

COMPILATION OF THE HIPPARCOS INPUT CATALOGUE—
AN EXTENSIVE USE OF SCHMIDT SKY SURVEYS

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The ESA Astrometry satellite Hipparcos is due to be launched in early 1988. It will measure very precise positions, parallaxes and proper motions for about 100 000 stars. However, in order to be included in the Input Catalogue, the programme stars should have positions and magnitudes known in advance with respective accuracies of about 1" and 0.5 magnitude. This will require new astrometric and photometric measurements and observations. Sky Survey Schmidt plates will be extensively used, especially for astrometric measurements in the Southern hemisphere.

I - INTRODUCTION.

The European Space Agency Astrometry satellite Hipparcos is due to be launched in early 1988 by Ariane. It will be placed in a geostationary orbit for a nominal life-time of 2.5 years.

It will measure the positions, absolute parallaxes and proper motions of about 100 000 stars brighter than 13 (most of them brighter than 11) with an expected accuracy of 0.001 to 0.002 arc.sec. or arc.sec. by year.

The instrument is an all-reflexive Baker-Schmidt telescope which allows the superposition of two fields, 58° apart, in the focal plane. It is described in detail by J.Y. Le Gall and M. Saisse in this Colloquium.

The general organization and the various aspects of the scientific preparation of the mission have already been presented ("The Scientific Aspects of the Hipparcos Space Astrometry Mission" and references herein; C. Turon-Lacarrieu 1983). Annual reports are issued by the "Project Scientist" in the "Bulletin d'Informations du Centre de Données Stellaires", Strasbourg Observatory (M.A.C. Perryman, 1981, 1982, 1983).

Let us only recall that ESA has charged four Consortia with the scientific aspects of the mission : the INCA Consortium for the Compilation of the Input Catalogue (led by C. Turon-Lacarrieu, Paris-Meudon Observatory, France) ; the FAST and NDAC Consortia for the Hipparcos Data Reduction (led respectively by J. Kovalevsky, Grasse, France, and by E. Høg, Copenhagen, Denmark) ; the TDAC Consortium for the Tycho Data Reduction (led by M. Grewing, Tübingen, F.R.G.).

II - COMPILATION OF THE INPUT CATALOGUE.

Due to the basic principles of the instrument : measurements of large angles (between stars in each field of view), continuous revolving scanning of the sky and photometric detection after modulation by a grid, it is necessary to compile and test in advance the entire catalogue of programme stars or "Input Catalogue". "Compile" means not only interrogate intensively the Strasbourg "Centre de Données Stellaires" (CDS) Data Base, but also perform new astrometric and photometric measurements and observations. Finally, each of the successive versions of the Input Catalogue will be tested by a complete simulation of the mission, in order to improve, from one version to the following, the uniformity of the programme stars spatial repartition, the adequacy of their magnitude distribution and to maximise the inclusion of high priority stars.

The different tasks and the structure of the INCA Consortium are described in C. Turon-Lacarrieu (1983).

205 observing propositions have been received by ESA, including about 800 000 stars (with many redundancies !). They are being merged, following the recommendations and priorities affected by the ESA Selection Committee. They are also being submitted to a careful study with respect to positions and magnitudes knowledge. Indeed a star, even with high priority, will not be kept in the final Input Catalogue if its a priori 1989 position is not known to about 1" and its magnitude to 0.5 magnitude.

These "technical" constraints, imposed by satellite operation and data reduction, will imply new measurements, either by the proposers or by the INCA Consortium, of a large part of the faintest ($m \gtrsim 9$) programme stars, and even of some brighter stars.

III - NEW GROUND-BASED OBSERVATIONS AND MEASUREMENTS.

III.1 - Astrometric observations and measurements.

Following the ESA requirements, 1989 positions should be known with an accuracy higher than 1".5 for all programme stars (r.m.s.) and higher than 1" for more than half of them, evenly distributed over the sky and brighter than $m_B = 10$. Conservative estimates of the number of stars to

be remeasured are the following :

- ~ 4 000 Northern stars, mostly brighter than ~ 9 ,
- ~ 16 000 Southern "faint" stars (9-13),
- ~ 15 000 Southern "bright" stars.

Northern observations will be mainly performed by the Bordeaux Transit Circle, Southern ones by an extensive use of Sky Survey Schmidt plates (Réquième, 1982).

Preliminary tests are being performed :

- comparison between the 3 involved measuring machines (Bordeaux, Hertsmonceux, Leiden) using copies of the same plate (ESO Quick Blue Survey) ;
- comparison and optimization of reduction programmes ;
- comparison between measurements performed with the same machine, using different copies of the same plate and the original plate (by courtesy of the Garching ESO staff).

III.2 - Photometric measurements.

The ESA requirement on magnitude accuracy (for integration time determination) is 0.5 magnitude. Moreover, the knowledge of a colour index is very desirable from a Data Reduction point of view.

It is very difficult to make even a conservative estimate of the number of stars to be remeasured as it strongly depends on the accepted proposals and on the proposers observing possibilities (Grenon, 1982).

Measurements will be made either by multicolour photoelectric photometry (already started) or by Schmidt plate measurements, but these are not well suited with the considered magnitude range. Another possibility being currently tested is the derivation of approximate magnitudes from prism-objective spectra taken for radial velocity measurements (Marseille and Haute-Provence Observatories ; cf. Fehrenbach and Burnage, this Colloquium), much better suited with stars in the 9-13 magnitude range.

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