This document is a description of the scripts written for the ceilometers deployed on a Russian drifting station “North-Pole-36”.
Ludovic Bariteau – 07/24/2009.

A. Raw data

The data file provided to generate have been posted on the PSD ftp site at ftp://ftp.etl.noaa.gov/et6/archive/NP36_ceilodata/ . The files available are from January to April 2009 and from September to December 2009. The daily files contain cloud base heights and backscatter profiles. Some problems were encountered within the data format especially in year 2008. 2009 seems to have less format issues.
Files with some highlighted issues (in red):
* A9012511.DAT
* A9022700.DAT:

```
0160001000100010001000200030003000300040004000$00050004002100C5001B0001
0480002000p000400020006000700050004000400 0F000E00170011000E007A0049
```

* A9030200.DAT:

```
01600170011000E000B000800900080008000?000600050004000200010003000000001
```

* A9030200.DAT
* A9030300.DAT
* A9030500.DAT
* A9042214.DAT → ceilometers interrupted. File combined with A9042200.DAT
* A8091603.DAT → seems to have some formatting issues ~2000GMT. Deleted the end and combined with A8091622.DAT file.
* A8091700.DAT
* A8091800.DAT
* A8092200.DAT and A8092207.DAT combined together
* A8092300.DAT:

```
1280000000AFFFD00000007FFFE0000FFFFFFFA00040008FFFFFFF900050000FFF8
14400
0FFFCFFF8000000000001000400040004FFFEFFFE0003000000020005FFFA
16000000005FFF500090001000 10003FFFF0000FFFF0001FFFB00050005FFFB0004
```

* A8092400.DAT:

```
06400000000FFFF000100000000000FFFE000000000010000FFFC000100000000
0800000FFFE000000010000FFFEFFFF000300000000001FFFF00000000FFFF0000001960000F
FFF000000020000FFFF00000000FFFFFFFF00000000FFFE0000FFFF0002
1120000000000010001000 1FFFF00000000FFFE000100000001000100000001 0000
```

* A8092500.DAT:

```
06401270092001F0016FFF20007FFF40003FFFCFFF5FFFE000C000900070000FFF5
080FFFFFFFD0006000EFFFF0000000300060009FFFBFFF8005FFF6000D0001FFF4FFFC
208 00000009FFF8FFFCFFF60006FFFB0001FFFEFFF0BFFFA0004FFF7FFFE0003
112000300000007FFFA0000FFF6FFFC00000008FFFA00090010FFFA00000000FFFD
```

* A8110100.DAT →format issues
* A8100700.DAT and A8100707.DAT combined together
* A8101100.DAT and A8101107.DAT combined together
* A8102600.DAT and A8102614.DAT combined together
* A8111300.DAT and A8111318.DAT combined together
* A8111400.DAT and A8111411.DAT combined together
* A8111600.DAT and A8111612.DAT combined together

* A8111800.DAT, A8111811.DAT, A8111812.DAT, A8111817.DAT and A8111822.DAT combined together
A8112900.DAT and A8112909.DAT combined together

At the beginning, erroneous files were manually corrected (either adding a character, deleting some lines, etc…) but at the end some piece of codes were added in *load_CT25data_NP36_v0709.m* to pass by those various format errors. The profile is kept to NaN when the error lines are encountered (note that this will show up in the backscatter plot with some weird colored data point…).

B. Scripts and Outputs

Read_CT25_NP36_v0709.m was the script developed to process the CT25 data. Once the user entered the month to be processed, the program lists all the .DAT files available for that month and process the data. For that purpose, it uses the function *load_CT25data_NP36_v0709.m* to extract the time series of cloud base heights and backscatter coefficient. Then it produces a time-height color plot of the ceilometer backscatter (in regular scale and in logarithmic scale), and a time-height plot of the cloud base. The files are called *backscatteryyyymmdd_doy.jpg, backscatter_log10_yyyymmdd_doy.jpg,* and *cloudbaseyyyymmdd_doy.jpg* respectively with *yyyy* being the year, *mm* the month, *dd* the day and *doy* the corresponding day of year (where 000 GMT January 1, 2008 = doy 1)

This program writes also two summary text files:

* *cloudbaseyyyymmdd_doy.txt*, which contains the basic cloud base height information:

1 Hour
2 Minutes
3 Seconds
4 Julian Day
5 N, where N=number of cloud layers (0-3) or a code (4-5) for marginal clouds
6 Height of the first layer in meters (NaN unless N>0)
7 Height of the second layer in meters (NaN unless N>1)
8 Height of the third layer in meters (NaN unless N>2)

* *backscatteryyyymmdd_doy.mat* which is a binary MAT-file containing:

1 Time in UTC
2 Range of each gate in meters
3 Backscatter coefficient in $srad^{-1} .m^{-1}$