

## LDS format descriptions for Underway Sensors

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The directories under lds/raw contains all data logged by the LDE0 Data System (LDS).

Many of R/V Sikuliaq's underway sensors that output ASCII serial data such as

GPS navigation, gravity, weather and surface water properties are logged by LDS.

LDS precedes each line of serial data with the logger label and time stamp delimited

by tabs. Everything after the time stamp is generally straight from the

instrument unmodified with the few exceptions noted below.

Many of the instruments on Sikuliaq that output serial data will conform to the

NMEA 0183 standard. NMEA 0183 is a combined electrical and data specification for

communication between marine electronics such as echo sounder, sonar, anemometer,

gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been

defined by, and is controlled by, the National Marine Electronics Association.

The NMEA 0183 standard uses a simple ASCII, serial communications protocol that defines

how data are transmitted in a "sentence" from one "talker" to multiple "listeners" at a

time. Sensors that output NMEA sentences will be noted below. More detailed information

on the meaning of the sentences can generally be looked up on the internet.

The following is a description of each of the individual sensors logged by LDS -

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### adcp\_speedlog:

UHDAS ADCP Speed Log from Workhorse 300 (nearest surface bin)

Location: Centerboard

Sample rate: variable

Example data lines:

adcp\_speedlog 2019-03-01T11:08:35.5956Z  
\$VDVBW,8.91,0.07,A,9.02,0.88,A\*5D

adcp\_speedlog 2019-03-01T11:08:39.2117Z  
\$VDVBW,9.03,0.09,A,9.47,1.04,A\*5D

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

\$--VBW,speed,speed,status,speed,speed,status\*checksum  
-Longitudinal water speed, knots  
-Transverse water speed, knots  
-Status: Water speed, A = Data valid  
-Longitudinal ground speed, knots  
-Transverse ground speed , knots  
-Status, Ground speed, A = Data valid

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ais\_r4-navigator\_bridge:

Bridge navigation R4 AIS Class A Transponder System

Sample rate: variable

Example data lines:

```
ais_r4-navigator_bridge 2019-02-28T00:00:00.7961Z !
AIVDM,1,1,,A,ENkb9V21FR0Vh;Uh;0Tah@@@@@;`j6@=3DVh00003vP000,2*16
ais_r4-navigator_bridge 2019-02-28T00:00:00.9246Z !
AIVDO,1,1,,,152gEJ5000o>>tLJ4gdL`9b00000,0*53
ais_r4-navigator_bridge 2019-02-28T00:00:01.4201Z
$PSTT,10A,20190228,000001*6C
ais_r4-navigator_bridge 2019-02-28T00:00:23.8870Z
$AIALR,201110.00,008,V,V,AIS: MKD connection lost*7F
```

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

!AIVDM,number of sentences,sentence number,,AIS channel,encoded AIS data,end of data\*checksum

-!AIVDM is received data from other vessels  
-!AIVDO is own vessels information

\$PSTT,10A,UTC date,UTC time\*checksum  
\$AIALR - alarm message

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ek80\_depth:

Depth output from the Simrad EK80, ES18 split-beam transducer  
Location: Centerboard  
Sample rate: variable

Example data lines:

ek80\_depth 2019-03-01T11:50:02.6900Z  
\$EKDBS,335.75,f,102.34,M,55.96,F\*14

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

\$--DBS,depth,f,depth,M,depth,F\*checksum  
-Water depth below surface, feet  
-Water depth below surface, Meters  
-Water depth below surface, Fathoms

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flow\_krohne\_fwd:

KROHNE OPTIFLUX 5000 Electromagnetic flowmeter measuring surface seawater flow being delivered to the underway instruments on the main lab Wet Wall. These electromagnetic flowmeters are designed exclusively to measure the flow and conductivity of electrically conductive, liquid media.

The interface to this instrument is via Modbus RTU over RS485. Custom software had to be written to extract the required data from the sensor. The logged data format is unique to Sikuliaq.

Location: Main Lab Wet Wall.

Water source: forward seachest or centerboard if seachest plugged with ice.

Sample rate: 1 per second

Example data line:

flow\_krohne\_fwd 2014-12-11T20:19:01.7029Z  
0.558,5.93,27.38,0.65940

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
flow speed [m/s]  
volume flow [l/min]  
coil temperature [C]  
conductivity [S/m]

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flow\_krohne\_pco2:

KROHNE OPTIFLUX 5000 Electromagnetic flowmeter measuring surface seawater flow being

delivered to the pCO2 system equilibrator in the wet lab. These electromagnetic

flowmeters are designed exclusively to measure the flow and conductivity of electrically conductive, liquid media.

The interface to this instrument is via Modbus RTU over RS485. Custom software had

to be written to extract the required data from the sensor. The logged data format is unique to Sikuliaq.

Location: Wet lab, next to pco2 equilibrator.

Water source: forward seachest or centerboard if seachest plugged with ice.

Sample rate: 1 per second

Example data line:

flow\_krohne\_pco2 2017-06-01T18:15:27.9012Z  
1.204,71711.54,-271.97,1.18521

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
flow speed [m/s]  
volume flow [l/min]

coil temperature [C]  
conductivity [S/m]

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fluoro-trip-fwd:

WET Labs Eco Triplet Scattering Fluoresense Sensor.  
Configuration: Red scattering (650nm), Chlorophyll EX/EM  
(470/695nm), FDOM EX/EM (370/460nm)

Model: Eco Triplet BBFL2  
Serial Number: 6921  
Installed: Nov. 6th, 2021  
Calibrated: June 24, 2021

Location: Main lab, Wet Wall.

Plumbed in series: tsg\_sbe45\_fwd > tsg\_sbe45\_fwd\_2 > tdgp >  
oxygen\_optode4330 > fluoro-trip-fwd > flow\_krohne\_fwd.

Water source: forward seachest or centerboard if seachest plugged  
with ice.

Sample rate: 1 per second

Example data line:

fluoro\_triplet\_fwd 2021-11-08T01:36:11.9710Z 11/08/21  
01:35:45 650 4021 695 147 460 69 535

Field Descriptions:

Log Name  
Log Time  
Sensor\_Date  
Sensor\_Time  
Scattering\_Wavelength\_EM(650nm)  
Signal  
Chlor\_Wavelength\_EM(695nm)  
Signal  
FDOM\_Wavelength\_EM(460nm)  
Signal  
CPU thermistor

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## fluoro-triplet-ctd:

WET Labs Eco Triplet Scattering Fluoresense Sensor attached to Sea-Bird CTD.

Configuration: Red scattering (650nm), Chlorophyll EX/EM (470/695nm), FDOM EX/EM (370/460nm)

Model: Eco Triplet BBFL2  
Serial Number: 6919  
Installed: Nov. 6th, 2021  
Calibrated: June 22, 2021

Location: CTD instrument package

Sample rate: Can be from 1 to 4 per second depending on science request

Example data line:

fluoro_triplet_ctd	2021-11-11T05:16:23.1722Z	11/11/21	05:16:07
650 1742	695 67	460 64	551

Field Descriptions:

Log Name  
Log Time  
Sensor\_Date  
Sensor\_Time  
Scattering\_Wavelength\_EM(650nm)  
Signal(counts)  
Chlor\_Wavelength\_EM(695nm)  
Signal(counts)  
FDOM\_Wavelength\_EM(460nm)  
Signal(counts)  
CPU thermistor

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## fluoro-triplet-ctd-mrg:

Includes all data from flouro-triplet-ctd with core Seabird CTD data appended at the end.

Example data line:

fluoro_triplet_ctd_mrg	2021-11-10T05:15:23.5898Z	11/10/21
05:15:08 650 854	695 73	460 65
24049 1002.000	2.595	2.568 46.13

## Field Descriptions:

Log Name  
Log Time  
Sensor\_Date  
Sensor\_Time  
Scattering\_Wavelength\_EM(650nm)  
Signal(counts)  
Chlor\_Wavelength\_EM(695nm)  
Signal(counts)  
FDOM\_Wavelength\_EM(460nm)  
Signal(counts)  
CPU thermistor  
Scan\_Count  
Elapsed Time(sec)  
Pressure(db)  
Depth(m)  
Altimeter(m)

The beginning of the next CTD cast has this line in the data:

fluoro\_triplet\_ctd\_mrg 2021-11-10T07:21:30.3262Z  
000000000000000000000000000000000000

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## gnss\_cnav:

C-Nav3050 Globally Corrected Global Positioning System (GcGPS).  
C-Nav Subscription Services were active for this entire cruise.

Note: C-Nav Subscription Services requires a clear line-of-sight of their geostationary satellites.

The cnav antenna was relocated to the top of mainmast and sits between the SeaPath antennas with clear access to the satellites. This was completed in February of 2016. Antenna was re-surveyed into the ships coordinate system by IMTEC March 5th, 2016.

When operating in high latitudes, i.e. above 76°N, differential correction solutions are received over the internet (OTI).

Due to the limited connectivity in such remote locales, internet corrections are not always available.

S/N: 13669  
P/N: 92-310413-3002LF

Location: Antenna at top centerline on main mast.  
Sample rate: 1 per second

Example data lines:

```
gnss_cnav 2015-01-10T03:23:13.0575Z
$GNZDA,032313.00,10,01,2015,00,00*7E
gnss_cnav 2015-01-10T03:23:13.1366Z
$GNRMC,032313.00,A,1807.457933,N,16228.301394,E,1.70,231.0,100115,0,E,
D*00
gnss_cnav 2015-01-10T03:23:13.1767Z
$GNVTG,231.0,T,,M,1.70,N,3.15,K,D*17
gnss_cnav 2015-01-10T03:23:13.2183Z $PNCTR,NAVQ,032313.00,3D,C2-
SET,DUAL*24
gnss_cnav 2015-01-10T03:23:13.3072Z
$GNGGA,032313.00,1807.457933,N,16228.301394,E,2,17,0.7,50.860,M,0.000,
M,3.0,0336*52
gnss_cnav 2015-01-10T03:23:13.3806Z
$GNGST,032313.00,0.2704,0.0601,0.0498,0.6302,0.0601,0.0498,0.1475*78
gnss_cnav 2015-01-10T03:23:13.4166Z
$PNCTR,RXQ,032313,Y,13.25,10,0*43
```

Field Descriptions:

- LDS Logger ID
- LDS Time Stamp [UTC]
- NMEA ASCII messages

The following is a brief overview of the NMEA sentences currently being generated:

```
$..ZDA,time,day,month,year,offset_hour,offset_min*checksum
$..RMC,time,status,lat,N/S,lon,E/W,sog,cog,date,variation,E/
W,mode*checksum
$..VTG,cog,T,cog,M,sog,N,sog,K,mode*checksum
$..GGA,time,lat,N/S,lon,E/
W,quality,used,hdop,alt,M,separation,M,age,id*checksum

$..GST,time,rms,majoraxis,minoraxis,orientation,laterr,lonerr,alterr*c
hecksum

$PNCTR,NAVQ,time,nav mode,type,solution mode*checksum
  -The UTC time of the message in HHMMSS.
  -Navigation Mode(2D,3D,...).
  -GcGPS Correction Signal Type
  -Solution Mode(Single or Dual frequency).

$PNCTR,RXQ,time,Y/N,signal,idle,bad*checksum
  -The UTC time of the message in HHMMSS.
  -Either a Y (Yes) or N (No) to indicate the status of the C-Nav
signal lock.
  -The C-Nav correction service signal (or carrier) to noise
```



ration.

- The percentage of Idle packet messages being received (over the last 4 seconds).

- The percentage of Bad packet messages received (over the last 4 seconds)

Note: NMEA messages begin with "\$GN..." if tracking both GPS and GLONASS, and "\$GP..." if only tracking GPS.

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gnss\_mps865:

Trimble MPS865 Modular GNSS Heading Receiver for real-time and post-processing applications.

Satellite signals include GPS, GLONASS, QZSS, as well as SBAS.

Two Trimble GA830 antennas in athwartship arrangement provide fixed heading solution.

Azimuth offset is 89.46 degrees, and vector length is 3.656 meters.

Serial Number: 5751R95527

Location: Antennas on main mast instrument platform

Sample rate: 10 per second

Example data lines:

```
gnss_mps865 2019-11-18T10:22:48.4628Z
$GPZDA,102248.50,18,11,2019,,*6D
gnss_mps865 2019-11-18T10:22:48.4704Z
$GPGGA,102248.50,7139.5054506,N,15211.0747110,W,2,21,0.6,22.257,M,-1.1
71,M,2.0,0131*7D
gnss_mps865 2019-11-18T10:22:48.4749Z
$GPVTG,286.91,T,271.25,M,008.157,N,015.107,K,D*28
gnss_mps865 2019-11-18T10:22:48.4765Z $GPHDT,286.64,T*0B
gnss_mps865 2019-11-18T10:22:48.4857Z
$PASHR,ARR,2,2,14,102248.50,3.342,0.558,1.432,0.220,0.214,0.292,0.0388
05,-0.183990,-0.099694,2,0,0,1*24
gnss_mps865 2019-11-18T10:22:48.4905Z
$PASHR,ARA,0,102248.50,0.006,,0.054,0.091,,0.154,0*23
```

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]

NMEA ASCII messages

The following is a brief overview of the NMEA sentences currently being generated:

\$..ZDA,time,day,month,year,offset\_hour,offset\_min\*checksum

\$..GGA,time,lat,N/S,lon,E/

W,quality,used,hdop,alt,M,separation,M,age,id\*checksum  
\$.VTG,cog,T,cog,M,sog,N,sog,K,mode\*checksum  
\$.HDT,heading,T\*checksum

ARR: Vector & Accuracy

\$PASHR,ARR,d0,d1,d2,m3,f4,f5,f6,f7,f8,f9,f10,f11,f12,d13,d14,d15,d16\*c  
c

ARA: True Heading (this message delivers roll-related data due  
to antenna installation)

\$PASHR,ARA,f1,m2,f3,f4,f5,f6,f7,f8,f9\*cc

Please see MPS865 User Guide for descriptions and ranges of  
\$PASHR parameters.

Note: The antennas have not been surveyed into the ship's coordinate  
system.

Therefore positions are referenced to the primary  
antenna location.

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grav\_bgm3\_222:

Gravimeter BGM-3, Serial Number: 222

The interface to the BGM-3 meters is a second (third?) generation of  
the original interface  
designed by Joe Stennett at Lamont in the 1980s.

Location: Aft inboard wall of electronic workshop, 1-12-1  
Calibration Date: 01/27/22

Sample rate: 1 per second

Example data lines:

grav\_bgm3\_222 2014-11-17T20:18:10.3194Z 04:024671 00

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Interface\_Counter\_period:Raw\_Counts  
Status

Status:

00 = data valid  
01 = platform not valid(e.g. gyro)  
02 = sensor not valid

03 = both platform and sensor not valid

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gyro\_1:

NAVIGAT 2100 Fiber-Optic Gyrocompass and Attitude Reference System.  
Primary.

Location: Forward bulkhead of upper lab, 03-32-2

Sample rate: 10 per second. Downsampled to 2 per second in log files.

Example data lines:

```
gyro_1 2014-12-11T00:16:03.5470Z $HEHDT,107.38,T*12
gyro_1 2014-12-11T00:16:03.5984Z $TIROT,-0000.6,A*20
gyro_1 2014-12-11T00:16:03.8972Z $PPLAN,,,,,,,,2*71
```

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

```
$--HDT,heading,T*checksum
$--ROT,rate of turn,status*checksum
```

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gyro\_2:

NAVIGAT 2100 Fiber-Optic Gyrocompass and Attitude Reference System.  
Secondary.

Location: Forward bulkhead of upper lab, 03-32-2

Sample rate: 10 per second. Downsampled to 2 per second in log files.

Example data lines:

```
gyro_2 2014-12-11T22:05:38.7155Z $PPLAN,,,,,,,,1*72
gyro_2 2014-12-11T22:05:39.0194Z $TIROT,-0039.0,A*2C
gyro_2 2014-12-11T22:05:39.0669Z $HEHDT,106.27,T*1D
```

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

\$--HDT,heading,T\*checksum  
\$--ROT,rate of turn,status\*checksum

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ins\_seapath\_position:

Kongsberg Seapath 320+ Precise Heading, Attitude and Positioning Sensor.

The product combines inertial technology together with GPS and GLONASS satellite signals. Core components in the product are the MRU 5+ inertial sensor, the two combined GPS/GLONASS receivers, the Processing and HMI Unit.

RTCM corrections provided by the C-Nav3050.

The navigation reference point used is the ship's granite block. The origin for the vessel coordinate system (0, 0, 0) is the center of the granite block located in science hold, 2-67-0.

Sample rate: 1 per second

Example data lines:

```
ins_seapath_position 2014-12-11T22:09:32.4715Z
$GPZDA,220932.45,11,12,2014,,*6B
ins_seapath_position 2014-12-11T22:09:32.5563Z
$GPGGA,220932.45,2207.733438,N,16242.262661,W,2,09,1.1,7.25,M,4.62,M,1.2,0001*6A
ins_seapath_position 2014-12-11T22:09:32.6020Z
$GPVTG,111.01,T,101.59,M,8.5,N,15.7,K,D*14
ins_seapath_position 2014-12-11T22:09:32.6841Z
$GPRMC,220932.45,A,2207.733438,N,16242.262661,W,8.5,111.01,111214,9.4,E,D*16
ins_seapath_position 2014-12-11T22:09:32.7451Z
$GPGST,220932.45,0.49,0.206,0.193,32,0.202,0.197,0.439*42
ins_seapath_position 2014-12-11T22:09:32.8020Z
$GPGBS,220932.45,0.06,-0.03,0.44,19,0.00,0.46,0.51*40
ins_seapath_position 2014-12-11T22:09:32.8229Z
$GPHDT,104.68,T*0E
ins_seapath_position 2014-12-11T22:09:32.8450Z
```

```
$PSXN,20,0,0,0,0*3B
    ins_seapath_position 2014-12-11T22:09:32.8825Z
$PSXN,23,1.28,1.93,104.68,-0.24*18
```

Field Descriptions:  
LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

```
$.ZDA,time,day,month,year,offset_hour,offset_min*checksum
$.RMC,time,status,lat,N/S,lon,E/W,sog,cog,date,variation,E/
W,mode*checksum
$.VTG,cog,T,cog,M,sog,N,sog,K,mode*checksum
$.GGA,time,lat,N/S,lon,E/
W,quality,used,hdop,alt,M,separation,M,age,id*checksum

$.GST,time,rms,majoraxis,minoraxis,orientation,laterr,lonerr,alterr*c
hecksum
$.HDT,heading,T*checksum
$.GBS,UTC,Laterr,Lonerr,Alterr,SVID,Det,Bias,StdDev*checksum

$PSXN,20,horiz-qual,hgt-qual,head-qual,rp-qual*checksum
$PSXN,23,roll,pitch,heading,heave*checksum
```

Note: The 'ins\_seapath\_10hz' logger uses the talker ID \$IN, and has a faster sample rate of 10 per second.

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mb\_em302\_centerbeam:

Nearest nadir centerbeam depth from the multibeam EM302. The data is extracted directly from the

Kongsberg XYZ88 datagram. Note that there are two timestamps included. The first timestamp is

the time the datagram is received by LDS and logged. The second timestamps is the time extracted

from the XYZ88 header which represents the time the data is valid. This datagram does not include

latitude/longitude so this information must be obtained from a separate GPS source. Note that the

time of the GPS latitude/longitude is closest to the LDS timestamp.

The logged data format is unique to Sikuliaq.

Sample rate: variable

Example data lines:

```
mb_em302_centerbeam 2014-12-11T22:47:00.4684Z
$EMCTR,2014,12,11,22:46:48.730,22.101408,-162.613610,4567.00,288*56
```

Field Descriptions:

```
LDS Logger ID
LDS Time Stamp [UTC] (Note: This is the time the datagram was
received by LDS)
ID [$EMCTR]
Year,Month,Day,Hour:Min:Sec (Note: This is the time from the
Kongsberg XYZ88 datagram header)
Latitude [Decimal Degees]
Longitude [Decimal Degees]
Depth [Meters]
Number of Beams
Checksum
```

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mb\_em710\_centerbeam:

Nearest nadir centerbeam depth from the multibeam EM710. The data is extracted directly from the

Kongsberg XYZ88 datagram. Note that there are two timestamps included. The first timestamp is the time the datagram is received by LDS and logged. The second timestamps is the time extracted from the XYZ88 header which represents the time the data is valid. This datagram does not include latitude/longitude so this information must be obtained from a separate GPS source. Note that the time of the GPS latitude/longitude is closest to the LDS timestamp.

The logged data format is unique to Sikuliaq.

Sample rate: variable

Example data lines:

```
mb_em710_centerbeam 2014-12-09T00:42:29.8146Z
$EMCTR,2014,12,09,00:42:28.954,25.616626,-172.513725,111.31,350*6B
```

Field Descriptions:

```
LDS Logger ID
LDS Time Stamp [UTC] (Note: This is the time the datagram was
received by LDS)
ID [$EMCTR]
Year,Month,Day,Hour:Min:Sec (Note: This is the time from the
Kongsberg XYZ88 datagram header)
```

Latitude [Decimal Degees]  
Longitude [Decimal Degees]  
Depth [Meters]  
Number of beams in ping  
Checksum

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mbari\_isus\_fwd:

In Situ Ultraviolet Spectrophotometer (ISUS) is a real time, chemical free sensor for measuring nitrate concentration in seawater. The instrument is programmed to output full ASCII frames and scheduled on a 5 minute duty cycle to conserve lamp life.

NOTE: This instrument is only run when requested.

Model: Sea-Bird MBARI-ISUS V3

Serial Number: Last three digits in first column of data

Location: Main lab Wet Wall

Water source: forward seachest or centerboard if seachest plugged with ice.

Sample rate: 2-3 samples every 5 minutes

Example data line:

mbari\_isus\_fwd 2017-06-06T11:25:31.9325Z  
SATNLF0204,2017157,11.425316,1.25,-12.88,56.93,0.18,0.000177,22.12,21.56,22.89,397604,14.22,11.95,5.01,11.44,14145.40,164.32,1125.20,1173.62,1118,1123,1129,1134,1122,1120,1127,1132,1129,1143,1138,1158,1133,1145,1134,1153,1152,1151,1170,1163,1184,1225,1289,1426,1633,1989,2519,3261,4247,5459,6940,8621,10491,12537,14650,16789,18932,20991,22805,24372,25617,26447,26825,26836,26497,25956,25309,24625,24017,23556,23238,23130,23149,23431,23833,24428,25150,25993,26965,28025,29135,30325,31539,32717,33841,34868,35767,36399,36746,36807,36497,35833,34851,33650,32276,30781,29275,27821,26386,25122,23989,23005,22147,21436,20825,20355,20022,19765,19619,19567,19610,19735,19927,20211,20553,20949,21386,21865,22362,22824,23271,23674,23956,24144,24208,24126,23940,23607,23133,22589,21954,21293,20593,19921,19251,18631,18078,17547,17086,16701,16383,16133,15947,15838,15783,15764,15827,15916,16062,16259,16472,16759,17036,17369,17720,18079,18465,18849,19269,19669,20061,20485,20880,21236,21534,21841,22091,22287,22429,22518,22533,22508,22409,22229,22018,21713,21383,20989,20521,20080,19586,19116,18645,18149,17664,17207,16738,16281,15816,15369,14911,14486,14075,13683,13324,13000,12700,12437,12202,12009,11842,11698,11564,11443,11346,11239,11171,11095,10993,10898,10805,10739

,10645,10590,10523,10471,10417,10365,10295,10263,10234,10225,10193,10173,10165,10143,10153,10125,10096,10073,10033,10007,9939,9895,9820,9765,9682,9590,9511,9418,9316,9176,9018,8824,8645,8445,8287,8133,7964,7833,7713,7572,7475,7371,7303,7197,7063,6891,6727,6590,6451,6334,6231,6128,6033,5986,5906,5832,5741,5699,5668,5610,5445,5150,4755,4755,58

Field Descriptions: (see ISUS-V3-Manual.pdf for more detail)

LDS Logger ID  
LDS Time Stamp [UTC]  
INSTRUMENT S/N  
DATE  
TIME  
NTR\_CONC  
AUX1  
AUX2  
AUX3  
RMS ERROR  
T\_INT  
T\_SPEC  
T\_LAMP  
LAMP\_TIME  
HUMIDITY  
VOLT\_12  
VOLT\_5  
VOLT\_MAIN  
REF AVG  
REF STD  
SW DARK  
SPEC AVG  
CHANNEL( $\lambda$ 1)  
CHANNEL( $\lambda$ n)  
CHANNEL( $\lambda$ 256)  
CHECK SUM  
TERMINATOR

-----  
-----  
met\_met4a\_fwdmast:

Paroscientific Meteorological Measurement System

Model: MET4A

Serial Number - Pressure:146582

Serial Number - R/H and Temp:20268816

Installed: May 18, 2021

Calibrated: August 8, 2019



Location: forward mast, 14.9m(49') above average water line

Sample Rate: approximately 1 every 2 seconds

Example data lines:

```
met_met4a_fwdmast 2019-11-15T04:57:25.2081Z
$WIXDR,PRESS,1.017845,bar,s/n146581,TEMP,-13.43,C,RH,86.15,%RH,s/
n20268722,FAN,1
```

Field Descriptions:

- LDS Logger ID
- LDS Time Stamp [UTC]
- ID [NMEA-style tag]
- Barometric Pressure [bar]
- Digiquartz pressure sensor serial number
- Air Temperature [deg C]
- Relative Humidity [%]
- RH/temperature probe serial number
- Fan Status [0 = not acceptable, 1 = acceptable speed]

-----

met\_ptu307:

Vaisala Combined Pressure, Humidity, and Temperature Transmitter  
Model: PTU307

Serial Number: J162010

Installed: February 17, 2021

Calibrated: January 3, 2019

Location: forward mast, 15.2m(50') above average water line

Sample rate: 1 every 5 seconds

Example data lines:

```
met_ptu307 2014-12-11T22:57:50.4649Z N 0 P= 1016.8 hPa T=
24.5 'C RH= 68.0 %RH
```

Field Descriptions:

- LDS Logger ID
- LDS Time Stamp [UTC]
- Transmitter status [7 character field, for example:
  - N 0 no heating
  - h 115 probe heating active, power 115/255
  - H 159.0 purge heating active, temperature 159C
  - S 115.0 purge cooling active, temperature 115C

X 95.0     sensor heating active, temperature 95C ]  
Atmospheric pressure[hPa]  
Air Temperature[C]  
Relative Humidity[%]

Probe heating is enabled with the following settings:

```
> heat
  Probe heat      : ON
  Interval        : 10
  Min. pwr        : 18
  Step            : 1
  PID intv.       : 2
  Target          : 2.5
  P               : 15.0000
  I               : 0.0500
  D               : 0.0000
  EMAX            : 2000
```

Sensor heating is enabled with the following settings:

```
> xheat
Extra heat : ON
RH limit   : 95 %RH
Temperature : 100 'C
Duration   : 30 s
```

(xheat does not appear to work when probe heating is enabled)

Automatic chemical purge is enabled with the following settings:

```
> pur
Interval Purge : ON
Interval       : 720 min
Power-up Purge : OFF
Duration       : 120 s
Settling       : 240 s
Temperature    : 160 'C
Temp. diff.    : 0.5 'C
```

Data filtering is enabled with the following settings:

```
> filt
Filter          : ON
EXT factor      : 0.030

> avrg
P1 average      : 1 s
```

-----  
-----  
oxygen\_optode4330:

Aanderaa Oxygen Optode. An optical sensor that does not consume oxygen. The measurement principle is based on fluorescence quenching.

Model: 4330

Serial Number: 3594

Installed: February 21, 2021

Calibration date: September 12, 2020

Location: Main lab, Wet Wall.

Water source: forward seachest or centerboard if seachest plugged with ice.

Plumbed in series: tsg\_sbe45\_fwd > tsg\_sbe45\_fwd\_2 > tdgp > oxygen\_optode4330 > fluoro-trip-fwd > flow\_krohne\_fwd.

Sample rate: 1 per 5 seconds

Example data line:

4330	3594	222.949	100.855	22.736	28.536	29.136	36.328
7.192	968.1	843.7	155.3				

Field Descriptions:

Model No.  
Serial No.  
O2Concentration[uM]  
AirSaturation[%]  
Temperature[Deg.C]  
CalPhase[Deg]  
TCPhase[Deg]  
C1RPh[Deg]  
C2RPh[Deg]  
C1Amp[mV]  
C2Amp[mV]  
RawTemp[mV]

---

oxygen\_optode4330\_cor:

Includes salinity compensated O2 Concentration using TSG-sbe45 temperature and salinity.

Example data line:

```
oxygen_optode4330_cor 2021-05-24T00:00:03.1008Z
4330,3594,503.7600,408.7601,109.8400,-0.1550,0.0000,-0.1741,30.1824,62
.012229,-168.620039
```

Field Descriptions:

Log Name  
Log Time  
ModelNo.  
SerialNo.  
O2Concentration[uM]  
salinity corrected O2Concentration[uM]  
AirSaturation[%]  
Optode Temp[C]  
reference salinity[psu]  
TSG Temp[C]  
TSG Salinity[psu]  
latitude  
longitude

---

pco2\_ldeo\_merge:

LDE0 pCO2 seawater sensor

Location: Wet lab.

Water source: forward seachest or centerboard if seachest plugged with ice.

Sample rate: 1 every 3 minutes

NOTE: New equilibrator installed, June 2021. New SBE38 installed, February 2022.

The original sensor format has been modified by pre-pending the logger name and logger timestamp and appending the additional ship supplied parameters lat, lon, cog, sog, sst, salinity, baro, wind speed, and wind dir.

Example data line:

pco2\_ldeo\_merge 2021-11-08T01:55:23.9660Z 2021312.08020,  
1791.82, 27.38, 1017.46, 58.05, 259.30, 258.73, 0.38,  
1.12, 12.00, CC46471, 6426.167370 N,16531.564263  
W,269.89,11.2,0.5166, 25.3485,1015.9 ,18.8,69.1,6.35

#### Field Descriptions:

Log\_Name Log\_Time Date-Time, CO2(mvolts),Cell Temp(C),Baro  
Pr,Flow(ccm),CO2(ppm),pCO2(uatm),Equil T(C),SBE38 T(C),ID#,  
ID,lat,lon,cog(D),sog(knots),sst(C),salinity(psu),baro(hPa),wind  
speed(knots),wind dir(D)

NOTE: Post-Processed Data can be found here: <https://www.ncei.noaa.gov/access/oads/>  
Enter "sikuliaq" in the "Additional Terms" window.

-----  
-----

rad\_qsr2150a:

Biospherical Instruments reference PAR sensor

Model: QSR2150

Serial Number: 50173

Calibration Date: 02/08/19

Installation Date: 02/01/22

Location: top of science control room

Sample rate: 1 Hz

ADC sample rate 125, gain 1

Averaging 125 readings

Calfactor: 0.0007529uE/m2 sec

Calibration Mode = B, Output calibrated for use in air dividing net  
volts by 0.0007529 with units of uE/m2 sec

Dark zero, currently dark = 0.010320v.

temperature is enabled, line voltage is enabled

Example data line:

rad\_qsr2150a 2022-02-01T22:23:11.9094Z 866.876, 12.74,  
7.494

#### Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]

PAR [ $\mu\text{E}/\text{m}^2 \text{ sec}$ ]  
Sensor Temperature [C]  
Line voltage [volts]

-----  
-----  
rad\_sgr4:

Kipp & Zonen Smart Pyrgeometer

Model: SGR4-V  
Serial Number: 210133  
Calibration Date: 19 July 2021  
Installation Date: 02/01/22

Location: top of science control room

Sample rate: 1 Hz

Example data line:

rad\_sgr4 2022-01-28T01:10:44.4696Z  
611,133,-91.77,252.74,6.04,12.05,1,1,0

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Device\_Type: type of sensor [611 = sgr4]  
Serial\_Num: last three digits of sensor serial number  
Net\_Rad[W/m<sup>2</sup>]: temperature compensated net radiation in Watts per  
meter squared  
LW\_Down[W/m<sup>2</sup>]: temperature compensated long wave downwelling  
radiation in Watts per meter squared  
Body\_Temp[']: sensor body temperature in degrees Celsius  
Ext\_V: externally supplied voltage reading  
Scale\_Factor: range and scale factor (determines number of decimal  
places)  
Op\_Mode: Operational mode [1 = normal]  
Status\_Flag: sensor status flags [0 = normal]

-----  
-----  
rad\_smp21:

Kipp & Zonen Smart Pyranometer

Model: SMP21-V  
Serial Number: 200195  
Calibration Date: 15 July 2020  
Installation Date: 02/01/22

Location: top of science control room

Sample rate: 1 Hz

Example data line:

```
rad_smp21      2022-02-01T21:52:59.4144Z
605,195,405.6,9.7,12.0,1,1,0
```

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Device\_Type: type of sensor [605 = smp21]  
Serial\_Num: last three digits of sensor serial number  
Rad[W/m2]: temperature compensated short wave radiation in Watts  
per meter squared  
Body\_Temp[']: sensor body temperature in degrees Celsius  
Ext\_V: externally supplied voltage reading  
Scale\_Factor: range and scale factor (determines number of decimal  
places)  
Op\_Mode: Operational mode [1 = normal]  
Status\_Flag: sensor status flags [0 = normal]

-----  
-----  
sb\_echosounder\_1:

Bridge navigation echo sounder, port console  
Model: LAZ 5100  
Sample rate: variable

Example data lines:

```
sb_echosounder_1 2014-11-19T02:52:42.7943Z
$SDDPT,0005.9,-0.0,0010*6B
sb_echosounder_1 2014-11-19T02:52:42.8741Z
$SDDBT,0019.3,f,0005.9,M,0003.2,F*30
```

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

\$--DPT,depth,offset,range\*checksum  
-Water depth relative to the transducer, meters  
-Offset from transducer, meters  
-Maximum range scale in use

\$--DBT,depth,f,depth,M,depth,F\*checksum  
-Water depth below transducer, feet  
-Water depth below transducer, Meters  
-Water depth below transducer, Fathoms

-----  
-----

sb\_echosounder\_2:

Bridge navigation echo sounder, chart table fiddle board  
Model: LAZ 5100  
Sample rate: variable

Example data lines:

sb\_echosounder\_2 2014-11-19T02:48:28.9308Z  
\$SDDPT,0005.7,-0.0,0010\*65  
sb\_echosounder\_2 2014-11-19T02:48:29.0106Z  
\$SDDBT,0018.6,f,0005.7,M,0003.1,F\*39

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

\$--DPT,depth,offset,range\*checksum  
-Water depth relative to the transducer, meters  
-Offset from transducer, meters  
-Maximum range scale in use

\$--DBT,depth,f,depth,M,depth,F\*checksum  
-Water depth below transducer, feet  
-Water depth below transducer, Meters  
-Water depth below transducer, Fathoms



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---

speedlog:

Bridge navigation Doppler Speed Log

Sample rate: variable

Example data lines:

```
speedlog 2014-12-12T06:02:42.8523Z $VDVLW,14566.6,N,4566.64,N*5A
speedlog 2014-12-12T06:02:43.7550Z $VDVBW,5.5,0.2,A,,,V,,V,,V*44
```

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ASCII message

The following is a brief overview of the NMEA sentences currently being generated:

\$--VLW,dist,N,dist,N,dist,N,dist,N\*checksum  
-Total cumulative water distance, nautical miles  
-Water distance since reset, nautical miles  
-Total cumulative ground distance, nautical miles  
-Ground distance since reset, nautical miles

\$--

VBW,speed,speed,status,speed,speed,status,speed,status,speed,status\*checksum

-Longitudinal water speed, knots  
-Transverse water speed, knots  
-Status: Water speed, A = Data valid  
-Longitudinal ground speed, knots  
-Transverse ground speed, knots  
-Status, Ground speed, A = Data valid  
-Stern transverse water speed, knots  
-Status, stern water speed, A = Data valid  
-Stern transverse ground speed, knots  
-Status, stern ground speed A = Data valid V = Invalid

---

---

ssv\_aml-svxchang\_fwd:

AML Oceanographic SV•Xchange field swappable sound velocity sensor.

Measures speed of sound in surface seawater from forward seachest in bow thruster room.

Model: SV•Xchange Calibrated Sensor

Serial Number: 203299

Location: Bow thruster room. Water source forward seachest.

Sample rate: 1 every 5 seconds

Example data line:

ssv\_aml-svxchang\_fwd 2014-12-12T06:08:43.7092Z 1537.965

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]

Speed of Sound [m/s]

-----  
-----  
tdgp:

Pro Oceanus Mini TDGP. Designed for measurement of gas tension (total dissolved gas pressure) in liquids.

The sensor operates through diffusion of gas from water through a hydrophobic membrane to an accurate and stable pressure sensor.

Model: 0-2 bar

Serial Number: 40-793-33

Installed: February 21, 2021

Calibration date: There are no calibration documents.

Location: Main lab, Wet Wall.

Water source: forward seachest or centerboard if seachest plugged with ice.

Plumbed in series: tsg\_sbe45\_fwd > tsg\_sbe45\_fwd\_2 > tdgp > oxygen\_optode4330 > fluoro-trip-fwd > flow\_krohne\_fwd.

Sample rate: 1 per second

Example data line:

tdgp 2021-11-10T00:00:02.7440Z P  
2020,12,12,13,44,29,11.91,996.55,11.9

Field Descriptions:

Log\_Name  
Log\_time  
Start of data line(P)  
Year  
Month  
Day  
Hour  
Minute  
Second  
Instrument Temperature [°C]  
Dissolved Gas Pressure [mbar]  
Supply voltage [volts]

Note: Year, Month, Day, Hour, Minute, Second are from the instrument. DO NOT USE. Use the Log\_time for the correct date and time of sample.

---

thermo\_pyrometer-ct15:

Heitronics infrared radiation pyrometer. Measures sea surface skin temperature.

Model: CT15.10

Serial Number: 10975  
Installed: Feb. 2022  
Calibrated: July 2018

Location: Just forward of science control room, 14.3 m (47 feet) above average water line.

Sample rate: 1 per second

Example data line:  
thermo\_pyrometer-ct15 2022-02-01T22:23:06.2516Z 14.87 C

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Temperature [C]

NOTE: This instrument is not regularly calibrated/serviced.

---

thermo\_sbe38\_fwd:

Sea-Bird SBE 38 Temperature sensor.

Measures surface seawater temperature from forward seachest for the UNCSW system.

Model: SBE38

Serial Number: 3865482-0631

Installed: 03 Feb 22

Calibrated: 26 Jan 21

Location and water source: Forward seachest in bow thruster room

Sample rate: 1 Hz

NAvg=5

Example data line:

thermo\_sbe38\_fwd 2016-03-12T00:00:16.7036Z 16.7103

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]

Temperature [C]

---

thermo\_sbe38\_incubator:

As of February 2022, this sensor has been removed from the underway system and will not be supported in future cruises

---

tsg\_emssv:

Log of the Kongsberg external datagrams(C+T format) sent to the Kongsberg MBES (EM302 and EM710).

These provide the real-time input for surface sound velocity needed by these sonars.

Sample rate: 1 every 5 seconds

Example data line:

```
tsg_emssv 2014-12-12T06:51:13.1575Z $KSSIS,80,1537.39,26.44,
```

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Kongsberg external datagram(C+T format)\*

\* Note:

\$KSSIS,80,c.c,t.t,\n\r  
where

- \$KSSIS specifies that this is a Kongsberg proprietary datagram format
- 80 is the datagram number indicating that this is an external soundspeed sample
- c.c is the sound speed at transducer represented as an ASCII text string e.g. 1537.39
- t.t is the temperature at transducer represented as an ASCII text string e.g. 26.44

-----  
-----

tsg\_sbe45\_fwd:

Sea-Bird SBE 45 MicroTSG Conductivity and Temperature Monitor.  
Measures surface seawater temperature and conductivity.

Model: SBE 45 MicroTSG (Thermosalinograph)

Serial Number: 0385

Installed: October, 15 2020 Prior to SKQ202016S

Calibrated: March 6, 2020

Location: Main lab, Wet Wall.

Water source: forward seachest or centerboard if seachest plugged with ice.

Plumbed in series: tsg\_sbe45\_fwd > tsg\_sbe45\_fwd\_2 > tdgp >  
oxygen\_optode4330 > fluoro-trip-fwd > flow\_krohne\_fwd.

Sample rate: 1 every 5 seconds

Example data line:

tsg\_sbe45\_fwd 2014-12-12T06:34:03.1647Z 26.4679, 5.44818,  
34.9076, 1537.771

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Temperature [C]  
Conductivity [S/m]  
Salinity [psu]  
Speed of Sound [m/s]

---

tsg\_sbe45\_fwd\_2:

Sea-Bird SBE 45 MicroTSG Conductivity and Temperature Monitor.  
Measures surface seawater temperature and conductivity.

Model: SBE 45 MicroTSG (Thermosalinograph)

Serial Number: 0399

Installed: October, 15 2020 Prior to SKQ202016S

Calibrated: March 6, 2020

Location: Main lab, Wet Wall.

Water source: forward seachest or centerboard if seachest plugged  
with ice.

Plumbed in series: tsg\_sbe45\_fwd > tsg\_sbe45\_fwd\_2 > tdgp >  
oxygen\_optode4330 > fluoro-trip-fwd > flow\_krohne\_fwd.

Sample rate: 1 every 5 seconds

Example data line:

tsg\_sbe45\_fwd2 2014-12-12T06:34:03.1647Z 26.4679, 5.44818,  
34.9076, 1537.771

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Temperature [C]  
Conductivity [S/m]  
Salinity [psu]  
Speed of Sound [m/s]

---

---

winch\_rapp:

Sikuliaq is equipped with a suite of electric winches manufactured by Rapp Marine, consisting of two hydrographic winches with .322 EM cable and a traction winch with two storage reels containing .681 EOM cable and 9/16 3x19 trawl wire. The PLC interfaces with a databroker that outputs NMEA data at 20 Hz using ZeroMQ distributed messaging.

Sample rate: 20 per second

Example data line:

winch\_rapp 2017-06-01T12:26:37.6783Z  
@RCWD,2,3,103.64,0.42,-29.95,0,102.96,0.294791\*3d

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
ID [@RCWD]  
Winch Number [1, 2, 6, 7] - see note below  
Winch Mode [1=manual, 2=auto\_payout, 3=auto\_haulin]  
Length [meters] - motor calculated  
Tension [metric tons] - motor calculated  
Velocity [meters per minute]  
Alarm  
Length [meters] - block counting  
Tension [metric tons] - load cell  
Checksum

Note: The ship's typical arrangement is to use Winch #1 for .322 ops off the stern A-frame and Winch #2 for .322 ops off the starboard Load Handling System for CTD casts. Winch #6 refers to Storage Drum 1 which houses the .681, and Winch #7 refers to Storage Drum 2 which houses the 9/16 trawl wire.

---

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wind\_gill\_fwdmast:

WindObserver 70/75 Ultrasonic Anemometer  
Relative wind speed only.

Model: 1390-75-B-313

Serial Number: 1351006 - WC45

Location: Forward mast, 15.5m(51') above average water line

Sample rate: 1 per second

Example data line:

```
wind_gill_fwdmast 2014-12-12T07:08:16.3849Z A,356,006.00,M,60,0E
```

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
Unit ID  
Wind direction [In degrees relative to bow of ship (DDD)]  
Wind speed [In increments of 0.01 units (+-MMM.MM)]  
Units [M Metres per second (m/s)]  
Status [0 : OK  
60 or 66 : Heating enabled and OK if enabled  
Any other value: Warning or fault condition ]  
Checksum

-----  
-----  
wind\_gill\_fwdmast\_true:

WindObserver 70/75 Ultrasonic Anemometer  
Computed true wind speed. Uses SeaPath 320+ for reference heading source.

Data format had been modified by LDS to use the NMEA standard for sentence  
MWD (Wind Direction & Speed).

Model: 1390-75-B-313  
Serial Number: 1351006 - WC45

Location: Forward mast, 15.5m(51') above average water line  
Sample rate: 1 per second

Example data line:

```
wind_gill_fwdmast_true 2014-12-12T07:25:11.4542Z
```



\$WIMWD,81.4,T,,M,6.9,N,3.6,M\*43

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ID  
Wind direction, 0 to 359 degrees,T[True]  
Wind direction, 0 to 359 degrees,M[Magnetic]  
Wind speed, N[knots]  
Wind speed, M[meters/second]

---

---

wind\_mast\_port:

R.M. Young Ultrasonic Anemometer (heated)  
Component of Ship's navigation instrumentation.  
Relative wind speed only.

Model: 85004  
Location: Main mast, port side  
Sample rate: 4 per second

Example data line:

wind\_mast\_port 2015-08-19T00:25:29.5382Z  
\$WIMWV,296,R,06.1,N,A\*07

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ID  
Wind direction, 0 to 359 degrees,R  
Wind speed,  
Wind speed units[K/M/N/S],  
Status [A = Data Valid, V = Data invalid]

Note: This sensor is not part of the pool of science maintained instrumentation.

---

---

wind\_mast\_port\_true:

R.M. Young Ultrasonic Anemometer (heated)  
Component of Ship's navigation instrumentation.

Data format had been modified by LDS to use the NMEA standard for sentence

MWD (Wind Direction & Speed).

Model: 85004

Location: Main mast, port side

Sample rate: 4 per second

Example data line:

```
wind_mast_port_true      2015-08-19T00:06:17.4217Z
$WIMWD,60.4,T,,M,12.2,N,6.3,M*72
```

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]

NMEA ID

Wind direction, 0 to 359 degrees,T[True]

Wind direction, 0 to 359 degrees,M[Magnetic]

Wind speed, N[knots]

Wind speed, M[meters/second]

Note: This sensor is not part of the pool of science maintained instrumentation.

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-----  
wind\_mast\_stbd:

R.M. Young Ultrasonic Anemometer (heated)

Component of Ship's navigation instrumentation.

Relative wind speed only.

Model: 85004

Location: Main mast, starboard side

Sample rate: 4 per second

Example data line:

```
wind_mast_stbd 2015-08-19T00:01:45.7871Z
$WIMWV,286,R,06.0,N,A*07
```

Field Descriptions:

LDS Logger ID

LDS Time Stamp [UTC]

NMEA ID

Wind direction, 0 to 359 degrees,R  
Wind speed,  
Wind speed units[K/M/N/S],  
Status [A = Data Valid, V = Data invalid]

Note: This sensor is not part of the pool of science maintained instrumentation.

-----  
-----  
wind\_mast\_stbd\_true:

R.M. Young Ultrasonic Anemometer (heated)  
Component of Ship's navigation instrumentation.

Data format had been modified by LDS to use the NMEA standard for sentence  
MWD (Wind Direction & Speed).

Model: 85004  
Location: Main mast, starboard side  
Sample rate: 4 per second

Example data line:

wind\_mast\_stbd\_true 2015-08-19T00:04:01.8781Z  
\$WIMWD,72.7,T,,M,13.1,N,6.8,M\*7B

Field Descriptions:

LDS Logger ID  
LDS Time Stamp [UTC]  
NMEA ID  
Wind direction, 0 to 359 degrees,T[True]  
Wind direction, 0 to 359 degrees,M[Magnetic]  
Wind speed, N[knots]  
Wind speed, M[meters/second]

Note: This sensor is not part of the pool of science maintained instrumentation.