

Raw data processing software v14.

This software requires a PC with the LabVIEW 2009 or later run time engine installed. The LiDAR's PC has the run RTE installed. To RTE can be downloaded from this location:

<http://joule.ni.com/nidu/cds/view/p/id/1383/lang/en>

Summary of operation.

This software will read and display raw data files, allowing various re-processing options as well as the option to re-save the data.

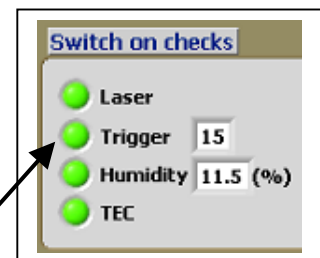
Editable parameters:

- Gate length
- FFT length
- Gate overlapping
- Number of rays to average*

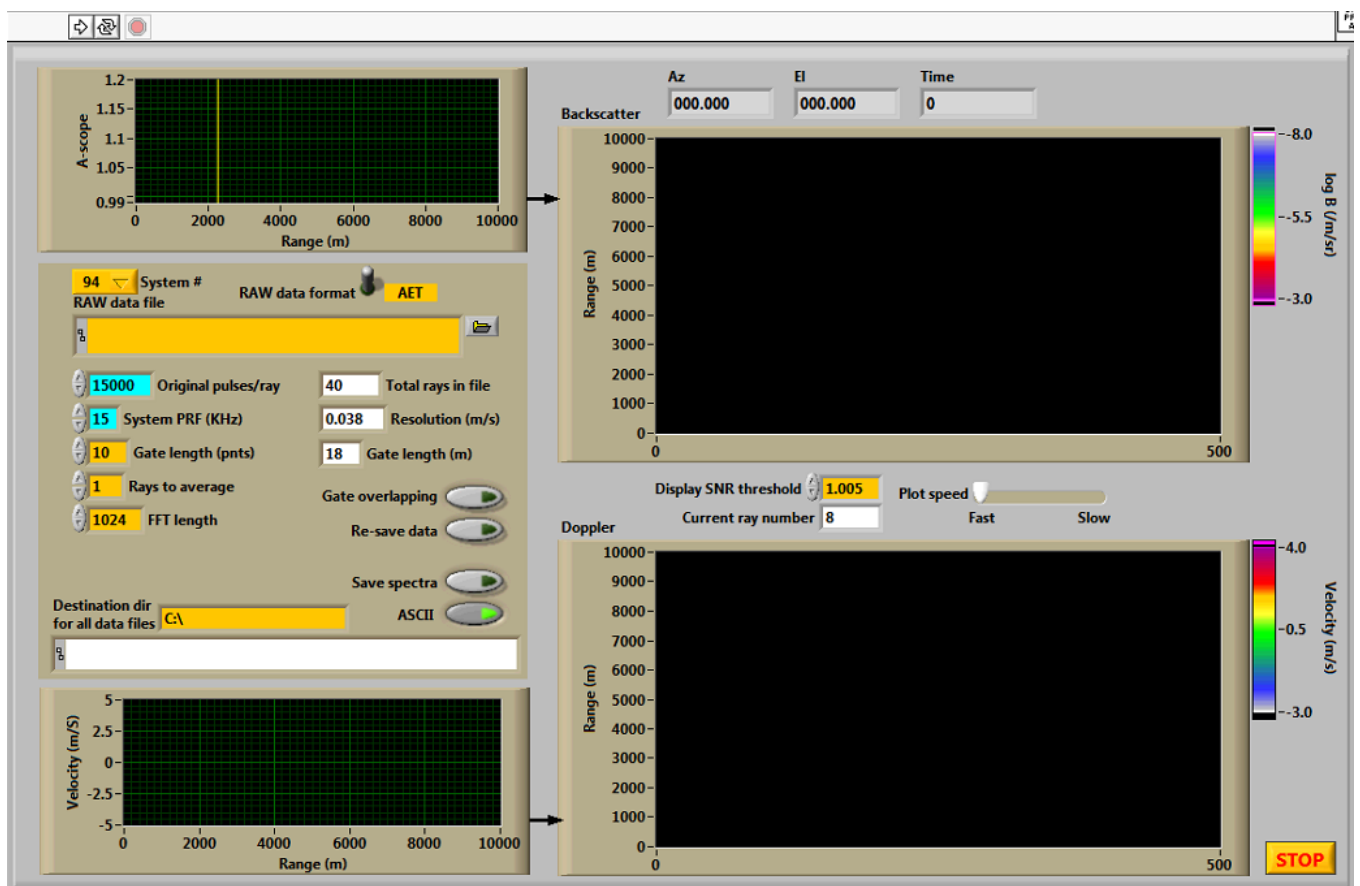
* The original number of pulses per ray cannot be reduced. For example, if 15000 pulses were averaged when the original data were collected, then this is the minimum amount of averaging that can be chosen by selecting 1 in the 'Rays to average' parameter. Choosing 2 will mean that 30000 rays will be averaged during re-processing.

On startup, the software will require certain settings to be entered:

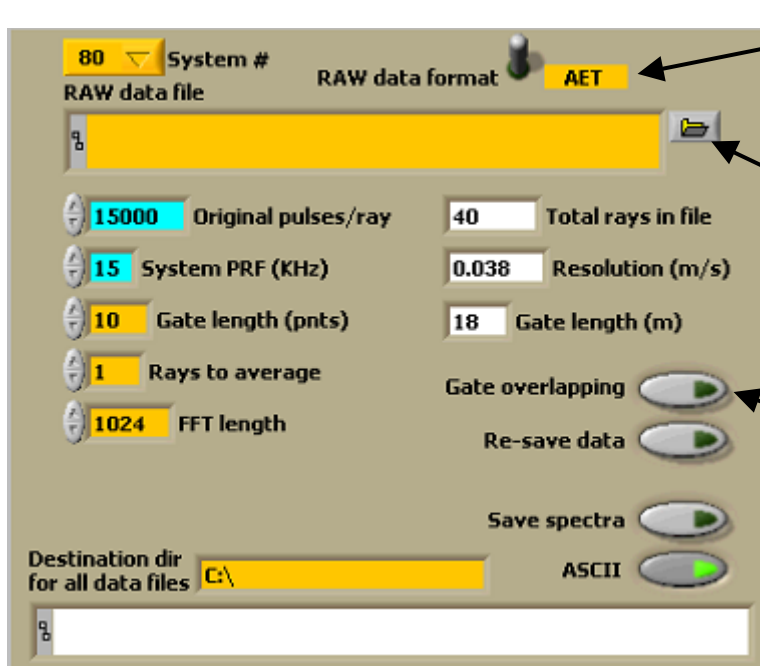
- RAW data input file and format – either regular or AET;
- System serial number;
- Original pulses per ray;
- System PRF – usually 10 or 15 KHz;
- New gate length (in points);
- New rays to average;
- FFT length;
- Option to log the processed data.



The **PRF** of the system can be read from the **Trigger** indicator on the main v14 software. A record is kept of all system parameters – so contact Halo if you need help. The **Original pulses/ray** number can be found on the corresponding processed data file header. The other fields having a yellow background are selectable, and can be changed for each run of this software.



For this example, the input fields have been left at their default values. The display fields have a white background, and are updated when the software is running.



AET format data files will have **aet_** at the beginning of their filename.

Press the browse button to select the RAW data file to be re-processed.

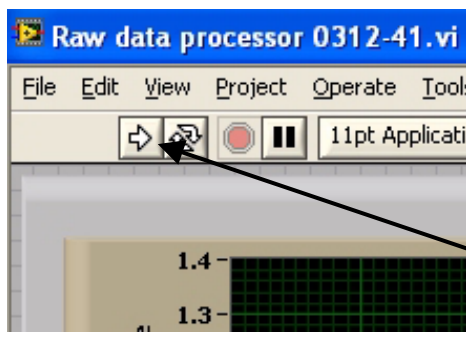
Gate overlapping will mean that successive gates are moved on by one point, rather than 'Gate length' number of points.

The header section from the original processed data file gives the original **Pulses/ray** – this is what a '1' entered into **Rays to average** will correspond to in this software.

If the processed data is to be saved, then the **Re-save data** button can be pressed to show a green light.

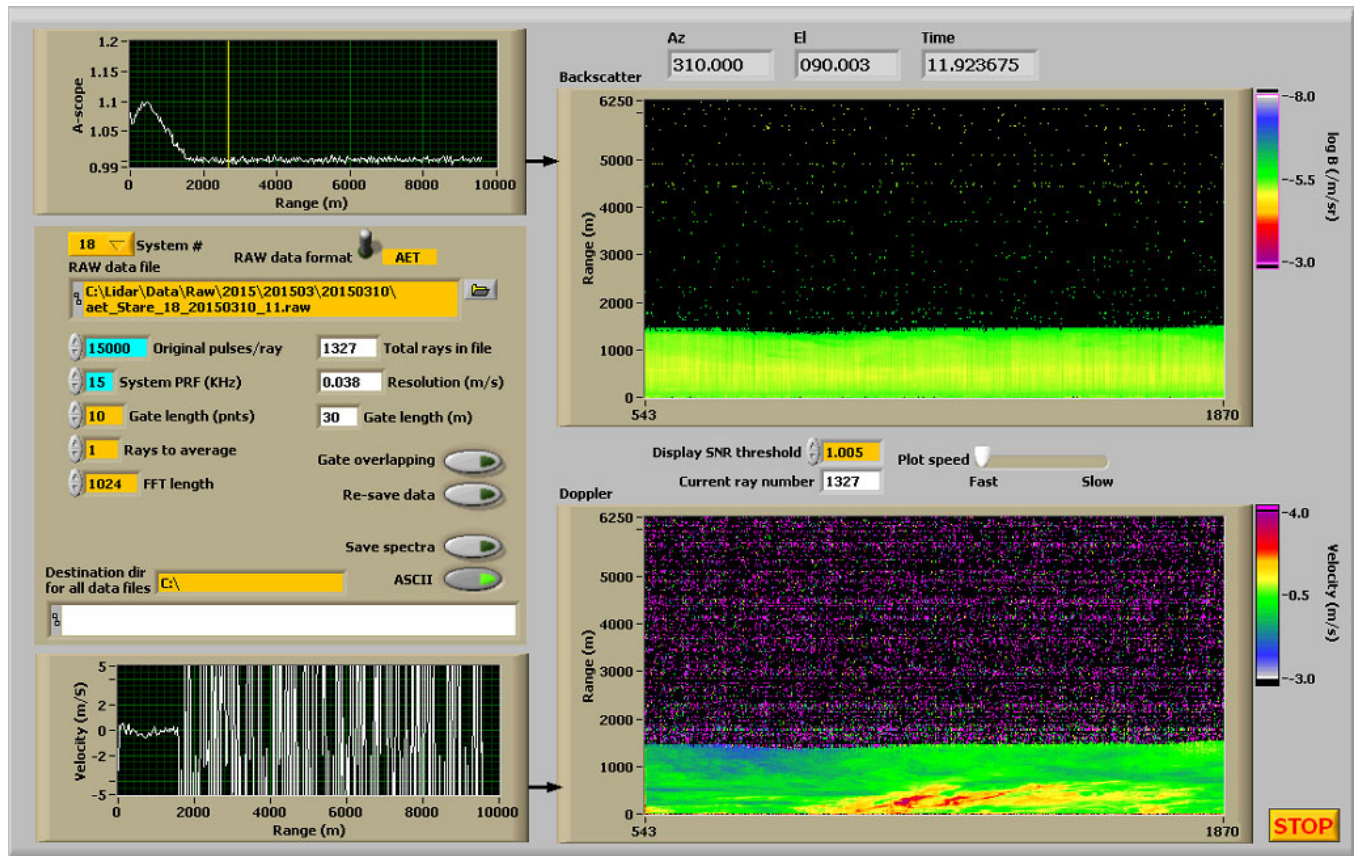
The header as taken from the corresponding original processed data file.

```
Filename: C:\Lidar\Data\CSM\2012\201201\20120117\41_20120117_203439.csm
System ID: 41
Number of gates: 139
Range gate length (m): 36.0
Gate length (pts): 20
Pulses/ray: 3000
No. of rays in file: 0
Scan type: ScanFile
Focus range: 0
Start time: 20120117 20:34:39.98
Resolution (m/s): 0.0637
Altitude of measurement (center of gate) = (range gate + 0.5) * Gate length
Data line 1: Decimal time (hours) Azimuth (degrees) Elevation (degrees) Pitch
(degrees) Roll (Degrees)
f9.6,1x,f6.2,1x,f6.2,f6.2,f6.2
Data line 2: Range Gate Doppler (m/s) Intensity (SNR + 1) Beta (m-1 sr-1)
i3,1x,f6.4,1x,f8.6,1x,e12.6 - repeat for no. gates
****
```



Press the right facing arrow to start the processing

After the run button is pressed, the data file will be accessed and re-processed using the input parameters. The plotting update rate can be adjusted by moving the 'Plot speed' slider. The display threshold can also be changed – it will not affect the logged data.



The processed data filename will be displayed if the **Re-save data** button is pressed. The software will begin processing as soon as it is started, so ensure that the save button is pressed prior to running if the complete data file is to be saved.

The re-processed data file name will be made up from the original raw data file name, and will be appended with 'reprocessed' along with the date and time that it was re-processed. It will be saved by default to C:\LiDAR_Reprocessed_Data – the LiDAR_Reprocessed_Data directory will be created if it doesn't exist. Type another directory into the **Destination dir** control box to save to, but make sure that the directory exists.



The data file will have the same format as the processed data as saved using the regular LiDAR software. The start time in the header will reflect the re-processing date/time. For **aet** format raw data files, the original time, azimuth and elevation will be stored in the re-processed files. Regular format raw files do not have azimuth, elevation and time saved, so the ray time will be the reprocessing time, and az / el will be set to 0.

RAW data format [Regular or AET]. Use this feature to select the format that the original raw data were collected in. In the AET version of the format, each hourly raw data file begins with 4000 points (10KHz PRF) or 3200 points (15KHz PRF) of background file. Then, each ray of raw data are followed by the azimuth, elevation and decimal time as double precision floating point numbers.

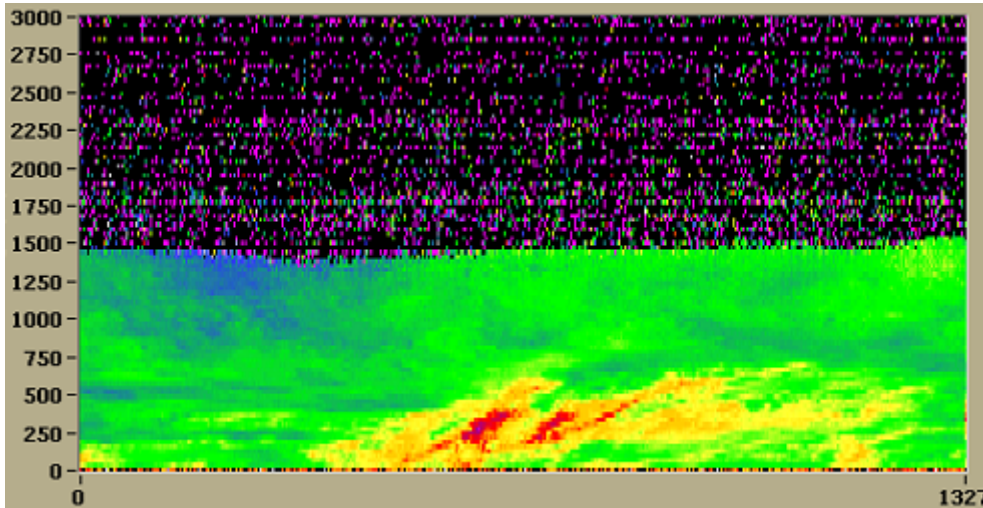
If the **Save spectra** button is pressed, then each ray's spectra data will be saved in either ASCII or binary format to a directory C:\LiDAR_Spectra_Data. The directory will be created if it does not exist. If another parent directory has been entered, then the LiDAR_Spectra_Data directory will be contained in it.

Note: The data format can't be changed once the software is running, and the Save spectra button has been pressed – it will be disabled and greyed out. It can be changed once the software is in a stopped state, even if it is greyed out still.

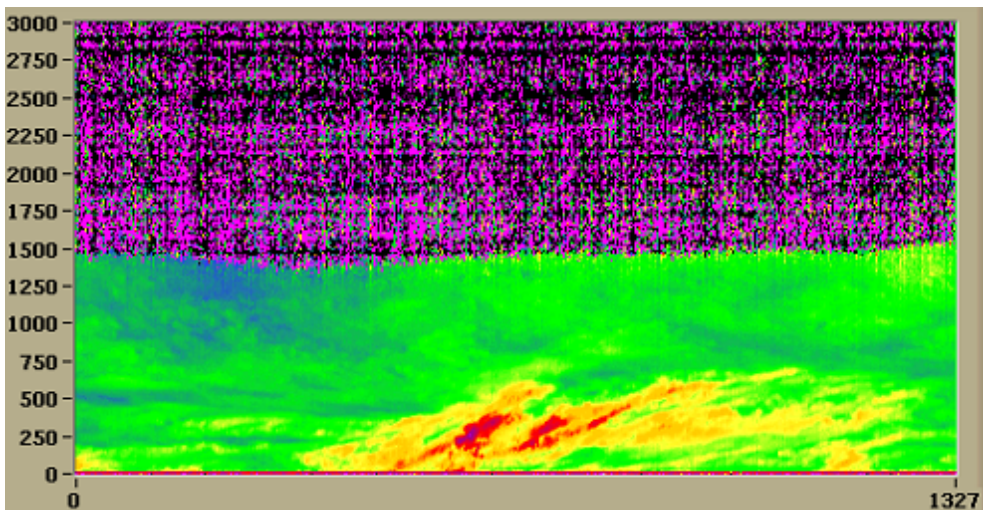
A sub directory will be created using the time that the software was run in the format 'YYMMDD_HHMMSS' and then each ray's spectra will be saved within that using the following nomenclature: Ray_0 then either .txt or .bin., Ray_1 etc. etc.

Each ray's file consists of [Number of gates x FFT length] of I32 type. Each number and each gate in a binary file follows on from the last with no space. The ASCII data has a [CR] after every number, which results in a column of numbers.

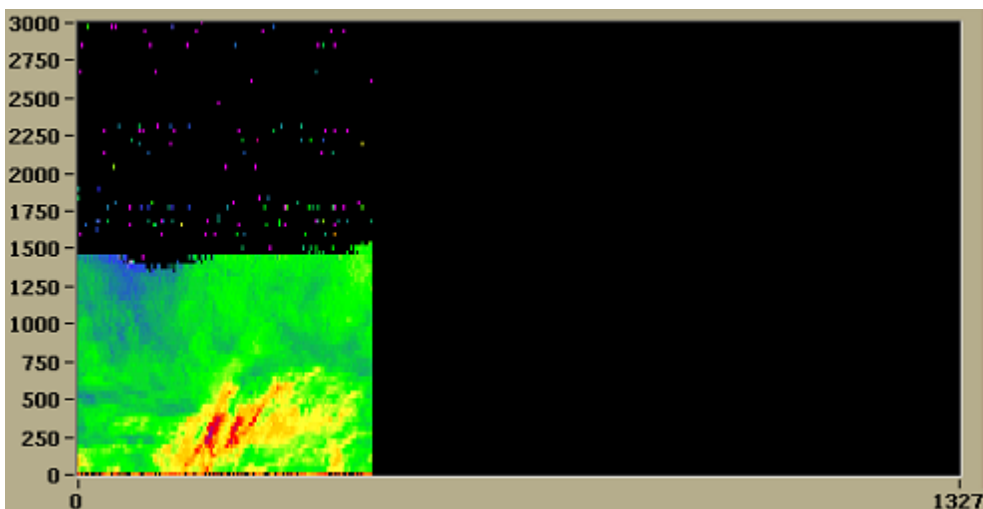
Example raw data file re-processed in several ways.



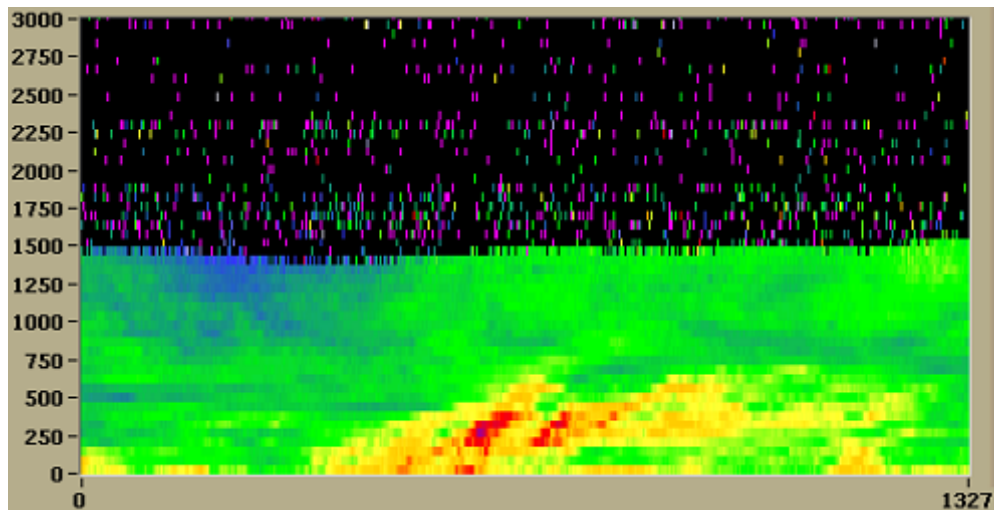
(1) Doppler data as processed originally – 15000 averages, 30m – 10 point gates.



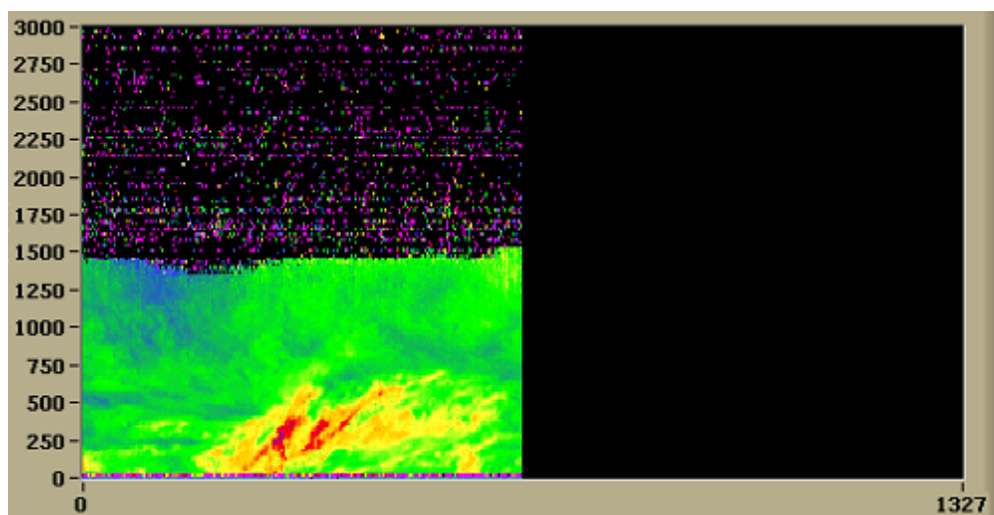
(2) Doppler data as processed originally – 15000 averages, 30m – 10 point **overlapping** gates.



(3) Doppler data as processed originally – **45000** averages (so averages set to 3), 30m – 10 point gates.



(4) Doppler data as processed originally – 15000 averages (so averages set to 3), **60m – 20 point gates**.



(5) Doppler data as processed originally – **30000** averages (so averages set to 3), **18m – 6 point gates**.

Software updates:

Build date	Type	Details
07/12/2012	Update	New systems added to the list.
14/12/2012	Bug fix.	Spectra output files varied in size depending on how fast the software ran. Files are now identical in size.
10/2/2014	Update	1. Systems up to 78 are included in the pull down menu. 2. Raw data incorporating azimuth, elevation and decimal time can be processed.
17/3/2015	Update	v14 software compatible version of RDP created, that has PRF input. Raw data files are 3200 or 4000 points no matter what range was selected at acquisition time.