

Sentry AUV Delivered Data Summary (2017-demopoulos Cruise)

WHOI Sentry Operations Group

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1 Introduction

This document summarizes the data obtained with the Sentry AUV during the PC1705 2017-demopoulos cruise. At the end of this cruise Amanda Demopoulos was provided with a copy of all the Sentry data from this cruise and the best “at-sea” data products produced by the Sentry team. This document summarizes the organization of this data with an emphasis on providing the client with ready access to the files needed for their research and reporting requirements. The document concludes with a tally of the data provided.

On this expedition, the total raw and processed data value is approximately 5T bytes of data. A large portion of this data is the raw data necessary to obtain final processed data products. Clients may choose to only use the at-sea processed data products discussed below.

This document does not serve as the cruise report (the Sentry team provides that in a separate document) nor does it provide any analysis or interpretation of the obtained data.

Sentry cruise data are organized into a number of directories. The top level directory structure contains the directories:

- **planning-bathy**- This is the bathy provided by science for planning purposes
- **docs**- Documents pertaining to the cruise such as launch positions and dive statistic summaries
- **plots**- Auto-generated data plots from the post processing pipeline. These plots are included in the cruise report.
- **products**- The best at sea derived data products from the cruise organized by dive number
- **dives**- All raw and processed data from individual dives
- **planning**- Files pertaining to mission planning. These are not generally needed by science
- **combined_grids**- Grids spanning more than one dive or local survey area site.
- **raw-usbl**- Log and configuration files from the Sonardyne USBL system
- **svp**- Sound velocity profiles used during the cruise
- **surface_photos**- Misc photos on deck

2 At-Sea Processed Data Products - Products Directory

The products directory contains a directory for each dive in the format **sentryxxx**. Most data products include a time and date stamp in the file name. For photos, that is the time the image was taken, for all other products that is the time of the renavigation process and can be matched to other files created with the same navigation.

Within each dive directory the following directories are included:

- **blueview**- This contains any data products created from the blueview sonar. The blueview sonar is a forward looking sonar, operating at 900KHz with a 90 degree field of view. Products are not normally created even if that sonar is installed and this directory is often empty.
- **sss-sbp/hf-sss**- This directory contains data products generated from the 410kHz sidescan sonar system. hf-sss stands for high frequency side scan sonar. Note that for a particular survey it is typical to have only HF or LF products, not both.
- **sss-sbp/lf-sss**- This directory contains data products generated from the 120kHz sidescan sonar system. lf-sss stands for low frequency side scan sonar. Note that for a particular survey it is typical to have only HF or LF products, not both.

- **sbp** -This directory contains SEGY, seismic-unix, and image files derived from the Edgetech sub-bottom profiler.
- **multibeam**- This directory contains the data products from Sentry's Reson multibeam sonar including grd and pdf files. The Reson multibeam sonar operates at 400KHz with an additional 200KHz option that is rarely used.

`sentryxxx_yyyymmdd_hhmm_tide_XxX_BVXX.grd`

where X is the grid size. If `_nav_` is included in the file name this means that `mb-navadjust` was applied. This is not common but if available these files are probably preferred to others.

- **photos**- This directory contains thumbnails and movies of the photos collected by Sentry. Full resolution photos can be found in the `dives` directory. The movies created by post processing is the collection of photos combined to make a movie. Sentry does not take continuous video during the dive. The photo thumbnails are created to give an alternative to the larger 24Mbyte .tif files with a smaller easier to load 200kbyte .jpg image file.
- **scc**- SCCs are 1Hz ASCII files containing post processed navigation and selected other science data. The timestamps on the SCCs can be matched to other data products. This flat ASCII file contains the date, time, latitude, longitude, depth, pressure, heading, altitude, obs-optical back scatter, eh, conductivity, temperature, sound speed, ORP sensor (if installed) and data from all three magnetometers (if installed). The file name contains both the dive number and the date on which the scc file was generated. If there are multiple scc files for a single dive, *use the file with the most recent date*. All fields in the scc file have been interpolated onto a 1 second time base. Users wanting to load the data into Matlab should use the mat files in the `nav-sci` directory.

3 Raw and Intermediate Data - Dives Directory

The `dives` directory contains the raw and intermediate data for each dive. Within the `dives` directory there will be a directory for each dive labeled as `sentryxxx`. Typically there will also be a directory labeled `pre-cruise` that contains assorted data from tests conducted prior to the first dive.

Within each dive directory the following directories exist:

- `blueview`- This directory contains the raw data from the blueview sonar if installed and active.

The blueview is stored in the following directory structure:

```
Blueview (data files produced by driver)
├── son (raw data files produced by sonar)
```

- `multibeam`- We provide the raw and processed data in several formats. The most common products used by our scientific collaborators are 2D plots (pdf, ps, png) and gridded bathymetry in GMT-compatible `grd` files and `asc` files for input into other GIS tools. The gridded data has been edited using our automated scripts and the soundings geolocated using our post-processed navigation. MB-system or Caris tools can be used by the client to hand-edit soundings, however our automated scripts work well. We also provide the edited data in `fbt` format, which can be imported directly to Fledermaus for gridding and display.

The multibeam is stored in the following directory structure:

```
Multibeam
├── raw (raw data files from the multibeam sonar)
├── log (log files from the reson driver that configures the reson subsea)
├── timing_test (separate directory used to compute or check timing offsets)
├── proc (color corrected color tif photos)
├── nav (vehicle navigation data)
└── Misc folders may exist with additional processing
```

- `nav-sci`- This directory contains all of the navigation, science, and engineering data logged by the vehicle during the dive. Most of this data is provided for archival purposes only (the `scc` files provide all standard sensor and vehicle navigation data. Users wishing to load data into Matlab, can use the `mat` files in `/proc`).

The navigation and science files are stored in the following directory structure:

```
nav-sci
├── proc (Processed navigation and science files)
├── raw (Raw navigation and science files)
│   ├── dvlsend (raw subsea dvl files)
│   ├── mapr (log files from the mapr when installed)
│   ├── mc (mission controller files)
│   ├── phins (log files created by the phins INS when active)
│   ├── rov (raw science sensor and engineering data in ASCII files)
│   ├── subsea-nav (subsea tracking data)
│   ├── topside-nav (topside tracking data)
│   └── acomm (log files from WHOI micro-modem if installed)
```

- **photos**-We provide images in several formats with different levels of processing. These include the raw bayer encoded (color) tif files directly from the camera real-time software should users choose to reprocess those images. We also provide automated processing for color compensation and equalization. Filenames include date and time and can be used in conjunction with the SCC to obtain information on vehicle state and scientific sensors.

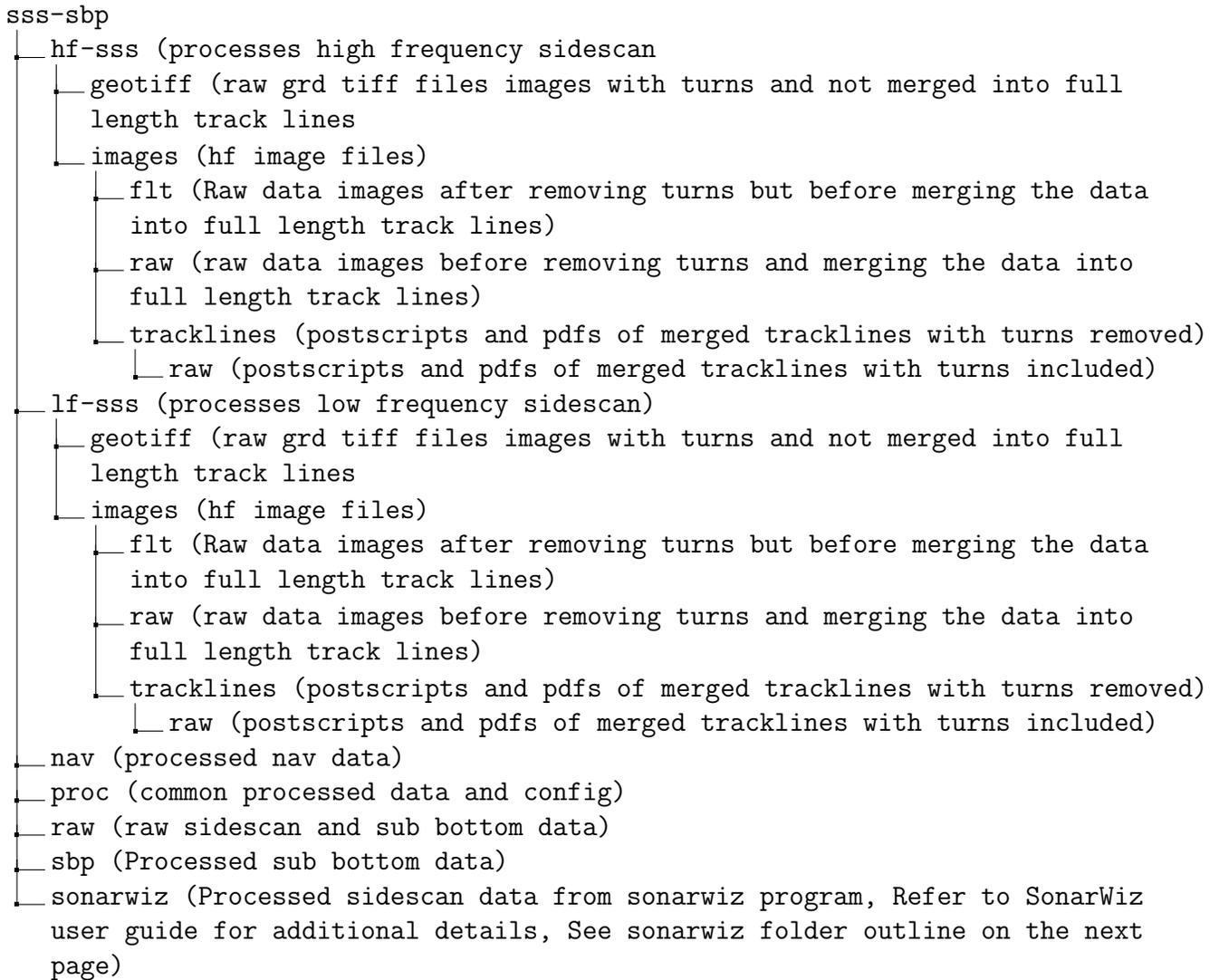
The photos are stored in the following directory structure:

```
photos
├── raw (Bayer encoded original images)
├── proc (color corrected color tif photos)
├── movie (contains movies in .mp4 formats)
└── thumbnails (reduced resolution jpgs of each processed image)
```

Presently, Sentry takes photos during the planned camera surveys and in the event that the dive ends with a photo survey, also during the ascent. Thus there will be photos of the water column.

- **sss-sbp**- All of the data from Sentry’s sub-bottom profiler and sidescan sonar. We provide the raw and processed Edgetech sonar data. This data is processed using MB-System. For each dive, there is a folder containing the raw data (jsf) files, a nav directory for navigation the jsf files, and lf-sss=120kHz, hf-sss=420kHz, and sbp=Chirp Subbottom data processing directories.

The side scan data is stored in the following directory structure:



The sonarwiz data is stored in the following directory structure:

```
sonarwiz
├── 3DView (The default location of the files created in the 3D export process)
├── Backup (Contains backup files of project data that are automatically created
    │     by SonarWiz)
├── CSF (Contains SonarWiz Common Sensor Format (CSF) files that are created
    │     either in recording raw data or when importing sonar data files into the
    │     program)
├── DEP (Empty, not typically used)
├── GeoTiff (GeoTiff image files generated by Save Project as GeoTiff function)
│   └── Tiles (prj tfw and tif files)
├── Images (Default directory for Batch Image Export from Sonar File Manager)
├── jsf (Navigation injected jsf files used for processing, created by Sentry
    │     post processing)
├── MAG (Contains CMF magnetometers files)
├── Misc (Not currently used by sonarwiz)
├── Rasters (Not currently used by sonarwiz)
├── SBP (Empty, not typically used)
├── SHP (Default directory for exported shp files from the Grid and Contour
    │     Utility)
├── Targets (Contains data and image files for all digitized targets)
├── Tmp (Used by some of the utility programs to store temporary files)
├── Web (Contains the html and associated image files generated by the Save
    │     Project as Website function)
├── XTF (Contains raw sonar files created during Real-time data recording)
└── sentryXXX mml (Sonarwiz project file)
```

4 Coordinate origins

The vehicle's control system uses simple equidistant coordinates. This system uses an origin, defined in terms of latitude and longitude (WGS84), and a fixed scaling between meters displacement from the origin. We use the identical routines that have been used by the NDSF assets Alvin and Jason for decades. These simple coordinates have several advantages for realtime control of a vehicle. Unlike UTM grid coordinates, the x and y axes intersect at right angles and align with true east and north respectively at the origin. These coordinates distort quickly as one moves away from the origin, but we solve that problem by putting the origin close to the operating area. We almost always report our results in latitude/longitude, so most users need not be aware of these details.

Individual Origins for each dive can be found in the dive summaries appended to the cruise report.

5 Data Receipt

Prior to departure from Norfolk, VA, the Sentry team delivered one copy of the entire raw and processed data to Amanda Demopoulos of NOAA. This data delivery comprises the final deliverable of both raw and processed data from the Sentry AUV. The data structure on the dive is described in detail in this report. Additional copies of the data will be transported back to WHOI for archiving.