Workshop on Data Science of POLI/USP

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Target

Reproduce on Python temporal series of netCDF files(i.e. temperature mean, precipitation mean, atmospheric pressure) for 10 days.

Setup environment

- Anaconda 2.7
- Py-ART
- NetCDF
- netCDF File Format and PyART Tutorial (5)
- Py-ART: The Python ARM Radar Toolkit (6)

Instrument : Surface Meteorological Instrumentation (MET)

Instrument Categories

Surface Meteorology

General Overview

The ARM Surface Meteorology Systems (MET) uses mainly conventional in situ sensors to obtain 1-minute statistics of surface wind speed, wind direction, air temperature, relative humidity, barometric pressure, and rain-rate. Additional sensors may be added to or removed from the base set of sensors depending upon the deployment location, climate regime, or programmatic needs. In addition, sensor types may change depending upon the climate regime of the deployment. These changes/additions are noted in the Deployment Locations and History section of the instrument handbook.

Output Datastreams

- met : ARM-standard Meteorological Instrumentation at Surface

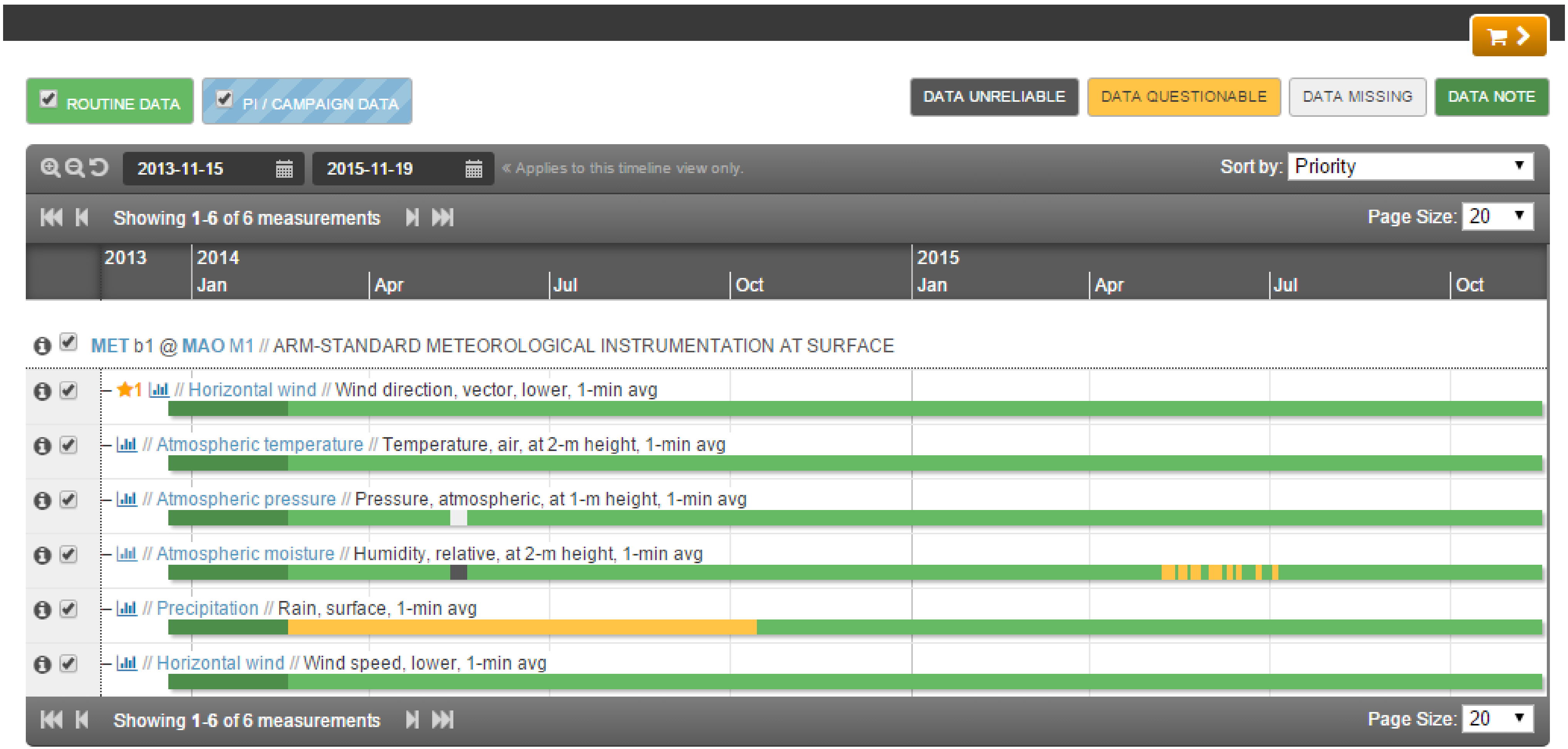
Primary Measurements

The following measurements are those considered scientifically relevant.

- Atmospheric moisture
- Atmospheric pressure
- Atmospheric temperature
- Horizontal wind
- Precipitation
- Visibility

AMF Deployment, Manacapuru, Brazil

As a critical component of GOAMAZON, the ARM Mobile Facility (AMF) will obtain measurements near Manacapuru, south of Manaus, Brazil, from January 2014 to December 2015. The city of Manaus, with a population of 3 million, uses high-sulfur oil as their primary source of electricity. The AMF site is situated to measure the atmospheric extremes of a pristine atmosphere and the nearby cities' pollution plume, as it regularly intersects with the site. Along with other instrument systems located at the Manacapuru site, this deployment will enable scientists to study how aerosol and cloud life cycles are influenced by pollutant outflow from a tropical megacity.


ROUTINE DATA
PI / CAMPAIGN DATA
DATA UNRELIABLE
DATA QUESTIONABLE
DATA MISSING
DATA NOTE
2013-11-15
2015-11-19
« Applies to this timeline view only.
Sort by: Priority
Showing 1-6 of 6 measurements
Page Size: 20
2013
2014
Jan
Apr
Jul
Oct
2015
Jan
Apr
Jul
Oct
MET b1 @ MAO M1 // ARM-STANDARD METEOROLOGICAL INSTRUMENTATION AT SURFACE
1 // Horizontal wind // Wind direction, vector, lower, 1-min avg
// Atmospheric temperature // Temperature, air, at 2-m height, 1-min avg
// Atmospheric pressure // Pressure, atmospheric, at 1-m height, 1-min avg
// Atmospheric moisture // Humidity, relative, at 2-m height, 1-min avg
// Precipitation // Rain, surface, 1-min avg
// Horizontal wind // Wind speed, lower, 1-min avg
Showing 1-6 of 6 measurements
Page Size: 20

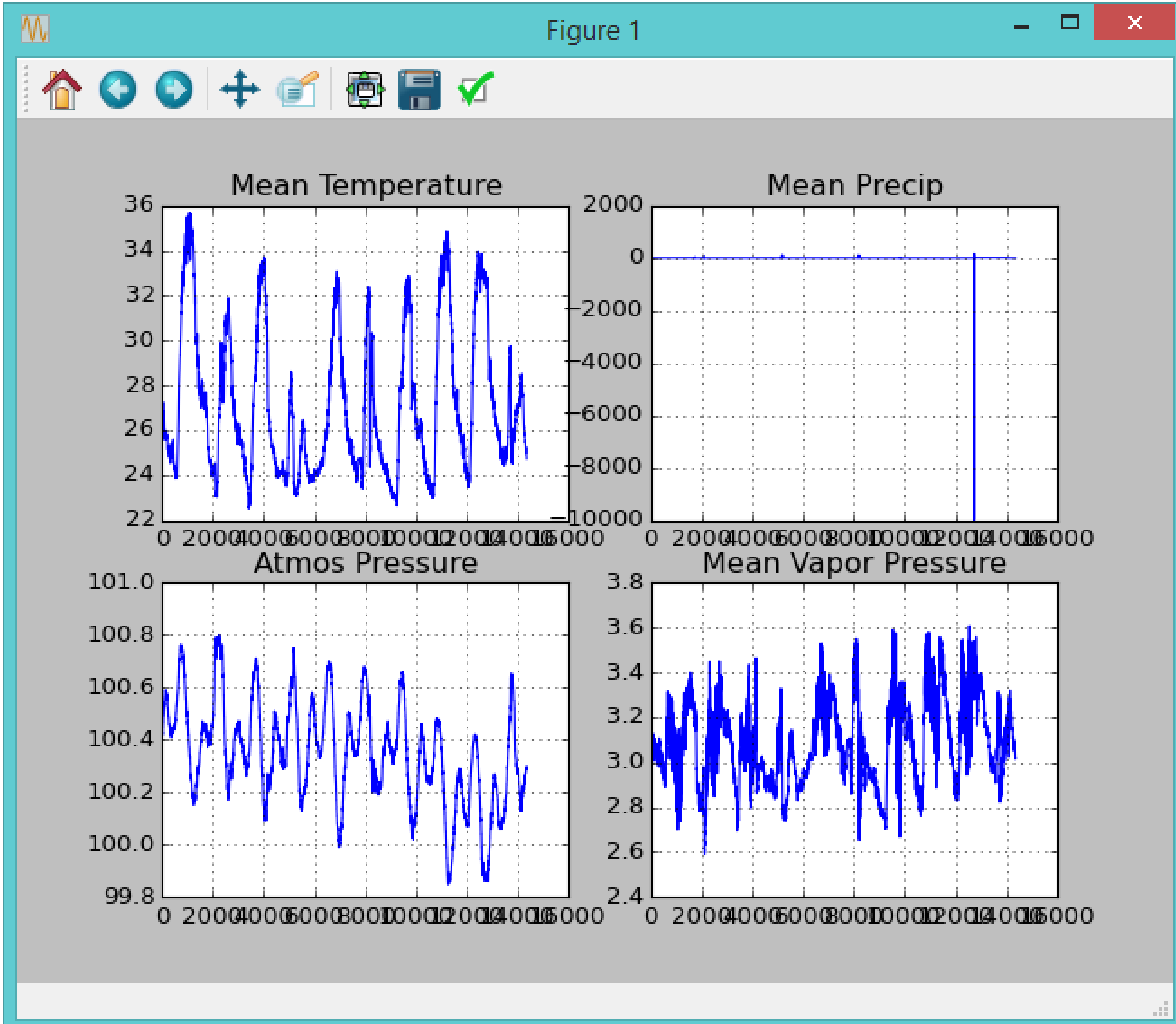


Figure 1
Mean Temperature
36
34
32
30
28
26
24
22
Mean Precip
2000
0
−2000
−4000
−6000
−8000
−10000
Atmos Pressure
101.0
100.8
100.6
100.4
100.2
100.0
99.8
Mean Vapor Pressure
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4

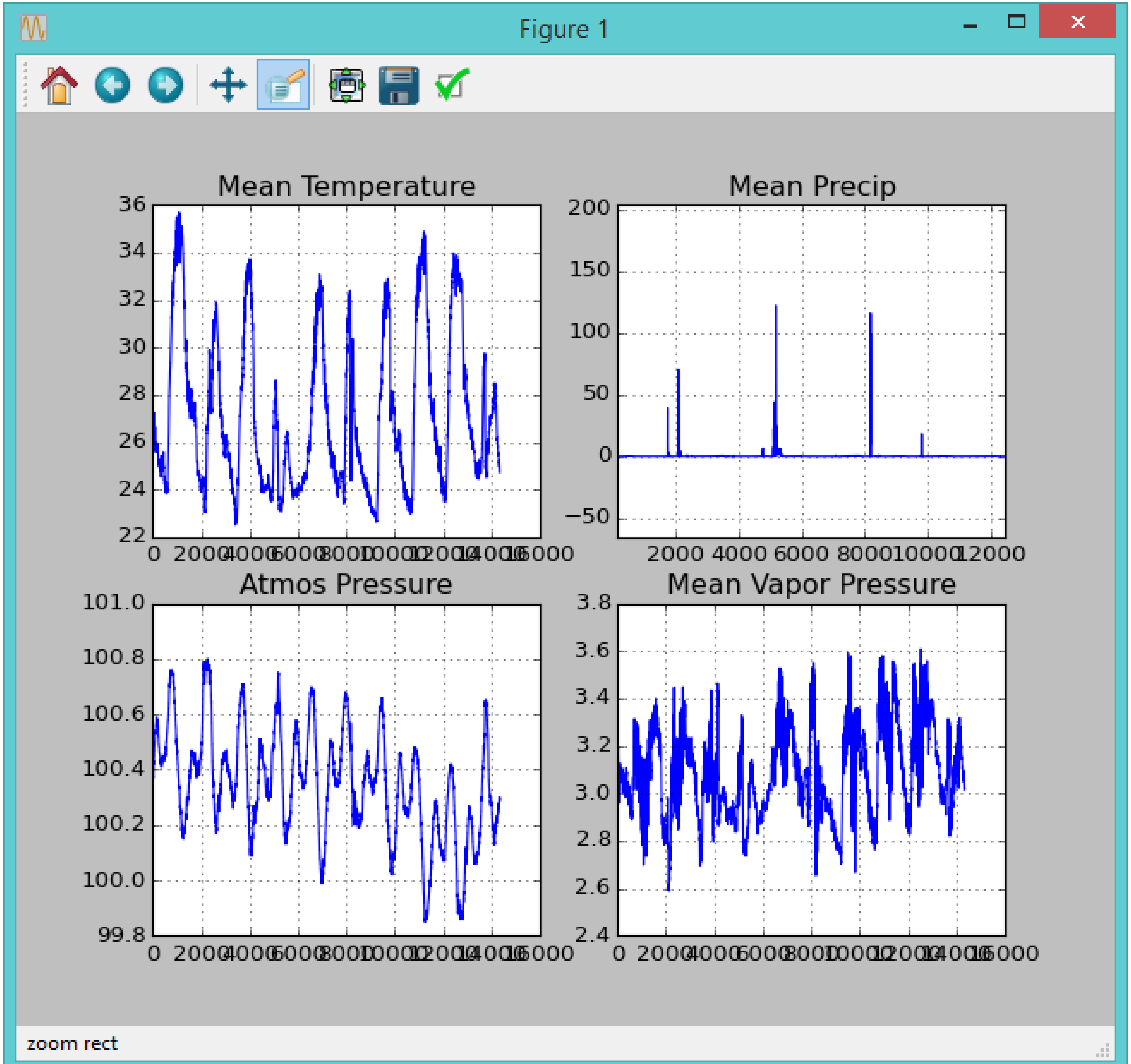
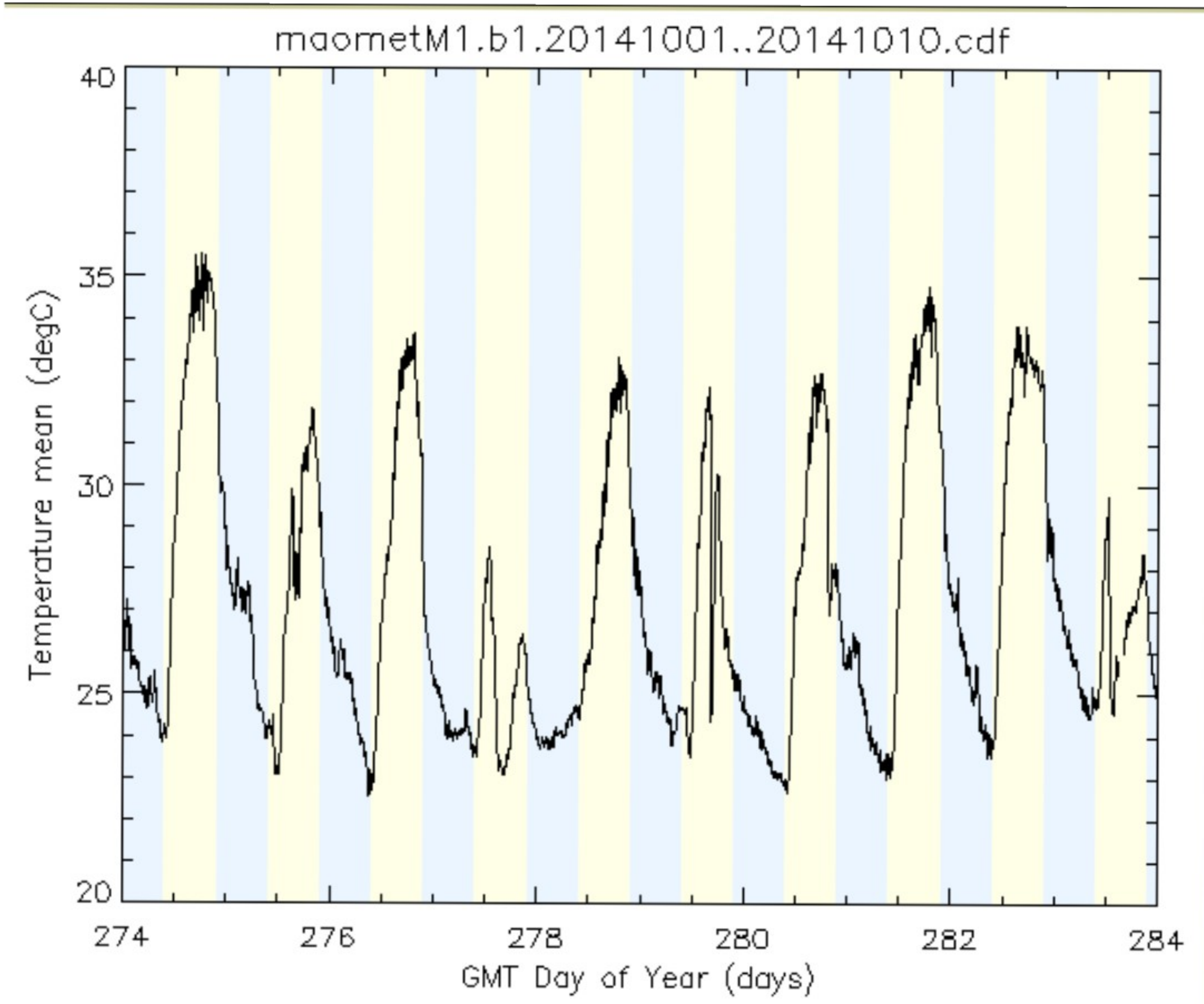
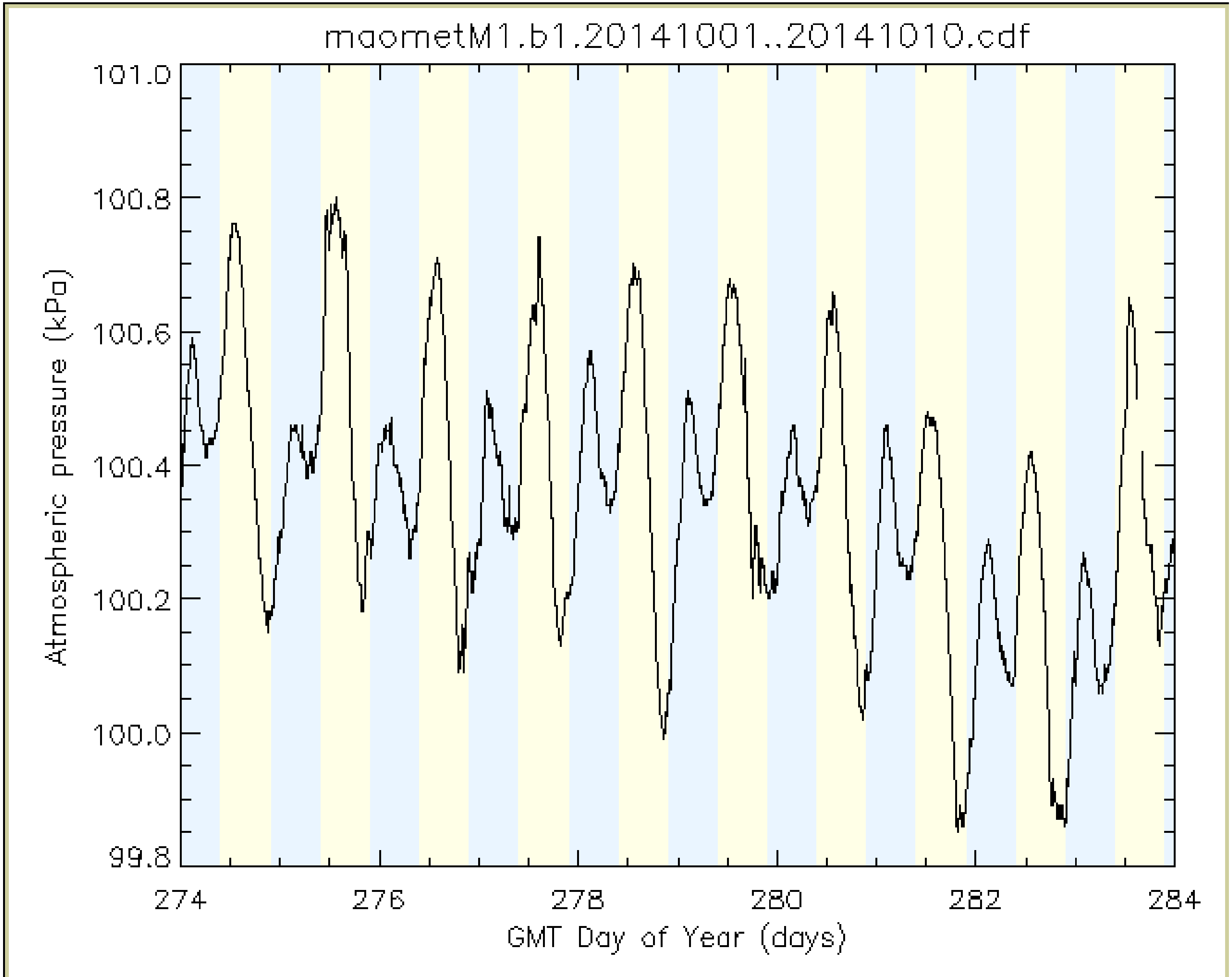


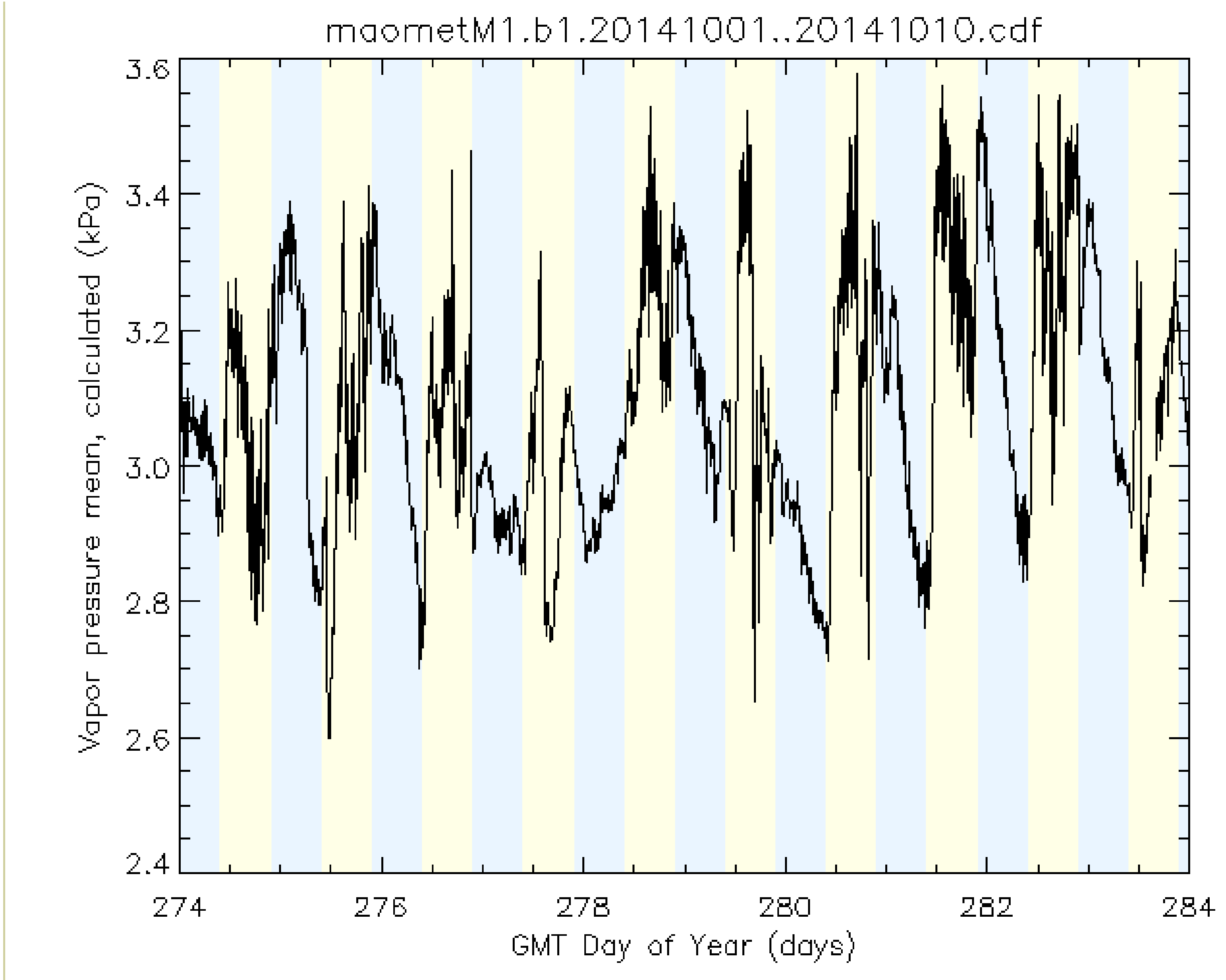
Figure 1
Mean Temperature
36
34
32
30
28
26
24
22
0 2000 4000 6000 8000 10000 12000 14000 16000
Mean Precip
200
150
100
50
0
−50
2000 4000 6000 8000 10000 12000
Atmos Pressure
101.0
100.8
100.6
100.4
100.2
100.0
99.8
0 2000 4000 6000 8000 10000 12000 14000 16000
Mean Vapor Pressure
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
0 2000 4000 6000 8000 10000 12000 14000 16000
zoom rect

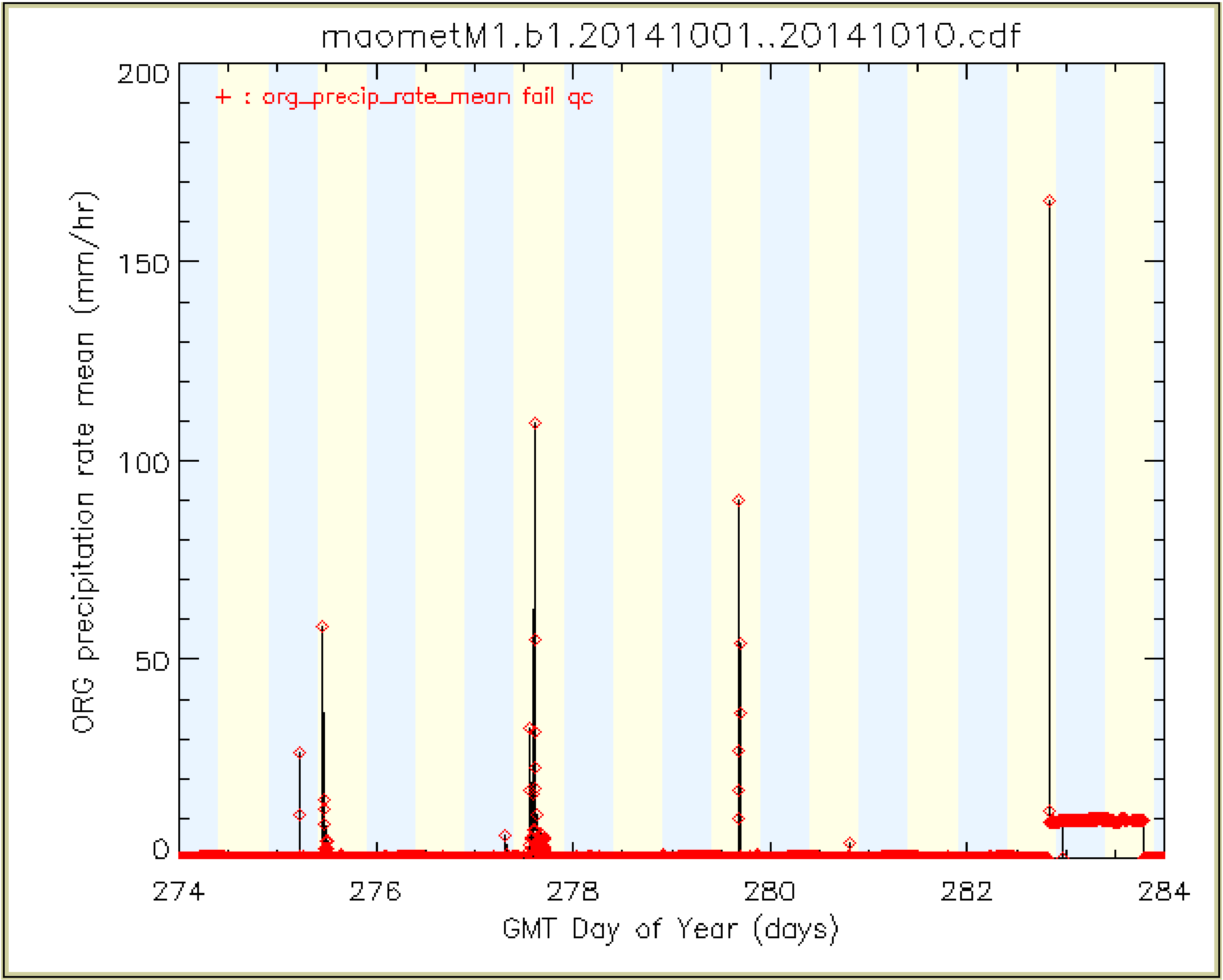


maometM1.b1.20141001..20141010.cdf
Temperature mean (degC)
40
35
30
25
20
274
276
278
280
282
284
GMT Day of Year (days)



maometM1.b1.20141001..20141010.cdf
Atmospheric pressure (kPa)
101.0
100.8
100.6
100.4
100.2
100.0
99.8
274
276
278
280
282
284
GMT Day of Year (days)


maometM1.b1.20141001..20141010.cdf
Vapor pressure mean, calculated (kPa)
3.6
3.4
3.2
3.0
2.8
2.6
2.4
274
276
278
280
282
284
GMT Day of Year (days)



maometM1.b1.20141001..20141010.cdf
+ : org_precip_rate_mean fail qc
ORG precipitation rate mean (mm/hr)
200
150
100
50
0
274
276
278
280
282
284
GMT Day of Year (days)

```
#!/usr/bin/python
import os
import commands
from netCDF4 import Dataset
import numpy as np
#from matplotlib.pyplot import subplots
import matplotlib.pyplot as plt

var = os.listdir('C:/Users/Cesar
Queiroz/workshopdc/datas')

temp_all = []
precip_all = []
atmos_all = []
vapor_all = []

for i in sorted(var):
   file_name = i
   file_obj = Dataset(file_name)

   temp_obj =
file_obj.variables['temp_mean']
   temp = temp_obj[:]
   temp_all =
np.concatenate([temp_all,temp])

   precip_obj =
file_obj.variables['org_precip_rate_mea
n']
   precip = precip_obj[:]
   precip_all =

np.concatenate([precip_all,precip])
```

```
 atmos_obj =
file_obj.variables['atmos_pressure']
   atmos = atmos_obj[:]
   atmos_all =
np.concatenate([atmos_all,atmos])

   vapor_obj =
file_obj.variables['vapor_pressure_m
ean']
   vapor = vapor_obj[:]
   vapor_all =
np.concatenate([vapor_all,vapor])

plt.close('all')

fig, ax = plt.subplots(2,2)
ax[0, 0].plot(temp_all)
ax[0, 0].grid()
ax[0, 0].set_title('Mean
Temperature')
ax[0, 1].plot(precip_all)
ax[0, 1].grid()
ax[0, 1].set_title('Mean Precip')
ax[1, 0].plot(atmos_all)
ax[1, 0].grid()
ax[1, 0].set_title('Atmos Pressure')
ax[1, 1].plot(vapor_all)
ax[1, 1].grid()
ax[1, 1].set_title('Mean Vapor
Pressure')

plt.show()
```