R/V Oceanus Calliope metadata file
Sat 07/Jul/2007 22:20:09
Current time zone: GMT Standard Time
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12kHz depth (Depth12)
Format: xxxx.x (meters)
Depth in meters obtained from the Knudsen 12 kHz channel. 4 meter transducer depth correction has been applied (see Knudsen bathymetry data string).

3.5kHz depth (Depth35)
Format: xxxx.x (meters)
Depth in meters obtained from the Knudsen 3.5 kHz channel. 4 meter transducer depth correction has been applied (see Knudsen bathymetry data string).

Acoustic wind sensor (WS425)
Format: $P<id>MWV,direction,ref,speed,units,status*CS
<id>; sensor's polling address
Direction; 0-359 degrees
Reference; R = relative, T = True
Speed; wind speed value
Units; K = km/hr, M = m/sec, N = kt
Status; A = data valid, V = data invalid
*CS; checksum

Data request polling address = $WIPAQ,*72\013\010
Checksum (8 bit XOR) must include $ and * characters

Temperature (AIR_TMP)

Air temperature (AIR_Temp_2)
Degrees C
Data obtained from Vaisala PTU200 sensor

Air Temperature (Air_Temp)
Format: xx.xxx (degrees C)
Data is obtained from IMET_HRH primary sensor.

Air temperature; WXT (C) (WXT5_Ta)
Ta = Air temperature, degrees C

Ashtech Heading, Pitch & Roll (PASHR)
$PASHR,ATT NMEA string
Format: $PASHR,ATT,tttt.t,hhh.hh,+ppp.pp,+rrr.rr,mrms,brms,x
tttt.t = GPS time in seconds of week
hhh.hh = Heading (degrees)
ppp.pp = Pitch (degrees)
rrr.rr = Roll (degrees)

mrms = Measurement rms error in meters
brms = Baseline rms error in meters
x = Attitude reset flag

Example: $PASHR,ATT,153663.5,092.09,-000.48,+000.04,0.0027,0.0103.0

Pitch - Bow up is positive; Roll - Port side up is positive
MRMS is the average double difference carrier phase residual. Typical values are 2-3 millimeters
BRMS is the RMS error for the differences between calibrated baseline magnitudes and computed baseline magnitudes for the three vectors formed by Antenna 1 to the other three antennas. Typical values are 1-3 cm but will increase under high PDOP conditions.
Attitude reset flag: 0 = attitude computed correctly, pitch and roll are valid
1 = attitude ambiguities have not been solved; pitch & roll set to 0.0

Barometric pressure (BPR)
MilliBars
Data obtained from Vaisala PTU200 sensor

Barometric pressure; WXT (hPa) (WXT5_Pa)

Pa = Barometric pressure, hPa

Distance to waypoint (DTW)
Distance in nautical miles to the last waypoint entered by Bridge personnel.
Value is obtained from the NMEA $GPBWR data output from the NS952
GPS receiver.

Sea Surface Conductivity (SSCND)
Falmouth Scientific TSG (OCM-S-212) sea surface conductivity
Format: xx.xxxx (mmho/cm or milli-Siemens/centimeter)
OCM sensor is mounted in the bow thruster room on the suction side of the clean
sea water distribution pump. Sea water intake is from a bow inlet pipe located
12 feet below the waterline.

Sea Surface Temperature (SSTMP)
Falmouth Scientific TSG (OTM-S-212) sea surface conductivity (degrees C)
Format: xx.xxxx (degrees C)
OTM sensor is mounted in the bow thruster room on the suction side of the clean
sea water distribution pump. Sea water intake is from a bow sea chest located
12 feet below the waterline.

GPS course over ground (GPS_COG)
Course over ground (true) obtained from NMEA GPS_VTG data sentence.
Format: xxx.x (degrees)

Latitude (GPS_Lat)
  Latitude from GPS NMEA GGA data sentence formatted for display.
  Format: dd mm.mmmm, N/S

Longitude (GPS_Lon)
  Longitude from GPS NMEA GGA data sentence formatted for display.
  Format: ddd mm.mmmm, E/W

GPS Navigation data (GPS)
  Complete NMEA data output from the primary GPS receiver (WGS84 datum).

  The single digit following the position information in the GPS_GGA data string
   indicates the type of GPS fix as follows:
      0=No valid fix; 1=Standard; 2=Differential; 3=P-Code

  NMEA GPS_GGA data sentence: Header , UTC of position, Latitude, N/S,
  Longitude, E/W, Quality indicator, Number of satellites in use, Horizontal
dilution,
  Altitude, M (meters), Geoidal seperation, M (meters), Age of differential
data
  (secs), Differential reference station I.D. * checksum.
  (Lat & Lon values are "degrees minutes.decimal_minutes")

  NMEA GPS-VTG data sentence: Header, Course, T (degrees true),
  Course, M (magnetic), Speed, N (knots), Speed, K (km/hr) * checksum.

 The GPS source is currently the Northstar 952 WAAS GPS. This is the same
 GPS used for primary ships Navigation.

GPS speed over ground (GPS_SOG)
  Speed over ground (knots) obtained from NMEA GPS_VTG data sentence.
  Format: xx.xx (knots)

GPS type (GPS_TYPE)
  GPS position type (Std, Diff, P-Code)
  GPS position type indicator is obtained from the "quality indicator" included
  as part of the GPS NMEA GGA data sentence.

Gyro heading (Gyro)
  Ship's heading (degrees true) obtained from the Gyro NMEA HEHDT data
  sentence.
  Format: xxx.x (degrees true)

IMET Temperature (IMET_Temp)

Temperature data from IMET temperature sensor. This sensor is not normally
installed; temperature data is usually obtained from the IMET humidity sensor.

IMET Wind (IMET_WND)

Format: X, Y, Total, Max, Min, LastVane, LastCompass, C1, C2

Wind X (m/sec), Positive for a stbd to port wind
Wind Y (m/sec), Positive for a bow to stern wind
Wind Total (m/sec), Averaged over previous minute
Wind Max (m/sec, 15 sec interval),
Wind Min (m/sec, 15 sec interval),
Last Vane Reading (deg),
Last Compass Reading (deg),
Counter1 ("0"), Counter2 ("4")

Note - Wind direction is not provided as a
single quantity. Direction values are ship relative.
The wind sensor does not have a compass installed
(value should always be 0.0).

IMET Barometric Pressure (IMET_BPR)
Format: xxxx.xx (milli-bars)

IMET Precipation (IMET_PRC)
Format: Last minute (mm/min) Last hour (mm/hr) Present level (mm)

IMET Shortwave Radiation (IMET_SWR)
Format: xxxx.x (watts/square meter)
>>
The sensor is made by The Eppley Laboratory, Inc. (EPLAB) in Newport, R.I.
The wavelength range for their precision pyranometer is 0.3 to 3 um.

IMET Humidity & Temperature (IMET_HRH)
Format: xx.xxx (%RH), xx.xxx (C)
Note - Humidity and Air temperature data are both obtained from this
instrument.

True wind speed & direction (TWind)
Format: Speed, Direction (meters/sec, degrees)
Wind direction is given in meteorological terms; a 0 degree wind comes from
the north. Ship speed and direction of travel are obtaned from GPS data
(GGA SOG & COG). Sensor mounting orientation is corrected using the
direction the ship is pointing obtained from the gyro (the ship is not
necessarily
moving in the direction its pointing).

Knudsen bathymetry (PKEL99)
Depth data obtained from the Knudsen bathymetry system. Values have
been corrected for transducer depth (4 meters).
Format: Header ($PKEL99), Time (hhmmss), 12 kHz depth (meters),
Transducer draft, 3.5 kHz depth (meters), Transducer draft,
Speed of sound (m/s), Lat (dd mm.mmm N/S), Lon (ddd mm.mmm E/W)

"Speed of sound" is the value used by the Knudsen to calculate depth. It is
entered

manually and therefore is not necessarily correct.
The time listed after the "Header" should be nearly identical to the data item's
timestamp - if it isn't, it means the Knudsen control computer is not synchronized
to the ship's master clock.

NMEA Gyro (HEHDT)
Ship's heading obtained from the Sperry Gyro.
NMEA format: Header ($HEHDT), Heading (degrees), T (true),
Heading (degrees), M (magnetic) * checksum.

Version 2.20 (1/1/97) of the NMEA 0183 standard does not show magnetic heading in this data sentence and the validity of this item is questionable.

NMEA depth (PKDMS)
Format: $PKDMS, xxxx.xx, f, xxx.xx, M, xxxx.xx, F *CS
(f = Feet, M = Meters, F = Fathoms)
12 kHz Depth value from Knudsen bathymetery system in NMEA format.

NS952 GPS BWR (GPBWR_NS952)
Northstar 952 GPS NMEA data output

NS952 GPS GPGGA (GPGGA_14004)

NS952 GPS GPVTG (GPVTG_NS952)
Northstar 952 GPS NMEA data output

NS952 GPS RMC (GPRMC_NS952)
Northstar 952 GPS NMEA data output

NS952 GPS ZTG (GPZTG_NS952)
Northstar 952 GPS NMEA data output

Position from GPS receiver (Lat_Lon)
Latitude & Longitude in decimal degrees.
Format: +/- dd.dddddd +/- ddd.dddddd (N & E are "+")

Precipitation (PRC)
Format: x.xx (mm/hr)
Data is obtained from the IMET precipitation sensor on the forward mast.

Pressure, Temperature, Humidity (PTU200)
Vaisala PTU200
Format: pppp.p, tt.t, hh
p = barometric pressure (mbar)
t = temperature (degrees C)

h = humidity (%)

Oceanus: Address = 10, Format cmd = 4.1 P ", " 3.1 T ", " 3.0 RH #r#n
Averaging time = 5 seconds (press = 2.5, RH = 2.5)

Rain accumulation; WXT (mm) (WXT5_Rc)
Rc = Rain accumulation, mm (accumulation is updated in 10 sec intervals)
The accumulation value is reset only when the sensor power is reset.

Rain intensity; (mm/hr) (WXT5_Ri)
Ri = Rain intensity, mm/hour

Rel Wind direction (Deg) (WXT5_Dm)
Dm = Wind direction, deg (2 Hz samples, 10 sec average) 0 deg wind comes over the bow

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Rel Wind speed (m/s) (WXT5_Sm)
Sm = Wind speed average, m/sec (2 Hz, 10 sec sample period)

Relative humidity (HRH_2)
Percent
Data obtained from Vaisala PTU200 sensor

Relative humidity (HRH)
  Format: xx.xxx   (%RH)
  Data is obtained from IMET_HRH primary sensor.

Relative humidity; WXT (%) (WXT5_Ua)
Ua = Relative humidity, %

SBE21 Temp & Cond (SBE21_TC)
  Temperature - degree C   (-5 to +35, +/- 0.01)
  Conductivity - mmho/cm (0 to 70, +/- 0.01)

  1 Siemens/meter = 10 mmho/cm

SBE21 conductivity (sbe21cnd)
 Format: dd.ddd mmho/cm   (0-70, +/- 0.01)
  Based on ITS90 temperature calculations

  1 Siemens/meter = 10 mmho/cm

SBE21 temperature (sbe21Tmp)
  Format: dd.ddd degrees C (-5 to +35, +/- 0.01)
    Based on ITS90 calibration coefficients
    (T68 = 1.00024 * T90)

SBE21 thermosalinograph (sbe21)
Format: ttttcccc T & C raw frequency values (hex)

SBE45 conductivity (SBE45C)
Surface conductivity from SBE45
Format: cc.ccccc (s/m)

SBE45 salinity (SBE45S)
Surface Salinity from SBE45
Format: sss.ssss (psu)

SBE45 sea temperature (SBE45T)
Sea surface temperature from SBE45
Format: ttt.tttt (degrees C, ITS-90)

SBE45 sound velocity (SBE45V)
Surface sound velocity from SBE45
Format: xxxxx.xxx (m/sec)

SBE45 thermosalinograph (SBE45)
Data Output Format
The output data format is:
ttt.tttt, cc.ccccc, sss.ssss, vvvvv.vvv
where
t = temperature (degrees Celsius, ITS-90)
c = conductivity (S/m)
s = salinity (psu)
v = sound velocity (meters/second)
All data is separated with a comma and a space.

Salinity (Salinity)
Format: Salinity (PSU)
Salinity calculated from FSI sea surface temperature and conductivity data values in accordance with UNESCO 44.

Sea surface fluorometer (Fluorometer)
WetLabs Wet-Star fluorometer located in the clean seawater system.

A MetraByte A/D converter is used to convert the 0-5 vdc fluorometer output to serial data. This device sets the output decimal point as necessary for best resolution which results in a 1 vdc fluorometer value being represented as +01000.00 in the raw MetraByte serial stream.

**WetLabs Wet-Star fluorometer Specifications
Mechanical
Size: Pressure housing-6.7 x 2.7 in (17.1 x 6.9 cm) Overall height (including bulkhead connector and tubing fittings)-10.2 in (25.7 cm)

Weight in air: 1.7 lb (0.8 kg); in water: 0.25 lb (0.1 kg)
Rated depth: 600 meters
Housing: Acetal copolymer
Electrical
Response time: 0.17 sec (analog); 0.125 sec (digital, optional)
Input: 7-15 VDC
Output: 0-5 VDC (analog); 0-4095 counts (digital, optional)
Current draw: < 40 mA (analog); < 80 mA (digital, optional)
Linearity: = 99% R2
Optical
Chlorophyll
Dynamic ranges: 0.03 -75 µg/l (standard); 0.06-150 µg/l (optional)
Sensitivity: = 0.03 µg/l
Excitation: 460 nm
Emission: 695 nm
CDOM
Dynamic ranges: 1000 ppb (estuarine waters)
250 ppb (near-coastal waters)
100 ppb (open ocean waters)
Sensitivity: 0.100 ppb quinine sulfate dihydrate (other sensitivities available on request)
Excitation: 370 nm (10 nm FWHM)
Emission: 460 nm (120 nm FWHM)
Uranine
Dynamic range: 0-4000 µg/l uranine
Sensitivity: 1 µg/l uranine
Excitation: 485 nm
Emission: 532 nm
Rhodamine
Excitation: 470 nm
Emission: 590 nm
Phycoerythrin
Excitation: 525 nm
Emission: 575 nm
Specifications are subject to change without notice.

Ship speed (SPD)
Ship speed in knots extracted from Sperry Speedlog data string.
Format: xx.x (knots)

Shortwave radiation (SWR)
Watts/square meter
Calibration constant applied

Sept. 2006Calibration constant = 8.38 x 10-6 volts per watt/square meter
Note - raw data is Volts * 10

Shortwave radiation (SWR)
The sensor is made by Eppley Laboratory, Inc. (EPLAB) in Newport, R.I.
The wavelength range for their precision pyranometer is 0.3 to 3 um.
Note - raw data is Volts*100

Sensor serial # 34730F3Installed Sept. 14, 2006
Calibration @ 25 degrees C, Aug. 31, 2006

8.38 x 10-6 volts per watt/square meter

Sound velocity (SSV)
Format: vvvv.vvvv (meters/sec)
Surface sound velocity calculated from FSI sea surface temperature and conductivity data values. Intermediate salinity values are calculated in accordance with UNESCO 44.

Sperry MK37 Gyro (HEHDT_MK37)
Ship's Sperry MK37 gyro heading reference

Sperry speedlog (SPDLG)
Format: ddd.d, ss.s
(ss.s = forward speed in knots)
(ddd.d data is unknown)

True wind direction (Wnd_Dir)
Format: xxx.x (degrees)
Wind direction obtained from the IMET wind sensor and corrected for ship heading (gyro) plus ship course and speed (GPS SOG & COG).

True wind speed (Wnd_Spd)
Format: xx.xx (meters/sec)
Wind speed obtained from the IMET wind sensor and corrected for ship heading (gyro) plus ship course and speed (GPS SOG & COG).

Turner fluorometer data (TF10_data)
Fluorometer data from Turner Designs Model 10. Full scale = 1 volt (1000.00 from MetraByte A/D module). Exact value is not in agreement with instrument's front panel meter due to the characteristics of the calibration resistor.
Science party
is responsible for recording comparative readings during the cruise if needed.

Turner fluorometer range (TF10_Range)
Fluorometer range setting from Turner Designs Model 10 (full scale = 1 volt).
Actual values reported by the MetraByte A/D module (1000.00=1 volt) are not in agreement with the value indicated in the Turner manual due to the accuracy
of the calibration resistor. Actual readings are per the following table (science
party should check these values at some point during the cruise):

Range	Expected	Actual
X0	0.0v	000.10
X3.16	0.4v	488.60
X10	0.7v	831.00
X31.6	1.0v	9999.99

WXT510 #5 (WXT5)
Vaisala Meteorological Instruments
June 12, 2007
Instrument WXT510AAC1BC00B0
Serial # C1240003
Test Date: 24th May 2007
Installed date 24 june 2007
By Patrick Rowe

WXT5
Vaisala WXT510 Weather Transmitter
Data Format:
WXT5 39240.67178 16:07:22 5R0,Dm=048D,Sn=0.0M,Sm=0.1M,
Sx=0.2M,Ta=24.5C,Ua=35.7P,Pa=1018.2H,Rc=0.00M,Ri=0.0M

WXT5 39240.67178 16:07:22 = Calliope designator and time values
(time stamps are GMT)
5R0 = Instrument's polled data request cmd ("5" is inst address)
Dm = Wind direction, deg (2 Hz samples, 10 sec average)
0 deg wind comes over the bow
Sn = Wind speed min, m/sec (2 Hz, 10 sec sample period)
Sm = Wind speed average, m/sec (2 Hz, 10 sec sample period)
Sx = Wind speed max, m/sec (2 Hz, 10 sec sample period)
Ta = Air temperature, degrees C
Ua = Relative humidity, %
Pa = Barometric pressure, hPa
Rc = Rain accumulation, mm (accumulation is updated in 10 sec intervals)
The accumulation value is reset only when the sensor power is reset.
Ri = Rain intensity, mm/hour

Wind speed and direction are given in meteorological terms: a "0" degree wind comes from the bow; a "90" degree wind comes from the Stbd side. Wind speed and direction values are ship relative and direction has not been corrected for mounting alignment error. Wind sampling is done at 2 Hz and averaged over 10 seconds - new data is available at 10 sec intervals.

WXT5_Dm
Ship relative wind direction (degrees) corrected for mounting alignment error.
Data Format: xxx

Wind direction is given in meteorological terms: a "0" degree wind comes from the bow; a "90" degree wind comes from the Stbd side. Wind sampling is done at 2 Hz and averaged over 10 seconds - new data is available at 10 sec intervals.

WXT5_Sm
Ship relative wind speed (m/s)
Data Format: xx.x

Wind sampling is done at 2 Hz and averaged over 10 seconds - new data is available at 10 sec intervals.

WXT5_Rc
Rain accumulation (mm)
Data Format: xx.xx

This value continues to increase until the sensor is reset as the result of power cycling (data polling does not reset the count).

WXT5_Ri
Rain intensity (mm/hr)
Data Format: x.x

This value is calculated over 10 second intervals.

TWSD5
True wind speed (m/s) and direction (degrees)
Data Format xx.x, xxx

Values are calculated from the Vaisala WXT510 Weather Transmitter raw data corrected for sensor alignment error and combined with the ship's gyro heading and GPS SOG and COG values.

TWS5
True wind speed (m/sec)
Data Format xx.x

Values are calculated from the Vaisala WXT510 Weather Transmitter raw data corrected for sensor alignment error and combined with the ship's gyro heading and GPS SOG and COG values.

TWD5
True wind direction (degrees)

Values are calculated from the Vaisala WXT510 Weather Transmitter raw data corrected for sensor alignment error and combined with the ship's gyro heading and GPS SOG and COG values.

Defined constants:

CRUISEID = NA
WindSensorOffset = 0.0

Auxiliary information:

Timestamp formats:

The Calliope data collection application always uses GMT timestamp values regardless of the time zone setting of the application computer. However, new files are started at midnight local time and any date and time information included in data file headers is local time. If date or time values are included in data files as logged values, these will also be local values. The Calliope ".dat" data file headers indicate the local time zone setting when the file was started.

Individual items in Calliope ".dat" data files are time stamped with two different formats. The first timestamp value is in the format used by Microsoft Visual Basic: the number of days since December 31, 1899

(Dec. 31 is day 1, not day 0). Its primary purpose is to provide a continuously increasing date and time indicator for use in data graphing applications. The VB format facilitates this for some applications but converting the number to the normal human readable form can be painful. The second timestamp value (hh:mm:ss format) in combination with the date in the file header may eliminate the need for this conversion. If not, the following may be helpful:

00.00 is 00:00:00 on Dec. 30, 1899.
00.50 is 12:00:00 (noon) on the same day.
35390.58333 is 14:00:00 May 15, 1998.