Jason Pre-cruise Data Planning Introduction

Overview

The intent of this brief is to introduce future users of *ROV Jason* to more complete information sources about its data products. A multi-faceted vehicle, *Jason* is capable of carrying a wide variety of sampling apparatus and of performing many different activities. We provide several documents describing NDSF-maintained data systems and the content that *Jason* users will receive from them. This document briefly summarizes *ROV Jason's* standard data collection systems and products.

Documentation Sources

More detailed information on *Jason's* systems can be found in the National Deep Submergence Facility web pages, which are under the main web site for the Woods Hole Oceanographic Institution (http://www.whoi.edu).

Data deliverables: https://ndsf.whoi.edu/data/#jason
Jason Capabilities: https://ndsf.whoi.edu/jason/using-jason/capabilities-jason/
Jason Sensors and Sampling: https://ndsf.whoi.edu/jason/systems-jason/ #imaging
NDSF Data policy: https://ndsf.whoi.edu/ndsf-data-archive-policy/
Jason Operational Summary/Metadata: https://ndsf.whoi.edu/data/#jason
Jason Sealog server: http://jason.sealog.whoi.edu/
Predive configuration pictures server: http://jasonconfigpics.whoi.edu/jasonconfigpics/gallery.html

Navigation

Jason's primary navigation sources are a Doppler velocity log (DVL) in combination with an IxBlue PHINS INS, which are usually augmented in real time with georeferenced information from an ultra-short baseline (USBL) system. During a lowering DVL, USBL, and INS histories can be displayed in real time and are logged by in-house softwares *navest* and *NavG*. The logged histories are mathematically merged in post-dive processing to yield an improved estimate of navigation. For those dives that are out of DVL range, an INS-based product or a smoothed USBL-based product is delivered.
We recommend bringing to your cruise previously collected navigation and bathymetry, with historical station positions, to increase the efficiency and productivity of your dive time. *Jason* navigators can guide you in the creation of underlays and waypoints and will incorporate this information into operational software for use in real time. Prior to your cruise, the NDSF data manager can assist you finding information and processing content.

Imagery

Jason carries a variety of video and still camera systems, generally described in Jason Imaging. Please discuss your project's needs with the *Jason* team during the pre-cruise process. The *Jason* control van houses a variety of imagery capture systems that have differing behaviors depending on imagery source. Operational procedures seek to achieve a balance between overwhelming data archival systems and the capture of high value moments. A combination of lower data volume, always-on recordings and large data volume highlights is utilized, with highlights captured by a science watchstander under the direction of the science watchleader.

Constant Video Recording

Three video cameras ("pilot", "brow", and "science") are captured by a direct-to-hard drive recorder. Video and accompanying files are clipped at a definable period, usually 15 minutes. The codec is h.264, which provides excellent viewing quality but is less suitable for production video editing. We currently employ two versions of constantly-on recorder. Our first generation system (2013) is used preferentially: it captures good imagery with file volumes of about 4.8GB per hour per camera. Our second generation recorder (2022) requires increased post-processing time and about 6x the disk space of the gen1 system. It is employed in those situations in which its superior color fidelity warrants usage according to the judgement of the chief scientist. Total volume from the gen2 recorder is about 30GB per hour per camera. We default to use of the gen1 system in order to reduce costs over the decades the footage will be archived. The post-processing of the gen1 clips requires about 15 minutes per hour of dive time. Video and subtitle files are merged in post-processing to yield a video with optional overlays, playable using software such as *vlc*. Deliverables include: the original .ts (gen1) or .mp4 (gen2) video, separate subtitles files in .srt format; a Matroska-container (.mkv) post-processed clip that merges the video and subtitles. The gen2 .mp4 files include embedded time code (SMPTE LTC).

Video Highlights

For those moments that may be processed for outreach, select activities of the dive can optionally be captured from the science party watchstander's choice of high definition (1080i) pilot, brow, or ultra HD (2160p/4K) science camera streams. These clips are compressed using the Apple ProRes422 family of codecs (2.7GB/3 minutes for high definition, 15GB/3 minutes ultra definition) and contain embedded time code. The resulting file is a .mov file type, playable by QuickTime and editable using NLE software such as Final Cut or Premiere.

Stills

Several sources of still images from *Jason* cameras are now available.

1. Standard still camera. Sulis model Z70, which produces 5968x3352 images in jpeg format.

2. Grabbed still images from one of the video streams from most of *Jason's* video cameras, as selected by science watchstanders. The system produces color RGB TIFF or JPG images scaled to the camera image: a 4K stream results in a 3840x2160x8 bit image; a 1080i stream yields a 2740x1540x8 bit image. The system has a timing function to support surveys.
3. *Sealog* grab stills from 1080i video streams as part of logging of events.

Still image filenames denote image capture time. A post-processed product merges vehicle navigation to image filename at the time the image was captured (.ppfx file).

Logging of Events
We have transitioned to the event log/dive summary system called *sealog.* Event hot buttons ease comment entry and standardize vocabulary, and can be modified by science watchstanders. We suggest that prior to the cruise you obtain or develop a hot button list according to the standards of your research community. The narration of your cruise will be available during the cruise from a server on the ship and post-cruise from a server at WHOI.

Bathymetry
Jason can carry a 400 kHz Kongsberg EM2040 multibeam sonar. Use of the EM2040 should be arranged in the pre-cruise process, and the chief scientist may wish to bring personnel who specialize in the production of bathymetry maps. The *Jason* at-sea data processor will produce a quick-look gridded product that is based on first-cut renavigation and multibeam soundings that have been processed using automated scripts.

Oceanographic Sensors
Jason's additional standard sensors include a pressure sensor from ParoScientific, an Aanderaa 4330 optode, an APS magnetometer, Reson SVP, and an RTD-based temperature probe. The Seabird Seacat19v2 CTD is typically used in a free-run ASCII output mode: alternate uses of the CTD should be addressed prior to the cruise and may require a dedicated watchstander from the science party.

Deliverables
The cruise data package will be placed on hard drive and will typically consist of

1. all raw *Jason* sensor logs.
2. video as described above.
3. still images as described above.
4. metadata and documentation.
5. Post-processed navigation.
6. Quick-look multibeam maps and raw multibeam ping files, when captured.
7. Sealog, provided by two methods:
    - the data package will contain the information used to populate the on-shore server, plus timestamped framegrabs and events with measurements in tabular format.
    - after the cruise, if not embargoed/password protected, on the server at http://sealog.whoi.edu/sealog-jason
    - (deprecated) Virtualvan after the cruise on password-protectable server at http://4dgeo.whoi.edu/jason

Data Package Media
We will provide a portable hard drive system and will deliver the data package on it to the chief scientist at the end of the cruise. The standard filesystem for the package is ExFAT, which is compatible with Windows Vista and later, MacOSX Snow Leopard and later, and linux with extensions. The *Jason* data processor will provide intermediary versions of the data package (excepting video highlights) throughout the cruise via a NAS share. Highlights can be shared using the data package drive in its intermediary version. The drive containing the data package will be suitable for transport and temporary housing of the data, but should not be used for permanent retention. Once back at your institution, please be sure to transfer the data to enterprise quality storage.

Community Access, Archiving
A copy of the data package is delivered to WHOI, along with a form completed by the chief scientist that assigns access protection durations. Researchers can contact the WHOI Data Library and Archives for delivery of permitted data package components. Non-imagery portions of the data package will also be copied to the LDEO-based Marine Geophysical Data System (MGDS), where researchers can retrieve permitted data package components.