Alvin Data Primer

Overview

This intent of this brief is to introduce users of *DSV Alvin* to more complete information sources about its data products. Data is delivered to a cruise chief scientist through collaboration between the *Alvin* operations team and *Atlantis's* shipboard scientific group (SSSG). *Alvin* data handling is independent of the Rolling Deck to Repository (R2R) program, which collects *Atlantis's* underway data.

Unless otherwise stated, *Alvin* data is delivered as originally collected during the dive, without post-dive treatment beyond organization into a cruise data package. *Alvin* operations are not funded for data post-processing. If you require post-dive or post-cruise treatment, or have data related questions, please contact the *Alvin* manager (Bruce Strickrott, strickrott@whoi.edu) or the National Deep Submergence Facility (NDSF) data manager (Scott McCue, smccue@whoi.edu).

Delivery and Post-cruise Storage

Alvin will produce significant volumes of data, primarily due to its video products. Volume estimates are 700GB of video and and 20 GB of non-video data per dive. All data will be presented on external USB hard drives, which are loaned by *Alvin* operations to the chief scientist so that she/he can carry the data products back to her institution. Video data will be separate from the other data types, and will be on drives formatted with the ExFAT[1] filesystem. You are asked to promptly return all the drives to WHOI after copying their content to a long-term storage system at your institution.
A copy of cruise data will also be transferred to WHOI's Data Library and Archives. This copy will be transported and stored on standard LTO (generation 5) archival tape media.

Data Availability on *Atlantis*

Raw video and sensor data will be retrieved from the submarine and made available on the ship within about a half-day of a dive. Some portions of the video package may require more time to be available.
Video will be staged on an independently networked computer cluster, i.e., with no connections to other ship's networks. Video products will be accessed via the work area in *Atlantis's* Main Lab, which offers Apple Mac workstations for viewing, copying, and editing video. The default setting is to provide non-passworded access to all video products. If this is not suitable, please raise the issue in pre-cruise discussions.
All other data types will be available from servers on Atlantis's main network.

Video

Video from all cameras on *Alvin* is either native 1080i/60 or is upconverted to that standard (1920x1080 pixels). The two science observers select which video streams are routed to the two in-sphere hard drive recorders. At the time of recording the sources are compressed by the Apple ProRes422LT codec and are captured to computer file (.mov) as the raw delivered product. A proxy product (50% scaling, h.264 codec, 5% filesize) is created in post-processing to provide a version for viewing on personal devices. To view these proxies, which are not playable by Apple Quicktime Player or Windows Media Player, users should install open source players such as *VLC* or *mplayer* on their personal computers. Atlantis's SSSG technicians offer a VLC installer.
Video clip file sizes are determined by the in-sphere observers and their camera selection behavior. The choice to view and record uninterrupted from one source can lead to very large files (>100GB), and this must be accommodated in your transport and long-term storage planning.

Still Images

Alvin's primary still image source is the externally mounted SubC 1Cam Alpha, which captures on a timed interval (default 30 secs) throughout the dive. It produces images at 6544 x 3680 x 8 bit resolution (.jpg).

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[1] https://en.wikipedia.org/wiki/ExFAT

The in-sphere observers and the pilot are provided with individual internal digital still cameras for both in-sphere and through view port documentation.
The Framegrabber logging system (installation TBD) captures 1920x1080 .jpg stills from the currently viewed video streams on a timed interval.

Navigation

Alvin's primary navigation sensors are a Doppler velocity log (DVL) in combination with a fiber optic gyroscope (FOG). These and other navigation sensors are logged by the in-sphere navigation computer to a single hourly ASCII text file. This aggregate file is parsed by sensor type during offload process and files for individual sensor types are created. Among these is a simple .csv file that can be viewed and processed using programs like a text editor, Matlab or Excel.
Navigation logging is split between *Alvin's* internal navigation system and systems within *Atlantis's* Toplab, which collect complementary datasets. For instance, georeferenced information is usually produced by the Sonardyne Ranger ultra-short baseline (USBL) system, which is based in Toplab. The cruise package includes the records from both of these logging stations.

Additional Sensors

When possible, all sensor records are produced and collected in text format, organized hourly. *Alvin's* Command and Control computer collects sensor records into a single large hourly file, which is delivered with the data package. This aggregate file is parsed by sensor type during offload process, creating files for individual sensor types.

Data Receipt/Access Protection

When your data package is delivered at the end of the cruise you will be asked to review a form that describes the package inventory and provides details for returning the drives to WHOI. You will be asked to acknowledge delivery of the package. Because NDSF does not have a default posture on data protection, you will also be asked to assign embargo durations on the various data components. You will also be asked to name institutions for whom acknowledgement is due when cruise data is used for outreach or commercial purposes. Please remember that while all video and still image data is yours for academic use, UNOLS/DESSC policy is that copyright for all imagery os retained by WHOI. When in doubt please contact media@whoi.edu.

Media recommendations

With each science party there are invariably questions of compatibility between shipboard systems and science party equipment. Most often these are questions of the filesystem with which a transport disk has been formatted, e.g., FAT32, NTFS, HFS, ExFAT. Another frequent question concerns the connection types offered by the shipboard equipment.
After weighing pros and cons we have chosen to format Alvin video drives with ExFAT because of its capabilities and compatibility with recent versions of MacOSX, linux, and Windows. Unfortunately, ExFAT will be incompatible with most (not particularly) older OSes. We recommend that users plan to bring drives (to be) formatted in ExFAT, and make sure their favorite operating system understands it.

The Apple MacPro workstations provided on the ship offer Firewire800 and USB2.0 (usually compatible with USB3.0 media) connections. They do not offer Thunderbolt. Users will also be able to download over Ethernet network.

Documentation Sources

Alvin data deliverables: http://www.whoi.edu/page.do?pid=20015
Alvin data formats: http://www.whoi.edu/fileserver.do?id=187125&pt=10&p=49058
Framegrabber: http://4dgeo.whoi.edu/alvin
WHOI Archive Policy: http://www.whoi.edu/main/ndsf/archive-policy
Informative documents/publications: http://www.whoi.edu/page.do?pid=51119