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CATLAC - Calibration and Validation Analysis Tool of Local Area Coverage for the SeaWiFS Mission

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1.0 INTRODUCTION

CATLAC (Calibration and validation Analysis Tool of Local Area Coverage) is a graphical interactive software package designed to assist individuals in selecting Local Area Coverage (LAC) targets to be viewed and recorded by the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) on the SeaStar satellite. Two different types of SeaWiFS data are recorded: LAC, or full 1 km resolution data used only for selected activities, primarily calibration and validation, and Global Area Coverage (GAC) data, which is merely LAC subsampled 4 pixels along- and across-track, and is used for global observations of ocean color. Calibration and validation activities for SeaWiFS include: lunar observations, solar irradiance reflectance observations of a diffuser plate, inter-gain calibrations, a check of the optical detectors, ship and buoy targets, and viewing of regions of interest at high resolution. Due to a limited on-board data storage capability (a total of 119.21 MB of storage is available), wise use of the LAC recorder space is crucial for mission success.

CATLAC allows researchers to graphically select and view LAC targets to be incorporated in the uplinked command schedule and subsequently stored on the onboard data recorder. The package is written almost entirely in the Interactive Data Language (IDL), the only exception is a spawned process to the scheduler which resides as a Fortran executable. Although it is written specifically for the SeaWiFS mission, the package can be adapted to other Earth-viewing missions. For a quick look at CATLAC refer to the example session listed in Section 9.0.

CATLAC provides the following basic functions:

- Determination and graphical display of LAC targets and calibration activities
- Creation of a "lac.dat" file which specifies targets and calibration frequencies
- Generation of a command schedule
- Display of the onboard recorder history derived from the commands

CATLAC functions allow an individual to create and display daily LAC targets on a global map, to specify calibration frequencies, and to verify the storage of the selected LAC targets. LAC targets are read by the scheduler each day and go into effect near local midnight for the Wallops Flight Facility (WFF) downlink site. The satellite pass corresponding to this time contains the first downlink of each schedule day (0-24 GMT). The timing of this procedure assures that no conflicts occur with active recording when changing the LAC target selections.

The Graphical User Interface (GUI) for CATLAC is shown in Figure 1. The display section, consisting of a graphics window, appears in the upper portion of the interface and the query section, consisting of button and text controls, appears in the lower portion. Actions are initiated by mouse clicks either in the display section or on a button in the query section. Text may also be entered in any of the text fields on the interface.

CATLAC interacts with a user-specified LAC recording file (referred to generically as "lac.dat") and a command schedule file (which is created by spawning the scheduler). The scheduler in turn requires orbit position files, tilt change (time when the sensor tilt changes from aft to fore)

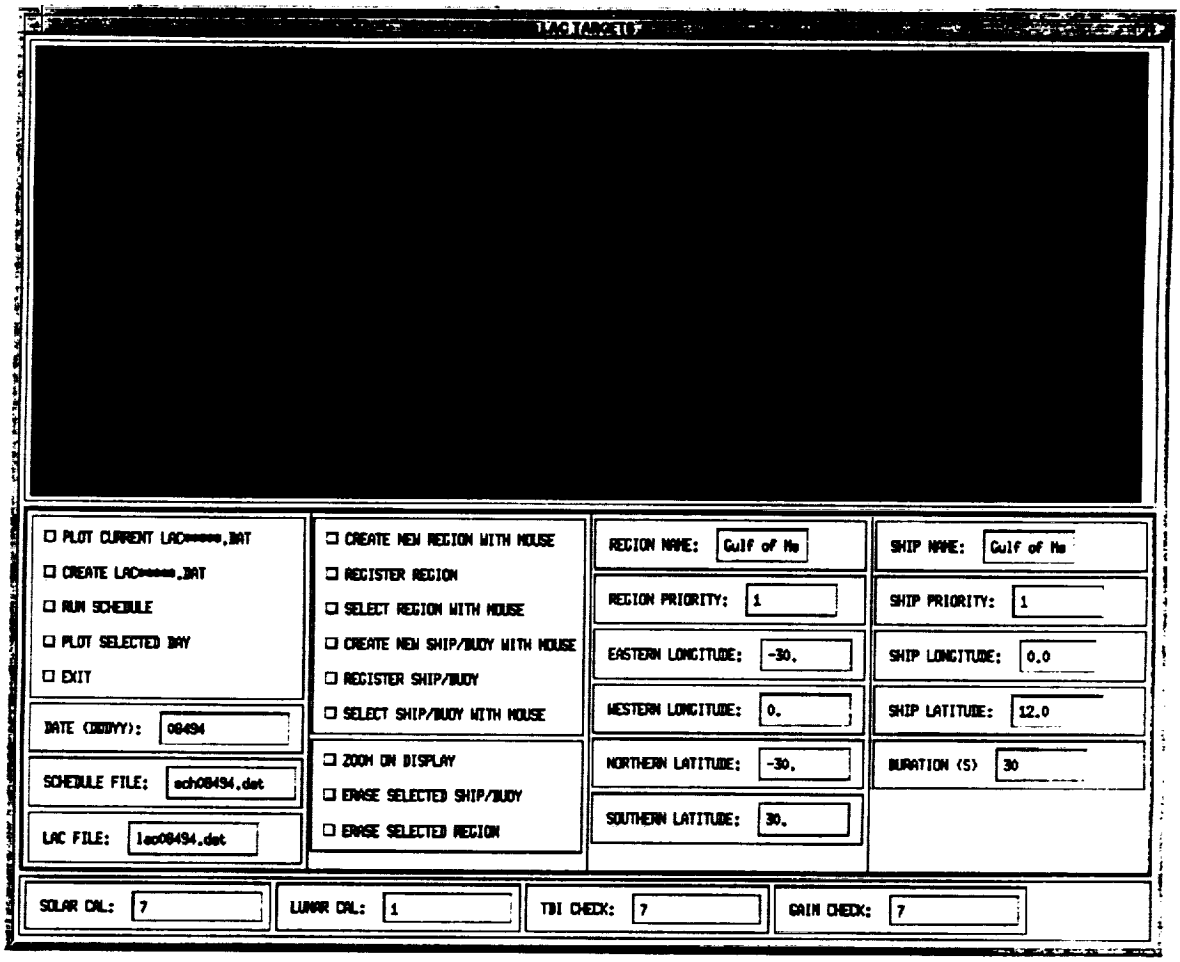

Figure 1. Graphical interface for CATLAC. Actions can be applied through the text and button controls in the lower portion of the interface. Displays appear in the upper portion.

files, and WFF downlink orbit files provided by SeaWiFS Mission Operations (MO). These files, which are tagged with a date field, will automatically be read by entering the date when invoking the scheduler. LAC recording periods from the schedule can then be displayed in CATLAC for verification.

The "lac.dat" file created by CATLAC is the primary form of communication for command scheduling from the Calibration/Validation (Cal/Val) element, which is responsible for selecting the targets, to MO, which is responsible for inserting the LAC targets into the command schedule. MO has adopted the following convention for all filenames: XXXDDDYY.dat where XXX is the file type specification, DDD is the day of year, and YY is the last two digits of year. For example, a "lac.dat" file actually has date information inserted in its name: "lac08094.dat" for day 80 (March 21) of 1994. This file may be used by CATLAC to display an initial set of targets or retrieve a previously saved set of targets. An example "lac.dat" is shown in Table 1. The file consists of three sections specifying recording information for ships or buoys, regions, and calibration activities. For the rest of this document buoys are referred to as ships since CATLAC processes ships and buoys in an identical manner. Ship information appears following the heading "In-situ" and includes ship and names with corresponding coordinates (longitude and latitude), priorities, and recording durations in seconds. Priorities are used to preferentially select targets to be recorded for each downlink period on the basis of ascending order (while recorder space is available a target of priority 1 is guaranteed space over a target of priority 2). The region section follows and includes region names, western longitudes, eastern longitudes, southern latitudes, northern latitudes, and priorities. The region coordinates define a rectangular area in equi-rectangular coordinates. Region priorities are used the same as in ship targets. Weekly calibration frequencies are specified next under "Solar Calibration", "Lunar Calibration", "Intergain Calibration", and "TDI Check". TDI stands for Time-Delay and Integration, and actually refers to a check of the individual optical detectors on the sensor.

2.0 CREATING THE INITIAL DISPLAY

To initiate a CATLAC session enter the "catlac" directory and type "idl". At the IDL command line type "catlac" and the interface will appear. A valid "lac.dat" file is required to use the full capabilities of CATLAC. A default "lac.dat" file without any specified targets can be created by the following actions (all CATLAC directions are listed within lines of asterisks):

****
* Click on "LAC FILE:" text box
* Delete existing filename and enter desired filename
* Hit ENTER/RETURN
* Click on "CREATE LAC*****.DAT"
****

(IMPORTANT: After entering text in a text box, the user must always hit the ENTER/RETURN key to ensure that the package reads the new information). All the plotting functions in CATLAC require a map projection in the display window. To plot a map with overlaying LAC targets from an existing (previously created) "lac.dat" file:

Table 1. An example of a "lac.dat" file listing 11 ships and 4 regions for day 80 in 1994. Ship targets follow the In-situ heading and include ship name, longitude, latitude, priority, and recording duration (seconds). Region specifications are next and include western longitude, eastern longitude, southern latitude, northern latitude, and priority. Calibration specifications follow indicating the weekly frequencies for solar calibration, lunar calibration, interchannel gain check, and Time Delay Integration (TDI).

```
Calibration Targets
1994   80
In-situ
 11
 Clark's Buoy                -156.3400    18.6700    1    30
 Bermuda Buoy                 -71.9000    32.1200    6    30
 JGOFS                         63.2500    19.4000    3    30
 NOAA S. Atlantic Bight       -77.5200    32.0300    4    30
 NOAA Gulf of Cal.           -107.2600    22.1100    5    30
 S.Africa                      10.2300   -32.8700    6    30
 Galapagos                    -92.6200    -3.2500    8    30
 Gulf of Mexico               -86.8600    24.7900    3    30
 Oregon St.                  -131.1400    45.7700    4    30
 Navy Bering Sea             -175.5800    63.4200   10    30
 Pacific                      175.0000     1.0000   11    30
Regions
 4
 Sargasso Sea                 -70.0000   -45.0000   20.0000   30.0000   2
 Gulf of Mexico              -110.0000   -80.0000   17.0000   31.0000   1
 Galapagos                   -105.0000   -75.0000  -15.0000    0.0000   3
 Micronesia                   135.0000   180.0000    0.0000   15.0000   4
Solar Calibration
  7
Lunar Calibration
  1
Intergain Calibration
  7
TDI Check
  7
```

****
* Click on "LAC FILE:" text box
* Delete existing filename and enter a valid filename
* Hit ENTER/RETURN
* Click on "PLOT CURRENT LAC*****.DAT"
****

LAC targets and the Goddard Space Flight Center (GSFC) visibility mask are plotted on a world map background using an equi-rectangular projection (Figure 2). The GSFC visibility mask is shown because a real-time data acquisition station is located there, and the schedule prohibits the recording of LAC targets within this region. Additional data acquisition sites may be specified at a later date by Cal/Val in a Mission Operations Change Request (MOCR) document. The sites will then be entered in a parameter file that is read by CATLAC and the scheduler. Ships are plotted as red or yellow plus signs (+) and regions are plotted as red, yellow, or white rectangles. The color scheme is used to differentiate currently selected targets (plotted red) from other targets (plotted yellow or white). With the exception of default regions, selected targets are "active" and can be modified or deleted. Coordinates and related information for the selected targets are displayed in the query section of the interface (in the columns starting with "REGION NAME:" and "SHIP NAME:"). Default regions (plotted white) can be selected, but CATLAC does not permit modifications to default attributes.

3.0 CREATING AND DISPLAYING LAC TARGETS

Two modes are available for creating LAC targets: targets can be graphically positioned on the display by using the mouse or the target coordinates can be typed into the appropriate boxes of the query section and displayed. Both methods can be used in conjunction with each other.

3.1 Ship Targets

The exact coordinates of ship targets can be specified and written to a "lac.dat" file by CATLAC. The schedule uses this information to turn on and off the LAC recorder in order to center the ship target during the recording period (i.e. the recorder is turned on one-half the specified recording duration before the ship target is viewed and turned off one-half the specified recording duration after the ship target is viewed). The scan line with a pixel closest to the target is always chosen as the central scan for the recording. Only whole seconds are considered since spacecraft commands can at best be updated at one second intervals. The following actions can be taken to graphically create and display ship targets:

****
* Click with left button on "CREATE NEW SHIP WITH MOUSE"
* Move the cursor to the desired position on the display and click on left button
****

A blue plus sign will appear on the display and the ship coordinates will appear in the appropriate boxes in the query section. The user will most likely want to change the ship name and priority. This information can be edited by changing the text in the appropriate box of the query section:

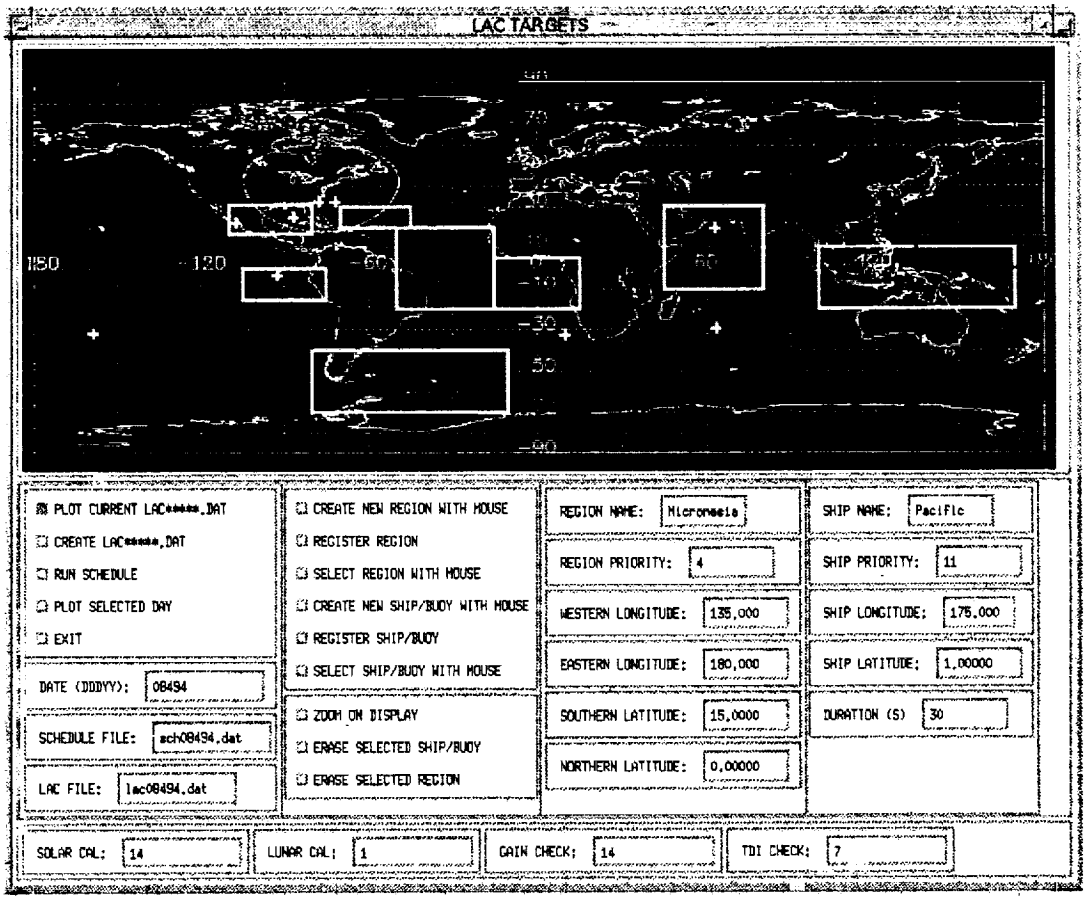

Figure 2. CATLAC showing user-defined ship and region targets. Ships appear as plus signs (+) and regions as rectangles. Red indicates currently selected targets, yellow indicates previously created targets, and white indicates default regions.

****
* Click with left button on "SHIP/BUOY NAME:" text box
* Delete existing text and type in new text
* Hit ENTER/RETURN key
****

Since locating a ship target via a mouse is imprecise, the user may also want to select the target precisely using the text input:

****
* Click with left button on "SHIP LONGITUDE:" text box
* Delete existing ship longitude and enter new longitude
* Hit ENTER/RETURN key (this will cause the ship to disappear from the display, the ship will reappear when it is registered)
* Click with left button on "SHIP LATITUDE:" text box
* Delete existing ship latitude and enter new latitude
* Hit ENTER/RETURN key
****

At this point the ship target can be registered, which means the ship attributes listed on the screen will be stored internally and can be subsequently written to a "lac.dat" file:

****
* Click with left button on "REGISTER SHIP/BUOY:"
****

The ship will now appear at its current coordinates as a red plus sign. Any other red plus sign will revert to yellow indicating a switch in the selected target.

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3.2 Region Targets

Region coordinates can be specified and written to a "lac.dat" file in a manner similar to specifying ship targets. Regions are always defined as rectangular areas in equi-rectangular coordinates. While LAC recorder space is available, the scheduler records LAC scans whenever the coordinates of the central pixel of a scan are within the perimeter of a region. As in ship targets, the recorder times for regions are registered at whole second intervals.

Region targets can be created by doing the following:

****
* Click with left button on "CREATE NEW REGION WITH MOUSE"
* A box will appear near the center of the display
* Move the box by holding left button and dragging
* Re-size the box by holding middle button and dragging
* Finalize position of region by clicking on right button
****

A blue rectangle will now appear on the display and the region coordinates will be listed in the appropriate boxes in the query section. The user can now edit the region name and priority:

****
* Click with left button on "REGION NAME:" text box
* Delete existing text and type in new text
* Hit ENTER/RETURN key
* Click on "REGION PRIORITY:" text box
* Delete existing text and type in new text
* Hit ENTER/RETURN key
****

Precise region coordinates can be specified by:

```
************************************
 * Click with left button on "WESTERN
   LONGITUDE:" text box
 * Delete existing western longitude and
   enter new longitude
 * Hit ENTER/RETURN key (this will
   cause the current region to disappear
   from the display, the region will
   reappear when it is registered)
   (this procedure can be repeated for the
    remaining coordinates)
    .        .        .        .
************************************
```

At this point the region target can be registered:

```
************************************
 * Click with left button on "REGISTER
   REGION"
************************************
```

The region will now be displayed as a red rectangle and the attributes will be saved internally. Any other red region will turn yellow (unless this region is a default region in which case it will turn white).

4.0 MODIFYING LAC TARGETS

Existing LAC targets (or those targets currently being displayed) can be modified or deleted. Changes can only be applied to selected targets (i.e. those colored red in the display with attributes shown in the query section). At any particular time, only one ship and one region can be selected.

4.1 Modifying Ship Targets

To select or activate a ship target:

```
************************************
 * Click with left button on "SELECT
   SHIP/BUOY WITH MOUSE"
 * A small box will appear near the center
   of the screen
 * Click on left button and drag box over
   the desired ship
 * Click on right button to select
************************************
```

Attributes of the selected ship will now be listed in the query section. Modifications to the ship attributes can now be applied as described in Section 3.1 or ships can be deleted by the following action:

```
************************************
 * Click with left button on "ERASE
   SELECTED SHIP/BUOY"
************************************
```

This will cause the ship to disappear from the display. The next ship in the internal list, if any, will become the selected ship and will be plotted as red with attributes listed in the query section.

4.2 Modifying Region Targets

CATLAC permits modifications only to non-default regions. Default regions can be selected but only for the purpose of displaying attributes. Default regions are specified a priori by the Project Scientist, and their purpose is merely to ensure that the LAC recorder space is fully used in the event that an insufficient number of targets and calibrations are selected. To select a region target:

****

* Click with left button on "SELECT REGION WITH MOUSE"
* Move cursor to any position inside of a region
* Click on right button to select
  (Note: for overlapping regions the cursor may not be inside more than one region at a time - otherwise no selection will occur)

****

Attributes of the selected region will now be listed in the query section. Modifications to non-default region attributes can now be invoked as described in Section 3.2 or non-default regions can be deleted by the following:

****

* Click on "ERASE SELECTED REGION"

****

This action will cause the selected region to disappear from the display. The next stored region, if any, will then be plotted as a red rectangle with attributes listed in the query section.

5.0 SPECIFYING CALIBRATION FREQUENCIES

When budgeting LAC recorder space it is important to specify calibration events since these activities compete directly with LAC targets for space. The weekly frequency of solar calibration, lunar calibration, TDI checks, and interchannel gain checks can be specified by entering a value in the appropriate box:

****

* Click with left button on "SOLAR CAL:" text box
* Delete existing text and entered desired frequency
* Hit ENTER/RETURN
  (Repeat for "LUNAR CAL:", "TDI CHECK:", and "GAIN CHECK:")

****

The command schedule program will only accept the following calibration frequencies:

solar calibration : 0, 1, 7, or **14** /week
(i.e., 0, once/week, once/day, twice/day)
lunar calibration : 0, **1**, or 2 /week
TDI check : 0, 1, 7, or **14** /week
interchannel gain check : 0, 1, 7, or **14** /week

The defaults for these frequencies are shown in bold. Any deviation from these defaults must be specified in a MOCR. If a frequency other than a default is specified, a warning box will be displayed on the screen notifying the user to draft a MOCR.

Pre-specified procedures and durations for these calibration activities have been defined by MO and Cal/Val (Woodward et al. 1993). These command procedures will automatically be included in the schedule and cannot be changed by CATLAC. The duration in seconds for each calibration event is as follows:

solar calibration:	116 s
lunar calibration:	120 s
TDI check:	82 s
interchannel gain check:	88 s

6.0 CREATING A "lac.dat" FILE

After LAC targets have been created or modified and calibration frequencies have been selected, the information can be saved by the following steps:

```
**************************************
 * Click with left button on "LAC FILE:"
   text box
 * Delete existing filename and enter new
   name
 * Hit ENTER/RETURN
 * Click on "CREATE LAC*****.DAT"
**************************************
```

This will result in the creation of a "lac.dat" file which can be read directly by the MO command scheduler. This program is included as an executable with the package. The scheduler integrates the information from the "lac.dat" file within the command sequences and assigns LAC record times.

7.0 RUNNING THE SCHEDULER

Prior to running the scheduler, a "date.dat" file can optionally be created by using the following Unix command: "date>date.dat". The scheduler checks for the existence of the date file and if it is current (containing current date); otherwise the scheduler will prompt the user for the starting date. The scheduler will then create a schedule at a pre-determined number of days (usually two days) following the specified start date. The scheduling offset is performed in order to accommodate the timing requirements needed in uplinking a command schedule to the spacecraft. The date offset parameter is not accessible to CATLAC. The scheduler requires orbit position files, tilt change files, and WFF downlink files provided by MO. The proper files will automatically be read by specifying the current date in a "date.dat" file or by entering the date at the appropriate prompt.

A command schedule can be created at any time from any existing "lac.dat" file:

```
**************************************
 * Click on "RUN SCHEDULE"
**************************************
```

This will initiate a command scheduling run identical to those run by MO. At this point the user will be prompted for the scheduling information in the window that was used to start the IDL session. If "date.dat" does not exist the following two prompts will be printed:

```
date.dat NOT CURRENT, INVALID, OR MISSING
EXIT PROGRAM AND TYPE "date > date.dat"
OR CONTINUE AND ENTER DATE FROM
   COMMAND LINE
Enter year

**************************************
 * Enter year (4 digits)
**************************************

Enter day of year
RUN WILL START 2 DAYS FROM THIS DATE

**************************************
 * Enter day of year
**************************************
```

The user will then be prompted for the length of the run:

```
Enter number of days to process

**************************************
 * Enter number of days
**************************************
```

The recording totals in the schedule are initialized to the saved values from the conclusion of the previous run. The scheduler then reads a new "lac.dat" for each day and initiates all target information at the midnight downlink. Therefore, it is advisable to run the schedule for only one or two days if only one "lac.dat" file was created. A scheduler run for one day may take several minutes depending on system load and the number of LAC targets that were selected. It is possible to create an entire week of "lac.dat" files, one at a time, and run the scheduler for this entire period. If the calibration frequencies specified in the "lac.dat" file differ from the default values, the scheduler will suspend processing and print a warning message to the screen. To continue processing, hit the ENTER/RETURN key.

8.0 VERIFYING THE SCHEDULE

To verify LAC target acquisitions and calibrations, record times can be graphically displayed for a selected day. In effect the display shows the portion of the Earth being viewed by the sensor during target recording or the position of the satellite during calibration recording. To plot recording times:

****
* Click with left button on "SCHEDULE FILE:" text box
* Delete existing filename and enter new name
* Hit ENTER/RETURN
* Click on "DATE:" text box
* Delete existing date and enter new date
* Hit ENTER/RETURN
* Click on "PLOT SELECTED DAY"
****

The recording periods for LAC targets and calibrations will now be graphically displayed on the screen along with the orbit tracks in which downlinks occurred (Figure 3). The target recordings appear as white swaths representing sensor scans of the specified targets and the calibration recordings appear as thick orange lines corresponding to the orbit positions during calibrations. The downlink orbit tracks can be used to delineate recording events for each downlink period. The user can now visually inspect the display to verify the recording of targets and calibrations. To assist in the visual inspection the zoom feature can be used:

****
* Click on "ZOOM ON DISPLAY"
* Move the cursor the desired region and click with the left mouse button
****

A new window with a magnified portion of the display will now appear. To destroy this window:

****
* Move the cursor to the original display and click with the right button
****

The above zoom procedure may also prove useful in the selection and modification of targets outlined in Sections 3 and 4. In addition to the graphical display, log files, written by the scheduler, may also be examined for schedule verification. The scheduler automatically writes a "record.log" file (Table 2), which contains all downlink times and recording durations and an "error.log" file which contains a listing of errors during a scheduler run. Table 3 lists the error flags used by the scheduler.

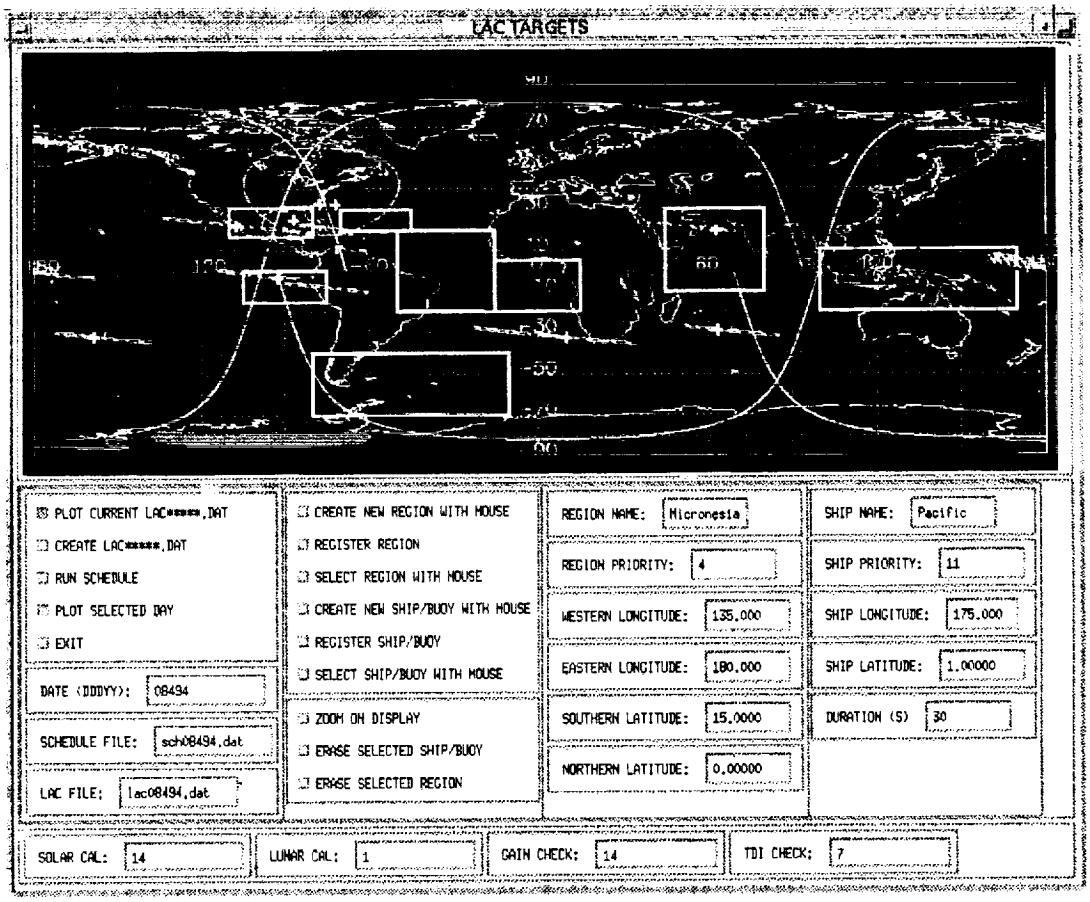

Figure 3. Verification of schedule. SeaWiFS instrument scans, calibration orbit positions, and downlink orbits are plotted to confirm onboard recording. Instrument scans appear as white swaths and indicate the earth positions being viewed by the sensor. Calibrations appear as thick orange lines and denote orbit positions during calibration activities. Downlink orbits are plotted to delineate recording periods.

Table 2. Sample "record.log" file. Downlink times are shown to differentiate recording periods. The LAC recording durations (seconds) and a running total are shown for each recording period. Due to overlaps, recording periods can have several targets combined.

```
*****************************************************
 DOWNLINK FOR DAY   260 AT 17337 SECONDS
       LAC SPACE =   563 SECONDS
  SPACE ALLOCATED =   563 SECONDS
 RECORDED:
  JGOFS                                          :  30   30
  Arabian Sea                                    :  171  201
  JGOFS                                          :  30   231
  Arabian Sea                                    :  197  428
  S.Africa                                       :  30   458
  Sargasso Sea                                   :  105  563

*****************************************************
 DOWNLINK FOR DAY   260 AT 60670 SECONDS
       LAC SPACE =   563 SECONDS
  SPACE ALLOCATED =   563 SECONDS
 RECORDED:
  SE Pacific                                     :  119  119
  NOAA Gulf of Cal.   Gulf of Mexico             :  162  281
  Galapagos                                      :  30   311
  SE Pacific                                     :  72   383
  Oregon St.                                     :  30   413
  NOAA Gulf of Cal.                              :  30   443
  Clark's Buoy                                   :  30   473
  Oregon St.                                     :  30   503
  Clark's Buoy                                   :  30   533
  Pacific                                        :  30   563

*****************************************************
 DOWNLINK FOR DAY   261 AT 14164 SECONDS
       LAC SPACE =   443 SECONDS
  SPACE ALLOCATED =   443 SECONDS
 RECORDED:
  JGOFS                                          :  30   30
  Arabian Sea                                    :  241  271
  S.Africa                                       :  30   301
  Sargasso Sea                                   :  142  443
```

Table 3. Listing of scheduler errors which can be written in the "error.log" file.

ERROR CODES

Non-Fatal:

810	incorrect lunar cal frequency
811	incorrect solar cal frequency
812	incorrect intergain frequency
813	incorrect TDI frequency

Fatal:

901	tilt index out of sync
910	insufficient space for lunar cal allocation
911	insufficient space for solar cal allocation
912	insufficient space for intergain allocation
913	insufficient space for TDI allocation
920	insufficient space for lunar cal recording
921	insufficient space for solar cal recording
922	insufficient space for intergain recording
923	insufficient space for TDI recording
924	insufficient space for ship recording
925	insufficient space for region recording
935	ship recording not within duty cycle
936	region recording not within duty cycle
940	incorrect time ordering of schedule
960	lunar cal on descending node
961	solar cal in wrong hemisphere
962	intergain check in wrong hemisphere
963	TDI calibration in wrong hemisphere
970	downlink file not found
971	tilt file not found
980	illegal cosine computation

Due to limited space on the data recorder, there is no guarantee that all selected targets will be recorded. If a desired target was not recorded the user has several alternatives available in creating a new "lac.dat" file:

- priorities can be juggled
- non-essential ship targets can be eliminated
  (ships always have priority over regions)
- ship recording durations can be decreased
- frequency of calibration activities can be decreased (calibrations always have priority over ships and regions)
- regions can have sizes and positions altered

Especially note that large changes can be effected by lowering the priority or eliminating ship or region targets located at high latitudes. This is due to the scan overlap that occurs in these regions, which can result in multiple selection of targets.

9.0 EXAMPLE OF A TYPICAL SESSION

The following illustrates an end-to-end CATLAC session in which targets and calibrations are designated and verified. Special attention should be noted as to which mouse button is depressed. Incorrect mouse clicks can cause the package to hang. If this should occur, remove the CATLAC window and start again.

* cd to "catlac"
* type "idl"
* type "catlac" from idl command line
* click with left button on "LAC FILE:" box and enter a valid "lac.dat" file and hit ENTER/RETURN
* click with left button on "PLOT CURRENT LAC*****.DAT:"
* click with left button on "SELECT REGION WITH MOUSE"
* move cursor to inside a yellow region and click with left button
* enter new coordinates in any region text widget and hit ENTER/RETURN
* click with left button on "REGISTER REGION"
* click with left button on "CREATE NEW REGION WITH MOUSE:"
* hold left button and drag box to desired location
* re-size box by holding middle button and dragging
* click on right button to display
* click with left button on "REGISTER REGION"
* click with left button on "SELECT REGION WITH MOUSE"
* move cursor to inside a yellow region and click with left button
* click with left button on "ERASE SELECTED REGION"
* click with left button on "SELECT SHIP/BUOY WITH MOUSE"
* move box to surround a yellow ship and click with right button
* enter new coordinates in any ship text widget and hit ENTER/RETURN
* click with left button on "REGISTER SHIP"
* click with left button on "CREATE NEW SHIP WITH MOUSE:"
* click on left button at desired location to display
* click with left button on "REGISTER SHIP"
* click with left button on "SELECT SHIP/BUOY WITH MOUSE"
* move box to surround a yellow ship and click with right button
* click with left button on "ERASE SELECTED SHIP"
* click with left button on "CREATE LAC*****.DAT"
* click with left button on "RUN SCHEDULE"

* go to parent window respond to prompts:
  year
  day of year
  number of days
* click with left button on "SCHEDULE FILE:" box, enter the name of the new schedule file and hit ENTER/RETURN (name must have the form schDDDYY.dat where YY is the last two digits of the year entered in schedule run and day is the day of year entered in schedule run)
* click with left button on "DATE (DDDYY):" box, enter the date and hit ENTER/RETURN (name must have the form posDDDYY.dat)
* click with left button on "PLOT SELECTED DAY"
* click with left button on "ZOOM ON DISPLAY"

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References

Woodward, R.H., R.A. Barnes, C.R. McClain, W.E. Esaias, W.L. Barnes, and A.T. Mecherikunnel, 1993. Modeling of the SeaWiFS solar and lunar observations. NASA Technical Memorandum 104566, Volume 10, 26 pp.

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13. ABSTRACT *(Maximum 200 words)*

Calibration and validation Analysis Tool of Local Area Coverage (CATLAC) is an analysis package for selecting and graphically displaying Earth and space targets for calibration and validation activities on a polar orbiting satellite. The package is written in the Interactive Data Language (IDL) and includes a graphical user interface. Although it is designed specifically for the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) mission, the package can be used for analysis on other Earth-viewing missions. An individual can use text or graphical methods in CATLAC to select Earth targets to be scanned by a satellite. Additional onboard calibration activities (such as observations of the moon, or solar irradiance from a solar diffuser), which use data recorder time, can also be specified. All information pertinent to the creation of a command schedule can be written to a file which is read by a command scheduler. The scheduler can be invoked and the Local Area Coverage (LAC) recording periods can be visually verified using CATLAC. The schedule can also be verified by examining record and error files written by the scheduler.

14. SUBJECT TERMS

Command and control of spacecraft; Ground-based tracking systems; Space tracking; Data acquisition network; Spacecraft command

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