
0
5000
10000
15000
20000
25000
30000
35000

[ ]: