Proc. VI Serbian-Bulgarian Astronomical Conference, Belgrade 7-11 May 2008,
Eds. M. S. Dimitrijević, M. Tsvetkov, L. Č. Popović, V. Golev
Publ. Astr. Soc. "Rudjer Bošković", No. 9, 2009, 113-142

WIDE-FIELD PLATE DATABASE – ONE MAJOR STEP WITH THE PARI NORTH AMERICAN INITIATIVE

MILCHO TSVETKOV[1] and WAYNE OSBORN[2]

[1]*Institute of Astronomy, Bulgarian Academy of Sciences,*
Tsarigradsko Shosse 72, 1784 Sofia, Bulgaria
e-mail: milcho@skyarchive.org
[2]*Central Michigan University (retired); Mt. Pleasant, MI, USA*
e-mail: Wayne.Osborn@cmich.edu

Abstract. The Wide-Field Plate Data Base (WFPDB, Tsvetkov 2006) contains information for the existing professional astronomical photographical plate archives for the period from more than 130 years since 1872. The US plate collections are about 50% from all existing. In November 2007 the PARI (Pisgah Astronomical Research Institute) was initiated and a meeting dedicated to the project for plate preservation of North American Plate collections took place.

1. INTRODUCTION

The Wide-Field Plate Database (WFPDB), http://www.skyarchive.org, (Tsvetkov 2006) is developed in the Institute of Astronomy, Bulgarian Academy of Sciences since 1991. The project aims at collecting information for photographic plates, taken with wide-field telescopes world-wide, as well as digitization of available plates.

In 2007 PARI initiates the National US meeting on the topic "National (US) plan for preserving astronomical photographic data. Here we discuss the key documents and resolutions of this meeting (Osborn 2007).

2. DOCUMENTS AND RESOLUTIONS OF THE PARI MEETING

The Workshop on a national plan for preserving astronomical photographic data took a place at the Pisgah Astronomical Research Institute, 1-3 November 2007. 31 participants from US and Europe attended the meeting. Here we present day by day the summary of sessions, but first we like to point on two notes:

1. The discussion at each session of the workshop focused on a specific topic related to the archiving of astronomical photographic data. The discussion was framed around a "guiding question" to which an answer is needed. Several secondary questions were generally posed to provide additional structure to the discussion. Participants were arranged into a round table format so that all could easily participate in the discussion and debate, which was moderated by a session chair. Projection capability and internet access was available at the discussion table.

2. The notes below present a summary of the discussions. The written comments represent a synthesis from several persons' notes and are intended to provide the sense of the comments, not verbatim remarks. As such, similar comments have been placed together.

DAY 1: THURSDAY, NOVEMBER 1

Opening session

1. Wayne Osborn welcomed participants to the workshop.

2. Don Cline, President of PARI, welcomed workshop participants to PARI and a short video was shown that provided an overview of PARI' history and current activities.

3. Workshop attendees were asked to introduce themselves and briefly describe their interest in preserving astronomical photographic data.
   - 25 of the 26 registered participants were present (one could only attended Friday's sessions) as well as five persons from PARI. A list of participants is given in Appendix A.
   - A wide variety of interests were represented. They include persons who
     - are stewards of plate collections and interested in archiving standards,
     - use photographic data in their research and want to ensure their preservation,
     - have carried out or are involved now in projects to convert astronomical photographs to digital electronic form,
     - are concerned about possible loss of historically important records, and
     - are developing catalogs of existing astronomical photographic plates.

     Many were interested in the suitability of PARI as an archive for astronomical photographic data.
4. Dave Clavier, PARI's Vice President of Administration and Development, provided an orientation to the facilities and a summary of rules and policies.

Tour of the PARI plate storage facilities

There was a tour of PARI's plate storage facilities.

1. One objective of the tour was to see what is available at PARI for plate archiving. The group was asked to look at
   - the available space and present storage conditions (*Are any changes recommended for how the plates are stored?*)
   - PARI's equipment for using plates: a high resolution scanner, computers for data storage, an iris photometer, light tables with magnifiers and microscopes, and presently non-functional Grant measuring engine and microphotometer (*Which of these should be available at a plate archive?*)
   - the adequacy of PARI's computers, internet access and other support capability.

2. A second objective of the tour was to use the plates presently at PARI to bring out some of the issues related to establishing an astronomical plate archive. The group was asked to note and compare the various parts of the present plate collection:
   - Warner and Swasey Schmidt plates (stored vertically, arranged by plate number)
   - Michigan slit spectrograms (stored vertically, arranged by R.A.)
   - CTIO Curtis Schmidt plates (stored vertically, arranged by declination zone)
   - CTIO 4-m plates (stored flat in drawers, arranged by plate number)
   - CTIO slit spectra (not organized)
   - Orphan plates: from Palomar, Hawaii, ESO, Hamburg, KPNO…
   - Mystery plates (*Can someone identify the institution from which these come?*)
   - Harvard Meteor patrol films and records (*what portion of this collection should be preserved?*)

   Using this collection as a case study, the group was asked to consider the following questions:
   - *Which of these collections is worth preserving and which are most important to preserve?*
   - *What is the preferred way to store plates in an archive?*
   - *What is the preferred way to arrange the plates in an archive?*
   - *What should be done with orphan plates- return or archive here?*

SESSION I: Discussion of the current situation

Question: Where are the significant collections of photographic data in North America?

The goal of this session was to learn what plate collections exist and their current states, what are the plans to preserve these plates, and what institutions wish loaned plates returned. Reports were given by institutional representatives and others familiar with various plate collections after which other collections were noted. The information gathered is summarized in Appendix B.

The following observations resulted from the discussion:

1. The first step should be to determine where plates are, how they are being stored and what state they are in.

2. A catalog of plate catalogs is needed, which implies finding out which observatories have catalogs of their plates. It was noted that Tsvetkov has been compiling a web-searchable catalog of wide-field (defined as 1° or greater) photographic plates (see http://www.skyarchive.org/).

3. Many observatories have plates lying around (they may not even know what they have). A general call should be made to have borrowed plates returned. Unwanted plates should be sent to some central location (PARI?).

4. The associated metadata are very important.

5. Plates from a single collection or program should in general be archived together (e.g., the Mt. Stromlo parallax plates should be at Yale where similar plated taken with the same telescope are filed).

6. CTIO does not wish plates returned and many have been archived at PARI. Thurburn Barker at PARI is preparing a master list of CTIO 4-m and Curtis Schmidt plate, and those holding such plates are encouraged to send a list to Barker so that their location can be noted in the catalog. Those that no longer want such plates can contact Barker about possible archiving at PARI.

7. PARI's first priority with the plates it holds should be to inventory and organize them and prepare a catalog.

8. It was noted that digital observations have similar archiving problems and may in fact be less accessible that plates (e.g., data on 9-track tape). A archive for CCD images is also needed.

9. It was agreed that a survey of institutions about plates should be carried out. It was noted that such a survey seems to be part of the charge to the Working Group on the Preservation of Astronomical Heritage of the AAS.

RECCOMENDATION: A census of existing North American astronomical photographic data should be carried out. This would be done by conducting a survey of observatories and other institutions known or expected to hold plates.

DAY 2: FRIDAY, NOVEMBER 2

SESSION II (modified): Discussion of why the photographic data should be preserved

Question: Is PARI seen as suitable for a national plate repository?

Griffin suggested that the order of the discussion should be modified. In particular, a fundamental issue seems to be a question posed in Session VI: Is PARI seen as suitable for a national plate repository? With the tour fresh in mind, it was agreed this was a good time to discus this now and then move on to Session II. It was agreed to do this.

1. There are two major things in PARI's favor for a plate repository: (1) many institutions do not want to keep their plates and (2) PARI has massive amounts of storage space.
    - Because some are not convinced of the value of plates and most institutions no longer want them, some action must be taken soon or these records will be lost.
    - Compared to PARI, all other institutions are tight in space. Many institutions feel their plates take up space that could be put to other uses, and they are therefore looking for a place to which they could move their collections.
    - While institutions *say* they want to get rid of their plates, the cost of shipping a large collection is a deterrent to sending them to an archive. A factor in evaluating keeping versus shipping versus discarding is which will be most cost effective for the observatory. Shipping to an archive may be considered to provide a low return on investment if the plates will be little used.
    - Not all institutions no longer want their plates. Some wish to keep them because they plan (or *might* want) to scan them themselves.
    - An advantage of a central archive is that it is easier for users of plates if they are in one location.

2. Several concerns about the suitability of PARI as a plate archive were noted.
    a. PARI lacks recognition and credibility.
        - Regarding being young, the "old" reputable institutions don't want to be plate repositories.
        - The question may be if it is less effort to change people's minds about keeping plates or to send them to a repository. Some minds have already been made up about this issue.

- If people know plates of interest exist at PARI, they will make an effort to use them.
- Reputation and credibility are a chicken versus the egg matter – if PARI is identified as a national plate repository, it will change peoples minds about PARI.

b. PARI is young and a non-profit organization, and how long it will exist. Cline noted

- PARI has now been in existence for 10 years.
- For the future, the issue of money and funding is a challenge (which raises the question of what it will cost to run an archive).
- Plates may offer a low return on investment, but PARI concern was that plates were just being thrown away and we didn't want to see valuable plates lost; if plates are to be destroyed, we will take them and store them. PARI is willing to go pick them up if they're deemed valuable (which raises the question of what is a valuable plate).
- The Harvard plate collections will come to PARI after the plates are scanned. The plan is to use Harvard as a model for any PARI scanning project (it was noted that having the Harvard collection would lend credibility to PARI).

c. PARI's location is an issue.

- It is not easily accessible and there is no nearby town to provide support (e.g., hotel, restaurants, grocery) for those that come.
- People do not have to visit PARI to use the plates if information is online.

d. While the physical facilities are good, manpower is lacking.

- Volunteers are good, but inadequate. Funding is needed for at least some professional staff.

3. Further discussion
   a. Establishing PARI as a repository doesn't mean it's the only repository.
      - Yerkes, Lowell and other places have no plans to discard their plate collections and could also be recognized as repositories.
      - Ideally, there should be a distributed archive – Yerkes, Yale, Lowell, etc. keeping their own plates and perhaps others, but being part of a repository system.
      - One could envision specializations, as for libraries: Certain repositories concentrating on wide-field plates, others on spectra, others on solar images, etc.
   b. McCluskey: There is some cost in getting plates and the associated materials. One doesn't want to become a dumping ground for useless cast-offs.
   c. Tsvetkov: there were ownership battles over plates when Europe planned a plate archive.

d. Tsvetkov and Hudec have visited many plate archives. In most cases the plates are stored in poor conditions. It would be valuable if North America could establish a precedent for how to archive plates.
e. It is in everyone's interest to maintain proper identity of plates. This means the first step should be an inventory and preparing a catalog of plates. Scanning can come later (with perhaps scanning on demand rather than systematically).
f. It was asked if the plates at PARI are being used. It is important to demonstrate that the plates are being used for science. Several in attendance (Griffin, Hudec, MacConnell) have projects that could utilize them.

4. Consideration of the basic question: **Although there are some problems, after inspection of the facilities is PARI seen as *enough* suitable to be a national plate repository?** Most felt the answer was yes.
   a. The access issue could be addressed through electronic access rather than physical access. Have the plates available on-line. This raises the issues of whether the scanning and cataloging capabilities are adequate.
   b. Some had concerns about the plate storage area.
      - Some felt the storage rooms should be as optimal as possible with good climate control.
      - Strelnitski: I came here to assess whether to send plates here. It has the space and hence the best potential for a suitable archive, but it is not suitable now. I feel it is important to complete one room as a model of proper storage.
      - Several mentioned mustiness in the storage area as a concern. Cline: the facility has temperature and humidity control and the rooms could be made more suitable, but it costs money.
      - One suggestion was that PARI set up a collecting area to keep musty new acquisitions separate from the main storage.
   c. In response to the concerns about the storage area, others noted that, while not perfect, PARI has better storage conditions than at most other places.
   d. An argument for a very good storage environment is that it will attract good collections, which in turn will attract more plates (a chain reaction).
   e. McCluskey proposed that we recommend that PARI be developed as a National Plate Repository. Skiff seconded the proposal, but suggested that the name use something other than "national." It was proposed that the archive be designated the Astronomical Photographic Data Archive (APDA).

RECOMMENDATION: Given its available physical space and support facilities, PARI's APDA should be developed as an astronomical photographic data archive.

SESSION II – Part I: Discussion of why the photographic data should be preserved

Question: Why are the photographic records worth preserving?

- What are the potential scientific uses?
- What are the potential historical uses?
- What are other potential uses: commercial, …?

1. The rationale for preserving the photographic data has previously been addressed on a number of occasions. Nevertheless, some present were not astronomers and possibly not familiar with the arguments, so it was felt worth revisiting this briefly.
   a. The projects of those present will provide some examples of why preserving the photographic data is of interest.
   b. The plates currently stored at PARI can serve as a "case study" for discussions of which collections and types of plates are most worth preserving.

   c. Also, our answer to "why we are dong this" may change people's minds about its importance.
      - To ensure preservation, we need to sell the idea – give tantalizing reasons.
      - An important goal should be linking the photographic data to the Virtual Observatory.
      - Get people to want to do it, *then* discuss resources (PARI); attitude precedes action
      - For this, we need to compile a list of examples of what's being done simply because we have the plates.
      - It was noted that a partial list of recent papers based photographic data is on the PARI website: http://www.pari.edu/library/astronomical-plate-center/CAPPOverview.pdf

2. The basic uses of plates in research now are:
   a. Plates permit one to engage in "time-domain astronomy," i.e. look at changes over time: in position, in brightness, in spectral characteristics, objects that come and than those that go.
   b. The discovery plates of objects that have since been lost because the published positions were poor can be re-identified with certainty when the object was marked on the plate.

3. A few examples of research projects that utilize plates:
   a. Extending orbital arc of minor planets (this is being done by amateurs for near earth objects).
   b. Investigating the period changes of variable stars. Those in globular clusters should correlate with the stars' predicted evolutionary changes.

c. Following spectral changes using slit spectra and objective prism plates, for example changes in Eta Carina.
d. Determining the proper motions of stars, particularly for membership studies in clusters.
e. Once digitized, data mining to search for optical transients events (e.g., gamma ray bursters).
f. Investigating changes in terrestrial ozone from the ozone features in spectra.

4. In making the case for the importance of plates for research,
   a. It would be good to maintain a list of projects that utilized plates. Note: a partial list is on the PARI website: http://www.pari.edu/library/astronomical-plate-center/CAPPOverview.pdf
   b. A call could be made (by e-mail) for proposed studies that would make use of the older data if readily available (digitized images) – "a wish list."
   c. We should keep in mind we do not know now what value the plates *will* have in the future as new problems arise and new methods are developed (an example being the current application of plates of stellar spectra to a terrestrial ozone study)

5. Astronomical photographic plates have uses besides for research
   a. Educational uses: plates can be used to teach how science is done through student projects that use a plate collection.
   b. Historical uses: When astronomers worked on the plate, they often marked on it. The markings along with the related notebooks, observing logs and notes on plate envelopes can show the process of discovery or lend historical insights (Rees: an example is Heiser's observing log note of "time out for satellite" in October 1957). Although not astronomical plates, plate collections can also contain early pictures of people, observatories, and instruments.
   c. Commercial uses: Books often need illustrations; the Harvard Plate Archive receives requests to reproduce photographs and charges a nominal fee for copies. Perhaps unwanted plats could be sold as astronomy memorabilia. Thir raises the issue of ownership of the plates.

6. A recommendation for those maintaining plate archives is keep as much metadata as possible (e.g., Photographs of notebook pages, plate envelopes, related journal articles)

7. It was suggested that there be a special session at the 2009 Winter meeting of the American Astronomical Society that would focus on the importance of the photographic data.
   a. It was agreed the session should not focus on "plate preservation" but rather on exciting projects made possible by plates.

b. The name "time-domain astronomy" was considered appropriate.
c. The question was raised as to who would propose the special session. It was suggested that it could be the AAS Historical Astronomy Division (HAD).
d. As the purpose would be to inform *mainline* astronomers that plates allow currently-valuable science, it was agreed that the session should not be a HAD-sponsored session but a general one.

RECOMMENDATION: A special session on "time domain astronomy" should be proposed to the American Astronomical Society for the January 2009 meeting.

SESSION II – PART 2. Discussion of priorities in plate archiving

Question: What should be the priorities for archiving?

- What types of photographic data are most important to preserve?
- Which data sets or collections are most important to preserve?
- What actions are most important to take?
  - For current plate archives: cataloging, environmental control, …?
  - For collections in danger of being lost: their evaluation, acquisition,…?

1. Osborn: some plates have more potential value than others. To illustrate some of the issues involved in setting priorities, he asked the group to consider the following questions about the plates at PARI:
   a. The Michigan slit spectra – how valuable are they? The Data for most of the objects observed have been measured and published, but the objects include novae which can't be re-observed. Will people still use these plates? Answer: some do go back and look at historical novae and supernovae.
   b. Photographs of solar eclipses – what science could come out of these plates? Answer: possible use in long-term climate change studies.
   c. Two PZT plates from Venezuela – do we keep them? Plates contain maybe 5 stars in a perhaps a 15′ FOV; from a series but we don't k now where the series is nor do we have other information about these plates two other than the plate numbers.
   d. Orphan plates and mystery plates – what priority should be spent on returning them/identifying them? It was pointed out that (1) the fact that these plates were borrowed by someone suggests they may be the more important ones and (2) the envelope format is often a key to the original institution.

2. A list of possible priorities was distributed as a starting point for discussion (see Appendix C). The group agreed, in general, with the priorities as listed. The following comments and modifications were suggested:
   a. Plates of galaxies closer than Virgo are important (as individual stars can be resolved).

b. Plates of stellar clusters are important for membership studies.
c. Priority III should be listed as "of less importance." For example, multi-image double star plates allow rapid variability to be detected and studied.
d. For spectra, the highest priority ones are the high-dispersion plates (Coudé plates). Image tube spectra are of low priority

3. There was a general feeling that, as far as practical, all plates should be kept rather than discarding those considered of little value.
   a. One may not know much about a plate or its value now, but relevant information may come to light later (an example was one of the PARI mystery plates that Strelnitsky and Tsvetkov were able to identify as from Kiev, contact the observer, and learn Kiev wants this plate returned). Tsvetkov identified independently the same plate using the WFPDB only for 5 minutes.
   b. It is the unwanted plates that are threatened. PARI has sufficient space to store unwanted plates, and if the choice is between discarding and archiving at PARI, send to PARI. PARI does not have to spend much time on the lower priority ones, just keep them. It was noted, however, that it is inconsistent to say "save them" but be unwilling to be one to keep them.
   c. It was asked if plates should continue to be kept after they are digitized. While scanning should be done, the plates are the actual records with the digital images being records of the records; the digital image may stimulate one to want to examine the original. Hudec: it is important to save the physical plates, not just an electronic version of the image because some research needs all three dimensions: x, y and depth in the emulsion.

4. The greater the amount of documentation for a plate, the greater its potential value.

5. In terms of actions, what are the priorities for a plate archive?
   a. The first priority for an archive should be acquisition so the plates are not lost. The general rule should be to get the plates to an archive, then assess their value.
      - Presently, many retired or about to retire astronomers want something done with their plates before they die or leave their institution.
      - Many institutions no longer want their plate collections. Plates being transferred should come with a letter of transfer as there may be legal issues regarding ownership, transfer across a national border, etc. Possible arrangements include outright transfer of ownership or a long-term loan.
      - Institutions should bear the cost of moving their collection and not expect it to be covered up by the receiving archive (but one hopes this expectation does not become an incentive to simply discard the plates).

- The archive should request that the supporting documentation also be sent, but some institutions will wish to keep these.
- It is assumed that orphan plates can be transferred without the permission of the original institution, but it is good practice to notify that institution of their existence.
- In the case of the PARI archive, PARI wants the log bogs and storage cabinets as well as the plates. For large collections, PARI can arrange pick-up rather than having them shipped.
- It was suggested that PARI could serve as an orphan plate clearing house to facilitate return of such plates to their original collections. Lists could be put on the web describing orphan and mystery plates so that people could recognize them.

b. The second most important action for an archive is to develop an on-line catalog of the available plates. Direct plate catalogs should contain sufficient information that one can determine if a given object probably appears on a listed plate.
c. When starting digitization, digitize the log books first or as the plates are digitize, not after completion of a plate digitization project.

RECOMMENDATION: When transferring plates from their home institution to an archive,

a. the receiving organization should obtain a letter or agreement, on letterhead and signed by Department chair or other designated person of the transferring organization, authorizing the transfer and listing conditions, if any;
b. the storage cabinets and the associated log books and other records should accompany the plates whenever possible; and
c. a catalog of the transferred plates should be prepared, preferably by the donating institution but otherwise by the recipient as soon as possible.

RECOMMENDATION: PARI should be designated as collection point for orphan plates, defined as those plates an observatory holds that are from some other institution, and will arrange for return or file them, as appropriate. Astronomers with plates they no longer need should return them to the appropriate observatories; if an observatory is unwilling to accept them, the astronomer should contact PARI about archiving.

6. It was asked to whom the recommendations are aimed.
   a. Making “recommendations” to certain entities may be illegal and one should make “suggestions” instead.
   b. A report on this workshop must be prepared for the sponsor, the National Science Foundation. It is expected the report will be distributed to members of the astronomical community as well.
   c. Osborn and Tritton agreed to prepare drafts of the formal of the recommendation with an indication of to whom they are made for discussion at the final session.

SESSION III: Discussion of practical aspects of photographic record preservation
Question: What should be the recommended protocols for preserving the photographic data?

1. The goals of an archiving initiative should be, in order, to (1) create web-accessible catalogs of available images and spectra, (2) place links to the data in the CDS, Virtual Observatory and other databases, and (3) have digital images of the plates available through the web.

2. Plate storage:
   a. Placing plates vertically in metal cabinets is the usual way to store them. They should not be packed too tightly, especially if the envelopes have glued seams. For large plates, there should be spacers every 12-inches (40-cm) to prevent a large weight on end plates.
   b. Old envelopes can cause problems (envelope glue can cause stains, envelopes can glue to plate, envelopes fall apart and information lost). Tyvek (especially seamless) envelopes help but their long term effects on plates are not yet known (Tritton: the Tyvek envelopes used in Scotland are disintegrating due to the humidity being too low).
   c. Plates should be archived indefinitely, even after they have been digitized.
      - While scanning should be done, the plates are the actual records with the digital images being records of the records; the digital image may stimulate one to want to examine the original.
      - Hudec: it is important to save the physical plates, not just an electronic version of the image because some research needs all three dimensions: x, y and depth in the emulsion.
      - Plates are estimated to have lifetimes of over 300 years, so they may outlast digital storage. In any case, digital storage needs to be maintained and updated as technology changes.
   d. Good environmental control (temperature, humidity, air cleanliness) is important.
      - A study at Virginia showed plate defect can change over time.
      - Fungus can be a problem.
      - Storage where exposed to pollutants (e.g., near an oil furnace) will cause problems.

   e. Evaluation of PARI's current storage conditions:
      - While better environmental control would be preferable, the current conditions are better than at many locations.
      - It was noted that the better plate vaults were built in early 1960s, but earlier most plates were stored poorly and many are still in good condition.
      - The general advice to PARI was to make what improvements that can be made, as funds permit.

3. Restoration. For important plates, problems need to be handled before scanning.
   a. Broken plates: a common fix is to place the pieces between clear glass plates.
   b. Stains: a citric acid bath will remove some stains and markings. It does not seem to affect the emulsion.
   c. Poorly processed plates (not properly fixed or washed): improper fixing can be helped with bio-urea and plates can be re-washed to limit further deterioration.
   d. Bathing and washing require darkroom facilities, which are now uncommon. Note: PARI still has a darkroom.

4. Metadata: what information should be available in on-line catalogs?
   a. While one would like as much information as possible in the catalog, but in preparing one there is the conflict between entering more data and processing more entries. This is a significant factor with limited manpower.
   b. It was agreed that the essential information in a plate catalog is:
      - Basic collection information: Telescope, its geographic coordinates (note if telescope was moved), plate series
      - Plate listings: sequence number, equatorial coordinates (and equinox), object (when important, as for spectra), date and time of exposure (type of time), length of exposure.
      - Putting the basic information in all records is preferable.
      - Time should be listed as accurately as possible.
   c. Other useful information to be included if possible includes the emulsion type, filter, if there are multiple exposures, size of the plate and covered field (when applicable).
   d. It is preferable if catalogs are ASCII text
   e. It is preferable if right ascension and declination appear on the same line (to assist "cut and paste)."
   f. Catalogs are not useful if they are not readily found. They should be tied to Vizier and if appropriate to the Wide-Field Plate Database (WFPDB).
   g. It would be best if a standard format for catalogs could be developed. This should be one for which entering the data is easy.
   h. Redundancy in the archived data, either the searchable catalog or a back-up one, is useful (an example: exposure length plus times of start and end of exposure.

RECOMMENDATION: Catalogs of plate collections that are produced should include at a minimum the plate number (and observatory series), equatorial coordinates (equinox), object (when needed), date and time of exposure (type of time), length of exposure.

a. Other useful information includes the emulsion, filter, if there are multiple exposures, size of the plate and covered field (when applicable).
b. When preparing catalogs, it is best to enter all the information at first, rather than planning to go back and complete entries.
c. On-line catalogs should be tied to Vizier and associated with the Wide-Field Plate Database (WFPDB) if appropriate.

5. Other records: digital copies of the following should also be available: observing log book pages (ADS is adding some observing log books to their database), plate envelope information, markings on plates before they are cleaned for scanning.

6. Digitization
   a. There was no consensus on what is as acceptable resolution for digitizing. What is acceptable depends on the images on the plates (e.g., what are the size of star images or width of spectral lines)
      - The Harvard scanning project uses 11 micron pixels, 12 bit.
      - A guide is grain size for various ISO numbers: ISO 100 – 12 micron, 400 – 19 micron, 1000 – 26 micron.
   b. Plates need to be clean and dust free for digitizing. Tsvetkov: can use an air airbrush and compressed air will remove moisture.

SESSION IV: Discussion of other initiatives to preserve photographic observations

Question: What can be learned from other plate preservation initiatives?

1. A number of the workshop participants have been involved in projects to convert photographic data to digital records. They were asked to provide brief reports, mentioning what has been accomplished, what protocols and priorities were adopted, how the project was supported financially, and in retrospect should things have been done differently?
2. Reports were given on the following projects (those reporting are in parentheses; notes from the reports are given in Appendix D):
   a. Harvard College Observatory DASCH project (Doane, Mink, Simcoe)
   b. Maria Mitchell Observatory project to digitize the plate collection (Strelnitski)
   c. Royal Observatory Edinburgh archiving project (Tritton)
   d. Wide-field Plate Database and European preservation projects (Tsvetkov)
   e. Italian and Vatican Observatories' plate digitization project (Bucciarelli)
   f. DAO Spectroscopic Plate Center (Griffin)
   g. University of Virginia archiving and scanning project (Lake, Lee, Patterson, Sallans)

3. The reports were followed by a discussion of what can be learned from these projects.
    a. The Harvard specialized scanner is excellent, but there are also many commercial scanners available. Some seem adequate but scan to scan variations are seen. Use the best scanner you can to avoid having to re-scan later.
    b. In scanning, there is a trade off between scanning resolution and time to scan. Decide on scanner characteristics based on the specific collection and intended use: There are different requirements for astrometry, photometry, spectral analysis, true archival scanning (capturing everything on the plate which requires grain-sized resolution), etc. Rees: for astrometry the guiding principle is 7 pixels across the smallest size you want to measure.
    c. There is also a trade off between quality and cost. While it is best to do as well as you can initially, true archival scanning will be very expensive and time consuming. One can consider lower resolution quick-look scans. These are quicker to obtain and produce smaller files that are easier to handle (e.g., download, put on servers) but usually require plates of interest be rescanned for scientific use ("scan on demand").
    d. It is preferable if the image file format is FITS, the astronomical standard. Tsvetkov: there are drivers that allow FITS output.
    e. Decide on scanner characteristics based on the specific collection and intended use: There are different requirements for astrometry, photometry, spectral analysis, true archival scanning (capturing everything on the plate), etc.
    f. Some archival work is labor intensive and workers are hard to obtain. Worker shortage has usually been addressed through volunteers (often retirees).

SESSION V: Discussion of how to finance plate preservation (3:45 – 5:00 pm)
Question: How should the plate preservation initiative be supported?

1. The group first tried to identify what is essential for a photographic data archive, what else would be desirable, and the associated costs. Considered essential were:
    a. Utilities. The storage environment needs some control. For PARI, it costs about $1000/month to operate Building 4, where the plates are stored.
    b. An archivist (or principle investigator). Someone must be in charge of the project that can make needed decisions, knows what the archive has and why it is important and can answer questions. Without someone who knows what they are doing it would be difficult operate an archive and make progress. Can this be a volunteer?

c. Physical infrastructure and equipment. There have to be storage cabinets, computers for cataloging, at least some type of scanner (showing the plates are important for science is important is seeking funding).

2. If there is to be a digitizing project the following it was also considered essential to have software support (a person), technical support (for IT and scanner issues) and scanning support (someone to do the scanning).
   a. Scanning projects are eventually completed, so their costs are not forever.
   b. Harvard projects 8-10 people full-time for five years to compete their digitization project.
   c. Could use several scanners to reduce the time waiting for a scan to complete. Someone mentioned that 200,000 photographs were digitized in four years using six scanners.
   d. The first steps should be inventorying and cataloging so that one knows what the strengths and potential of the collection are.

3. The identified costs suggest the target budget should be about $250,000 per year for an active archive engaged in digitization. This includes salaries for three staff (archivist, software, technician) plus funds for utilities and equipment. For just maintaining the plates and cataloging perhaps $10,000 per year is sufficient with work done by volunteers.

4. The discussion turned to how to obtain funds to support an archive.
   a. For a successful proposal for funding one needs to be able to provide examples that show the plates are important for good science. It follows that in order to seek funds one needs to know what parts of the collection are important to digitize.
   b. Some potential sources of revenue were proposed and considered:
      - Support from the federal government or state government.
      - Private support.
      - There are organizations that support making data available on-line and others that support preserving historical records. Different aspects of the archiving may have different sources of support.
      - Fundraising and an eventual endowment.
      - Tie plate scanning to another (well-funded) project, such as a spacecraft mission or large ground-based survey. This leveraging has been done by the Naval Observatory.
      - Directed appropriations (earmarks). These are dangerous as they may kill chances for other funding in the future.
      - Fees for use of the archive or services (e.g., providing scans of selected plates)
      - Sell memorabilia. For example, spare copies of the POSS prints could be sold.

c. Most funding sources are not keen on providing funds operating expenses. Sharp: government agencies such as NSF will not fund new on-going programs, as for NOAO, so getting PARI designated, as a national facility will not lead to federal underwriting.
d. The Harvard and Lowell experiences with funding their archives were noted as good examples.
   - Harvard has operated an archive for over 100 years and has an independent endowment to support it.
   - Archiving at Lowell has focused on history, e.g. photographs of people and telescopes. They are active in fundraising at local to national levels (e.g., Friends of Lowell), and this requires a fundraiser and also a financial administrator (much bookkeeping is required).
e. Sharp: Because NSF will not now fund on-going projects, don't rule it out.
   - One can request more funding every five years, but must re-justify the importance of the project.
   - NSF is interested in archiving data, especially data produced with NSF funding.
   - Presently the agency seeks to demonstrate a commitment to Presidential goals by closing down some projects.
f. In general, there is not a single solution to the funding problem and plate archives need to explore a wide range of potential revenue sources.

RECOMMENDATION: To assure the financial resources needed for archiving it is necessary to identify and explore every reasonable source of revenue.

g. Suggestions for PARI were:
   - Consider a full-time development person.
   - Seek to obtain an endowment to cover the archives core expenses.
   - The first task should be to produce a catalog or what the collection contains. A catalog would not only be of interest to researchers, but also would permit one to decide what should be scanned. Note: summary graphics for a catalog are useful: plots of number of plates each year, the sky coverage, etc.
   - Do a pilot study to demonstrate feasibility before starting on wholesale scanning.

5. Finally during this session the group discussed how to involve the astronomical community in supporting the archiving initiative, and thus in making funding available. It was agreed that the rationale for preserving the photographic record needs to be widely disseminated. And one must be able to answer the question "What's in it for me?"

a. There are compelling scientific reasons, but the importance of time-domain astronomy must be sold. It may be important to get a greater diversity of people involved.
   - Data mining is becoming more important in astronomy. The photographic record represents a huge database that has been mined only to perhaps 0.01%.
   - The nature of the time variations of objects is important astronomical data. Doing time-domain astronomy, however, is not easy because of the need to locate comparable observations at many epochs. Having plates at one location, particularly plates that have similar characteristics, makes this easier. The photographs extend back considerable the time range that can be used.
   - It is important to identify scientists that can carry out interesting time domain astronomy projects. Some potential projects may be more important than most of those currently being funded.

b. Besides scientific reasons, there are some practical ones.
   - For an institution it will be more cost effective to archive plates at PARI than to build a suitable facility to house plates at an on-campus location.
   - Moving plates to PARI can free up valuable space.

   These cost savings suggest institutions should pay the costs of shipping their plates to an archival center.

c. Some suggested ways to bring the case to the general astronomical community:
   - Have a letter or report on this issue in the AAS newsletter.
   - Publicize the recommendations of this workshop through the WGPAH
   - Prepare (or stimulate the writing of) an article suitable for *Astronomy* or *Sky & Telescope* on what the plate archiving initiative is trying to accomplish.
   - Talk it up – use the personal touch.
   - Bring this issue to the attention of the next decadal study committee, which is presently being formed. If one writes a well-thought-out comment on why plates are important, perhaps you'll be included on a committee.
   - Invite the public to participate in the use of the plates for some scientific project. Galaxy Zoo (http://www.galaxyzoo.org/) is a good model of such public participation.

RECOMMENDATION: The importance to astronomy of these historic data should be brought to the attention of those conducting the next decadal survey and the astronomical community in general.

a. A summary of the workshop should be prepared for the AAS newsletter.

b. A press release related to the workshop should be prepared and released to science-focused publications (e.g., *Sky and Telescope*).
c. The AAS Historical Astronomy Division (HAD) should receive a report on this workshop at their January 2008 meeting and the AAS Working Group on the Preservation of Astronomical Heritage (WGPAH) should discuss endorsing PARI as an astronomical photographic data archive at their next meeting.
d. The IAU or its Working Group for the Preservation and Digitization of Photographic Plates (WGPDPP) should be encouraged to recognize PARI as an astronomical photographic data archive.

SESSION VI: A national plan for photographic data preservation: recommendations

Question: Can PARI be recognized as the national photographic plate repository and the preservation plan be built around this decision?

To ensure that all topics would be covered, it was decided to continue the discussions during an unscheduled after-dinner session. The initial topic listed for this session, i.e. if PARI is seen as suitable for a national plate repository, had been discussed in Session II when it was agreed that PARI was indeed suitable. Consequently, the focus was on some practical considerations of PARI being a national plate repository.

1. The first question was whether PARI should be the archive to hold all types of photographs, for example spectroscopic data or photographs of solar system objects, or concentrate on direct image and objective prism plates.
   a. A system of astronomical photographic archives each with a different specialization, similar to how libraries specialize in certain areas, would be good.
      - Specializing means the archive can have the relevant expertise (one can't specialize in everything).
      - Mt. Wilson Observatory has established an extensive solar photo archive by digitized its solar photos (http://www.astro.ucla.edu/~ulrich/MW_SPADP/index.html). Could this be the solar repository?
      - Lowell has over a million images of solar system objects (e.g., planetary patrol, minor planets). Could Lowell be the repository for plates of solar system objects? Skiff: funding for this has dried up.
      - DAO has been suggested as a spectroscopic plate archive, but funding is limited.
   b. While there may be other plate archives (e.g., Mt. Wilson, Lowell, Harvard, Lick, Yerkes), that does not mean they want to add plates. Most do not want to invest much in archiving activities. Gates: Lick has no interest in taking others' plates.

c. The feeling was that PARI should focus on direct and objective prism plates, but should accept other types if they are not wanted and in danger of being discarded.
   - It was pointed out that PARI has already accepted the 30,000 Super-schmidt meteor project films from Harvard.
   - If the number of moon, sun, etc. plates is small it is probably better to keep a collection together than to break it up with some plates at PA-RI, some at Lowell, and others elsewhere.
   - If everything were to be sent to PARI it would be overwhelming.
   - Cline: PARI does not want to compete with other institutions for plates. Our primary focus is to be a long-term repository, serve as a clearing house and to archive unwanted direct and objective prism plates.

   It was agreed that specific decisions on what to accept should be left to PARI.

2. A second question was if PARI should an archive for more than American plates. Those attendees from Europe were asked how they see this - Would there be support for having European plates at PARI ?
   a. The reply was that they hope to set up a pan-European plate repository.
   b. For support the institution must be from the EU member-states. However, these institutions can work with external partners, so perhaps shared ex-penses could be used (e.g., borrowing an archivist from Europe under their monies to help with plates here).
   c. There have been some problems in establishing a European plate center, so perhaps Europe is not be a good place to look for a model.

3. The next item was if an aggressive campaign to have plates archived at PARI should be initiated or use an “if needed” approach.
   a. A number of institutions have contact PARI about plates they no longer want. This suggests there are plate collections in danger.
   b. A goal should be to rescue threatened plate collections but given the present lack of funding and limited available personnel and time, endan-gered collections will have to be handled on a case-by-case basis.

4. The group considered the issue of whether plates should be placed on long-term loan or grant PARI ownership of them. PARI’s preference is for owner-ship (would then have copy rights), but there can be legal issues (e.g., are gov-ernment documents so ownership can not be transferred). The consensus was that one standard policy is unrealistic. PARI should state its preference and then negotiate as necessary, obtaining a letter of transmittal that details the ar-rangement.

5. Next was a discussion of how to have PARI officially recognized as the national plate repository. Whether it should be recognized as the National Plate Repository or a national plate repository was left unresolved. Steps toward recognition will involve the AAS and the IAU. For the AAS, the WGPAH can make recommendations and we will request that this body discuss endorsing PARI as an astronomical photographic data archive at their upcoming meeting in January.

6. In ending this session, the group endorsed the following priorities for the photographic data preservation and archiving initiative:
   a. The general priorities should be acquiring plate collections before they are lost, preparing searchable on-line catalogs of the plates, digitizing important data sets and making them available to the astronomical community.
   b. Some specific actions should be follow from this meeting are:
      - Efforts will be made to have the plate center at PARI developed as a plate archive and clearinghouse for orphan plates.
      - Observers holding plates they no longer will be encouraged to return them to the home observatories or to PARI.
      - A report on this meeting will be prepared for the AAS newsletter.
      - A press release about the meeting will be prepared and sent out to scientifically-focused media.

7. The group was reminded that the closing sessions will involve a review of the adopted recommendations and the assignment of responsibilities for approved actions. Most then relaxed with a movie and popcorn.

DAY 3: SATURDAY, NOVEMBER 3

SESSION VII: A national plan for photographic data preservation: recommendations II

Question: What should be the archiving standards?

The group continued the discussion of the practical aspects of photographic data preservation. The topic was identifying standards for archiving. It was stressed that these should be *acceptable* standards, not ideal. ones. Some of this had been discussed in Session III.

1. Plate storage:
   a. The American National Standards Institute has published standards for plate storage (for sale at http://webstore.ansi.org/RecordDetail.aspx?sku=ISO+18918%3a2000).

b. As a general rule: store vertically in metal cabinets, not be packed too tightly and with spacers every 12-inches for large plates (see Session III); use acid-free envelopes; maintain an environment with temperature between 50° and 74° F, humidity around 35% and no large fluctuations; avoid ultraviolet light, for example fluorescent lamps.
c. It was noted that many observatories do not have good storage and the conditions at PARI are better.
d. PARI was judged to meet minimal standards now and is moving toward improving. PARI has metal shelves, temperature 65° to 70° F and humidity 35% with slow rate changes, back-up power and plans for filters and positive pressure to control dust and air quality. The floors are 7 inches of reinforced concrete on top of granite. The main concerns were the carpeting, mold from the recently acquired meteor film items, and the sprinkler system. The latter is required for insurance purposes but has the potential causing water damage. It was suggested that the storage cabinets somehow be protected from water (from either the sprinklers or broken plumbing on the floors above).

2. On-line catalogs: essential is basic information about the plate series (telescope, its geographic coordinates), plate number, equatorial coordinates, object (if important), date and time of exposure, length of exposure. Included if possible emulsion type, filter, if there are multiple exposures, size of the plate and covered field (when applicable).

3. Log books, plate envelopes and other records: One should employ standard archival standards. Joe Anderson of AIP is a resource. PARI's scanner was judged adequate for paper records. Doane: there are programs that allow one to scan the old envelopes and print the information on new ones.

4. Digitization: No single standard for resolution can be specified, as this depends on the plates and purpose of the digitization. In general, digitize at the highest resolution one can, with 11 – 30 microns being typical. One may need to digitize in tiles given the large file sizes that result. Plates must be cleaned before scanning, but any markings on plates are important and must be recorded before plates are cleaned. PARI's scanner is adequate to show what is on a plate but may not be suitable for archival digitization. Commercial scanners can smear the image, and Griffin showed the large differences seen when the same image is scanned with different scanners. Cline suggested that there be a working group formed to develop standards.

5. Use and users of plates:
   a. Policies on use of plates in an archive should be set by the plate archives management, and may depend on specific cases. Having an advisory committee should be considered.

b. In general, avoid loans of plates as it is very difficult to get them back. Scans of plates can be provided if only a few are requested. If many plates are to be used, the researcher should visit the archive or arrange to pay for the scanning.
c. While gloves should be used when cleaning plates, they are not recommended when using plates as it is then easier to drop them.
d. There should be frames to keep the emulsion side of plates from touching surfaces, such as light tables when the plates are bring examined visually.
e. Scans of a few plates

SESSION VIII: Disseminating the workshop findings and recommendations
Question: What are the tasks and who is assigned responsibility for them?

This session dealt with identifying the next steps to be taken and assigning responsibilities for carrying them out. A working draft of the recommendations that had been adopted was distributed.

1. The first topic was the preparation of a formal plan for preserving astronomical photographic data.
   a. This was the goal of the meeting's organizers, as reflected in the Workshop title.
   b. With the discussions completed, it was agreed that it would be premature to try and develop a formal plan at this time. It was felt better that another meeting on this topic be organized in one or two years. PARI would then have gained some experience in their archiving, which could be reviewed, and progress on the adopted recommendations could be assessed. A recommendations to do this will be added.

RECOMMENDATION: PARI is encouraged to organize regular meetings at which the progress of plate archiving can be assessed.

2. Each of the recommendations was discussed and assignments made, when applicable. The following forms of the recommendations reflect suggested changes, both during the discussions and subsequently.

A. Recommendations to the astronomical community

Recommendation 1. Given the eventual need for a database of astronomical photographic data, a census of North American astronomical photographic plates should be carried out. This would be done by conducting a survey of observatories and other institutions known or expected to hold plates.

a. The committee charged with this (which may be expanded to cover all aspects of a survey): McCluskey, Castelaz, Griffin, Osborn, Patterson
b. Recommended date by which the census should be completed: March 1, 2008
c. Expected release of the survey findings: June 2008 AAS meeting

Notes and comments:
a. Some information to collect: types of plates and numbers, date range, current status, long-range plans, use of plates in recent past (study, publications), contact person.
b. Census results should be published on the web and presented at the June 2008 AAS meeting.
c. The survey should be simple to encourage rely and make analysis easier.
d. A committee to conduct the census was formed and charges with developing the wording, the topics, compilations procedure, etc. The draft survey should be circulated to this group for comment.

Recommendation 2. Given its extensive available physical space and support facilities, PARI's Astronomical Photographic Data Archive (APDA) should be developed as an astronomical photographic data repository.

Recommendation 3. PARI should be designated as collection point for orphan plates, defined as those plates an observatory holds that are from some other institution, and will arrange for return or file them, as appropriate. Astronomers with plates they no longer need should return them to the appropriate observatories; if an observatory is unwilling to accept them, the astronomer should contact PARI about archiving.

Notes and comments:
a. The above version is a combination of former recommendations 3 and 4, as suggested in the discussion.
b. The term "orphan plates" has been defined, as suggested in the discussion. Observatories and observers will be asked to provide a list of what that hold for follow-up by PARI.
c. Once contacts from institutions not represented at the workshop are identified, establish a contact list (a listserv?) to widen the group involved in this project.

Recommendation 4. A special session on "time-domain astronomy" should be proposed to the American Astronomical Society for the January 2009 meeting.

Notes and comments:

a. The AAS Working Group on the Preservation of Astronomical Heritage (WGPAH) will be asked to recommend this to the AAS (McCluskey: Working groups are encouraged to make recommendations).

Recommendation 5. Institutions with collections of astronomical photographic plates are encouraged to compile a computer-based catalog of their holdings.

B. Recommendations to those engaged in plate archiving efforts

Recommendation 1. Those engaged in plate archiving should emphasize the importance of this work for "time-domain astronomy research" well as for ensuring the preservation of historical records.

Recommendation 2. When transferring plates from their home institution to an archive,

a. the receiving organization should obtain a letter or agreement, on letterhead and signed by Department chair or other designated person of the transferring organization, authorizing the transfer and listing conditions, if any;

b. the storage cabinets and the associated log books and other records should accompany the plates whenever possible; and

c. a catalog of the transferred plates should be prepared, preferably by the donating institution but otherwise by the recipient as soon as possible.

Notes and comments:

a. The above version is a combination of former recommendations 2 and 3, as suggested in the discussion.

Recommendation 3. In general, plates from the same origin should be stored together. Subsets of a collection may be kept separately, but should be cataloged so it is clear where each portion of the collection is housed.

Notes and comments:

a. If a collection is scattered there must be a master catalog of where the various portions are.

b. It is very difficult to keep track if plates are not in one's possession.

Recommendation 4. The importance to astronomy of these historic data should be brought to the attention of those conducting the next decadal survey and the astronomical community in general.

a. A summary of the workshop should be prepared for the AAS newsletter.

b. A press release related to the workshop should be prepared and released to science-focused publications (e.g., Sky and Telescope).
c. The AAS Historical Astronomy Division (HAD) should receive a report on this workshop at their January 2008 meeting and the AAS Working Group on the Preservation of Astronomical Heritage (WGPAH) should discuss endorsing PARI as an astronomical photographic data archive.
d. The IAU or its Task Force for the Preservation and Digitization of Photographic Plates (PDPP) should be encouraged to recognize PARI as an astronomical photographic data archive.

Notes and comments:
a. The astronomical community needs to be interpreted broadly. Institutions in Asia, Australia, Europe, South America, and South Africa have significant plate collections. There are many American plates in Europe. Griffin and Tsvetkov will work on bringing the role of PARI in this issue to the attention of the European astronomical community (there is an appropriate meeting in November).
b. The summary report on the Workshop will be prepared by Osborn, Castelaz, Simcoe, and Robbins. All are encouraged to send any of these and e-mail with comments on what should be included.
c. Doane and Cline agreed to work on the press release.
d. Griffin will work on bringing the matter to the attention of the IAU.
e. McCluskey will coordinate the actions of the WGPAH.

Recommendation 5. Catalogs of plate collections should include as much information as necessary to adequately describe their content. For direct plates, records should conform to the Wide-Field Plate Database (WFPDB) template; spectroscopic ones should follow the template developed by the IAU Working Group for Spectroscopic Data Archives.
a. Catalog information for direct plates should include at a minimum the plate number (and observatory series), equatorial coordinates (equinox), object (if relevant), date and time of exposure (time system used), and length of exposure. Other useful information includes the emulsion type, filter, plate size, area photographed, and if there are multiple exposures.
b. Catalog information for spectroscopic plates should include the plate number (and observatory series), equatorial coordinates (equinox), object, date and time of exposure (time system used), length of exposure, approximate central wavelength and dispersion. Other useful information includes the camera focal length, emulsion and grating characteristics.

c. On-line catalogs should be available through Vizier and associated with the Wide-Field Plate Database (WFPD) when appropriate.

Notes and comments:

a. The recommendation has been revised in response to the discussion and later comments. In particular, subsections b has been added to provide specificity for spectroscopic plates.
b. Removed from the recommendation is the observation that, when preparing catalogs, it is best to enter all the information at first, rather than planning to go back and complete entries.

Recommendation 6. The archiving of both photographic and paper records should adhere to accepted archival standards as far as possible.

Recommendation 7. In order to acquire the necessary financial resources needed for archiving it is necessary to identify and explore every reasonable source of revenue.

C. Recommendations to PARI

Recommendation 1. Given its available physical space and support facilities, PARI's Astronomical Photographic Data Archive (APDA) should be developed as an astronomical photographic data repository.

Recommendation 2. PARI should carry out a study of what will be needed to operate APDA in a professional manner. This would include personnel (e.g., an archivist) and the financial resources.

Recommendation 3. PARI should consider forming an advisory group charged with providing advice on photographic archiving issues.

Recommendation 4. PARI should work on establishing an endowment for plate archiving.

Recommendation 5. In order to attract funding, a priority for PARI should be to have some demonstrated uses of the plates it has in astronomical research.

Recommendation 6. To increase the plate archive's visibility to the astronomical community, PARI's website should have a direct link from the main PARI page to the plate archive portion (it presently is not easy to locate on the web site).

Recommendation 7. PARI is encouraged to organize regular meetings at which the progress of plate archiving can be assessed.

Notes and comments:

a. For visibility, a Wiki site might be set up on plate preservation. Everyone could then contribute to the content.
b. Cline: PARI is a public non-profit organization. As such, donations by both individuals and companies are afforded significant tax breaks.
c. It may be too early in the process to form an advisory committee.

3. POSSIBLE PRIORITIES FOR PHOTOGRAPHIC DATA ARCHIVING

PRIORITY I (keep and eventually scan)

- Wide-field, deep direct plates ("wide field" needs to be defined)
- Wide-field, deep objective prism plates ("deep" needs to be defined)
- Long series of plates on variable objects (e.g., magnitudes of QSO's, spectra of variable stars, globular cluster variables)
- Plate series on special objects (e.g., Eta Carina, Crab Nebula)
- Plates of one-time events (e.g., novae, solar eclipses)
- Plates of definite historical interest (e.g., discovery plate of Pluto)

Priority II (keep if convenient)

- Plates of galaxies, star clusters, and other multi-star objects
- Plates of nebulae
- Plates of possible historical interest (e.g., plate marked with notes by a famous astronomer, first plate taken by Palomar 200-inch)

Priority III (of little importance)

- Double star plates
- Parallax plates

Priority IV (should be discarded or sold)

- Focus plates, test plates, poorly exposed plates
- Plates used in teaching and for presentations (e.g., lantern slides, positive copies, plates for student laboratory exercises.)

Not fully considered above are spectrum plates and plates of solar system objects. Should these be in a separate archives?

Possible priorities for spectra:

- Spectra of one-time events (e.g., novae, unique occurrence of a line)
- Spectra of peculiar objects (e.g., Eta Carina)
- Long series of spectra of variable objects
- High dispersion spectra
- Other spectra

Possible priorities for plates of Solar System objects:

- Photographs and spectra of comets
- Plates of the sun and sunspots
- Astrometric plates of unusual minor planets
- Astrometric plates of planetary satellites
- Astrometric plates of planets and common minor planets
- Photographs of the moon

Summary

Finally we like to stress that with this initiative we hope will start the project of preservation of American Astronomical photographic plate collections. The major role in this project will play the Pisgah Astronomical Research Institute. More that 50000 plates are stored there. With this project we hope to cover the most valuable plate archives in the world and to provide on line access to the 1000000 plates - about the 50% of all existing astronomical plates.

Acknowledgements

We would like to thank the PARI authorities and colleagues for the kind hospitality. The Support of the PARI workshop by the US National Science Foundation is gratefully acknowledges. Alexander von Humboldt Stiftung and the project 436 BUL 113 between BAS/DFG support this work also.

References

Osborn , W.: 2007 http://www.pari.edu/library/astronomical-plate-center/workshop/

Tsvetkov, M.: 2006, Virtual Observatory: Plate Content Digitization, Archive Mining and Image Sequence Processing, ISBN-10 954-580-190-5, p. 10.