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Readme for the 2006 AMMA/ PIRATA Northeast Extension/ Sahara Dust cruise aboard
the NOAA Ship Ronald H. Brown.

This document is a description of the different ceilometer data files where the following
notation has been used:
    - JD for Julian day.
    - MM, DD and YY for month, day and year respectively.

A. Raw data

There are two output files for the ceilometer, and they are located in the folder called
AMMA_2006\RHB\ceilometer\Raw. The *.dat* files are the raw hexadecimal data, and the
.sta files contain the status of the ceilometer during its operation.

B. "Processed" data

A program was used to reformat the raw data into user friendly files:

• *JD_MM_DD_YY.txt* is the conversion of the raw hexadecimal data into ASCII
format.

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

• *backscatter_JD_MM_DD_YY.mat* is raw variables saved into a binary MAT-file
form. To retrieve the data, use the *load* function of Matlab.

1	Time in decimal hours
2	Range of each gate in meters
3	Sensitivity normalized backscatter coefficient in the units $10^{-7}.srad^{-1}.m^{-1}$

These files are saved in the folder *AMMA_2006\RHB\ceilometer\Processed*.

C. **Processed images**

From the binary MAT-files, daily graphs have been produced. These plots can be found in the folder *AMMA_2006\RHB\ceilometer\Processed_Images*.

- *AMMA2006_ceilometer_JD_MM_DD_YY_backscatter.jpg* is the time-height color plot of the ceilometer backscatter.
- *AMMA2006_ceilometer_JD_MM_DD_YY_base.jpg* is the time-height plot of the cloud base.

D. **Processed data**

The final files of our process are the files *AMMA06_ceilo_time.txt* where time = 30s, 10-min or 1-hr.
The program Dana_ceilo7_rhb_AMMA06.m was run to process raw ceilometer daily files (*JD_MM_DD_YY.txt*). This program reads all available files and writes a new file (AMMA*06_ceilo_30s.txt)* that contains the basic cloud base height information:

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

The program then computes cloud statistics at 10-min and 60-min time resolution. New files are written on these statistics with the following data columns.
The data files *AMMA06_ceilo_10min.txt* and *AMMA06_ceilo_1hr.txt* are:

1	Julian date
2	Number of samples
3	Number of clear samples
4	Number of one cloud layer samples
5	Number of multiple cloud layer samples
6	Number of samples with N=4, obscured
7	Number of samples with N=5, partially obscured
8	Clear fraction
9	Cloudy fraction
10	Cloudy fraction including obscured
11	Median cloud height (m)
12	Height with 16% clouds lower
13	Height with 16% clouds higher

You can find these files in the folder AMMA_*2006\RHB\ceilometer*.