

OBSERVATIONAL MISHAPS: A DATABASE

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ABSTRACT

We present a World-Wide-Web-accessible database of astronomical images which suffer from a variety of observational problems, ranging from common occurrences, such as dust grains on filters and/or the dewar window, to more exotic phenomena, such as loss of primary mirror support due to the deflation of the support airbags. Apart from its educational usefulness, the purpose of this database is to assist astronomers in diagnosing and treating errant images *at the telescope*, thus saving valuable telescope time. Every observational mishap contained in this on-line catalog is presented in the form of a GIF image, a brief explanation of the problem, and, when possible, a suggestion for improving the image quality.

I. INTRODUCTION

It is not uncommon for an astronomical image obtained after a lengthy integration to reveal that all is not well. As a consequence, telescope time is sacrificed identifying the problem. In an effort to shorten this investigation period, we have created a catalog of astronomical images bearing signatures of a range of mishaps encountered during observing runs. Included with each image is an explanation of the cause of the problem as well as a suggested solution. Since a large number of observatories today are connected to the Internet, the World Wide Web (WWW) was chosen as the ideal medium for presenting this collection of images.

Initially, the purpose of such a collection was to assist new graduate student observers at Michigan-Dartmouth-MIT (MDM) Observatory who frequently observe without the benefit of a more experienced observer. The aim was to provide these students with a means of quickly pinpointing the underlying problem affecting the image quality. This idea grew into a WWW accessible database complete with explanations of the "mishaps" responsible for the deterioration of the images, as well as suggested solutions.

II. THE FORMAT OF THE DATABASE

Every WWW page in this catalog contains an inverted colormap GIF image of the mishap, a table listing relevant information about the image (telescope, date, instrument, filter, exposure time), a brief description of the problem, and, if available, a suggestion of how to fix it. In a few cases, the cause of the problem could not be determined. These were dubbed "Unsolved Mysteries", and no explanation of the problem or suggestion for a fix are given. Since it is possible for one problem to manifest itself in a variety of ways, multiple images of the same mishap are presented where appropriate, cross referenced with the help of hypertext links. For example, condensation on the dewar window can appear as a filamentary structure or as a bright extended feature with cusps, depending on the locations of light sources in the field of view. For the more common problems of astigmatism, coma, bad guiding/focusing, and poor seeing, we have provided supporting plots/images where applicable via links on the relevant pages. Examples include radial profile plots across a stellar image or multiple images of the same field taken in different seeing conditions. In Fig. 1, we show an example of a typical page in the database, along with the explanation of the problem and a suggestion for the solution.

III. THE STRUCTURE OF THE DATABASE

Much consideration was given to effectively structuring the image catalog. Rather than sorting the images by cause, which is probably unknown to the astronomer accessing the database, we have grouped them by symptom. We provide the following two options for searching the database:

1. The user may browse the complete list of compiled images. This list features links to the various mishap pages as well as a brief description (1 - 2 lines) of the symptoms in the corresponding image.
2. The other option is to first broadly classify the image based on its symptoms and then choose the appropriate web page from a smaller list. This option will likely be more practical with an increasing number of images in the database. Apart from the frequently occurring problems of bad seeing/focusing/guiding, fringing, dust rings, and reflections, the current revision of the database lists the following as the top categories:

Unusual Appearance of Objects in the Image: familiar objects in the image, such as galaxies, stars, etc, have an unexpected appearance (e.g., guider jumps, deflated airbags, etc).



CCD and Electronics Features: features seem to be correlated with the CCD rows or columns, or they are otherwise suspiciously electronic in appearance (e.g., readout errors, shutter failure, etc).

Unexpected Objects in the Image and other External Interference: unexpected features obviously not due to the CCD or the electronics appear in the image (e.g., occulting dropout shutter, condensation on the dewar window, etc).

Unsolved Mysteries: as mentioned above, these are the cases for which we have so far not been able to determine the cause of the problem.

Each of the above links leads to a list of mishap pages in that category with a brief description of the corresponding image appearance.

IV. THE LOCATION OF THE DATABASE

The Observational Mishaps Database can be accessed at

<http://www.astro.lsa.umich.edu/mishaps/mishaps.html>.

It is also directly accessible from the University of Michigan Astronomy Department Home Page, whose URL is

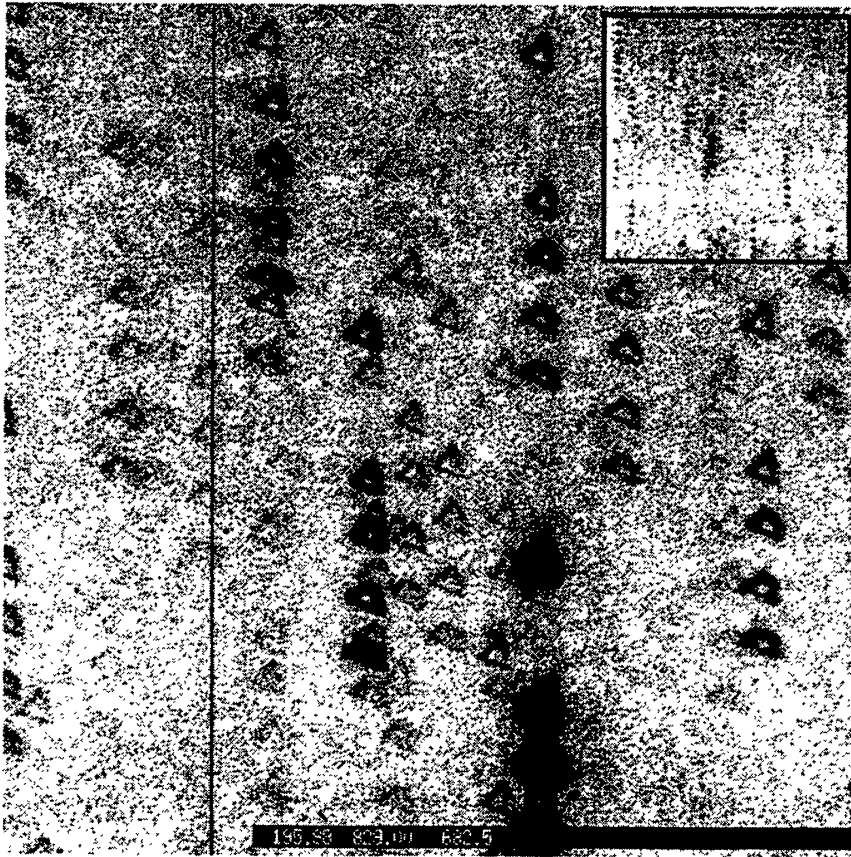
<http://www.astro.lsa.umich.edu>.

V. ADDITIONAL REMARKS

We have created a database of images which are deteriorated by the effects of various mishaps encountered during astronomical observing runs. Its structure was designed to help users quickly identify the cause of the poor image quality, thus saving telescope time. In addition to being widely accessible via the WWW, the advantage of such an on-line catalog is its versatility. Unlike a printed catalog, the on-line version can very easily be updated, corrected, and expanded, so that everytime the database is accessed the user will find it in its most up-to-date form.

Due to the practically infinite number of possible problems during observing runs, this collection is clearly far from and impossible to complete. Its usefulness, however, is obviously directly related to the number of examples it contains, and therefore we would appreciate any contributions by the astronomical community in the form of examples which might fit into this collection. Instructions for the submission of such images are given in the database.

Deflated Airbags



Telescope	MDM 2.4m
Date	9/13/96
Instrument	Templeton
Filter	V_schom
Exposure Time	2.5 sec
Other	Focus Exposure

Problem:

The airbags supporting the primary mirror were deflated when this image was taken. The reason for the triangular shapes of the stars in this focus image was that the mirror is supported at 3 ‘hard’ support points. This, of course, made it impossible to obtain a good focus.

Fix:

DO NOT MOVE THE TELESCOPE! The problem here was that the PC which ran the program responsible for the air pressure in the airbags was hung up. When it was rebooted, the airbags were re-inflated, and the problem was taken care of. A word of caution, however: **moving the telescope with deflated airbags can actually cause damage to the telescope itself.**

FIGURE 1. A typical webpage in the database



Furthermore, we realize that some of our interpretations of the mishaps, as well as some of our suggestions on how to improve the images, may be incorrect or incomplete. While it is our intention to regularly update and improve this database, we welcome any input about the database in general, its structure, or even individual examples.

VI. ACKNOWLEDGEMENTS

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