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From the AGE to the electronic IBVS: the past and the future of astronomical journals

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Abstract

Zach launched the first astronomical journals: the AGE and the MC. We will overview the road astronomical journals have covered, from the age of Zach to the present. Some major milestones on this road were the yearbooks, the first journals, the modern (refereed) journals, DTP and the electronic publishing. With the help of a small journal: the Information Bulletin on Variable Stars, we explore the question of open access and possible paths to the future as well.

In this paper we will discuss astronomical journals - following a talk given by us at the Univ. of Szeged in March 2004. The history of the first astronomical journals is discussed in detail by Herrmann (1972), and an overview of astronomical publications in general and journals in particular, can be found in the book "Data in Astronomy" by Jaschek (1989). Here we will focus on the interaction between the development of astronomy and the scientific journals of this field of research. The main emphasis of this paper is on the latest development in electronic publishing. Aspects of electronic publishing are discussed by Boyce (1998) and Heck (1997), early developments are reported by Murtagh and Adorf (1993).

Until the end of the 18th century prevailing forms of publication in astronomy were books and yearbooks. Pamphlets and correspondence provided means for rapid communication of ideas. By that time, however, the number of astronomers had grown to a level where copying and forwarding letters had become impractical. Yearbooks were unable to print news promptly, and early quarterly periodicals of Johann Bernoulli (III.) and K. F. Hindenburg were the first attempts to solve this problem. (The journals of learned societies, like the Philosophical Transactions and the Journal des Scavants, established more than a century earlier, did publish astronomical papers among others, but these can not be regarded as astronomical journals.) It was F.-X. von Zach, the outstanding organizer, who launched the first real astronomical journal, the "Allgemeine Geographische Ephemeriden" (AGE) in the beginning of the year 1798. It was a monthly journal covering the topics of geography and astronomy.

Two years later another journal launched and edited by Zach took its place: the "Monatliche Correspondenz zur beförderung der Erd- und Himmels-kunde" (MC). Together with the "Correspondance Astronomique, Géographique, Hydrographique et Statistique" (CA), Zach's journals served astronomy for nearly three decades. The basic problems necessitating journals were the speed of publication and the number of copies. The other question concerning the first journals was the language of publication. The possibilities at that time were Latin (used in Hell's Ephemerides Astronomicae), later German, French and English. Zach's journals were first published in German (AGE, MC) and then French (CA), but he published letters in other languages too.

The Astronomische Nachrichten (AN) and the Monthly Notices of the Royal Astronomical Society (MN) were the first astronomical journals surviving till the present. In an editorial note MN declares that published papers represent the opinion of their author, not that of the editor of the journal. A paper published in Zach's CA accusing J. Pasquich of forgery, caused serious problems for the editor. It was only much later, in the 20th century, that astronomical journals generally adopted peer review.

The following table lists data of some astronomical journals.

Journal	Year	Editor (first)
Allgemeine Geographische Ephemeriden	1798 - 1799	Zach
Monatliche Correspondenz zur beförderung der Erd- und Himmels-kunde	1800 - 1813	Zach
Zeitschrift für Astronomie	1816 - 1818	Lindenau
Correspondance Astronomique, Géographique, Hydrographique et Statistique	1818 - 1827	Zach
Astronomische Nachrichten	1821 -	Schumacher
Astronomische Abhandlungen	1901 - 1953	Kreutz
Monthly Notices of the RAS	1831 (1827) -	
Astronomical Journal	1851 (1849) -	Gould
Sideral Messenger ->		
-> Astronomy & Astrophysics ->	1892 - 1894	Payne, Hale
-> Astrophysical Journal	1895 -	Hale, Keeler
ApJ Supplement Series	1954 -	
AAS CD-ROM	1993 - 1997	
PASP	1889 -	
Bulletin Astronomique ->	1884 - 1968	
Journal des Observateurs ->	1915 - 1968	
Bulletin of the Astr. Inst. of the Netherlands ->	1921 - 1968	
Zeitschrift für Astrophysik ->	1930 - 1968	
Annales d'Astrophysique ->	1938 - 1968	
-> Astronomy & Astrophysics	1969 -	Pottasch, Steinberg
A&A Supplement Series	1970 - 2000	
IBVS	1961 -	Detre

The peer review process, however, necessarily delayed publication. Journals still printed, however, letters to the Editor, with somewhat shorter delay. In the field of variable star research, the Berkeley GA of the Commission 27 of the IAU launched a bulletin for rapid communication of news and results: the Information Bulletin on Variable Stars. At that time the IBVS promptly copied and mailed short communications submitted by the authors.

Another prevailing problem was the increasing volume of observational material. AN printed its "Astronomische Abhandlungen" series, and later, from 1954 the Supplement Series of ApJ began. As we will see, both the speed and volume problems hindered the publication process further on.

The advantages of journals over the observatory publications were the peer review and concentration of information to a few series. However, the number of existing journals became too large. A number of smaller European journals - in the spirit of the unification process - has merged to form Astronomy & Astrophysics (A&A). It started in 1969 as a refereed journal, and its supplement for printing large tables and large volumes of observational material was launched shortly afterwards. For European astronomers, publishing in the A&A meant larger impact for their papers. The language was English, and by the end of the 20th century even the AN adopted English.

With the increasing volume of published material libraries faced a twofold problem: those of storage and prices. Subscription fees and page charges burdened the research community. The printing of observatory publications was considered expensive - now journals became more costly.

The advent of DTP made it possible for the publishers to cut costs in typesetting, as it became a responsibility of the author. Despite this, the subscription prices kept increasing. Authors, however, were happy: they preferred to have more control over the layout of their own papers, and publication time could be shortened. An excellent typesetting software, TeX (together with the LaTeX macro package) has a vital role in this. Another step toward electronic publishing was electronic manuscript submission (on diskettes or in e-mail, ftp).

Electronic delivery of information to the reader first became possible with preprints and abstracts (together with bibliographic information). A preprint server was set up at LANL in 1991 (the precursor of arXiv, see Ginsparg, 1994) and it started serving astrophysics papers in 1992. The NASA started an ambitious project, the Astrophysics Data System, from which the bibliographic part became successful. ADS started in 1993.

Here we have to make a little excursion, and review briefly bibliographical services. These are essential for journals - although most journals print indices and ToCs, bibliographies are essential for locating information in journals. The table below summarizes historical facts.

Bibliographical services

	Year
printed:	
Lalande, J.J.	1803
Houzeaux, J.C. - Lancaster, A.	1882 - 1889
Astronomischer Jahresbericht	1900 - 1969
AAA	1970 - 2001
electronic:	
ADS	1993 -
CDS	1994 -
ARIBib	1998 -

By the early nineties a need for a computerized bibliographic service for astronomy had emerged. Astronomy and Astrophysics Abstracts was not available electronically free of charge, so ADS became successful promptly. ADS has grown rapidly, and has made real electronic publishing possible. Its search and link service is essential, and it made scanned journals from the pre-electronic age available. There are other electronic bibliographical services: the ARI Bibliographical Database for Astronomical References (ARIBib, which is, unfortunately, growing only backwards now) and the CDS Biblio service. Clearly ADS is the most comprehensive, but we think that maintaining other services is useful.

In 1991 the NASA and the AAS started exploring on-line literature, and launched the STELAR project. As a supplement of its Newsletter No. 62, the AAS made public its visionary ideas of electronic publishing in 1992. First the AAS CD-ROM series was launched a year later. Electronic journals came afterwards. The table below lists journals and features chronologically.

Electronic journals

Journal	Year
AAS CD-ROM	1993 - 1997
IBVS (PostScript)	1994 -
ApJ Letters (HTML)	1995 -
JAD	1995 -
ApJ	1996 -
A&A	1996 -
IBVS (archive material)	1996 -
AJ	1998 -
MN	1998 -
PASA	1999 -
IBVS (HTML)	2000 -
AN	2000 -

Electronic journals offered obvious advantages: fast publication time, low prices, room for large volumes of tables, figures and data. From these, price cuts have not materialized everywhere: some publishers are obviously not interested in cutting their profits. There is an added value in electronic journals: the ease of access and following reference links, the object links, and some truly electronic, unparalleled features like the use of the Aladin Sky Atlas in IBVS, for visualizing photometric sequences (see Holl 2004b).

While IBVS has kept its paper edition, and re-prints issues on CD as well, it is fully available on the Internet, free of charge. Users can choose from printable PostScript and automatically translated HTML versions, the latter offers object links to SIMBAD and GCVS, reference links to CDS Bibliographic Service and ADS, links to arXiv, Vizier, Aladin and GCVS. There are extensive supplementary material - tables, figures and data files - which are not printed on paper. All archive material is on the web, from the first issue in 1961, including observational data originally stored in the IAU Commission 27 archive.

The appearance of the first electronic journals happened a decade ago, and we have been witnessing their evolution since then. Though the idea of electronic journals had been conceived before the WWW became available, the WWW appeared just in time. Journals kept their paper editions, with the notable exception of PASA. The CD supplement for AAS journals was abandoned for the ubiquitous and fast Internet. And a ten-year period was not enough for commercial publishers to overcome some of the difficulties burdening subscribing libraries: the subscription and access authorization process, together with the publishers' policies, are still somewhat chaotic. It makes the conservative attitude of libraries in keeping paper subscriptions understandable. On the other hand, we can say that readers have endorsed electronic journals, and usage of printed journals have decreased dramatically.

The high prices of commercial journals led to the creation of the Open Access movement. Both standards and software were developed for non-commercial publishing (Open Archives Initiative and Open Citation Project), and lobby groups were established (Budapest Open Access Initiative) - references can be found in Holl & Vargha 2003. Services were set up for the Open Access community, like the Directory of Open Access Journals. In our opinion, self-publishing has become viable, and there is no real need for commercial publishers any longer - at least, not at the present price. We think paper editions of journals will remain with us for a while, but will lose their importance. Digital press will make it possible to decrease the number of printed copies without increasing the price considerably.

The future will bring us, undoubtedly, more integration of electronic resources. Electronic journals will integrate into the Virtual Observatory. Linking journals with electronic resources proved its advantages in improving quality (e.g. the number of reference errors has decreased in IBVS by using reference links). While propagating information automatically (from journals to bibliographic services, catalogs or databases) could be perilous, we think it is not only attractive, but necessary. We expect that there will be more data associated to the papers - IBVS will surely have more, and it will have

database-like features (see Holl 2004a). IBVS will keep moving towards semantic formatting (see O'Donnell 1993). In our opinion, electronic journals should (and will) keep peer review, editorial control, but more and more papers will be openly accessible, either at commercial publishers, institutional and thematic repositories, or at non-commercial journals. Journals might not crowd library shelves in the future - but their contents will not be unlike that of founded and edited by F.-X. von Zach.

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