Twenty First Meeting of the Hipparcos Science Team

ESOC, 16 August 1989

Attendance:

HST: Prof. P.L. Bernacca, Dr M. Crézé, Prof. F. Donati, Dr. M. Grenon, Prof. M. Grewing. Prof. E. Høg, Prof. J. Kovalevsky, Dr F. van Leeuwen, Dr L. Lindegren, Dr H. van der Marel, Mr C.A. Murray, Mr R.S. Le Poole, Dr C. Turon.

ESTEC: M.A.C. Perryman, K. Clausen, H. Hassan

ESOC: J. van der Ha et al.

ESA: R.M. Bonnet

Project Report

Prof. Bonnet opened the Science Team meeting, presenting the news of the satellite status.

After a successful launch on 8 August, repeated attempts to fire the apogee boost motor had been unsuccessful.

Hassan presented a status report on the problem and a schedule for the past and future attempts. Clausen presented details of the present understanding of the failure mechanism. A failure investigation board would be set up to report on the failure within the months of September–October.

Van der Ha reported on the activities that had been conducted within ESOC on the questions of orbit stability, operational complexity, difficulties with RTAD, sky coverage, eclipse duration, etc (see Presentation handout of 89-08-16). Similar activity reports from the side of Matra were presented by M. Broquet.

The most serious limitation on the mission was the expected lifetime of 6 months dictated by expected degradation of the solar panels in the GTO. Based on this assumption, and on other parameters estimated by ESOC/Matra, the Science Team concluded that:

(a) the mission will NOT provide parallaxes, proper motions, a reference system at the milli-arcsec level, double star parameters, homogeneous sky coverage, etc.

(b) it would provide engineering verification of the satellite design and of the data reduction chains, positions of the 120 000 stars with a precision of 0.02–0.05 arcsec, and Tycho positions for 200 000 stars to 0.1 arcsec.

The Science Team concluded that the present mission was likely to fail in most of its major scientific objectives, and presented its request that *'the European Space Agency develops an identical flight model of Hipparcos to be relaunched at its earliest opportunity to attain the agreed goals of the space astrometry mission'*.

Prof. Bonnet considered it premature and undesirable to widely circulate such a resolution before the lifetime of the satellite and other system parameters had been verified. The Science Team agreed with this position. Prof. Bonnet announced that (a) a meeting of the SPC would be held on 18 September at which the Hipparcos status would be discussed, and (b) that industry had been given instructions to present cost estimates for a second mission. Prof. Bonnet stressed that the Science Team should not, however, consider that such a second mission could necessarily be funded.

A series of actions assigned to the Science Team during the meeting were concluded and reported to J. van der Ha the following day. In particular (a) an orbit perigee of greater than 500km (to give fewer gas jet actuations) was requested; (b) no changes to the Input Catalogue or to the modulation (PSF) strategy, or to the precession rate were required; (c) NSL as opposed to sun-pointing was required if at all possible; (d) Crézé/Kovalevsky and Lindegren would assess the potential sky coverage: for this, van der Ha would communicate to them the orbital elements, assumed visibility parameters, and station locations.

Future Meeting

At ESOC, Tuesday 19 September, starting at 09.00hrs, and continuing until mid-afternoon.

M.A.C. Perryman

21 August 1989

The Undersigned, being the Members of the ESA Appointed

HIPPARCOS SCIENCE TEAM

understanding that:

1) the HIPPARCOS satellite, solely through failure of its apogee boost motor, has failed to reach its designated geostationary orbit;

2) its mission duration is limited, through radiation damage of the solar arrays in its transfer orbit, to approximately six months;

3) its total useful data acquisition is limited within that period, through ESOC software redevelopment requirements, calibration, lack of ground station coverage, and mission loss due to radiation effects, occultations, and attitude reconstitution difficulties at perigee, to a total of approximately 60 days.

informs all pertinent advisory bodies that the present mission fails completely in its major scientific objectives, because:

1) it will provide no parallaxes, (compared with 0.002 arcsec foreseen);

2) it will provide no proper motions, (0.002 arcsec per year foreseen);

3) it will not provide a reference system at the foreseen milli-arcsec level;

4) it will not yield useful estimates of double star parameters;

5) it will, because of the the short mission duration, result in considerable inhomogeneities in the resulting (degraded) system of positions;

6) it will not provide the (more than) 200 scientific proposals, from all over the world, submitted to ESA with the astrometric or astrophysical data requested by them.

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while noting that the proposal 'recovery' mission should be fully exploited since it is provisionally expected to yield:

1) engineering verification of the satellite design;

2) verification of the data reduction chain;

3) positions of the 120,000 programme stars with a precision of 0.02-0.05 arcsec, (compared with an expected precision of 0.002 arcsec). A longer than 6 month mission will provide improved homogeneity of the sky coverage;

4) Tycho positions for 200,000 stars to 0.1 arcsec, (compared with 0.03 arcsec for 400,000 stars projected);

5) astrometric and photometric data which will enhance the value of a future astrometry mission.

stressing that:

1) the scientific goals of the HIPPARCOS mission remain valid and unquestioned;

2) the increased scientific effort required to treat the data from the proposed recovery mission is considered worthwhile in the context of a future astrometry mission;

3) the above projected results of the recovery mission have been assessed very rapidly and may well be over-optimistic, (in particular, a nominal scanning law has been assumed);

4) a considerable scientific body in Europe has devoted some 10 years of effort, (2000 man years with infrastructure, equivalent to some 100 MAU development costs), to the preparation of the treatment of the scientific data as part of its commitment to the scientific programme of ESA;

5) the Science Team has full confidence in the role of ESA in the development of the HIPPARCOS satellite and ground segment support.

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Requests that:

the European Space Agency develops an identical flight model of HIPPARCOS to be relaunched at its earliest opportunity to attain the agreed goals of the space astrometry mission.

ESOC, 17 August 1989

M. A. C. Perryman, (ESA) Chairman

P. L. Bernacca (Asiago)

M. Crézé (Besançon)

F. Donati (Torino)

M. Grenon (Geneva)

M. Grewing (Tubingen)

E. Hog (Copenhagen)

J. Kovalevshy (Grasse)

F. van Leeuwen (Cambridge)

L. Lindegren (Lund)

H. van der Marel (Delft)

C. Murray (RGO)

R. Le Poole (Leiden)

C. Turon (Meudon)