EXISTING DATA CENTERS AND THEIR FUTURE ROLE

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Two IAU data centers, one at the Lowell Observatory and the other at Meudon, were organized in the early 1960s for the purpose of establishing a collection of planetary data and images accessible to all qualified scientists. These centers trace their origin to an IAU resolution sponsored by Commission 16 in 1961. Ours at the Lowell Observatory, known as the Planetary Research Center, was also recommended by the U. S. Lunar and Planetary Missions Board and by the U. S. Space Sciences Board Panel on Earth-Based Planetary Astronomy. Since its inception, our Center has been supported by a grant from NASA Headquarters.

As far as ground-based planetary observations are concerned, the principal resource material not already available in published literature was initially in the form of planetary photographs. Our collection (Baum, 1973) now includes about 118,000 different image sequences, with a total of nearly two million planetary images. This ground-based collection is, of course, now being augmented with copies of spacecraft images.

On the basis of our experience, we believe that a data center will succeed best if it is operated by a staff that is actually engaged in its own research. Guest investigators often need more than a data library or a plate collection. We find that they need to confer with (and sometimes collaborate with) experienced colleagues. And if there is a resident research staff, there will also be instruments and computers for the assessment of data. At our Center the use of the collection by guest investigators alone would tend to utilize less than its full potential. In an effort to derive more science from our (and NASA's) investment, the emphasis of related work by our staff therefore shifted

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long ago from the enlarging of the collection to the extraction of scientific results from it.

Astronomical data centers are likely to become increasingly involved with images, whether they wish to or not, because the conventional distinction between images and data is rapidly disappearing. In the past, an astronomical image was typically represented by a distribution of photographic grains on a plate or film. Today, it may alternatively be represented by an array of numbers that can be processed in a computer and stored on magnetic tape. Moreover, a digital image can be translated into a photographic image, and vice versa, with relative ease.

A digital image is not necessarily a secondary product created by microphotometrically scanning a photograph. Increasingly, astronomical images are being recorded at the telescope with scan-readout (television-like) detectors, including those that count individual photoevents and thereby provide photometrically linear response (for example, Boksenberg and Burgess, 1972). As dramatically demonstrated by recent Viking orbiter pictures of Mars, a digital camera system (Carr *et al.*, 1976) can also provide images of excellent quality.

It has been suggested that data centers might store digital images in raw form so that users of the centers can apply their own favorite computer processing programs, but there are good reasons for planning differently. This question is of immediate importance for deciding on the storage of recent spacecraft images and also of future importance for ground-based astronomical images as digital methods become more common. A digitally processed image differs from a raw image in somewhat the same sense that reduced data (as stored by a data center) differ from raw data (original observations). Instrument peculiarities and aberrations are corrected for, and calibrations are introduced. This process tends to be rather complex and to require intimate familiarity with each particular imaging system. The best plan will ordinarily be for data centers to store digital images in at least a partially processed form.

In summary: (1) An astronomical data center that is only a data library may be less well utilized than one that is also an equipped research center. (2) The digital recording and processing of images seems likely to have a major impact on the future functions of data centers.

REFERENCES

Baum, W. A. The International Planetary Patrol Program: An Assessment of the First Three Years. *Planetary and Space Science* 21, 1511-1519, 1973.

Boksenberg, A., and Burgess, D. E. An Image Photon Counting System for Optical Astronomy. *Advances in Electronics and Electron Physics* 33, 835-849, 1972.

Carr, M. H., Masursky, H., Baum, W. A., Blasius, K. R., Briggs, G. A., Cutts, J. A., Greeley, R., Guest, J. E., Smith, B. A., Soderblom, L. A., and Wellman, J. B. Preliminary Results from the Viking Orbiter Imaging Experiment. *Science* 193, in press, 1976.