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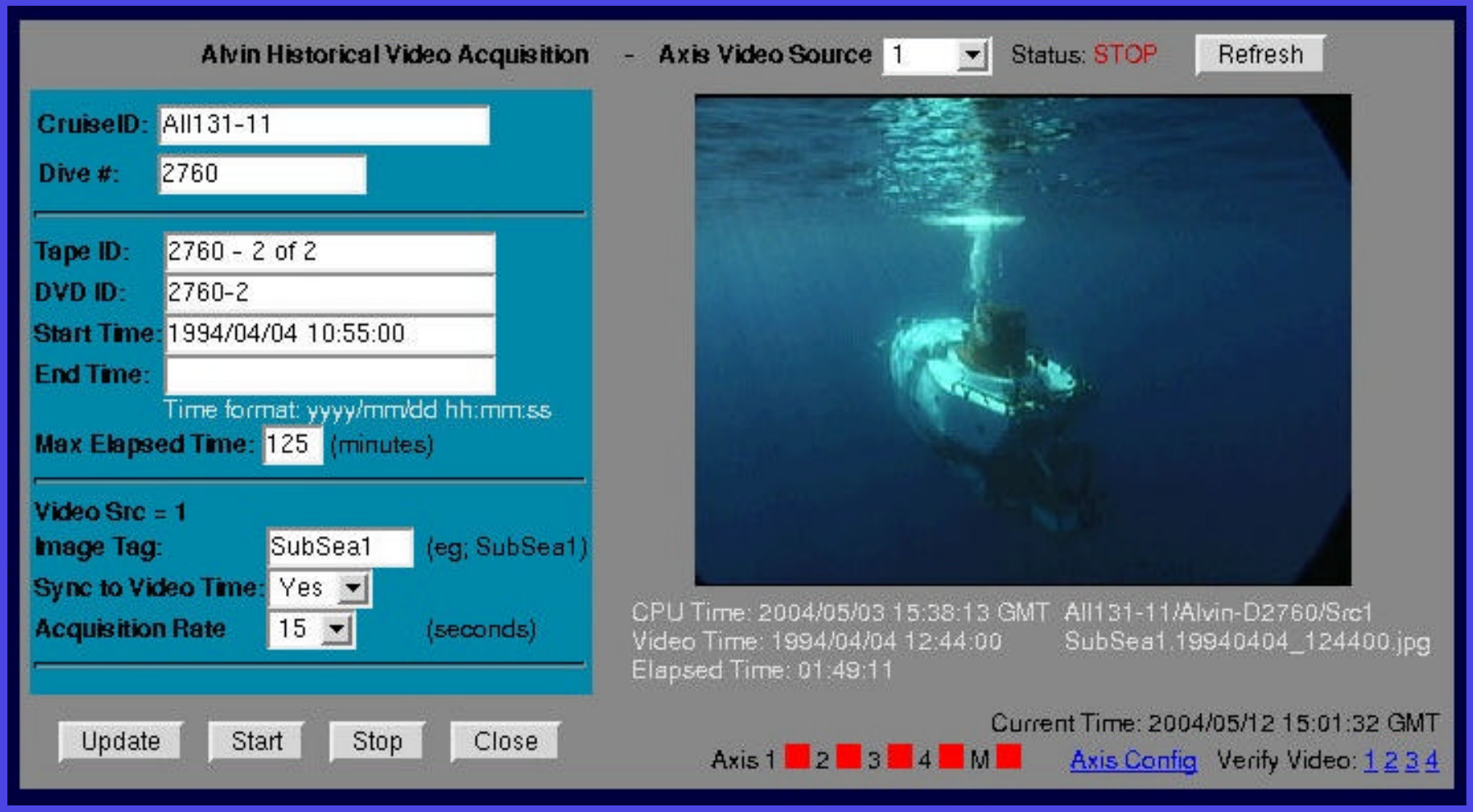
# The National Deep Submergence Facility Archives: Video Data Migration, Meta-data, and Development of a Distributed Database



## Critical Archiving Issues

• preservation, migration and better access to the 35mm Alvin, Jason and Argo II still images through digitization and proper cataloging with relevant meta-data,

• assessing Alvin data logger data, migrating data on older media no longer in common use, and properly labeling and evaluating vehicle attitude and navigation data,

• migrating older Alvin and Jason video data, especially data recorded onto Hi-8 tape that is very susceptible to degradation on each replay, to newer digital format media such as DVD,

• improving the capabilities of the NDSF archives to better serve the increasingly complex needs of the oceanographic community, including researchers involved in focused programs like Ridge2000 and MARGINS, where viable distributed databases in various disciplinary topics will form an important component of the data management structure.

## Current Alvin and Jason2 Frame-Grabber & Virtual Van URLs

**Alvin**

**http://www.whoi.edu/marops/vehicles/alvin/alvin_framegrabber.html**

http://www.whoi.edu/marops/vehicles/alvin/alvin_framegrabber.html

**Jason2**

**http://www.whoi.edu/marops/vehicles/jason/van_cruises.html**

http://www.whoi.edu/marops/vehicles/jason/van_cruises.html

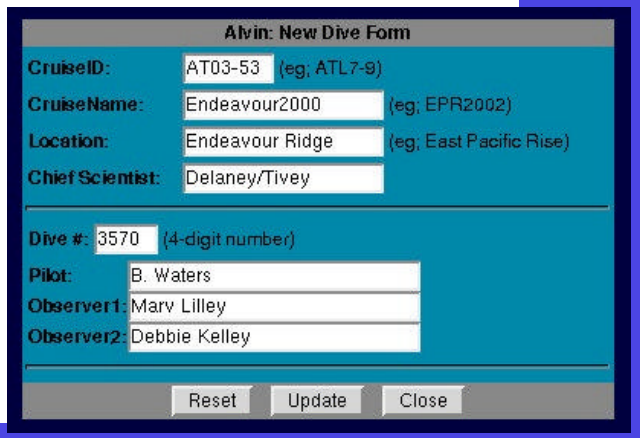
This routine, real-time capability for providing metadata and visual data from Alvin and Jason2 have been valuable to optimizing scientific productivity on research cruises and satisfying metadata requirements of major science programs.

## Procedure for Putting Historical Alvin Data On-Line and Transfer Video to DVD

0) Cruise Dive/Data Research
1) Video Acquisition - Frame-Grab Images & Transfer to DVD
2) Data Acquisition - Navigation, Attitude, Science Data
3) Merge Navigation & Attitude data with Image Data
4) Fill-out End of Dive Form and Generate HTML Tree
5) Burn CD and put on Webserver

Access Dive Information (Image/Data) via Web-Browser

0 **Cruise/Dive Data Research - Prioritized on Science needs, video sources/quality, data availability/format**

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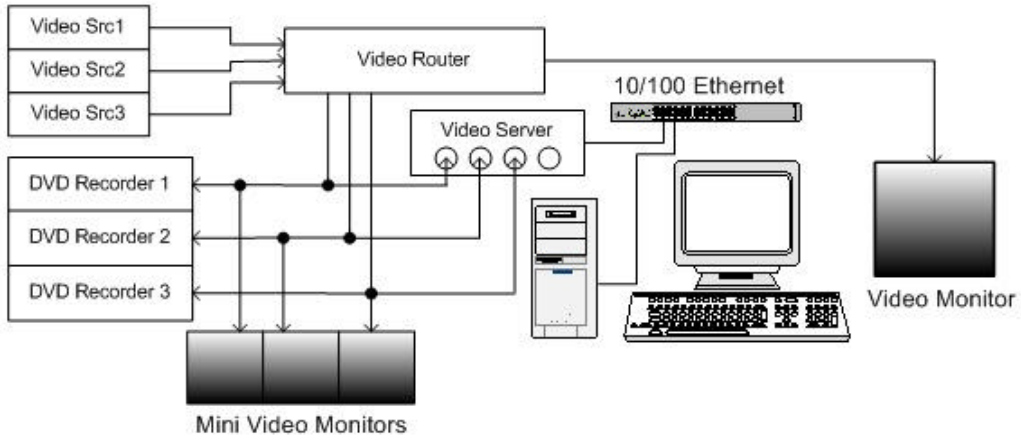
1

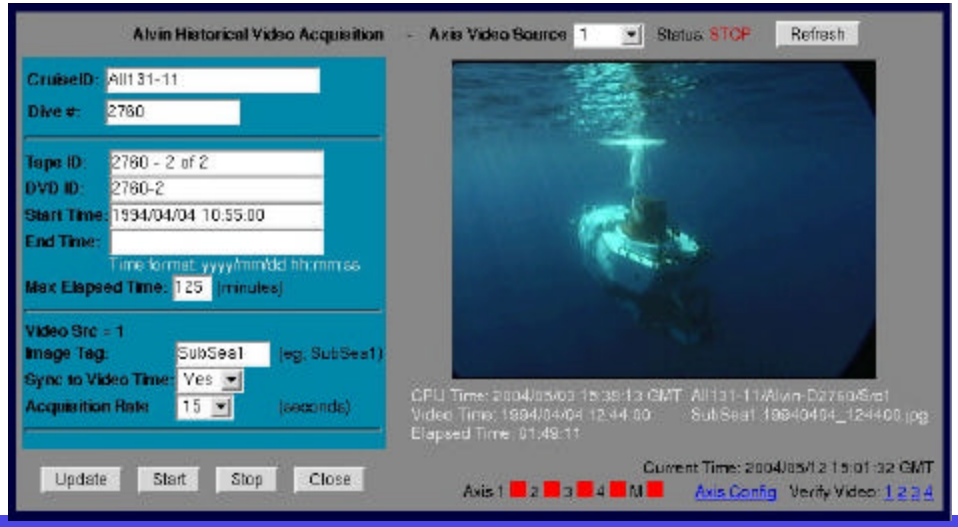
## Video Acquisition - Frame-Grab Images and Transfer Video to DVD

Hardware Setup:




Process:

1) Load video source, load DVD recorder, setup video router, verify video in video monitor. Note video start time.
2) Fill-out Web Form and press **Update**
3) Start video source, DVD recorder, and press **Start** button on form. Verify video monitor and Frame-Grab images
4) When done, press **Stop** button on form and stop video player and DVD recorder.
5) Remove media, label and verify DVD
6) Verify DVD and stored Frame-Grabbed images: /data/Alvin/CruiseID/Dnnnn/Src1/Images0001/*.jpg



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**Summary of Results:**

We developed, built, and implemented a prototype system to address putting the historical Alvin datasets on-line, and at the same time, transferring the video to DVDs. Photos of the equipment are shown below.

The left image shows the Computer and Video monitors; the middle image shows 3 mini-LCD monitors, 16-port video switcher, 4-port axis video-server, and DVD players/recorders; the right image shows the Hi-8 and VHS video source decks and computer network interface.

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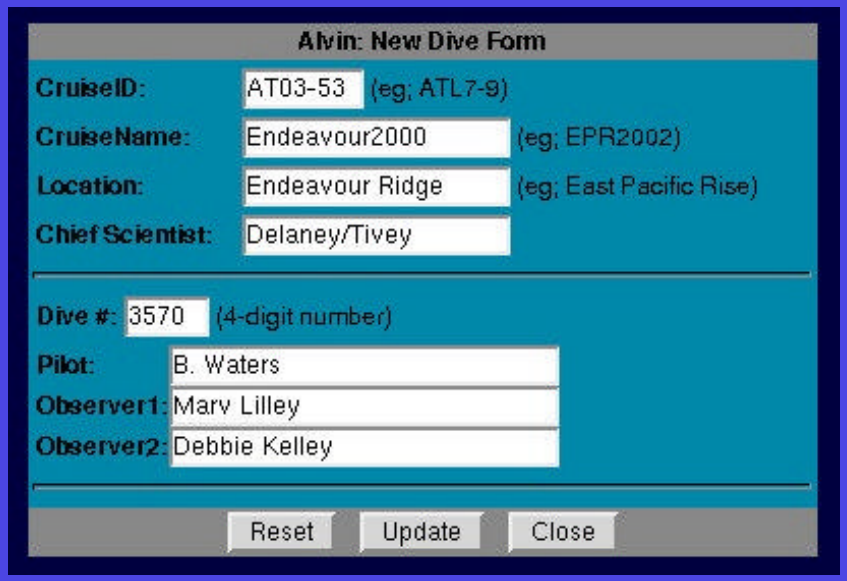
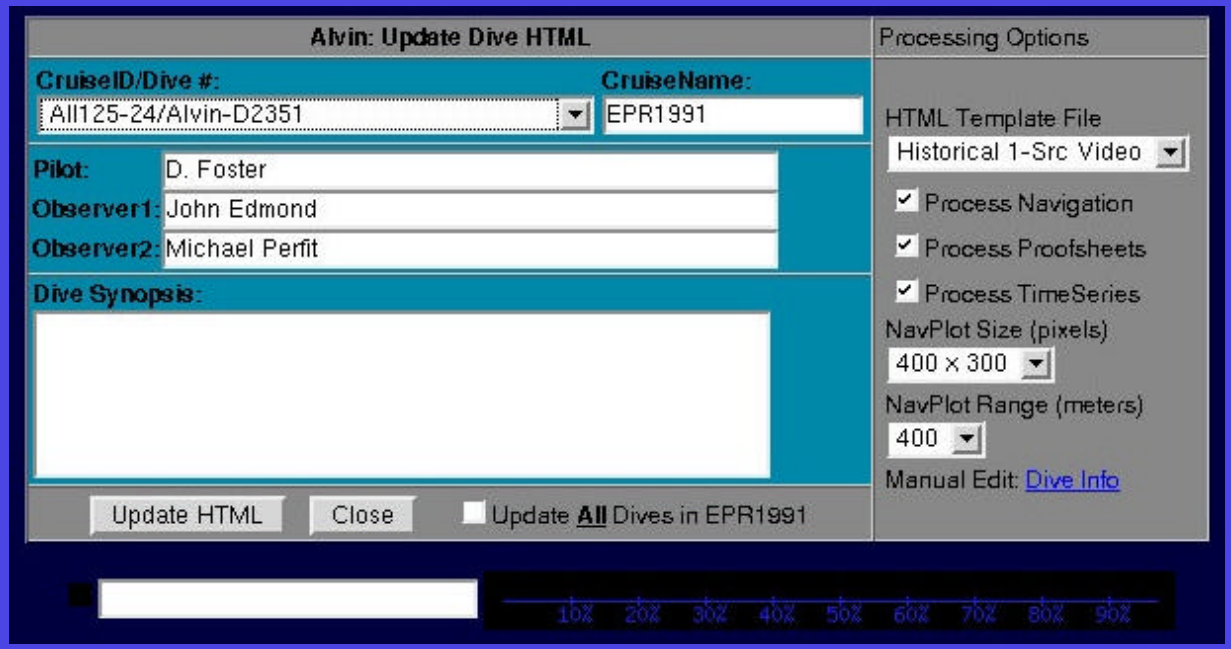
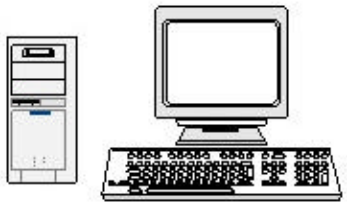


## 2 Data Acquisition - Navigation, Attitude, Science Data

Hardware Setup:

Apriori Data
CDs, Floppies,...

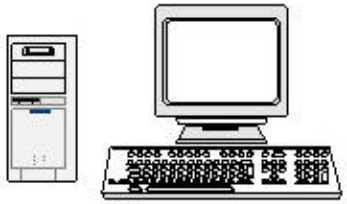


Process:
1) Load original dive nav/att data into CruiseID/Alvin-Dnnnn/Data (may want subdir Nav/Att/Mag…)
2) If original dive data format not documented, document with a README file.
3) Convert data format to condensed electronic index card (EIC) format (ie; self documentation space or comma separated records). If custom script is required, script naming convention is Dnnnn2EIC. Output file naming convention is alvin.dnnnn.dat.eic and should be stored in same directory as this is an intermediate file. The final eic file will be merged with the frame-grabbed images (refer to step 3). Note: Time formats should be converted to yyyy/mm/dd hh:mm:ss.s and in addition to Alvin coordinates, lat/long coordinates should be generated.

## 3 Merge Navigation/Attitude Data (alvin.dnnnn.dat.eic) with Images

Hardware Setup:

Dive data previously converted to EIC format



Process:
1) Run script that reads each Frame-Grab image EIC and finds corresponding EIC record in Nav/Att alvin.dnnnn.dat.eic file.
2) Then combine Nav/Att info to EIC Frame-Grab image info and write EIC entry to CruiseID/Alvin-Dnnnn/EIC/alvin.dnnnn.eic. If Nav/Att entry doesn't exist, just use Frame-Grab EIC entry.

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4 **Fill-out End of Dive Form and Generate HTML Tree**

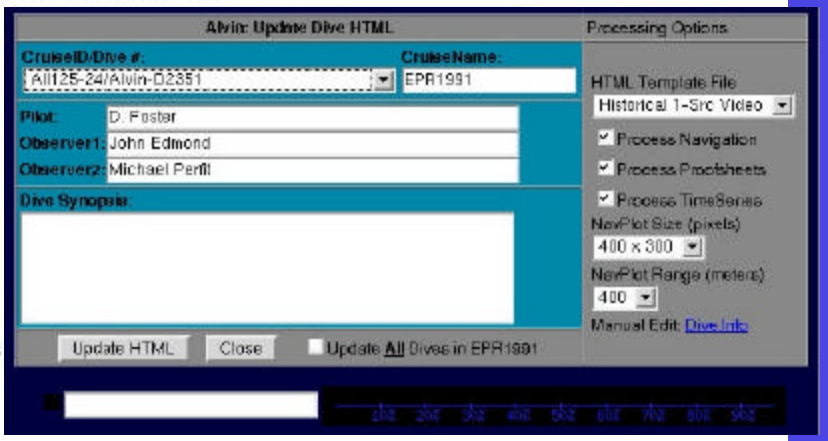
Software Setup:

Script: alvin_generate_html
Requires: perl, gnuplot, fly

Input: alvin.dnnnn.eic
SrcN/Images0001/*.jpg
Alvin HTML Template File

Output: HTML Tree
CruiseID/Alvin-Dnnnn/html
CruiseID/Alvin-Dnnnn/TimeSeries
Updates Cruise Dive List

End of Dive Form




5 **Burn CD and put on Webserver (WHOI/MarineOps)**

**Frame-Grabber User Interface (Netscape)**

Web Accessible
Integrated Images, Data, & Navigation Map
Random-Access Time-Line
VCR-style Playback Buttons
Image Proof-Sheets
Cruise Dive Info

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As part of the prototype testing, we processed historical dives from the East Pacific Rise 1991-1994 and Endeavour 2000.
For each dive, the video imagery was transferred onto DVDs, images frame-grabbed every 15 seconds, and a composite Frame-Grabbed dataset with merged Navigation and Attitude data for each dive is available on-line via a web-browser.

**http://4dgeo.whoi.edu/hist-alvin/**

**http://4dgeo.whoi.edu/hist-alvin/**

Below is a summary of the current Frame-Grabber system and the work done with the historical Alvin dives.

Overview Cruises Architecture User Interface Documentation

View: Recent Cruises

| CruiseID | CruiseName | Alvin Dive | #Dives | #Images | Chief Scientist | Access |
|---|---|---|---|---|---|---|
| AT03-53 | Endeavour 2000 | 3569-* | 2 | 3038 | Delaney/Tivey | Public |
| AII131-12 | East Pacific Rise 1994 | 2763-2772* | 7 | 8101 | Fornari/Jannasch | Public |
| AII131-11 | East Pacific Rise 1994 | 2734-2760* | 12 | 11247 | VonDamm/Lilley | Public |
| AII125-38 | East Pacific Rise 1992 | 2488-2500* | 10 | 11571 | Haymon | Public |
| AII125-24 | East Pacific Rise 1991 | 2350-2374* | 9 | 11521 | Haymon/Fornari | Public |

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**Summary**

| **Frame-Grabber System** | **# Cruises** | **# Dives** | **# Images** | **# DVDs** |
|---|---|---|---|---|
| Alvin FrameGrabber [in production since 4/2003] | 14 | 137 | 185,962 | N/A |
| Historical Alvin [EPR91-94,END2000] | 5* | 40 | 45,478 | 120 |

*Not all dives processed for each cruise

**http://4dgeo.whoi.edu/DAQ/AT03-53/dive_list.html**

**http://4dgeo.whoi.edu/DAQ/AT03-53/dive_list.html**

# EPR 2004 Data

## Endeavour 2000 Data

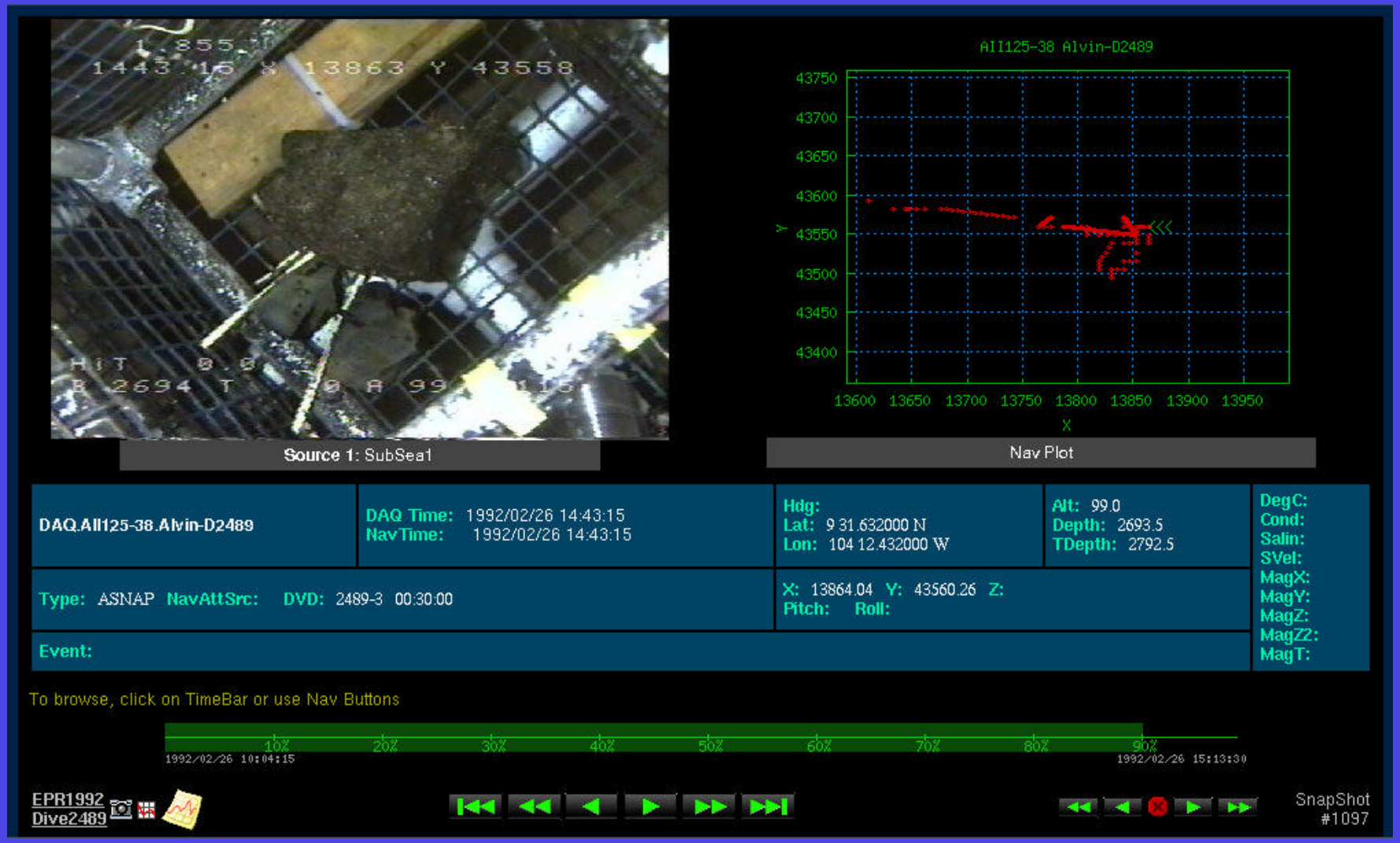
Good video, overlay, and nav/attitude

# Endeavour 2000 Data

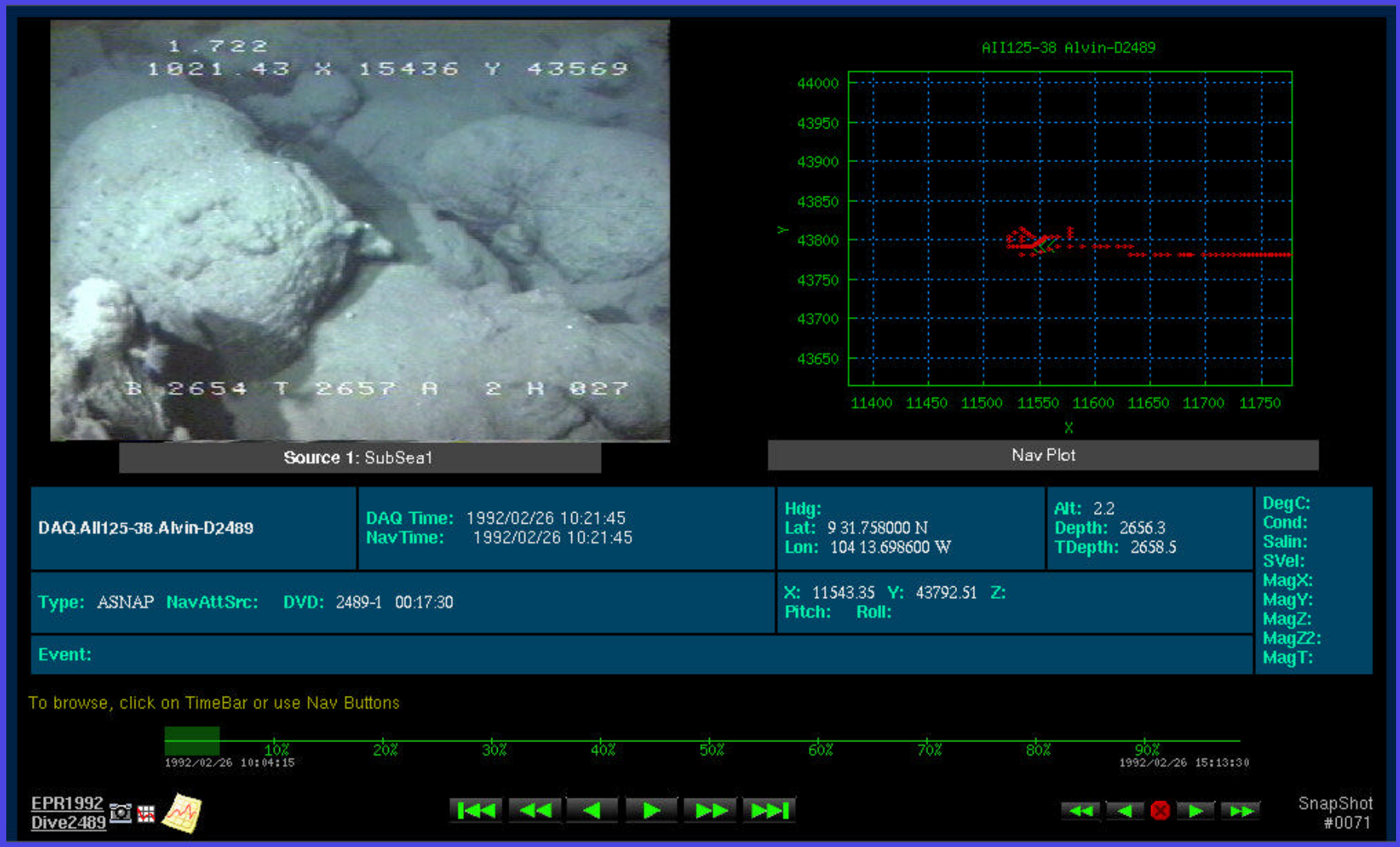
bad overlay

# Endeavour 2000 Data

# EPR 1992 Data



# EPR 1992 Data



# EPR 1991 Data

# Thumbnail Pages

**Alvin Dive2353 - Camera1**
**AII125-24 EPR1991**
Total Pages=24, Images/Page=50, Total Images=1196

Page 12 of 24 [Goto page: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ]

| | | | | |
|---|---|---|---|---|
| -551- SubSea1.19940403_122815.jpg [32987 bytes] | -552- SubSea1.19940403_122830.jpg [40828 bytes] | -553- SubSea1.19940403_122845.jpg [42169 bytes] | -554- SubSea1.19940403_122900.jpg [50805 bytes] | -555- SubSea1.19940403_122915.jpg [51039 bytes] |
| -556- SubSea1.19940403_122930.jpg [51185 bytes] | -557- SubSea1.19940403_122945.jpg [54309 bytes] | -558- SubSea1.19940403_123000.jpg [54095 bytes] | -559- SubSea1.19940403_123015.jpg [53418 bytes] | -560- SubSea1.19940403_123030.jpg [56118 bytes] |
| -561- SubSea1.19940403_123045.jpg [54394 bytes] | -562- SubSea1.19940403_123100.jpg [51865 bytes] | -563- SubSea1.19940403_123115.jpg [34939 bytes] | -564- SubSea1.19940403_123130.jpg [48022 bytes] | -565- SubSea1.19940403_123145.jpg [54204 bytes] |
| -566- SubSea1.19940403_123200.jpg | -567- SubSea1.19940403_123215.jpg | -568- SubSea1.19940403_123230.jpg | -569- SubSea1.19940403_123245.jpg | -570- SubSea1.19940403_123300.jpg |

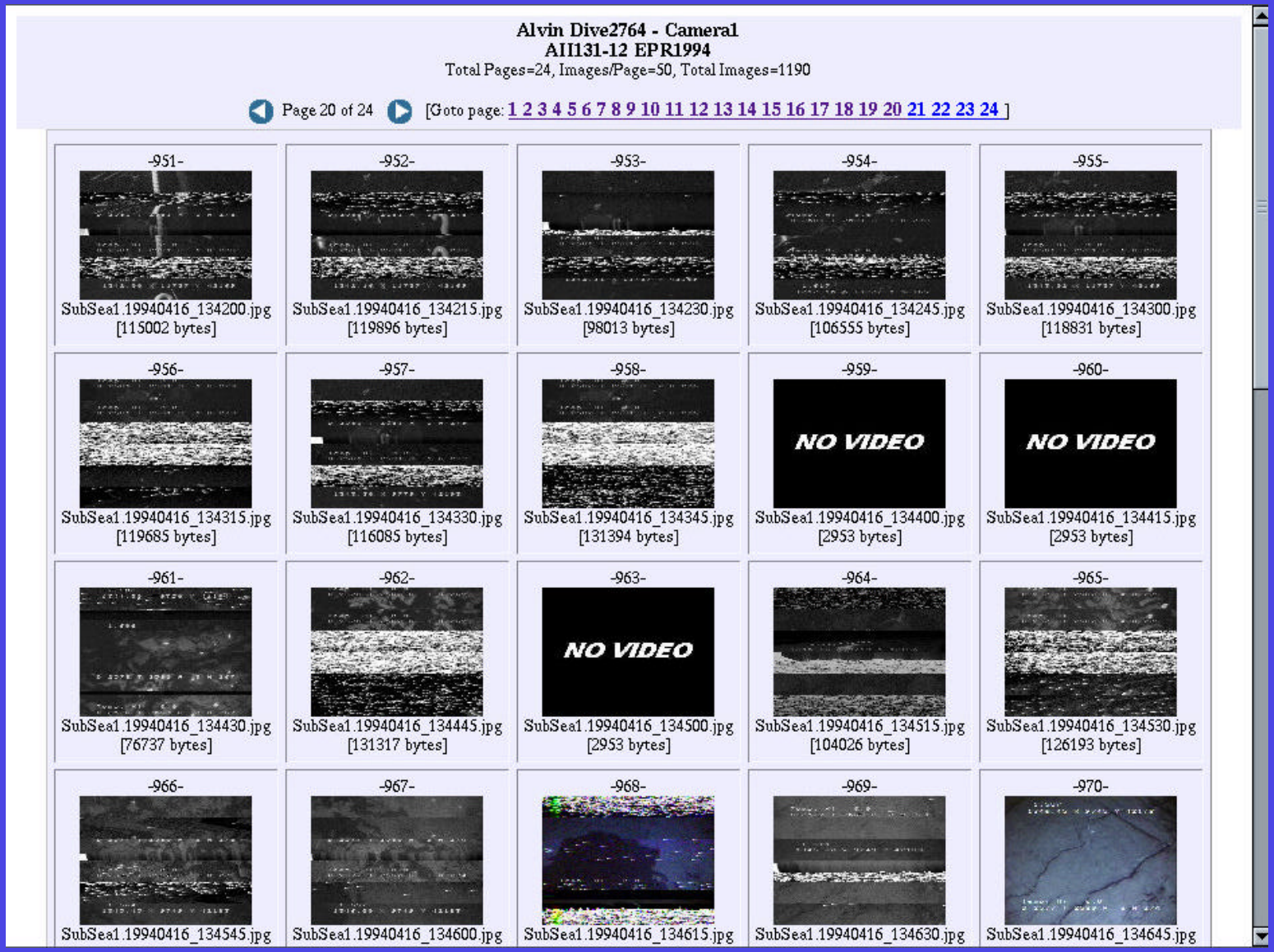
# Examples of Bad/Poor Quality Images/Data

**Alvin Dive2503 - Camera1**
**AII125-38 EPR1992**
Total Pages=22, Images/Page=50, Total Images=1056

Page 15 of 22 [Goto page: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 ]

| | | | | |
|---|---|---|---|---|
| -701- SubSea1.19920311_132800.jpg [37321 bytes] | -702- SubSea1.19920311_132815.jpg [36637 bytes] | -703- SubSea1.19920311_132830.jpg [35472 bytes] | -704- SubSea1.19920311_132845.jpg [35603 bytes] | -705- SubSea1.19920311_132900.jpg [36021 bytes] |
| -706- SubSea1.19920311_132915.jpg [35979 bytes] | -707- SubSea1.19920311_132930.jpg [35911 bytes] | -708- SubSea1.19920311_132945.jpg [36109 bytes] | -709- SubSea1.19920311_133000.jpg [36406 bytes] | -710- SubSea1.19920311_133015.jpg [36403 bytes] |
| -711- SubSea1.19920311_133030.jpg [36804 bytes] | -712- SubSea1.19920311_133045.jpg [36819 bytes] | -713- SubSea1.19920311_133100.jpg [36960 bytes] | -714- SubSea1.19920311_133115.jpg [36936 bytes] | -715- SubSea1.19920311_133130.jpg [36949 bytes] |
| -716- SubSea1.19920311_133145.jpg | -717- SubSea1.19920311_133200.jpg | -718- SubSea1.19920311_133215.jpg | -719- SubSea1.19920311_133230.jpg | -720- SubSea1.19920311_133245.jpg |

# Examples of Bad/Poor Quality Images/Data



**Alvin Dive2764 - Camera1**
**AII131-12 EPR1994**
Total Pages=24, Images/Page=50, Total Images=1190

Page 20 of 24 [Goto page: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ]

| | | | | |
|---|---|---|---|---|
| -951- SubSea1.19940416_134200.jpg [115002 bytes] | -952- SubSea1.19940416_134215.jpg [119896 bytes] | -953- SubSea1.19940416_134230.jpg [98013 bytes] | -954- SubSea1.19940416_134245.jpg [106555 bytes] | -955- SubSea1.19940416_134300.jpg [118831 bytes] |
| -956- SubSea1.19940416_134315.jpg [119685 bytes] | -957- SubSea1.19940416_134330.jpg [116085 bytes] | -958- SubSea1.19940416_134345.jpg [131394 bytes] | -959- NO VIDEO SubSea1.19940416_134400.jpg [2953 bytes] | -960- NO VIDEO SubSea1.19940416_134415.jpg [2953 bytes] |
| -961- SubSea1.19940416_134430.jpg [76737 bytes] | -962- SubSea1.19940416_134445.jpg [131317 bytes] | -963- NO VIDEO SubSea1.19940416_134500.jpg [2953 bytes] | -964- SubSea1.19940416_134515.jpg [104026 bytes] | -965- SubSea1.19940416_134530.jpg [126193 bytes] |
| -966- SubSea1.19940416_134545.jpg | -967- SubSea1.19940416_134600.jpg | -968- SubSea1.19940416_134615.jpg | -969- SubSea1.19940416_134630.jpg | -970- SubSea1.19940416_134645.jpg |

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# Examples of DVD - Duplicated Video

Duplicated DVD video imagery is taken from the following cruises:

**EPR-1991, EPR-1992, EPR-1994, & END-2000**

The clips match to the following #s in the DVD listing:

**Clips #1-3 Endeavour 2000, Dive 3569**

1) 3-chip camera (Hi-8 recording)

2) Hi-8 scrolling video

3) Text/bad video

**Clips #4-6 EPR 1992, Dive 2489**

4) B/W Manip dist shot and different camera

5) Colorbars and some dark/bw

6) View of a sample

**Clips #7-8 EPR 1991, Dive 2352**

7) Clams

8) Bad Sync

**Clips #9-13 EPR 1994, Dive 2764**

9) Bad Sync

10) Text only w/ poor video quality

11-13) good imagery - crabs, tube worms etc.

# Experience and Projections Re: Personnel Effort & Future Work

- With our current prototype setup (2 DVD recorders, 1-axis 4port video server, 1-computer, 2-hi8/vhs video input sources) processing time is 1/2 real-time, or stated another way, we can process the data twice as fast as real-time.
- For data that is newer than 1991, we estimate that a 1/2 FTE can do the complete processing including frame-grabbing, DVD media transfer, and nav/att processing and merging.
- With more equipment and personnel, we can process the data faster; so if we double the equipment and increase 1/2 FTE to 1FTE, we can process the data 4-times faster than real-time.
- For older data, we don't have experience yet. We may run into problems with video quality, and for much older datasets (70's, early 80's), we will run into navigation data-format/media issues which will take longer to sort-out and process.
- For the production system we will need to add several pieces of equipment including DVCam players, time-code readers/displays, and an audio switcher for dives that contain LTC (timecode in the audio track).
- Produce similar data for historical Jason cruises and merge navigation and vehicle attitude with imagery.