

ICE-T 2011 Data Description README.txt

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This README file gives a brief description of the ICE-T 2011 data acquired by SPEC Inc during the ICE-T field campaign in St. Croix, US Virgin Islands during July 2011.

The data is in two main formats: png image files and ASCII 1Hz text files, described in detail below.

ICE-T (Ice in Cloud Experiment - Tropics) was funded by the National Science Foundation. The NCAR C-130 Research Aircraft and the SPEC Learjet flew many individual missions and several joint research flights collecting data from the same clouds.

Flight tracks for the SPEC Learjet and the NCAR C-130 are available for each flight in Google Earth kml format. This format can be opened directly using Google Earth.

Instrument processing details are covered in other documents, please contact SPEC.

The SPEC Learjet instrument payload for ICE-T consisted of the following:

HVPS	(mfr SPEC Inc)
Dewpoint Hygrometer	(mfr Edgetech)
FFSSP	(mfr SPEC Inc, PNNL owned)
3V-CPI	(mfr SPEC Inc)
Pitot/Static	(mfr Rosemount)
Temperature	(mfr Rosemount)
Nevzorov (x2)	(mfr Sky Tech)
GPS	(mfr Garmen)
2D-S	(mfr SPEC Inc)
Icing Detector	(mfr Rosemount)
AIMMS-20	(mfr Avantech)
FCDP	(mfr SPEC Inc, PNNL owned)

The NCAR C-130 also flew a SPEC 3V-CPI instrument, as well as many aerosol and other instruments including a LIDAR. For more information, or C-130 and Lear data, please see the ICE-T home page: <http://www.eol.ucar.edu/projects/ice-t/>

The general directory structure of the data is /project/flight_date/instrument/data

For ICE-T data the directories are laid out as follows, with detailed descriptions below.

/icet/2011_07_dd/2D-S/<png images>
/icet/2011_07_dd/HVPS/<png images>
/icet/2011_07_dd/CPI/<png images>
/icet/2011_07_dd/1Hz/<1Hz binned processed data>
/icet/2011_07_dd/*.kml

Missing data is generally flagged as -999 or -9.99E+000, and a dummy file will have a nonsensical date/time using 99's in the filename, such as 110799999999FCDP_1Hzadaptive2.txt and are filled with -999's (these files were occasionally used by SPEC's plotting programs when some probe data had not yet been processed for a flight, or could not be processed).

The various data file formats submitted are described in detail below, after each "%%%" bullet. All text files use the ASCII character set, and all file compression uses standard Windows .zip format.

%%% 2D-S/HVPS Optical Array Probe Png Pages:

Generated by SPEC IDL programs 2D-S View, or HVPS View, these pages of images show a sample of the Optical Array Probe data taken by each instrument. The date and time for each image strip, as well as any processing parameters are displayed withing the page.

File name shows the probe and date/time to millisecond and microsecond UTC for the start of data in the file.

<PROBE/CHANNEL>YYYYMMDD_HHMMSS_milmic.png

HD20110719_191731_934895.png is for a 2D-S Horizontal png page starting at 2011-07-19 19:17:31.934.895 UTC

HD or VD are 2D-S Horizontal and Vertical. HVPS_ is HVPS.

The images are displayed with deadtime white space removed. The 2D-S is at 10 microns per pixels, while the HVPS is at 150 microns per pixel. The 2D-S is often sub-sampled when generating the png pages, in order to show the character of the particles without displaying all of the millions of particles imaged.

%%% CPI/3V-CPI Image Png Pages:

File name shows the probe and date/time to millisecond UTC for the start of data in the file.

However there was a glitch on the 3V-CPI file naming that named all 3V-CPI png pages 01 for January,

instead of 07 for July. This will be fixed in a future update to the dataset.

CP20110119_191420_711.png is for a CPI png page starting on 2011-07-19 19:14:20.711 UTC

Generated by SPEC IDL programs CPI View, or 3V-CPI View, these pages of images show Cloud Particle Imager images collected onto a page for easier viewing. The date and time for the page, as well as for individual frames are displayed on the page, as well as any processing parameters are displayed within the page. The frame time is printed once for the first image in a frame, and the subsequent images from that frame are displayed to the right and wrapping below.

%%% 2D-S 1Hz ASCII Files:

The 2D-S 1Hz ASCII files are tables of concentration, extinction, and liquid water content, as well as bin counts for various size ranges. The format is identical to the HVPS, except for some notes in the header.

File name shows the probe channel, processing methods, and date. There are generally three 2D-S 1Hz files per flight, a Horizontal file, a Vertical file, and an averaged file. Methods M1 and M4 were combined for this data. Please see the file "Appendices_A_B_2D-S_Processing_Software_v4_05092011.doc" for more information on the 2D-S processing methods.

TDS20110715H_Lear_M1M4comb.txt 2D-S data from 2011-07-15 for Horizontal channel, with M1 and M4 combined
TDS20110715M1M4_Lear_HVave.txt 2D-S data from 2011-07-15 averaged between H and V channels, with M1 and M4 combined
TDS20110715V_Lear_M1M4comb.txt 2D-S data from 2011-07-15 for Vertical channel, with M1 and M4 combined.

Generated by SPEC IDL program 2D-S View, using shattering removal and cleaning as described in the manual and appendices.

The individual columns in the files have text headers to identify them, with the descriptions below:

Time	Time in seconds UTC from start of day
sv(Liter)	Sample Volume in Liters
conc	Total Number Concentration in #/Liter
extinction	Extinction in 1/km
LWC	Liquid Water Content in mg/Liter
IrregularCNT	Particle Irregular Counts
Number5to55	Number of particles in size range 5 to 55 microns
Number55to255	Number of particles in size range 55 to 255 microns
Number_GT_255	Number of particles in size range greater than 255 microns
N:5-15	Number of particles in size range 5 to 15 microns
N:15-25	Number of particles in size range 15 to 25 microns
.	.
.	. 61 bins total
.	.

N:2805-3005	Number of particles in size range 2805 to 3005 microns
N:3005-inf	Number of particles in size range greater than 3005 microns
E:5-15	Extinction in 1/km/micron for size range 5 to 55 microns
E:15-25	Extinction in 1/km/micron for size range 55 to 255 microns
.	.
.	. 61 bins total
.	.
E:2805-3005	Extinction in 1/km/micron for size range 2805 to 3005 microns
E:3005-inf	Extinction in 1/km/micron for size range greater than 3005 microns
M:5-15	Mass total in mg/Liter/micron for size range 5 to 55 microns
M:15-25	Mass total in mg/Liter/micron for size range 55 to 255 microns
.	.
.	. 61 bins total
.	.
M:2805-3005	Mass total in mg/Liter/micron for size range 2805 to 3005 microns
M:3005-inf	Mass total in mg/Liter/micron for size range greater than 3005 microns

%%% HVPS 1Hz ASCII Files:

The HVPS 1Hz ASCII files are tables of concentration, extinction, and liquid water content, as well as bin counts for various size ranges. The format is identical to the 2D-S, except for some notes in the header.

File name shows the probe channel, processing methods, and date. Methods M1 and M2 were combined for this data. Please see the file "Appendices_A_B_2D-S_Processing_Software_v4_05092011.doc" for more information on the 2D-S processing methods.

Generated by SPEC IDL program HVPS View, using shattering removal and cleaning as described in the manual and appendices.

Time	Time in seconds UTC from start of day
sv(Liter)	Sample Volume in Liters
conc	Total Number Concentration in #/Liter
extinction	Extinction in 1/km
LWC	Liquid Water Content in mg/Liter
IrregularCNT	Particle Irregular Counts
Number5to55	Number of particles in size range 5 to 55 microns
Number55to255	Number of particles in size range 55 to 255 microns
Number_GT_255	Number of particles in size range greater than 255 microns
N:5-15	Number of particles in size range 5 to 15 microns
N:15-25	Number of particles in size range 15 to 25 microns
.	.
.	. 61 bins total

Second	Time in seconds UTC from start of day
conc(#/L)	Total Number Concentration in #/Liter
extn(1/km)	Extinction in 1/km
lwc(mg/L)	Liquid Water Content in mg/Liter
SV(Liter)	Sample Volume in Liters
totCNTs	Total Particle Counts for this second

Bin(#/L/um)01	Bin 01 concentration per micron
Bin(#/L/um)02	Bin 01 concentration per micron
.	.
.	. 21 Bins total
.	.
Bin(#/L/um)20	Bin 20 concentration per micron
Bin(#/L/um)21	Bin 21 concentration per micron

NBin01	Bin 01 counts
NBin02	Bin 02 counts
.	.
.	. 21 Bins total
.	.
NBin20	Bin 20 counts
NBin21	Bin 21 counts

%%% M300 1Hz ASCII Files:

ASCII output file generated by the M300 Playback. File name has data and _m300. These files have been altered from the raw M300 output into tab separated ASCII text files which are easier to read into Matlab. However, this separates some of the columns into tab-delineated fields (see Date and Time below for examples). Of interest here are the aircraft latitude and longitude, altitude, True Air Speed, Temperature, Nevzorov data, Rosemount Icing Probe frequency, and Edgetech Hygrometer Relative Humidity.

Date	MM<tab>DD<tab>YYYY
Time	in UTC HH<tab>MM<tab>SS
GPSTime	
AIMMSTime	
Garmin Longitude	
Garmin Latitude	
AIMMS Longitude	
AIMMS Latitude	
Lear Static Pressure mb	
AIMMS Static Pressure mb	
Lear Pressure Altitude ft	
AIMMS Press Altitude ft	
Lear DiffPressure mb	
Garmin GPS Atitude ft	

AIMMS GPS Altitude ft
ARINC Altitude ft
ARINC Baro Corrected Altitude ft
Lear Cockpit Heading deg mag
AIMMS Heading deg true
Garmin Magnetic Variation deg
Lear IAS knots
AIMMS IAS knots
ARINC IAS knots
Lear TAS m/s
AIMMS TAS m/s
Garmin GPS GroundSpeed m/s
AIMMS Ground Speed m/s
Rosemount Temp C
AIMMS Temp C
AIMMS RH percent
Theta K
NevATWC_adj g/m3
NevBTWC_adj g/m3
NevALWC g/m3
NevBLWC g/m3
Garmin GPS Wind Dir MAGorGEO
Garmin GPS Wind Speed m/s
AIMMS Wind Dir m/s
AIMMS Wind Speed deg MAGorGEO
AIMMS Wind Velocity NS m/s
AIMMS Wind Velocity EW m/s
AIMMS Wind Velocity UD m/s
AIMMS Vertical Wind m/s
RICE Mso Frequency Hz
Edgetech Hygrometer V
Edgetech Dew Point C

%%% AIMMS-20 (turbulence) 1Hz ASCII Files:

Derived AIMMS turbulence data -- Preliminary.

There are 5 columns:

Time in UTC
Turbulent Energy Dissipation Rate from Vertical Winds (m^2/s^3)
Turbulent Energy Dissipation Rate from Horizontal Winds (m^2/s^3)
Latitude
Longitude
Altitude (feet)

%%% Nevzorov 1Hz ASCII Files:

These files represent Nevzorov data with the linear offsets removed (zeroed), with all data values in grams/cubic meter. Nevzorov A is on the Lear Left nose, while Nevzorov B is on the Right nose of the SPEC Learjet. Only the _new fields should be used from this file.

Second	in UTC seconds from start of day
hhmmss	in UTC
IWCNvAT_new	g/m ³ Total water content (ice and liquid) for Nevzorov A
IWCNvBT_new	g/m ³ Total water content (ice and liquid) for Nevzorov B
IWCNvAL_new	g/m ³ Liquid water content for Nevzorov A
IWCNvBL_new	g/m ³ Liquid water content for Nevzorov B
IWCNvAT_old	g/m ³
offsetAT	g/m ³
IWCNvBT_old	g/m ³
offsetBT	g/m ³
IWCNvAL_old	g/m ³
offsetAL	g/m ³
IWCNvBL_old	g/m ³
offsetBL	g/m ³

%%% Google Earth .kml flight tracks

- standard Google Earth .kml files (format available at <http://code.google.com/apis/kml/documentation/>) depicting the flight tracks of the Lear and C-130. The naming is as follows:

C130_track_rf10.kml

-- C-130 flight track for ICE-T named for Research Flight number. (note that these values are incorrectly in the units of feet however Google Earth only reads .kml values in meters, so the vertical relief is incorrect)

FlightAware_N999MF_TISX_TISX_20110724.kml

-- Lear flight track downloaded from FlightAware.com for tail number N999MF

spec_2011_07_24.csv.kml

-- Lear flight track generated from onboard GPS data, higher resolution than the FlightAware flight track

%%% Instrument Images and Flight Videos

Images of Lear instruments and video frame captures are provided in standard JPEG and TIF formats. Flight videos from the cockpit mounted video camera are in AVI format, 30 frames/second, 1140kbps, 24bit, using FFDS compression (<http://www.cccp-project.net/>)

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