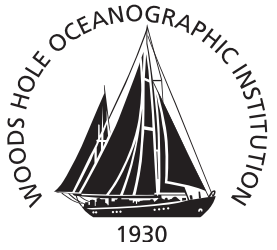
WHOI-2002-12

Woods Hole Oceanographic Institution



The Jason II Virtual Control Van System, Data Acquisition System, Web-based Event Logger, and SeaNet

by

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Technical Report

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Approved for Distribution:

W. Rockwell Geyer, Chair

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1 Background

Today's scientific underwater remotely operated vehicles (ROVs) generate a tremendous amount of data collected from a variety of sensors in real-time. Often integrated information such as multiple video streams, vehicle telemetry, and scientific data are only available to the users in the ROV control-van during real-time operations. Although all the data is logged, it is extremely difficult for scientists to re-create a combined display of this information or have the ability to review and access an entire cruise dataset in an integrated fashion.

We introduce a methodology of taking real-time information snapshots or *infosnaps* during events that occur within the ROV control-van. *Infosnaps* are taken during *interesting events* such as when a scientist enters an event via a computer logging system. Infosnaps are also taken at regular time intervals, such as once a minute, to ensure complete data coverage. As part of the *Jason II* ROV upgrade, we have developed the Virtual Van data acquisition system that captures the information in the control-van during ROV operations including up to four simultaneous video sources, vehicle data, scientific instrument data, and event data which is used to generate the infosnaps. These control-van infosnaps are automatically cataloged and immediately accessible and searchable via a web-browser. The system is designed for both scientific and public outreach needs and has been integrated with the SeaNet system to provide remote on-shore access for scientific collaboration and public outreach. This technology of real-time image and data snapshots combined with integrated web-based access has been extremely successful and has been applied to other underwater vehicles such as DSV Alvin, deep-towed camera systems, and an autonomous underwater vehicle called Seabed.

During the past two years, the *Jason II* Virtual Van system has been deployed on seven *Jason* cruises (see figure 1) and has captured over 50,000 control-van infosnaps, containing more than 200,000 images. Each control-van infosnap seamlessly integrates four simultaneous video snapshots with vehicle data such as navigation, depth, and heading, scientific instrument data from instruments such as a CTD and a magnetometer, and event data as entered by scientists. All this information is accessible via a web-browser in real-time and is available to the scientists after the cruise for post-cruise data access and analysis.

CruiseName	CruiseID	Location	Dates	Vessel	ChiefSci	View	VVan
Hawaii 2002	tn151	Hawaii	Oct 24 – Nov 12, 2002	R/V Tompson	Fred Dunnebeir, Mike Garcia		
Juan de Fuca 2002	atlv7120	Juan de Fuca	August 29–September 23,2002	R.V Atlantis	Paul Johnson		
JasonIISeaTrials	atl7–2002	Astoria	July 19–22, 2002	R/V Atlantis	Andy Bowen		
JuanDeFuca2001	tn129	Juan De Fuca Ridge	June 17 – July 2, 2001	R/V Thompson	Paul Johnson		
Indian Ocean 2001	kn162–13	Indian Ocean	March 27 – May 5, 2001	R/V Knorr	Cindy Van Dover		
EelRiver 2000	tn118	Eel River Basin, Washington	October 12 – October 17, 2000	R/V Thompson	Lisa Levin		
JuanDeFuca 2000	tn117	Juan De Fuca Ridge	September 29 – October 7, 2000	R/V Thompson	Paul Johnson		

Figure 1: List of *Jason II* Virtual Van Cruises

The Virtual Control Van project is part of the *Jason II* upgrade effort and has been combined with SeaNet to provide live access to remote underwater scientific expeditions. Funding for this effort provided by the Keck Foundation.

2 The Control Van and the Virtual Control Van

The control van is a shipboard enclosure where pilots, navigators, and engineers stand watch and control remotely operated vehicles (ROVs) such as *Jason II* for underwater scientific research. During ROV operations, there is a wealth of real-time information available in the van. This information includes live video displays, navigation data, vehicle telemetry, scientific instrument data, and events that are entered by scientists. The Virtual Control Van is a web-based application that captures all the information that occurs inside the Control Van during vehicle operations and makes this information available, in real-time, to people on the ship and also on-shore for post-cruise analysis and cruise planning. A photo of the inside of *Jason*'s control van and a screen snapshot of the Virtual Van is shown in figure 2.

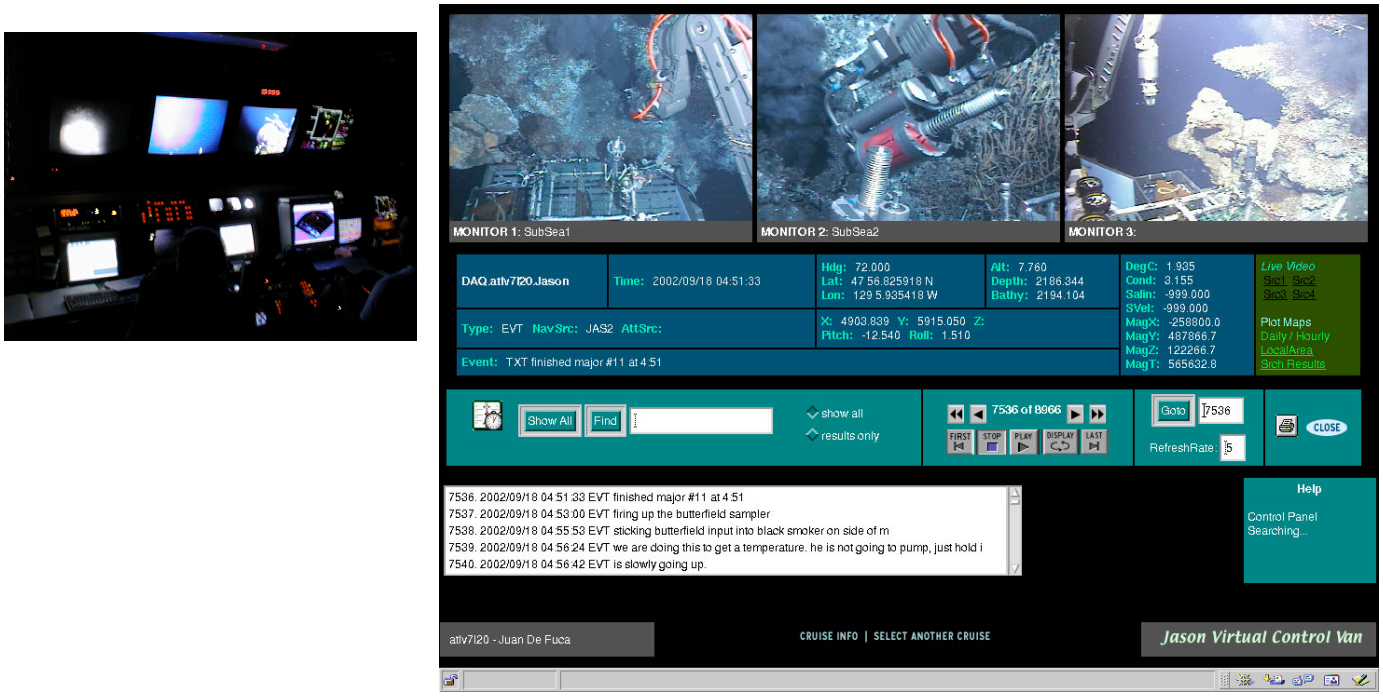

Figure 2: Inside *Jason*'s Control Van (left); Screen snapshot of *Jason II*'s Virtual Control Van (right).

The Virtual Van system consists of several components: The Data Acquisition System (DAQ) including a network-based video server, the GeoBrowser System, the Virtual Van Setup Manager, a web-based Event Logger, and the Virtual Van user interface/website. The Virtual Van system is integrated with *Jason*'s topside telemetry system, navigation system, and data system. The system architecture is shown in Figure3. Not shown in the figure is a spare data acquisition computer (seadata2), which regularly mirrors the data from the primary computer (seadata1).

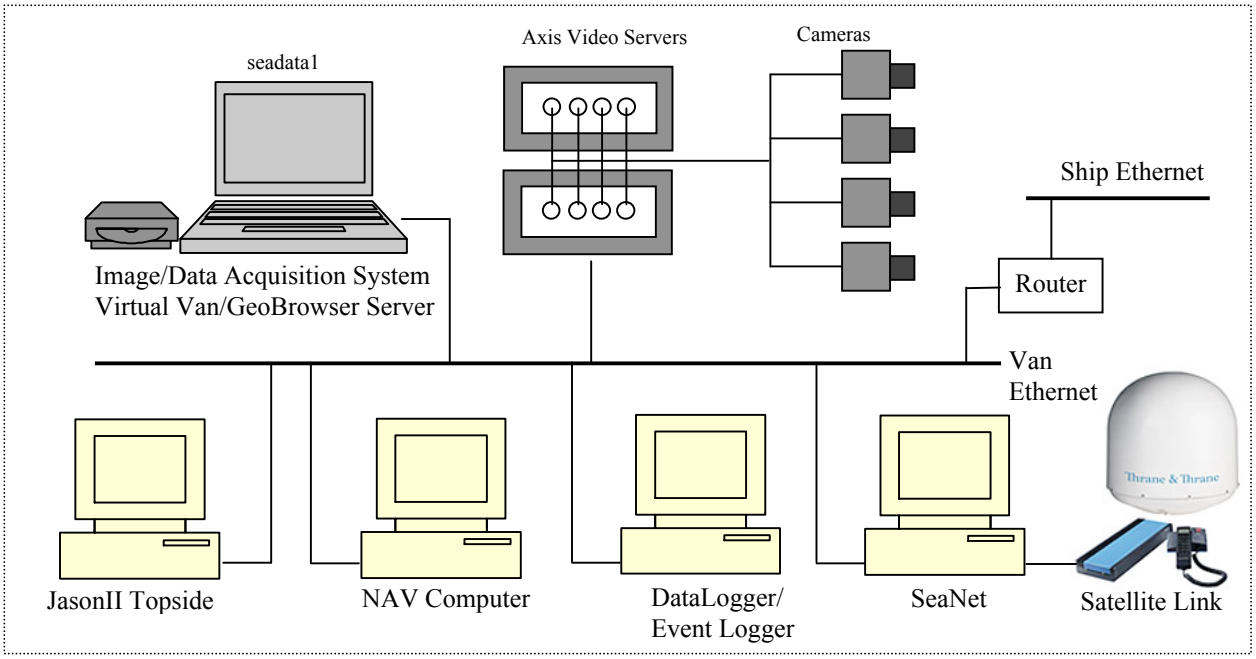

Figure 3: Virtual Van System Architecture

The image/data acquisition system (DAQ) continually monitors *Jason* II's telemetry data available via UDP over the Ethernet. Every minute or when a scientist enters an event via the event logger, the DAQ system tells the video server to simultaneously snapshot four video sources. The DAQ stores the images as jpegs and co-registers them with the vehicle data, such as navigation, attitude, along with available science instrumentation outputs, and stores the *infosnap* as an ASCII electronic index card (EIC). In real-time, scientists and observers can view the combined display of the information collected via a web-browser, either inside the control van or in any network accessible area on the ship. The web-browser Virtual Van display is generated on-the-fly via the GeoBrowser server, which allows users to search, plot, and display EICs. The DAQ system is designed to require minimum human intervention and monitoring. The default system configuration is designed to run continuously and does not need to be stopped on vehicle recovery nor restarted on each lowering. The system is intelligent enough to automatically capture images once *Jason* II is below a specified depth or within a specified altitude above the seafloor. Events entered by scientists, however, are always captured and logged even if the vehicle is on-deck. The DAQ control and status display is web-based and highlights errors if intervention is required. For redundancy, there are two axis video servers and two Virtual Van DAQ computers (only seadata1 is shown).

For cruises that require interactive Internet at-sea capabilities, such as remote science collaboration and educational/public outreach, the SeaNet system can be configured to automatically send a subset of the Virtual Van displays to shore via a satellite communications link. Additionally, the SeaNet system can be used for other Internet at-sea services such as interactive web access, batch file transfer, email, web mirroring, and video conferencing.

Post-cruise, the DAQ cruise directory containing the images and electronic index cards (EICs) are loaded onto a shore-side server enabling complete web-access for post-cruise analysis. The shore-based Virtual Van server provides access to current and prior cruises for collaborating scientists and for educational/public outreach and is available via http://www.whoi.edu/marops/vehicles/jason/van_main.html.

3 Getting Started for a New Cruise

This section describes the steps required to setup the Virtual Control Van and Data Acquisition system for the start of a new cruise. Sections 4-6 provide reference material on using the DAQ Control, the Virtual Van, and the Web-based Event Logger.

1) Power-on the equipment by turning-on the UPS and then the outlet switch below it. Both computers (seadata1 and seadata2) will come on-line and have a login prompt. Log into the seadata1 computer with the username **virtualvan** and enter the password (refer to At-Sea User Account/Password Summary).

2) Click on the tool-chest from the top menu bar to bring-up the *Jason* II Data Acquisition Tools administrative webpage. If there is no top menu bar, enter the URL http://198.17.154.221/virtualvan/tools.html in the Netscape browser. This webpage contains the links needed to setup for a new cruise. As shown in figure 4, this web page contains links for setting up the TCP/IP router to communicate between the control van and computers on the shipboard network; the virtual van setup page for configuration a new cruise; the DAQ Control for starting, stopping, and monitoring the data acquisition system; the Event Logger, an application for scientists to enter description of real-time events; a link to the Virtual Van main website; and miscellaneous links to access the video servers and the GeoBrowser system directly.

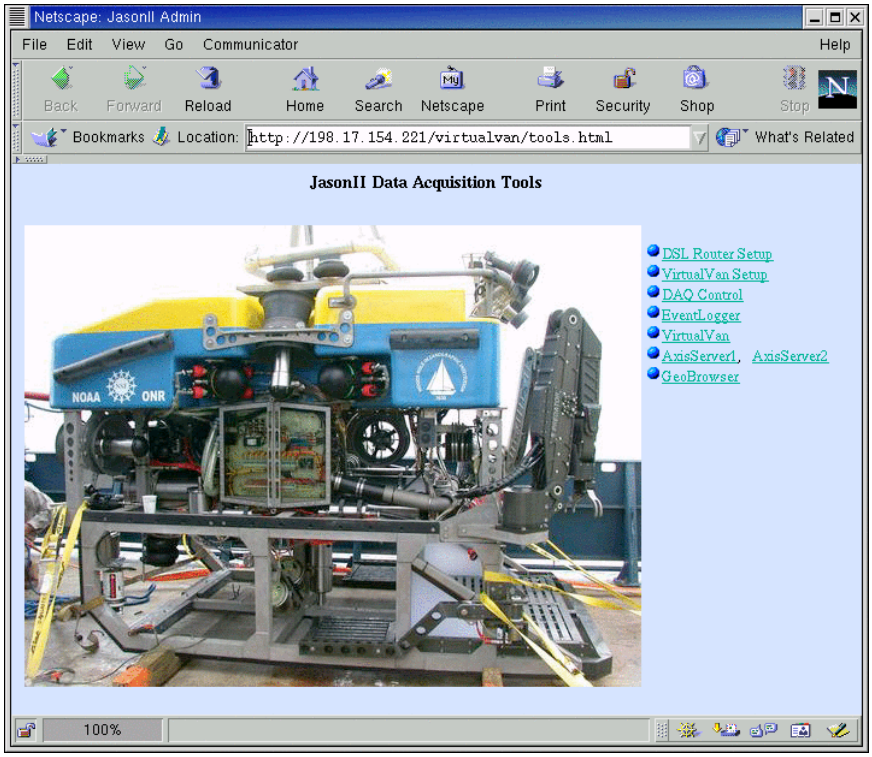

Figure 4: *Jason II* Data Acquisition Tools web page

3.1 DSL Control Van Router Setup

Preparation for a new cruise begins with setting up the DSL TCP/IP Router ship's address via the DSL Van Router Setup link. Before setting up the van router you need to get a shipboard network address and other information (see below) from the appropriate network administrator. Clicking on the **Router Setup** link brings-up the router's management website. Click **login** (no password required) and then click on **Setup** and then **WAN**. Select **Static IP Address** and press **More Configuration**. Enter the appropriate information for the ship address including IP, subnet mask, gateway, and DNS. When finished configuring the router, be sure to logout. An example WAN configuration for the R/V Atlantis is shown below:

Example WAN configuration:

```
IP: 199.92.161.1
Subnet Mask: 255.255.255.0
Gateway: 199.92.161.21
DNS: 199.92.161.2
```

There are many virtual applications pre-configured in the router that allow access to the control van network via the router's shipboard address. The common applications configured include web-access to the VirtualVan, ssh, and ftp. Refer to DSL TCP/IP Router Configuration for the router configuration setup.

Access to the Virtual Van web-server is provided via the URL http://WAN_address/virtualvan/. It is recommended that a link be placed on the ship's website (if there is one) pointing directly to the Virtual Van so that other shipboard users can simply click on the link.

3.2 Virtual Van Setup

The first time you click on the **Virtual Van setup** link, you will be asked for a username and password. The username is **vv-admin** (refer to the At-Sea User Account/Password Summary for the password). Figure 5 shows a snapshot of the setup menu with the New Cruise form. To configure a new cruise, simply click on the **New Cruise** link and fill-out the form. At the bottom of the form, click **Update**. Check the bottom of the form after submitting it to confirm that there are no errors. **IMPORTANT NOTE**: the CruiseID field is critical and should not contain any spaces or special characters.

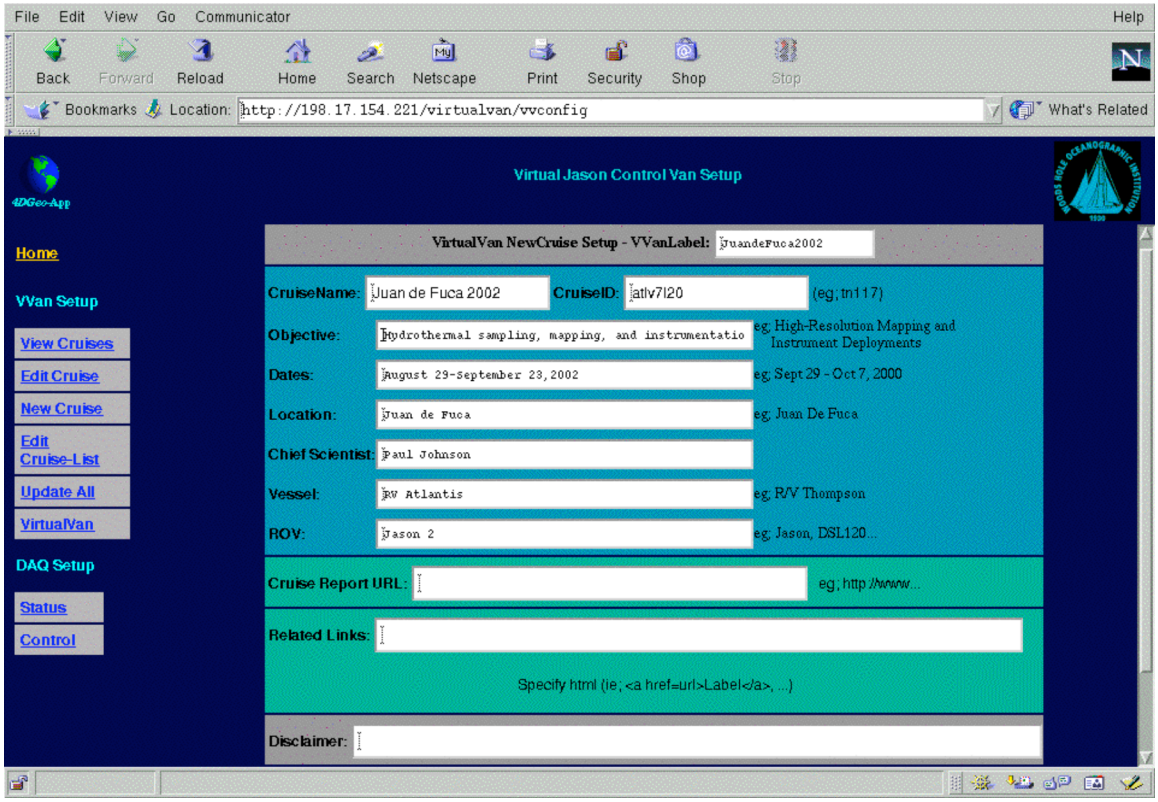

Figure 5: Virtual Control Van Setup menu with New Cruise form

CuiseID is used in creating directories to store all the data. Other fields can be modified later by selecting **Edit Cruise** from the menu on the left. Currently, in order for the new cruise to appear at the top of the list in the virtual van website, you will need to manually edit the cruise-list. Click on **Edit Cruise-List** from the menu and move the new cruise name from the bottom of the list to the top. Press **update** for the changes to take effect. If you modify either the cruise-list or edit a cruise, you will need to click on **Update All** for the changes to take effect. The new cruise process updates the main Virtual Van website with the new cruise information, creates a DAQ configuration file, and integrates with the GeoBrowser system by creating a new cruise collection and custom display forms (Dforms).

3.3 Miscellaneous Scripts

There are a couple of miscellaneous scripts that need to be manually updated when configuring a new cruise. Miscellaneous scripts for the virtual van are located in **/webdata/virtualvan/misc_scripts** on seadata1. The **update_4dgeo_index** script needs to have the collection name ($collection) updated appropriately. This script is run hourly as a geobrowser cronjob; it updates the electronic cards indices to allow quick spatial and temporal searching.

There is a script on the secondary/backup data acquisition machine (seadata2) that automatically mirrors data from the primary machine (seadata1). The script only runs on seadata2 via a cronjob and is located in **/root/mirror_seadata1**. There is a section within the script for copying the latest cruise data. Comment out all previous cruises and specify the current cruise directory.

Note: Any software modifications should be done on seadata1 as several directory trees are automatically mirrored onto seadata2. Thus changes to software made directly on seadata2 may be inadvertently overwritten.

4 DAQ Control

The DAQ Control program allows the user to start, stop, and monitor the virtual van data acquisition system. To start the DAQ system, select the current cruise Config File and press **START** (to eliminate the watch icon, press START again). The status of the system is shown in the lower half of the display and updates approximately every 10 seconds. To update the status at anytime, press **Show Status**. To stop the DAQ system, press **STOP**. The status pages monitors disk space, communications to the video server, vehicle data, event data, and shows a picture of the last infosnap in the bottom right. Flashing red text highlights errors including low disk space, faulty communications to the video servers, or raw data not received within a specified time limit. Within the control menu, you can enter text events similar to the event logger program.

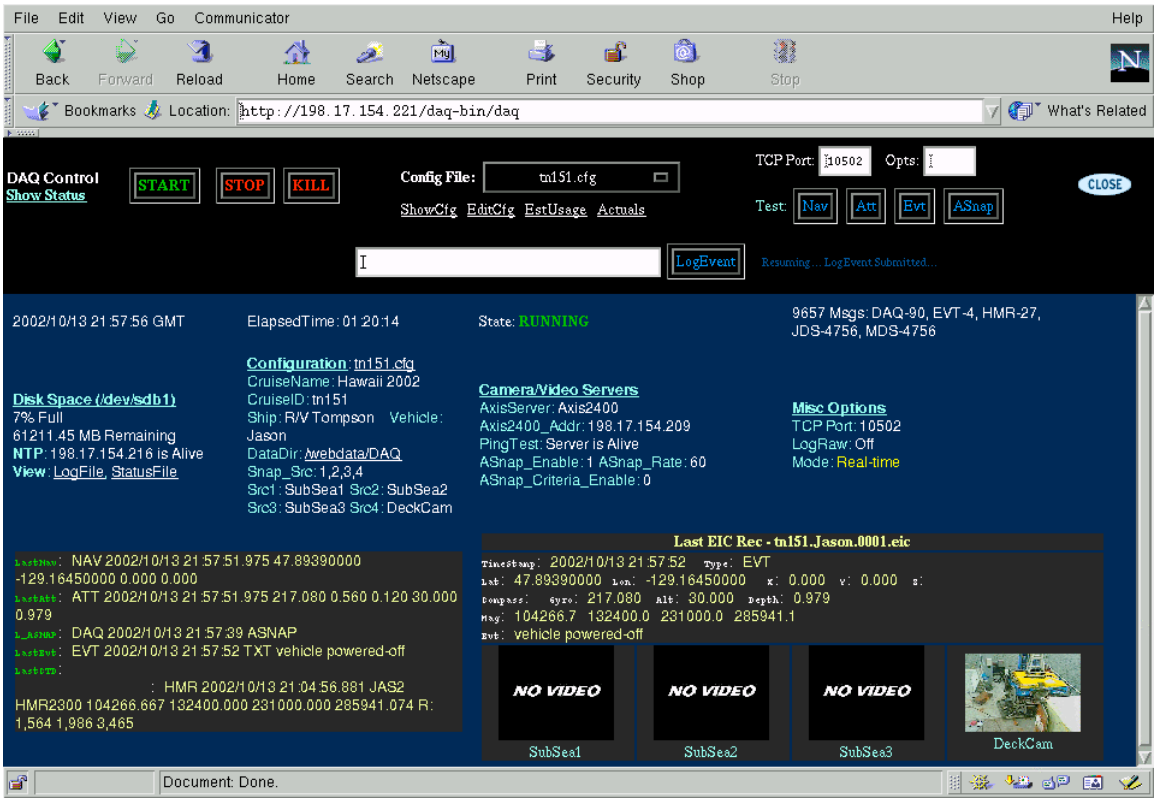

Figure 6: DAQ Control and status window

The DAQ system is pre-configured to take automatic infosnaps at a particular rate (e.g.; once every minute) independent of whether events from scientists have been entered. Additionally, to reduce unnecessary infosnap storage, the auto infosnap includes a criteria-based feature that will only take infosnaps if the vehicle's depth and altitude are within a particular range. These features are selectable within the DAQ configuration file. To modify the configuration file from the DAQ control panel; select the configuration file, press **EditCfg**, make the necessary changes, and press **Update**. For the changes to take effect, you need to restart the DAQ system by pressing **STOP** and then pressing **START**.

5 The Virtual Van

After the Virtual Van setup is completed and the DAQ system is started, visual displays of the infosnaps are automatically accessible via the Virtual Van web-server. The main Virtual Van website is available via web-browsers both inside the control van and throughout the ship. A link to the main Virtual Van website is available on the *Jason II* Data Acquisition tools web page. Within the website, simply click on a cruise from the left menu and then click 'Enter *Jason* Control Van'. On shore, the main website including infosnaps from a number of different Jason cruises is available at http://www.whoi.edu/marops/vehicles/jason/van_main.html (or directly at http://4dgeo.whoi.edu/virtualvan).

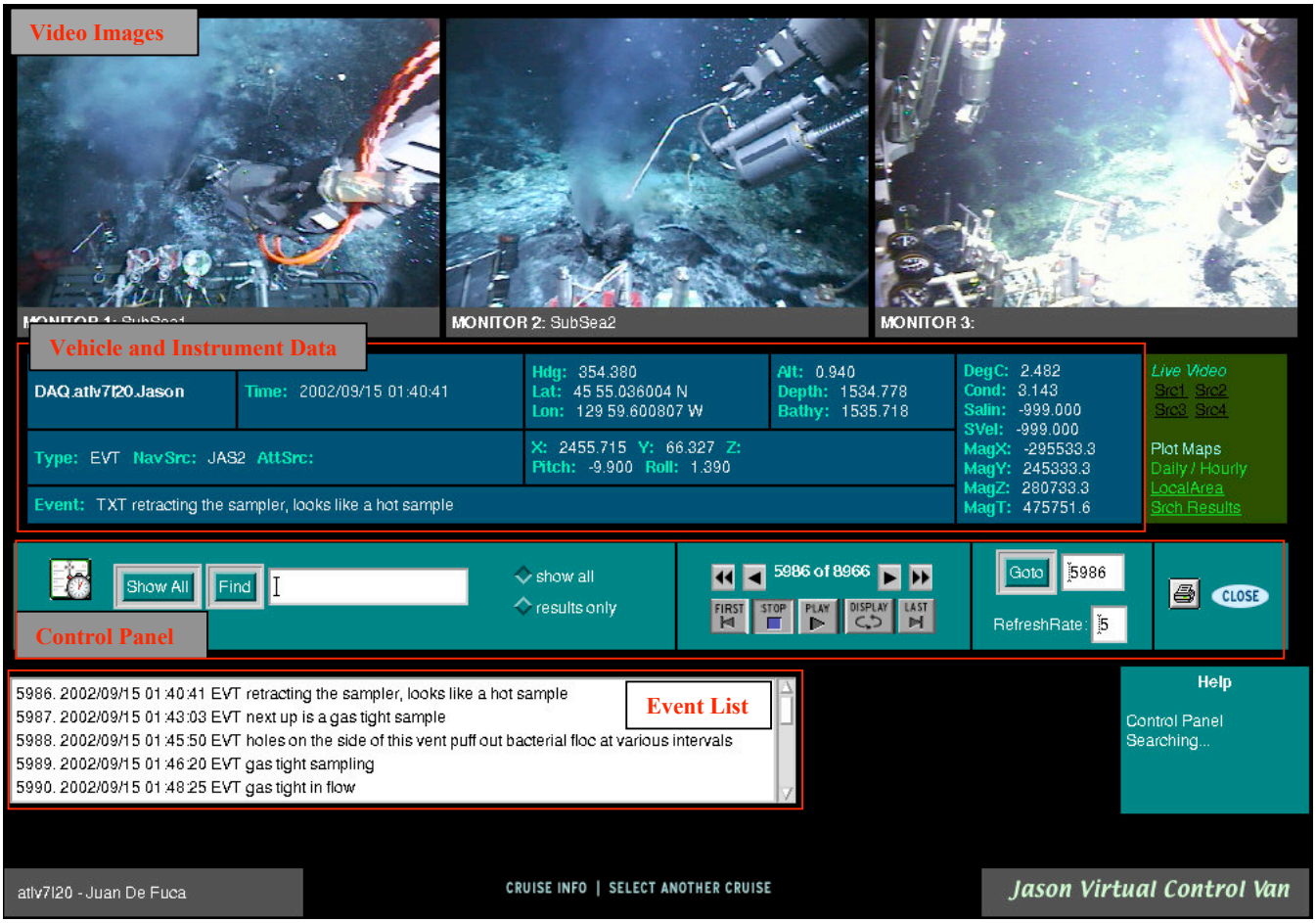

Figure 7: *Jason II*'s Virtual Control Van User Interface

Video images transmitted from the vehicles are shown in the top frames, the vehicle and scientific instrument data below the images, the infosnap control-panel is in the middle, and the cruise event list is near the bottom. Clicking on the video images shows the full resolution of the images. To go to an event, you can click on the event of interest from the event list. The control panel allows text searching, calendar searching, and navigation through the data via the control buttons. Clicking on the **Display** button continuously monitors the most recent data in near real-time. Clicking on **Cruise Info** will display a synopsis of the current cruise. Click on **Select Another Cruise** to view a different cruise.

Note that four video sources are digitized and logged, but only three of the four sources are displayed on the Virtual Van at one time. This allows for larger images with limit screen space. The GeoBrowser custom display form (Dform) specifies which video sources are displayed in the Virtual Van and can be modified to change the sources. The changes to the Dform file take effect immediately. In the future, users will be able to select which video sources are displayed.

The infosnap control panel is used to navigate and search for information within the Virtual Van snapshots. Figure 8 shows a screen snapshot of the control panel. It contains 4 sections. The left section of the panel is used to search for keywords and date via a calendar, the middle section operates as VCR controls and steps through infosnaps one or many frames at a time, the section to the right of that gives random access to a particular infosnap number and also include a refresh-rate (in seconds) for the play button. The section on the right is used for control buttons such printing or closing the Virtual Van window.

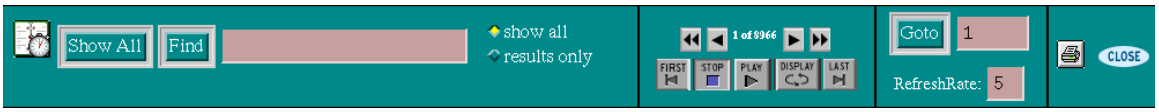

Figure 8: Virtual Control Van Control Panel

Figure 9: To search for a particular date, you can either type-in the date in yyyy/mm/dd format and do a text search, or you can click on the Calendar icon on the control panel which will display an interactive calendar with dates highlighted where data is present (figure on right).

There are two primary ways to do keyword text searching within the Virtual Van. The first method is to **show all** the events surrounding the keyword you are searching for (refer to figure 10). This can be quite useful since the data is collected in a time-series fashion and thus shows all the events that occurred in the same area to the event that you are interested-in. If you press **Find** again, it will find the next occurrence.

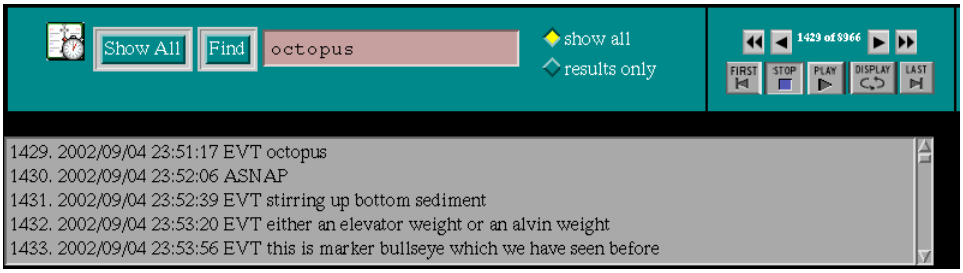

Figure 10: Text search with 'Show All' selected

The second method is to show the **results only** (refer to figure 11). Note: you must press the **results only** diamond before you type in the text field. This method is similar to an Internet search where only the matching text is shown in the event list. The matching events may span different geographic areas and could occur over a varied time frame. This type of search can be quite useful since you see all the matching events at once. Note that the VCR type controls can be used to step through the matching events. To go back and step through all the events, click on the **Show All** button.

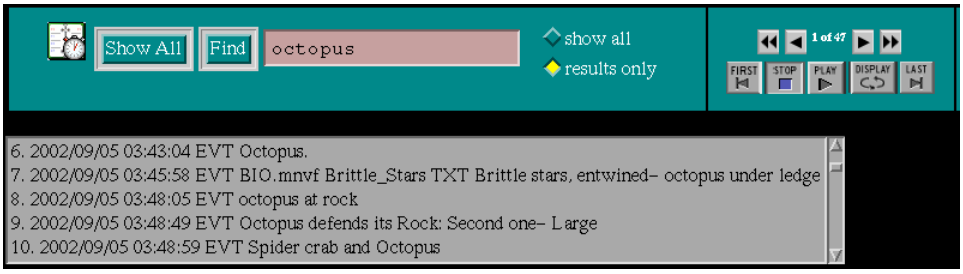

Figure 11: Text search with 'Results Only' selected

Independent of which keyword text searching is used, the event list can be scrolled up and down and individual events can be selected by simply **clicking on an event**. Additionally, as you navigate through the infosnaps with the VCR-type buttons, you can preview the infosnap for any event in the event list by clicking on the event.

Finally, highlight image snapshots of the cruise (either jpg or gif) can be added to the website by manually copying files to the appropriate cruise directory under /webdata/virtualvan/html/VV-*cruiseID*/Snapshots. The image_list file in that directory needs to be updated and contains a one-line entry for each image filename in the order that you want the snapshots to appear.

6 Web-based Event Logger

The Event Logger program is a web-browser application that allows scientists to enter either pre-defined categories/observations or free-form text as descriptions of events that occur in real-time during vehicle operations. Note that using pre-defined terms that use a common terminology greatly simplifies scientific access to the Virtual Van data during post-cruise analysis. When the **LogEvent** button is pressed, the text describing the event is transmitted to the DAQ program that then creates an infosnap of the information within the control van including four video source frame grabs, vehicle data, and the event data itself; all of which are time-stamped and logged to an ASCII formatted electronic index card (EIC). As a precautionary safety measure, the raw events are also time-stamped and logged to an auxiliary raw file. To use the EventLogger: select a category, click on one or more observations, and press **LogEvent**. To enter free-form text, simply type an event in the **Event textfield** and press carriage-return or click on the **LogEvent** button. To identify a particular target, enter the target identification (eg; 1, 1A, etc.) and press **LogEvent**. Figure 12 shows a screen snapshot of the Event Logger.

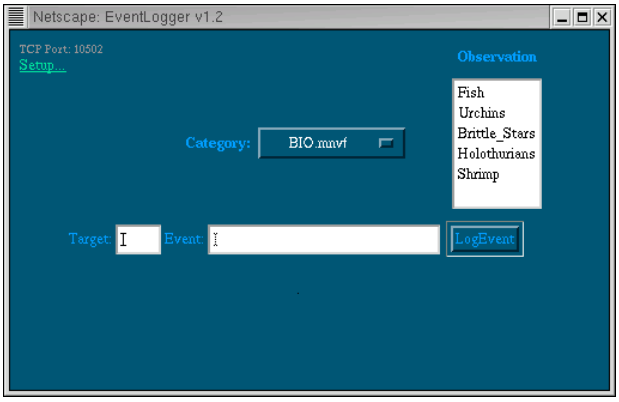

Figure 12: Web-based Event Logger. Simply select a category and one or more observations and press the **LogEvent** button. For free-form text, enter the event and press carriage-return or click on the **LogEvent** button.

The event logger's categories and observation lists are user configurable by clicking on the **Setup link**. Figure 13 shows an example of the Event Logger Setup screen. To make changes to an existing observation list; click on the list, edit it, and press **Update**. To add a new observation list, you need to edit the master category list.

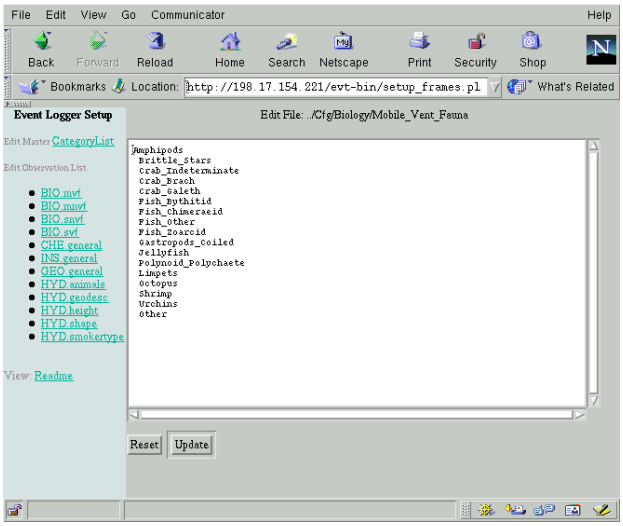

Figure 13: Event Logger setup screen for configuring new categories and observations

7 GeoBrowser – exporting data

The GeoBrowser system serves the data to the Virtual Van system. It can also interface to other external applications to allow searching and exporting of data. Refer to the WHOI GeoBrowser technical report (Woods Hole Oceanographic Institution Technical Report, WHOI-2001-13) and on-line documentation for more information. Below is an example of a Unix command to retrieve and export fields from a particular cruise to an ASCII comma separated file.

```
wget -O test_export.out http://198.17.154.221/geo-
bin/GB_cmd?collections=WHOI/Cruises/tn151&user_id=DAQ-DISP_9999&\
               cmd=Export_Cards&\
               Export_What=Collections&fmt=ASCII&delim=Comma&\
               ExportFields-USER_SELECT&\
               EXPORT__DAQ.type=on&\
               EXPORT__EIC.time=on&\
               EXPORT__EIC.lat=on&\
               EXPORT__EIC.lon=on&\
               EXPORT__DAQ.g=on&\
               EXPORT__DAQ.p=on&\
               EXPORT__DAQ.r=on&\
               EXPORT__DAQ.a=on&\
               EXPORT__EIC.depth=on&\
               EXPORT__DAQ.etype=on&\
               EXPORT__DAQ.evt=on&
```

Note: If you want to use the GeoBrowser directly, you'll need to update the master index to include the new cruise directory.

1. su - geobrowser
2. cd ~geobrowser/Collections/Clists
3. Edit WHOI and add entry
   NewCruiseName; WHOI/Cruises/NewCruiseDir
4. Verify in GeoBrowser that NewCruise collection is visible. Click on 'Select...' and then 'Build Selection List'. Select WHOI and the NewCruise should be visible. If not, check for typos. Click on new cruise and then click on Add.

8 Software Overview

The Virtual Van data acquisition system consists of three independent components: the Virtual Van, the data acquisition system (DAQ), and the GeoBrowser system. Each of these systems have their own directory structure. Below is a brief description of each of these components. The Virtual Van/DAQ system runs on Linux Redhat 6.x and Redhat 7.2.

Virtual Van: This is the account that you log into and run everything from. The virtual van software is located in /webdata/virtualvan and requires that the apache web-server is configured appropriately. The cgi scripts and html code is located in this directory tree.

DAQ: The data acquisition software currently resides under /home/stevel/Daq-tools/DataAq. All the data collected is saved to /webdata/DAQ/CruiseID.

GeoBrowser: The GeoBrowser system is the main server for the Virtual Van system. The software resides in /home/geobrowser and requires that the apache web-server is configured appropriately.

8.1 Apache Web-server Configuration

The apache web-server configuration file is /etc/httpd/conf/httpd.conf and contains customizations for the virtual van, DAQ, event logger, and GeoBrowser system.

Virtual Van:
```
Alias /virtualvan /webdata/virtualvan/html
Alias /virtualvan/vvconfig /webdata/virtualvan/html/Config/vv_config.html
ScriptAlias /vv-bin /webdata/virtualvan/cgi-bin
<Directory /webdata /virtualvan>
   AuthType Basic
   AuthName vv-admin
   AuthUserFile /webdata/virtualvan/vv_htpasswd
   AllowOverride Limit AuthConfig
</Directory>
```

DAQ:
```
Alias /webdata /webdata
Alias /DAQ /webdata/DAQ
ScriptAlias /daq-bin /home/stevel/Daq-tools/DataAq/cgi-bin
Alias /daq-html /home/stevel/Daq-tools/DataAq/html
<Directory /webdata/DAQ>
   Options FollowSymLinks
</Directory>
```

Event Logger:
```
Alias /eventlogger /home/stevel/Daq-tools/EvtLogger/html
ScriptAlias /evt-bin /home/stevel/Daq-tools/EvtLogger/cgi-bin
```

GeoBrowser:
```
Alias /GeoBrowser /home/geobrowser/4DGeo/GeoBrowser/html
ScriptAlias /geo-bin /home/geobrowser/4DGeo/GeoBrowser/cgi-bin
<Directory /home/geobrowser/4DGeo>
   Options FollowSymLinks
</Directory>
```

8.2 Axis Video Server Configuration

The axis video servers are configured identically except for their ip addresses. The username is root for the administration web pages (refer to the At-Sea User Account/Password Summary for the password). Image settings are no time-on image, color, low compression, 0 x/y offsets. Input modulation is set to NTSC.

8.3 DSL TCP/IP Router Configuration

For new cruise operations, the only configuration parameter that should need to be changed is the Internet WAN settings to interface with the ship's network. Below is a sample configuration. Note: a new SMC Barricade router is pre-configured with the LAN IP address of 192.168.2.1 and needs to be set to the control-van address of 198.17.154.1. This is a bit tricky since you have to temporarily set the IP address on the computer to the SMC network 192.168.2.x. Then, using a web-server go to 192.168.2.1 and change the LAN IP address to 198.17.154.1. As soon as you change the LAN IP address, however, you will lose connectivity and will have to reset the IP address of the computer back to the control-van network. All the other router settings can now be configured with a web-browser at 198.17.154.1. This procedure only needs to be done once for a brand-new router (or if the reset button has been pressed).

```
SMC Model# 7008ABR Broadband Router    Serial# A216027267

Setup LAN
IP Address: 198.17.154.1
Subnet Mask: 255.255.255.0
DHCP Server: Disabled

WAN Fixed IP: 199.92.161.1     NOTE: This WAN address info is for a registered IP address
Subnet Mask: 255.255.255.0           for the Atlantis it should NOT be used
GatewayIP: 199.92.161.21             on other ships. Get valid network info from the
DNS: 199.92.161.2                    shipboard LAN administrator
Secondary DNS:

Firewall: Enabled
Timezone: GMT

Virtual Servers:
Private IP     Private Port   Type  Public Port
198.17.154.221      80        TCP        80
198.17.154.209      80        TCP        8001
```

```
198.17.154.210      80        TCP        8002
198.17.154.223      80        TCP        8003
198.17.154.222      80        TCP        8004
198.17.154.222      22        TCP        22
198.17.154.205      22        TCP        2201
198.17.154.223      1720      TCP        1720
198.17.154.223      22232     TCP        22232
198.17.154.222      20        TCP        20
198.17.154.222      21        TCP        21

Special Application
Trigger Port     Trigger Type      Public Port    Public Type     Enabled
1720               tcp              5555-5560,     TCP             checked
                                    2326-2365
1720               tcp              5555-5560,     UDP             not-checked
                                    2326-2365

Misc
Administrator time-out 10 minutes
Discard PING from WAN side (not enabled)
Remote Mangement  0.0.0.0  (not enabled)
IP Address of Virtual DMZ Host 198.17.154.223
Use non-standard FTP port [blank]

Verify settings by pressing Status. When done configuring the SMC router, be sure to Logout.
```

8.4 Example DAQ Configuration File

```
#
# Data Acquisition Config File
#
EIC.df: DAQ.tn151
CruiseName: Hawaii 2002
CruiseID:   tn151
ChiefSci:   Fred Dunnebeir, Mike Garcia
Ship:       R/V Tompson
Vehicle:    Jason
Src1: SubSea1
Src2: SubSea2
Src3: SubSea3
Src4: DeckCam

Snap_Src:  1,2,3,4
ASnap_Enable: 1
ASnap_Rate: 120
ASnap_Mimg_nd: 0,0
ASnap_Criteria_Enable: 1
ASnap_Criteria_MaxAlt: 29
ASnap_Criteria_MinDepth: 100
ESnap_Mimg_nd: 0,1

MGen_Types: CRUISE,DAILY,HOURLY

DataDir:    /webdata/DAQ
MaxImgsPerDir: 1000
MaxEICPerFile: 2000
NavTimeout: 100
AttTimeout: 100
EvtTimeout: 600
CtdTimeout: 100
MagTimeout: 100
AcceptNavSrc: JAS|ARGO|AMS|FISH|RLY

AxisServer: Axis2400
Axis240_Addr: 198.17.154.222
Axis240_Res: full
Axis2400_Addr: 198.17.154.209
Axis2400_Res: full

GeoBrowserEnable: 0
GeoBrowserHost: dunkle.whoi.edu
GeoCollection: WHOI/Cruises/tn151
GeoPfile: DAQ_XY
GeoUID: DAQ-DISP_9999
```

9 SeaNet

SeaNet is a communication system that connects the *Jason* II system and Control Van with the Internet and also provides voice communications. The new *Jason* II SeaNet system allows Jason II to travel with its own communications equipment thus providing SeaNet capabilities for *Jason* II when deployed on ships not equipped with SeaNet. During at-sea operations, investigators have their choice as to what SeaNet Internet services they are interested in using: Interactive Web Access, Batch File Transfer, Email, Web mirroring, and Video Conferencing. In addition to the Internet services, we also provide voice communications either through the F77 system or through an Iridium satellite phone. The Iridium unit also provides shore to ship computer communications for remote diagnostics.

The SeaNet system has been used with *Jason* on several cruises. Depending on the expeditions, SeaNet has been used to transfer real-time data to collaborating scientists, to download weather reports and datasheets from the Internet, educational curriculums such as Dive and Discover, and for everyday email. During the *Jason II* sea-trials, the Virtual Van system was connected with the SeaNet system and regularly transmitted real-time updates. During times of bad weather, real-time weather reports were downloaded to assist in cruise planning.

9.1 Internet Services via Fleet77

The SeaNet data communication system for *Jason II* is a second-generation laptop-based system. The SeaNet software has been integrated with the new Inmarsat Thrane&Thrane Fleet77 system consisting of a transceiver and an antenna together with a handset and cradle (figure on right). The tracking antenna is 85 cm high, has a diameter of just 84 cm and weighs 25 kg/55 lbs. The terminal is an integrated communication center providing phone, MPDS (mobile packet data service), and high-speed data (64kbps) links. SeaNet uses the high-speed data link to send images, video, and data back to shore. The MPDS system allows *Jason II* to stay connected longer to the Internet and be only charged for the bytes transferred.

Figure 14: F77 Satellite System

As mentioned earlier, investigators have their choice as to what SeaNet Internet services they are interested in using: Interactive Web Access, Batch File Transfer, Email, Web mirroring, and Video Conferencing.

To use the SeaNet system, log into the jas-scn laptop computer with the username seanet (refer to the At-Sea User Account/Password Summary for the password). After you login, you will see the SeaNet Netscape interface. Refer to the SeaNet training documentation for operational use including setting up interactive users, email users, and *DataPipes* for batch file transfer and web-mirroring applications. For video conferencing, refer to the SeaNet application note on Video Conferencing. For the MPDS service, refer to the *Jason II* SeaNet documentation. The F77 unit can also be used for voice communications. Simply detach the handset, enter the PIN code and then the phone number followed by # (e.g., 0115084572000#). To hang-up, press the on/off-hook button on the handset.

9.2 Iridium Phone System

As part of the SeaNet system for *Jason II*, we have also installed an Iridium satellite phone system in the *Jason II* control van. This system provides reasonably inexpensive phone communications and a mechanism for shore-based personnel to dial into computers at-sea for remote diagnostic purposes. Instructions to use the Iridium phone follow:

Power-Up: Turn on the power strip; press and hold the power button on the handset until lights appear.
To dial-out on the phone:

1) Select username *Jason*ControlVan by toggling the Up/Down arrow and pressing OK. Enter the password (refer to the At-Sea User Account/Password Summary)
2) If asked for a PIN code, enter PIN (refer to the At-Sea User Account/Password Summary)

3) Take the phone off-hook and dial-out:
   Dial 00 <country code> <area code> and phone number followed by '#'.
   For example: 00150824572000# to dial WHOI.
   At the end of the call, simply return the handset to hang-up.
4) To Lock the phone, press the bottom three keys: Shift, Key, OK.

Power-Down: Press and hold the power button on the handset until all lights appear and turn off. Then turn-off the power strip.

Note: The Eurocom Iridium handset cannot be used as a speakerphone even though the handset has a built-in speaker. However, a separate speakerphone may be connected to the Eurocom's base unit to provide this capability.

10 Shore-based Web-server and Video Facility

A shore-based web-server and video facility has been setup in the Deep Submergence Laboratory at the Woods Hole Oceanographic Institution to support operations at-sea and for post-cruise analysis. The shore-based Virtual Van server provides access to current and prior cruises for collaborating scientists and for educational and public outreach. The video system allows us to replay any video data collected during a *Jason II* cruise and provides the tools for real-time video streaming for scientific and educational opportunities.

11 Acronyms

DAQ - Data Acquisition system for the Virtual Control Van
DSL - Deep Submergence Laboratory, Woods Hole Oceanographic Institution
EIC - Electronic Index Card
ISDN - Integrated Service Data Network (64kbs)
MPDS - Mobile Packet Data Service
ROV - Remotely Operated Vehicle
TCP/IP - Transmission Control Protocol/Internet Protocol
UDP - User Datagram Protocol
UPS - Uninterruptible Power Supply
WHOI - Woods Hole Oceanographic Institution
VV - Virtual Van
4DGeo - 4GeoBrowser System

12 At-Sea User Account/Password Summary

seadata1:	username: virtualvan	passwd:	
	username: geobrowser	passwd:	
	username: root	passwd:	
seadata2:	username: virtualvan	passwd:	
	username: geobrowser	passwd:	
	username: root	passwd:	
axis servers:	username: root	passwd:	(webform)
VirtualVan Setup:	username: vv-admin	passwd:	(webform)
GeoBrowser:	username: DAQ-DISP	pin:	(webform)
jas-scn:	username: seanet	passwd:	
	username: root	passwd:	
Iridium Phone:		pin:	
	User: *Jason*ControlVan	passwd:	

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16. Abstract (Limit: 200 words)

Scientific underwater remotely operated vehicles (ROVs) collect data from multiple video cameras and scientific instruments. This integrated information is often only available in an ROV control-van during operations. Although all the data is logged, it is difficult for scientists to re-create a combined display of this data and have the ability to review and access an entire cruise dataset easily. We introduce a methodology of taking continuous real-time information snapshots (infosnaps) during interesting events and at regular time intervals for complete data coverage. These infosnaps capture four simultaneous video sources, vehicle data, instrument data, and event data as entered by scientists. The infosnaps are automatically cataloged and immediately accessible and searchable via a web-browser. We developed, built, and deployed the Jason II Virtual Control Van system on seven Jason cruises. The system has captured over 50,000 control-van infosnaps, containing more than 200,000 images co-registered with vehicle telemetry and scientific instrument data. The Virtual Control Van is designed for both scientific collaboration and public/educational outreach. It has been integrated with the SeaNet system to provide remote on-shore access. The report describes the Jason II Virtual Control Van system and includes instructions for setting up the system in the field.

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