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The MAST Pointings Tables Project

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Abstract. We have undertaken a project to create a database of all HST imaging observations organized by position on the sky. A World Wide Web (WWW)-based interface to this database has also been created, in supplement to the existing interface to the HST archive. These "pointings tables" enable quick identification of overlapping fields that can be used for multi-wavelength studies of objects and for variability studies by comparing images at given positions over different epochs. They will also allow for "mini-surveys" by providing lists of images over a specified coordinate range, such as above and below the Galactic plane. We plan to develop pointings tables for other MAST missions besides HST and expect these tables to form an important part of the upcoming virtual observatories.

1. Introduction

A question often asked of the HST archive has been: "Is there an easy way to find out how many times a region of the sky has been observed with more than one filter?" Now that question and others may be easily answered using the HST "pointings" tables and interface.

The first task was to decide how to organize the observations into sky regions. Initially this task was done as part of the MAST Scrapbook project where "representative" observations were chosen in a set of well defined "bands" for a sky region for the WFPC2 instrument. Each sky region was called a "pointing." A "pointing" is defined as an area of the sky falling within an instrument's field of view. The project realized that once we had divided the sky into pointings, it would be a simple matter to count the observations and filters falling within a pointing, thus enabling the questions our users had been asking to be answered.

2. Creating the Tables

The first step in creating the tables is to determine the sky regions that have been observed by a specific HST imaging instrument. The coordinates for all observations made with a specific instrument are selected and sorted. The first

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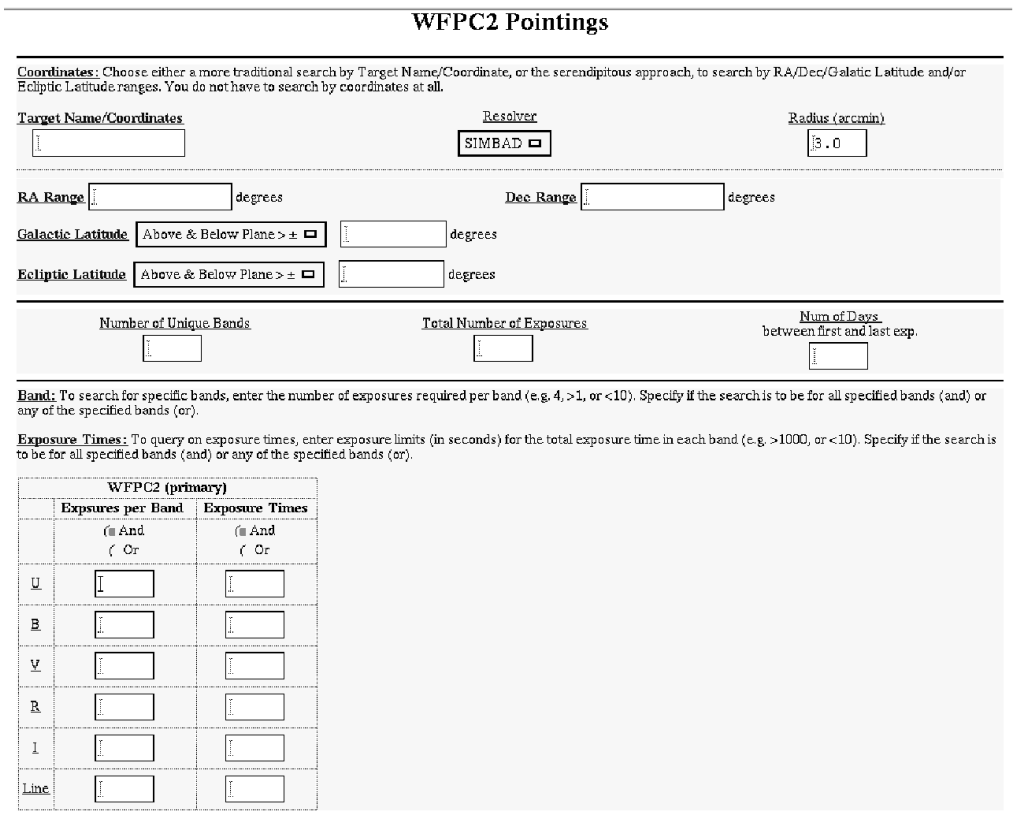
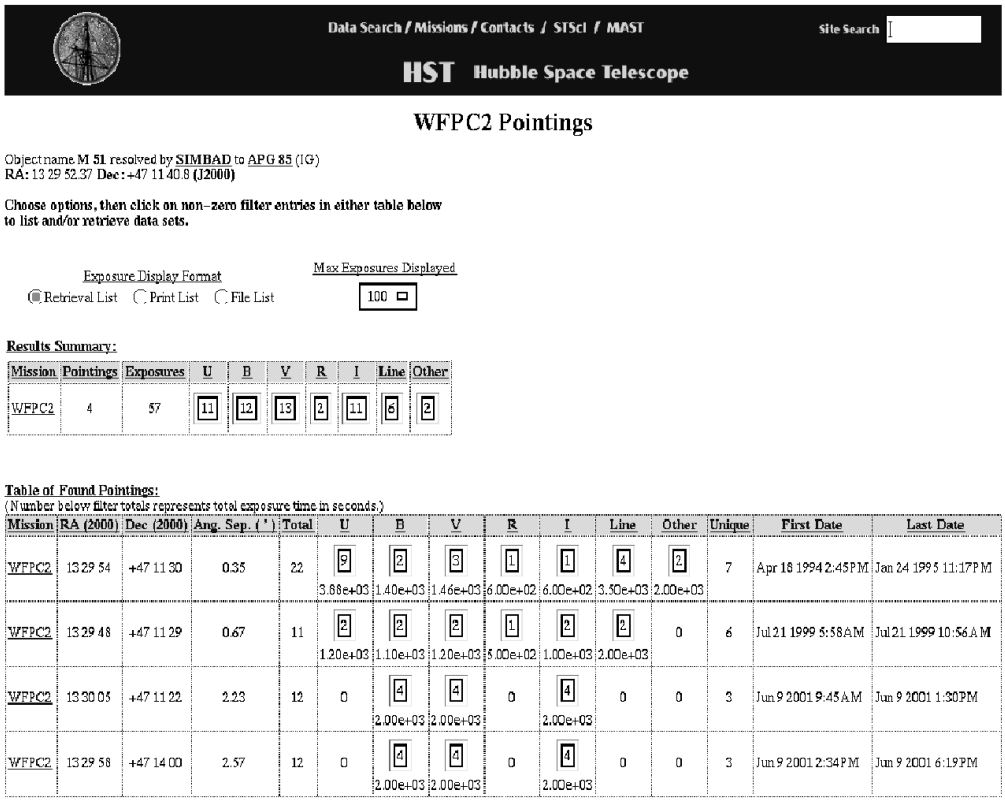


Figure 1. Pointing search specification page.

set of coordinates in the list are automatically defined as the coordinates for the first pointing. All coordinates within the defined "field of view" for that instrument are removed from the list of potential pointings. The next unselected observation becomes the second pointing and the same procedure is followed until all observations are assigned as a member of a pointing. It should be noted that while the method for defining a pointing is defined, the individual pointings may change over time as new observations are added for active instruments. During the second step, individual observations are assigned to pointings. An observation may fall in more than one pointing and is then counted as a member of all appropriate pointings. The filter is used to determine which "band" the observation is assigned to. The values for the total exposure time for each band in the pointing, the first and last observation date/time, the total number of exposures and the total number of different bands found for that pointing are also calculated. A table containing the list of dataset names with the pointing and band assignments is also created. Currently, pointings tables are available for the WFPC2, STIS (images), and FOC instruments.



Data Search / Missions / Contacts / STScI / MAST Site Search

HST Hubble Space Telescope

WFPC2 Pointings

Object name M 51 resolved by SIMBAD to APG 85 (IG)
RA: 13 29 52.37 Dec: +47 11 40.8 (J2000)

Choose options, then click on non-zero filter entries in either table below to list and/or retrieve data sets.

Exposure Display Format: (•) Retrieval List ( ) Print List ( ) File List

Max Exposures Displayed: 100

Results Summary:

Mission	Pointings	Exposures	U	B	V	R	I	Line	Other
WFPC2	4	57	11	12	13	2	11	6	2

Table of Found Pointings:
(Number below filter totals represents total exposure time in seconds.)

Mission	RA (2000)	Dec (2000)	Ang. Sep. (')	Total	U	B	V	R	I	Line	Other	Unique	First Date	Last Date
WFPC2	13 29 54	+47 11 30	0.35	22	9 3.68e+03	2 1.40e+03	3 1.46e+03	1 6.00e+02	1 6.00e+02	4 3.50e+03	2 2.00e+03	7	Apr 18 1994 2:45PM	Jan 24 1995 11:17PM
WFPC2	13 29 48	+47 11 29	0.67	11	2 1.20e+03	2 1.10e+03	2 1.20e+03	1 5.00e+02	2 1.00e+03	2 2.00e+03	0	6	Jul 21 1999 5:58AM	Jul 21 1999 10:56AM
WFPC2	13 30 05	+47 11 22	2.23	12	0	4 2.00e+03	4 2.00e+03	0	4 2.00e+03	0	0	3	Jun 9 2001 9:45AM	Jun 9 2001 1:30PM
WFPC2	13 29 58	+47 14 00	2.57	12	0	4 2.00e+03	4 2.00e+03	0	4 2.00e+03	0	0	3	Jun 9 2001 2:34PM	Jun 9 2001 6:19PM

Figure 2. Pointings search output.

3. The Interface

The interface for the pointings table is a WWW form which can be found at `http://archive.stsci.edu/cgi-bin/point`, together with the definition of the pointing radii and filter/band assignments. Users select the instrument pointings table they wish to search. On the subsequent form, users may select a specific target, coordinate ranges, or might decide to search above/below the Galactic or ecliptic plane. They may choose to look for pointings with observations in more than one filter with or without exposure time constraints in each filter. Users may choose to do time-variability searches by specifying the number of days between the first and last observations in a pointing. See Figure 1 for an example of the form. The search results are displayed as two tables (see Figure 2). The top table is a summary of all pointings found by the search. The second table has a row for each pointing found fitting the search criteria. The number of observations within each band is also a link. When this link is executed, a list of the specific datasets for that pointing/band is displayed. Users may look at previews and also submit archive requests for those data.

4. Future Plans

We plan to add pointings tables for NICMOS and ACS instruments in the next six months.

In the future, users will be able to search for pointings of "secondary" instruments in the context of pointings for a "primary" instrument. For instance, perhaps a user is interested in WFPC2 observations, but would also like to know if there are any STIS image observations within the field of view of the pointing. A search will be made of the WFPC2 pointings table. Then a secondary search of the STIS pointings table will be made looking for STIS pointings within the WFPC2 field of view for each WFPC2 pointing. Users will be able to specify filters and exposure times for all secondary instruments in addition to those specified for the primary instrument.