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Readme for the data files from the 2006 Texas Air Quality Study (TexAQS) and Gulf of Mexico Atmospheric Composition and Climate Study (GoMACCS) 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 *TexAQS_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 *TexAQS_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 *TexAQS_2006\RHB\ceilometer\Processed_Images*.

- *TEXAQS2006_ceilometer_JD_MM_DD_YY_backscatter.jpg* is the time-height color plot of the ceilometer backscatter.
- *TEXAQS2006_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 *Texaqs06_ceilo_time.txt* where time = 30s, 10-min or 1-hr.
The program Dana_ceilo7_rhb_Texaqs06.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 (*Texaqs06_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 *Texaqs06_ceilo_10min.txt* and *Texaqs06_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 either in the folder T*exAQS_2006\RHB\ceilometer* or in T*exAQS_2006\RHB\Scientific_analysis\Ceilo*.