

EXISTING COMETARY DATA AND FUTURE NEEDS

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The upcoming return of comet Halley has already now stimulated considerable interest in cometary research. This interest is found not only among astronomers but particularly among physicists concerned with space science and a growing number of chemists.

In order to assist scientists studying comets and their interaction with the interplanetary medium, a report is presented on compilations of existing cometary observations and data and plans for additional publication.

1. "Catalogue of Cometary Orbits"

B. G. Marsden's comprehensive catalogue of cometary orbital elements is being updated in short intervals. This most recent catalogue (1979) lists orbital elements for 1027 cometary apparitions of 658 individual comets observed between 87 BC and the end of 1978. Of these, 275 (i.e., 42 percent) had elliptical orbits ($e < 1.0$). Among them, 113 comets (17 percent) are short-period ($P < 200$ years) and 162 (25 percent) are long-period ($P > 200$ years) objects. Of the 113 short-period comets, 72 have been observed at two or more apparitions, and 41 have been observed at only one apparition.

285 (i.e., 43 percent) have parabolic ($e = 1.0$), and 98 (15 percent) have hyperbolic ($e > 1.0$) orbits. Strongly hyperbolic orbits ($e > 1.0$) are not known. Cometary statistics will of course change as new comets are found and old ones are re-observed.

2. "Physical Characteristics of Comets"

Vsekhsvjatsky's (1967 and later supplements) comprehensive catalogue lists important physical characteristics of comets since -466 (Halley's comet). The cometary apparitions are reviewed separately, and data are given on the apparent motion, observed distinctive features, dimensions and brightness. A short account of the observations is followed by references to the original investigations. The catalogue is being updated.

3. "Atlas of Representative Cometary Spectra"

This Atlas was published in 1958 by P. Swings and L. Haser. It illustrates a great variety of different aspects of cometary spectroscopy, by combining spectra of many comets obtained between 1903 and 1952 with different types of telescopes and dispersion systems, and at various heliocentric distances. In addition, the related laboratory spectra are reproduced. Each plate is accompanied by a short description of the main features, together with the corresponding observational data. An introductory text provides essential information on observational and instrumental factors, a description of the observed cometary bands and the corresponding laboratory spectra.

4. "Atlas Cometas-Viento Solar"

The Atlas Cometas-Viento Solar was published in 1973 by the Observatorio Astronomico of the University of Cordoba (Argentina). It gives isophotometry curves for 13 comet photographs from comet 1963V to comet 1969IX.

5. "Isophotometrischer Atlas der Kometen"

This Atlas consists of two parts and was published in 1979 (Hoegner and Richter, 1979). The first part (2nd edition), contains 11 pages and 90 plates of different comets, the second part has 7 pages and 55 plates.

6. "Atlas of Cometary Forms"

An "Atlas of Cometary Forms" was published in 1969 (Rahe *et al.*, 1969), dealing mainly with structures near the nucleus of a comet. The Atlas contains four sections of pictorial material. In the first section, drawings from visual telescopic observations of the central regions of comets made during the 19th and 20th centuries are reproduced. The second section is devoted to comets for which both extended visual and photographic observations are available. The third pictorial section is the largest portion of the Atlas; in it a large number of photographs of bright comets is displayed. The final section includes photographs of comets for which less extensive photographs of structures in the coma are available.

7. "Atlas of Cometary Spectra"

An atlas of high resolution cometary spectra with supplementary coverage of medium resolution optical, as well as UV-, IR- and radio spectra is presently being prepared by C. Arpigny, B. Donn, F. Dossin, J. Rahe, and S. Wyckoff. In addition to the spectra, a brief general discussion of cometary spectroscopy and extensive references will be included.

8. "Atlas of Comet Halley 1910 II Photographs and Spectra"

With reference to the impending return of Halley's Comet in 1986, a major effort has been made by J. C. Brandt, B. Donn and the present author to collect and study carefully the material obtained at its last apparition. The present capability to make quantitative studies of multi-parameter structural phenomena, as well as the unique opportunity to investigate extensively a bright comet at two subsequent appearances by utilizing the great wealth of observational information gathered in 1910 and correlating it with the material to be obtained in 1986, make this program especially valuable.

The problem in tracking down the original plates, in many instances, proved to be extremely difficult if not impossible. A great number of photographs had been destroyed during the past seven decades through circumstances such as war, fire, or in the course of "cleaning-up" old plates vaults. Others were completely lost, buried somewhere in the archives of older observatories or were in such poor condition that they were completely unusable. However, the significant body of plates that has been obtained proves to be of immense potential in spite of several obvious deficiencies such as lack of calibration and non-uniform background. Original photographic plates or good film copies of such originals have been obtained from the following observatories: Catania (Italy), Cordoba (Argentina), Harvard (USA), Heidelberg (Germany), Helwan (Egypt), Indiana (USA), Kodaikanal (India), Lick (USA), Mt. Wilson (USA), Vienna (Austria), and Yerkes (USA). The first part of the Atlas will deal with historical appearances of Halley's Comet and give reproductions of early sightings. The Atlas should be available in 1982.

References

- Cordoba Atlas Cometas-Viento Solar. 1973, Observatorio Astronomico, University of Cordoba, Argentina.
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