

**University of Notre Dame Halo Photonics Stream Line Scanning  
Doppler LiDAR Data Captured During the Fall Campaign  
LID-UND-FALL**

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## 1.0 Data Set Overview

### 1.1 Time period covered by the data

List of days when scans are available:

2012/10/01  
2012/10/02  
2012/10/03  
2012/10/04  
2012/10/05  
2012/10/06  
2012/10/09  
2012/10/10  
2012/10/11  
2012/10/14  
2012/10/15  
2012/10/16  
2012/10/17  
2012/10/18

### 1.2 Physical location (latitude, longitude, elevation)

40.097200, -113.23759, 1327

### 1.3 Instrument type

LIDAR

### 1.4 Data provider

University of Notre Dame

### 1.5 Web address references

<http://www3.nd.edu/~dynamics/materhorn/>

[https://www.eol.ucar.edu/field\\_projects/materhorn-x](https://www.eol.ucar.edu/field_projects/materhorn-x)

## 2.0 Instrument Description

Halo Photonics Streamline scanning Doppler wind LiDAR with 18m range gates measuring radial velocities along each ray.



### 2.1 Instrument website

<http://halo-photonics.com/>

[http://www.insc.c.utah.edu/~hoch/METCRAX2.0/HALO\\_INFO/StreamLine%20v4.pdf](http://www.insc.c.utah.edu/~hoch/METCRAX2.0/HALO_INFO/StreamLine%20v4.pdf)

### 2.2 Table of specifications

Accuracy	Range	Frequency	Resolution
Consult the manufacturer specifications.			

## 3.0 Data Collection and Processing

### **3.1 Description of data collection**

Data collection, when available, was only conducted during intense observation periods (IOP).

### **3.2 Description of derived parameters and processing techniques used**

Original data files are provided. For more details about derived parameters see: [http://www.inscc.utah.edu/~hoch/METCRAX2.0/HALO\\_INFO/StreamLine%20v4.pdf](http://www.inscc.utah.edu/~hoch/METCRAX2.0/HALO_INFO/StreamLine%20v4.pdf)

### **3.3 Description of quality assurance and control procedures**

This dataset was not subject to any quality control or processing it has been provided in its original form.

### **3.4 Data intercomparisons**

## **4.0 Data Format**

### **4.1 Data file structure**

ASCII tab separated, the exact structure provided by the file description.

### **4.2 File naming convention**

Several different file naming conventions are utilized for the different scanning strategies. However, all of the files are ASCII tab separated and follow a similar format with the file extension \*.hpl or \*.csm. The hpl have different file names include, but are not limited to Stare\*, User\*, VAD\*, Wind\_Profile\*. The Stare\* as the name indicates the LiDAR operates with the scanning head locked with both a fixed Azimuth and Elevation angle. The User\* scans are user specified and are usually follow with a 1, 2, 3. These scans may be Range Height Indicator (RHI) scans, where a fixed Azimuth is used with a scanning elevation over time. Conversely these scans may also be Plan Position Indicator (PPI) scans, where the elevation is kept fixed and a range of azimuth values is scanned. A VAD\* or Velocity Azimuth Display scan, where the elevation is kept constant and a 360 degree azimuth scan is performed allows for the three wind components of velocity to be mathematically computed from the radial velocity measurements. A Wind\_Profile\* where the elevation is set to 90 degrees sets the LiDAR to stare vertically. Finally, the LiDAR system has another method, Processed\_Wind\_Profile\*, of computing vertical profiles of horizontal wind speed and direction, the format of these files will be described below. Additionally, a tab separated ASCII file is provided which gives additional information regarding the LiDAR system. The file includes the following columns: the data file name, the system time, the internal temperature, internal humidity, a 0 column, the input voltage and the data acquisition card temperature. The last column may not be present if the temperature is provided in the first column.

### **4.3 Data format**

Varies.

### **4.4 Data layout**

Each of the files has seventeen header lines describing the setup. The header describes the columns. The first row following the header provides the decimal hour, therefore the full time and date can be achieved by reading the Start time contained in the header. Also in the first line following the header is the Azimuth (degrees), followed by the Elevation (degrees). Following are rows corresponding to each 18m range gate for a single ray. The columns are the range gate number, the radial velocity (m/s), the signal to noise intensity (dB), Beta (m<sup>-1</sup> sr<sup>-1</sup>). Following all the range gates for a given ray, the process begins again with the decimal hour line followed by the first range gate line and so on. The azimuth and elevations values which are provided next to the decimal hour may be used for plotting the different scanning methods. The Processed\_Wind\_Profile\* files do not contain any header lines. These files provide the UTC time and date in the file name. The first line contains the number of data lines in the file. Following the first line of data there are three tab separated columns which are the height above ground level, the wind direction in degrees from north (0 north, 90 east, 180 south, 270 west), and finally the horizontal wind speed in m/s.

#### **4.5 List of parameters with units, sampling intervals, frequency, range**

Consult individual file headers, additionally see file description provided above, or [http://www.inscc.utah.edu/~hoch/METCRAX2.0/HALO\\_INFO/StreamLine%20v4.pdf](http://www.inscc.utah.edu/~hoch/METCRAX2.0/HALO_INFO/StreamLine%20v4.pdf)

#### **4.6 Data version number and date**

raw, v1.0, October 2016

#### **4.7 Description of flags, codes used in the data, and definitions**

#### **4.8 Data sample**

Sample dataset is not suitable for display in this document.
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### **5.0 Data Remarks**

#### **5.1 PI's assessment of the data**

CSM Data -

10/07

LiDAR Triangle Scan towards UU

166 gates, 18m gate length

AZ = 196, EL = 0 -90

10/10

Tower mode with ARL

AZ = 315, EL = 0 -90

Files ending with 011029 - 211845

166 gates, 18m gate length

Tower mode with ARL

Files ending with 211845 - 221845

62 gates, 48m gate length

LiDAR Triangle Scan towards UU

Files ending with 222659 - 235659

62 gates, 48m gate length

AZ = 196, EL = 0 -90

10/11

LiDAR Triangle Scan towards UU

62 gates, 48m gate length

AZ = 196, EL = 0 -90

10/14

166 gates, 18m gate length

AZ = 285, EL = 0 - 180

10/16

AZ = 315, EL = 0 - 90

62 gates, 48m gate length

## **5.2 Missing data periods**

## **5.3 Software compatibility**

## **6.0 References**

- [1] [http://www.insec.utah.edu/~hoch/METCRAX2.0/HALO\\_INFO/StreamLine%20v4.pdf](http://www.insec.utah.edu/~hoch/METCRAX2.0/HALO_INFO/StreamLine%20v4.pdf)
- [2] <http://remotesensing.spiedigitallibrary.org/article.aspx?articleid=2521574>
- [3] Fernando, H. J. S., E. R. Pardyjak, S. Di Sabatino, F. K. Chow, S. F. J. DeWekker, S. W. Hoch, J. Hacker, J. C. Pace, T. Pratt, Z. Pu, J. W. Steenburgh, C. D. Whiteman, Y. Wang, D. Zajic, B. Balsley, R. Dimitrova, G. D. Emmitt, C. W. Higgins, J. C. R. Hunt, J. G. Knievel, D. Lawrence, Y. Liu, D. F. Nadeau, E. Kit, B. W. Blomquist, P. Conry, R. S. Coppersmith, E. Creegan, M. Felton, A. Grachev, N. Gunawardena, C. Hang, C. M. Hocut, G. Huynh, M. E. Jeglum, D. Jensen, V. Kulandaivelu, M. Lehner, L. S. Leo, D. Liberzon, J. D. Massey, K. McEnerney, S. Pal, T. Price, M. Sghiatti, Z. Silver, M. Thompson, H. Zhang, T. Zsedrovits, 2015: The MATERHORN – Unraveling the Intricacies of Mountain Weather, BAMS, doi: <http://dx.doi.org/10.1175/BAMS-D-13-00131.1>.

