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The NOAO Science Archive, Version 2.0

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Abstract. The NOAO Science Archive (NSA) is a major step toward building a comprehensive scientific archive of the optical and infrared data holdings of the National Optical Astronomy Observatory. The goals for the NSA are to rapidly create a scientifically useful archive of NOAO Survey data, to develop in-house expertise in the relevant technologies, to identify requirements for NOAO's developing comprehensive archive, and to create a high level of visibility as well as utility for both the NOAO Archive and NOAO Surveys, for example, through new Web services.

The holdings of the NSA[1] are drawn from the NOAO Survey program as well as from other coherent imaging or spectral, optical/IR reduced datasets that may be identified as candidates from NOAO or community facilities. Catalogs and other derived data products will be included in addition to images, spectra and the tools necessary to evaluate them. Synoptic, time-domain data is a special focus in anticipation of the needs of the LSST.

The NSA team is working in coordination with other groups at NOAO who are focusing on data handling and data pipeline systems in the context of supporting NOAO instrumentation as well as the emerging National Virtual Observatory infrastructure.

Planning for the NSA was started in November of 2001 by the Science Data Systems Group of the NOAO Data Products Program.Version 1.0 of the NSA was released in April, version 1.1 in July and version 1.2 in October of 2002. We discuss plans for Version 2.0 of NSA to be released in January of 2003.

1. NOAO Science Archive Overview

The NOAO Science Archive (NSA) provides a rapid prototyping environment of techniques, hardware and software while at the same time building an operational archive of scientifically interesting data sets. NSA represents the first major project of the newly established NOAO Data Products Program that

[1]National Optical Astronomy Observatory, operated by the Association of Universities for Research in Astronomy, Inc. (AURA) under cooperative agreement with the National Science Foundation

[1]`http://archive.noao.edu/nsa`

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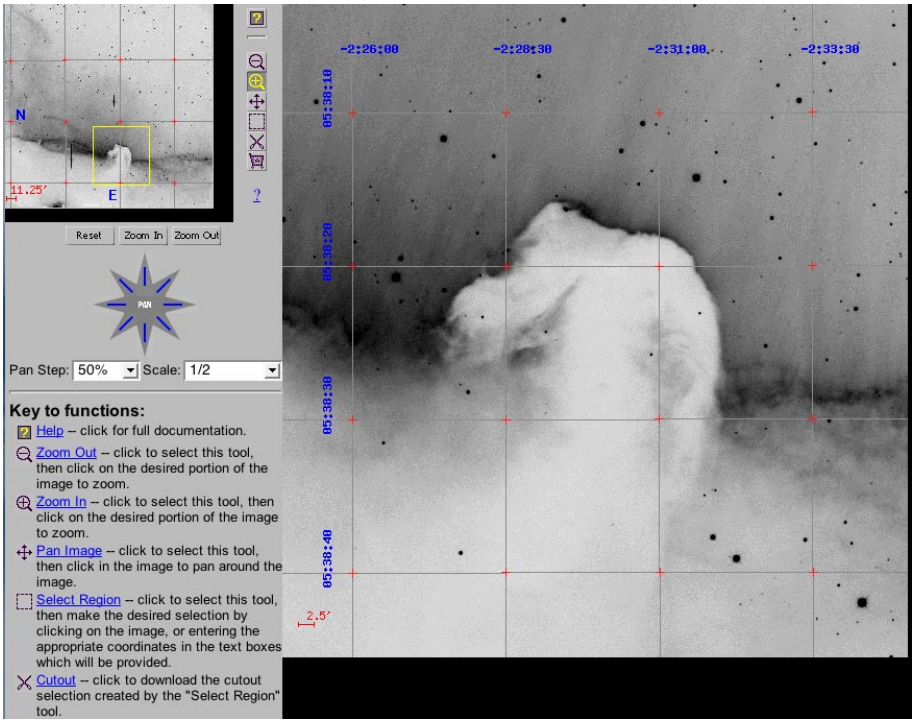

Figure 1. The NOAO Cutout Tool is dynamically connected to all data holdings – over 15,000 calibrated images as of January 2003.

seeks to construct a complete data handling system from data capture to public archiving of the resulting data products, anticipating the requirements and possibilities of the National Virtual Observatory and the Large Synoptic Survey Telescope.

Data products contained in the NSA are the results of the successful NOAO Survey Program.[2] Survey teams provide the key to the NSA by providing a wide range of extremely useful datasets. The survey teams reduce and calibrate the data before it is ingested into the archive.

A major requirement of NSA is to not only build an archive system—but to build the community who will use that system. In such a case it is highly desirable to keep the development team in close communication with all the users of the system, including the survey teams themselves. In general, the NOAO Data Products Program seeks to build community partnerships wherever possible with both data providers and data customers.

2. NSA Web Interface

The NOAO Science Archive is accessed through a Web interface using HTML and JavaScript for the client interface, and Apache, MySQL, PHP, C and IRAF

[2] `http://www.noao.edu/gateway/surveys/programs.html`

Figure 2. The NOAO Science Archive Shopping Cart.

task executables for server-side procedures. The interface provides the user the capability to search the NSA via coordinate information, object name, observation date, photometric depth, survey name, and filter. Access to SIMBAD or NED is enabled through C client libraries, kindly provided by each of these projects.

The NOAO Science Archive Image Viewer and Cutout Service[3] was derived from the NOAO Deep-Wide Field Survey[4] Image Viewer and benefits from ongoing work for NOAO's National Virtual Observatory efforts.

Search results include the ability to view the full FITS header, download the FITS file, create a cutout region of the image for download, and a shopping cart mechanism to assemble datasets (that is, either full images or cutout regions) for bulk download.

3. NOAO Science Archive Status

Work on the NSA project started in the Fall of 2001 with a part time team of four. Current staffing has grown to about seven. The initial version 1.0 of NSA was finished and released in April of 2002 and included data from three survey projects and the ability to search the database, retrieve data files and perform various utility chores such as ingesting data and logging traffic. Static preview images and the ability to display the FITS headers were also included.

A follow-up NSA version 1.1 was immediately initiated and was released in June of 2002. This version was principally a support release for the NOAO Deep-Wide Field Survey and included a revised version of their release 1 data products along with data quality masks and related improvements. Version 1.2

[3] `http://www.archive.noao.edu/ndwfs/data-cutout.html`

[4] `http://www.archive.noao.edu/ndwfs`

of NSA was released in October of 2002. Even incremental releases like version 1.2 include significant new data holdings—version 1.2 approximately doubled the data holdings. This release also marked the first appearance of the new database-enabled NOAO image cutout server.

In addition to including data from many more of the NOAO survey projects, version 2.0 will include full support for the NOAO cutout server for all data holdings. This is being implemented dynamically directly from the NSA MySQL database information, rather than using a static index file as was originally done for the NDWFS data. An "NSA Shopping Cart" is being implemented to service "push" requests for multiple data files. A mirror archive will be hosted at CTIO in La Serena, Chile. The hardware, including a one Terabyte class RAID array, is in the process of being configured. The data, database, software and web pages will be copied onto the new disks before the system is shipped to the Southern hemisphere.

The long term goal is a fully engineered archive to serve as a major component of the Virtual Observatory. Planning activities for how to transition subsystems of the NSA onto the corresponding engineered subsystems are in progress. It is likely that significant portions of the NSA—and large amounts of data holdings—will remain in operation indefinitely.

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