

JOINT COMMISSION VIII

Archiving of Current Observational Data
(including Solar System Data)

Commission 5 with 6, 10, 15 16, 20, 27, 29, 40 & 44
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Due to the fire which broke out at the San martin Cultural Center, it was not possible to hold this Joint Commission Meeting. However, in view of the importance of the subject, the IAU General Secretary agreed that the texts should nevertheless be published. This decision was much appreciated by all concerned.

ARCHIVING OF DATA IN POSITIONAL ASTRONOMY

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Astrometry is the oldest of the astronomical endeavors. Indeed, we still have the observing journals of Galileo, the journals of Flamsteed, and those of most of the other old transit-circle astronomers. We have most of the early photographic plates taken for the astrographic catalog project, and almost all the parallax plates. However, as technology progressed, we have become somewhat less precise in recording what we did. It is for this reason that this joint meeting was called: to impress on the modern astronomer that, in general, he only extracts a fraction of the information from his observations, and that these observational data may, in the future, provide an invaluable source needed for the progress of the science.

1. The Astrographic Catalog project was the first large international effort in science, conceived at the end of the last century, and eventually leading to the formation of the International Astronomical Union. Most of the photographic plates were in good shape, but the measurement accuracy in the printed AC is variable. Should these plates be remeasured with modern measuring machines? Most of the plates have indeed been archived, but some are in remote observatories which do not want to give them up. Some were destroyed in wars or fires, and in some you find the stars at the bottom of the box, which contains blank plates; the emulsion has fallen off. Re-measurement or at least re-reduction will help immensely in proper motion studies. Lesson 1: Never throw your plates away unless you have measured every object on every plate with an accuracy well surpassing what can be gotten out of the emulsion - and perhaps not even then. Another important aspect of the archiving process is to record the intermediate steps, such as the derived plate constants and the catalogs used to derive the plate constants. Sometimes it is difficult to find what was used in order to reduce the raw measurements to a final catalog. The reference stars that provide the plate constants now have very much better positions than they did at the time the catalog was derived. There is, therefore, even in a project that was started 100 years ago, a clear need to look at original data; make sure they are archived!

2. Although transit-circle astronomers recorded a considerable body of information regarding their observations, it is still very hard to find out what was used in the older and even the somewhat more modern transit-circle reductions. The transit-circle astronomer often considers the O-C's as the observational data, but they are not, unless one records exactly what correction for polar motion, nutation, refraction, etc., went into the "observed" quantity, or in the so-called "calculated" apparent place. Those who are

reanalyzing the best of the older transit catalogs to extract the very best positions for the improvement of the proper motions in the fundamental reference frame have great difficulties knowing what the data really mean in fine detail. Lesson 2: Archive the very original measurements, not after the first reduction, and include all ancillary data. However, modern methods raise a problem. We now put an image dissector or a CCD array in the focal plane. Do we record all the pixels--Gigabytes worth--or should we derive the centroid of the stars as we go and only keep the positions and the intensities of the stars? What if after three years we find a software glitch or invent a much better algorithm? Lesson 3: Keep the pixels if you digitize, unless you are completely confident of yourself that you extracted all the information and did it correctly.

3. Almost all parallax plates are archived, and are apparently well catalogued. It is clear that a remeasurement of the old plates with new machines might well improve the results, but will there be anyone who will go back and remeasure and re-discuss the old parallax data, a monumental task? What if the old measures are superseded? HIPPARCOS will measure many of the parallaxes obtained earlier with ground-based instruments, with much greater accuracy. The total number of parallax plates in the world is somewhere between 300,000 and 500,000. I recommend that they be left archived and their whereabouts made known. After all, this is a history of the night sky and it might be useful for other purposes. Lesson 4: Even if apparently superseded, do not destroy old photographic plate material.

4. I want to briefly touch on the VLBI astrometry that has been done by a number of institutions over the last 10 to 15 years. The VLBI astrometric catalogs have internal accuracies of 1 milliarcsecond (mas), but catalog differences are in the 3 mas range. Fortunately, the VLBI correlator managers all archive the first results of the correlation, the interferometer fringes, if you will, with all pertinent auxiliary data attached. We can thus go back to the original data and re-reduce all observations using a consistent set of parameters. Lesson 5: Keep the original data base, and make sure it is in the hands of experts.

5. The situation in the double-star field is very good. The double-star observation catalog, listing every single observation reported in the literature, is a very complete data base. It is currently being completed by making sure that all available older measurements, as well as new ones for which unfortunately the journals no longer give space for publication, are included.

6. Conclusion. Archiving in positional astronomy is in relatively good shape. Astrometry has good archives because of the long-term nature of many of the projects. Double stars and proper motions require comparison of 100 years or more worth of data. Without proper archiving, we would not be where we are today, but we must keep that up. We cannot stop archiving just because the pixels come in with alarming speed. When we can afford CCD's and computers to take our data, we can afford the purchase of specialized archiving devices: CD-ROM, 8-mm tapes, optical disks, etc. The astronomer who feels he cannot afford the means to archive his data does a major disservice to the science. Lesson 6, and the final all-important lesson: The cost of archiving must be included in the cost of all astronomical projects.