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Miraculous approval of Hipparcos in 1980: (2)¹*Erik Høg, Niels Bohr Institute, Copenhagen*

ABSTRACT: *The approval of the Hipparcos mission in 1980 was far from being smooth since very serious hurdles were encountered in the ESA committees. This process is illuminated here by means of documents from the time and by recent correspondence. The evidence leads to conclude that in case the approval would have failed, Hipparcos or a similar scanning astrometry mission would never have been realized, neither in Europe nor anywhere else.*

1. Introduction

The discussions in ESAs Astronomy Working Group (AWG) and the Science Advisory Committee (SAC) in 1979-80 have been summarised in a previous report (Høg 2008) as repeated here in section 2. I have in the present report chosen to let documents and witnesses speak separately, through quotations and recent correspondence. It may look a bit complicated, but I hope at least some readers will appreciate to get in closer touch with history in this manner.

Correspondence with Ed van den Heuvel is collected in section 3, and I am quoting in extenso because I think the drama is of some interest for a wider audience. Section 4 brings further quotations from the meetings in AWG, SAC, and the Scientific Programme Committee (SPC) and from recent correspondence with Jean Kovalevsky and Catherine Turon. I conclude that Hipparcos prevailed thanks to a kind of miracle. In section 5 I argue that in case the approval would have failed, Hipparcos would never have been realized.

Lennart Lindegren just wrote that he intends to write down the developments up to 1980 from his own perspective, but he cannot promise a certain date. Jean Kovalevsky will try to write before summer on the 1965-1975 period. I will update the present report if further evidence of sufficient interest should become available.

¹ This report is identical to that of 2008-05-28, except that I have added a note in January 2011 at the end of section 3 which shows the crucial role of E.P.J. van den Heuvel in the AWG decision as advocate of Hipparcos. The remaining text and conclusions of 2008 are unchanged.

2. Summary of discussions in AWG, SAC, and SPC

The Hipparcos project won the competition with the EXUV project in ESAs Astronomy Working Group, but only barely so according to Edward van den Heuvel (2008, priv. comm.), X-ray astronomer and a member of AWG until the end of 1979, and much in favour of Hipparcos. Several votings took place in AWG before 1980, and at one of the crucial ones Hipparcos stayed for further consideration only because one person had been convinced to change position.

My own attitude then was that if Hipparcos had lost I was ready to quit the project for lack of faith that the astrophysicists would ever let it through.

The final voting in AWG took place on 24 January 1980 (ESA 1980a): Of the 13 members present, 8 voted in favour of Hipparcos and 5 in favour of EXUV, but dangers for Hipparcos laid ahead. At its meeting on 6th and 7th February 1980 the Science Advisory Committee (SAC) discussed six missions and preferred (ESA 1980b) the combined Comet/Geos-3 mission and the Hipparcos mission. The SAC did not make the choice between these two missions which represented the interests of the ESA working groups for respectively the solar system and astronomy. Both missions were therefore recommended, though on certain conditions, and the process ultimately led ESA to do something ESA had never done before: approve two missions at the same time. SAC expressed a preference for Hipparcos over the EXUV mission if the payload is funded *outside* the mandatory budget of ESA. In the end Hipparcos was funded *within* the mandatory budget, so Hipparcos was up against great hurdles all the time, but our mission won in the end, thanks to negotiations of which details are reported by Jean Kovalevsky in section 4. This leads to a summary of the ESA committee meetings in January to July of 1980:

24 Jan. AWG: Hipparcos is recommended.

6/7 Feb. SAC: Comet/Geos3 and Hipparcos are recommended, no choice is made within SAC, but there are conditions on both.

4/5 Mar. SPC: Hipparcos is selected as the next scientific project of ESA. The Hipparcos instrumental payload is included on certain conditions. The mission to Halley comet shall be pursued on certain conditions, and if these conditions are met SPC will in fact have approved two missions simultaneously, resulting in consequences for the schedules.

8/9 July SPC: Giotto is included for a flyby in 1986 of Comet

Halley as a purely European project since NASA could not make a firm commitment. The schedule of Hipparcos is accordingly stretched by six months.

3. Edward van den Heuvel (2008 and 2011, priv. comm.)

The summary in the first paragraph of section 2 was based on the following mails, here slightly shortened and quoted with permission from Ed van den Heuvel. I asked Ed on 17 March 2008 how close the vote in AWG was. He answered at 6:07 PM our time, the same day:

Dear Erik,

The vote was indeed very close. I was able to convince one of the X-ray astronomers (Spada) not to vote for the EUV/Soft X-ray mission which was then the competitor of Hipparcos, and his vote was just the one that made the difference

Spada, although director of the X-ray astronomy lab in Bologna, casted the vote that made the difference

very sadly, Spada has completely disappeared from the scene in Italy. ...

I am at the moment working at the Institute for Theoretical Physics, University of California Santa Barbara. If you wish to call me ...

Best wishes,

Ed van den Heuvel

An hour later, at 7:21 he added:

Dear Erik,

It is a long time ago, and there have perhaps been various stages of voting in the AWG. I do not have any of my papers here in California, so I cannot check. I know I kept my papers from that time in the AWG in my archive in Amsterdam, so when I am back I can check.

What I remember is that we first had Setti as the AWG chair (I thought you were in the AWG at that time), and under his chairmanship we had many discussions of the projects but not a final vote. When the vote had to be taken, Setti had been replaced by De Jager from my country, who had a big stake in the EUV/X-ray mission. It was under his guidance that the vote which I mentioned in my last e-mail to you was taken and in which Spada and I (as X-ray astronomers) voted in favour of Hipparcos ...

Now that you say that I was no longer in the AWG in 1980 when apparently a final vote was taken, I am getting a bit confused, about whether there may have been a still later (definitive?) round of votes and whether the votes which I mentioned was perhaps an earlier round.

I presume that it must be possible to trace that back in the minutes of the AWG from 1979 and 1980.

As you know, memory is not fully reliable, and this was almost 30 years ago. But I vividly remember that there was this one voting round where Spada's vote made the difference. I thought that what I remembered is that if in that voting round Hipparcos would have lost, then the AWG from that moment would have gone further with the EUV/X mission. But I hope this can be traced back in the AWG minutes.

There you also could trace back whether Spada was still in the AWG when the final vote was made. I do not know whether the minutes tell whom voted in favour and whom voted against? (*No, the minutes do not give such details, EH*)

Since I am just saying this all from the top of my head, without any papers here that may support it, and since- as said- memory may be unreliable, please consider all this as confidential, and not for circulation. (*Permission has later been given, EH*)

Best wishes,

Ed

Note by EH: It seems that Ed has been member of AWG with his period of three years 1976-79 overlapping my years 1976-78. But I do not remember him from that time in spite of his great sympathy for the space astrometry project and the important role he has played in the mission approval. About twenty years ago, however, he told me what I just reported, and he has recalled it ever since when we happened to meet with years between. Therefore I contacted him when I was writing (Høg 2008) and got immediate reply.

Note by EH added in January 2011 with Ed's permission: A conversation in Amsterdam with Ed resolved the questions of doubt mentioned above by Ed. The round of vote in AWG mentioned was in fact the final one on 24 January 1980 where the X-ray astronomer Spada voted for Hipparcos which would otherwise have lost to the EXUV mission. Also radio astronomer Schilizzi voted in favour, after consulting with Ed. This gave the vote of 8 to 5 in favour of Hipparcos. Present at the meeting as members of AWG were thirteen persons: de Jager, Cezarsky, Delache, Drapatz, Fabian, Grewing, Jamar, Murray, Perola, Puget, Schilizzi, Spada, and Swanenburg while Rego was unable to attend.

Van den Heuvel, although no longer a member of AWG, and Delache had the preceding day on invitation by the chairman, de Jager, presented a summary of the two missions "on behalf of the Chairman ... to assist the Working Group in its formulation of the recommendation" (quoted from the letter of invitation). It was quite unexpected by de Jager who was Ed's former boss and also an X-ray astronomer, and not to his liking that Ed strongly advocated Hipparcos.

4. From the committee meetings in 1980

Some further quotations from AWG and SAC meetings (ESA 1980a and 1980b) illustrate the difficulties

Hipparcos encountered. At a meeting on 24 January 1980 the AWG considered the Astrometry and EXUV missions, concluding that both missions will give excellent scientific return. This is elaborated for the two missions. On astrometry for instance this: “*The Astrometry mission, HIPPARCOS, will give fundamental quantitative results to all branches of Astronomy. It emphasises typical European know how and will serve a community never before involved in space research*”; on the EXUV mission for instance this: “*The fact that the scientific objectives of this mission are being covered by two different missions proposed by other agencies (EUVE by NASA and ROBISAT by Germany) emphasises its timeliness.*”

It is somewhat surprising then that 5 members were still in favour of EXUV and only 8 in favour of HIPPARCOS. One could have thought that a unique mission as Hipparcos would come above anything else in everybody's mind.

SAC discussed the missions on 6th and 7th February 1980 and unanimously recommended that the combined Comet/Geos-3 mission be selected as proposed by the Solar System Working Group (SSWG) on certain conditions. Strong advocates for EXUV were also present at the SAC meeting: “*in the event that the Hipparcos payload would need to be funded within the mandatory programme, the SAC was divided as to whether Hipparcos should then remain the Agency's choice or EXUV should be carried out because this mission was considered by some members to be just as interesting.*” (The quotation is literal, including spellings and emphasis.) In the end, Hipparcos was in fact financed *within* the mandatory programme.

In view of all these hurdles it seems a kind of miracle that Hipparcos could prevail, but it was of course because the right people worked hard to make it happen. The final solution was that SPC approved two missions: Giotto, the mission to comet Halley, to be launched first and to be followed by Hipparcos, and that SPC decided to finance the Hipparcos scientific payload out of the mandatory programme. ESA otherwise always assumes that payloads are financed by the member states.

Where were the competing EXUV people in all this? An answer may be found in the following letters from Jean Kovalevsky.

Jean Kovalevsky wrote on 2008.05.11:

I was invited to the AWG for the Hipparcos presentation, but did not attend the discussions.

I was member of SAC and I remember very well that, at some point, there was a vote between Hipparcos and EXUV: Hipparcos had 5 votes out of 6, the only tenant of EXUV was H Elliot from the UK. The other members were: Egidi (Frascati), Tammann (Basel), Weiss (Erlangen) and Pinkau (Chairman). The fact that SAC proposed that Hipparcos payload was to be paid nationally was simply repeating the SSWG statement.

It was evident for me and (at least as far as I remember) Tammann, that the responsibility of the payload had to be taken over by ESA, but I felt that insisting on this point would have been counter-productive, because the announced costs of the two proposals without the payload were identical while adding 50 MAU to the cost of Hipparcos would have killed it.

So I decided, in order to save the mission, to accept this point. After all, SAC was only an advisory group and had no financial responsibility. The only ESA body that could overrule the normal procedure (following which nations should fund and prepare the payload) was the SPC. An additional problem was that the laboratories involved in space hardware had experience in receivers and in conventional optics, but no one was reasonably able to built the delicate parts of Hipparcos. I knew that at least the French delegation at SPC, and possibly others will lobby in favour of an indoor payload funding. The March decision by SPC proved that I was right.

Pinkau had reported to the March SPC meeting of the views of SAC. I prepared, as an attachment for you, the part which concerns Hipparcos and EXUV.

From the part on Hipparcos: “The SAC realized the extremely fundamental nature of the mission, and the impact it will have on many branches of science and our conception of the world we live in. The SAC also noted the strong support for this mission within the AWG.” Then the three areas of concern to the SAC are outlined: Technical difficulties, the data analysis problem, and the cost of the mission.

Catherine Turon wrote on 2008.05.13:

Hipparcos was approved in March 1980, and Giotto later, after still another meeting of the SPC (exceptional ???), in July 1980. I do not have the minutes of these SPCs neither their decisions, but the letter of information sent to “the wide scientific community” by E.A. Tredelenburg, then Director of the Scientific Programme. I'll send these to you.

EH wrote on 2008.05.15:

I was the only astrometrists in the AWG about 1977 and I remember saying to Malcolm Longair in a coffee break: “You astrophysicists will decide about the astrometry project and you should be aware that you have only one opportunity to approve such a mission. If you reject it this time it cannot be revived because the astrometrists would never again believe astrophysicists could ever let it pass. We would believe that no matter how much you are impressed by space astrometry, in the end the majority would always put their own project higher.” He said that I should not use this as an argument, but only

argue with the qualities of the project. That was all he said, a wise advice, I think, which I followed. But the insight I believed to have then has become certainty after seeing the evidence presented here.

Jean Kovalevsky wrote on 2008.05.23:

Dear Erik.

Let me make some further remarks that could enrich your text, a text which I fully appreciate.

Coming back to the February 1980 SAC meeting, there was really NO competition between the Comet/Geos3 mission and the astronomical missions. From the very beginning of its session, SAC did not like the idea of choosing between an astronomical and a Solar system mission. It considered that it would be more fair to give a chance to both working groups' proposals, and that ESA, rather than deciding missions one by one every year or so, must have a broader and more prospective policy.

So, indeed, the choice was only between EXUV and Hipparcos. I think that the key sentence in the pages I sent you is the following: "It was thought that then a new proposal for an EUV-mission would be very worthwhile". This was really killing EXUV.

Now, there were two conditions:

- For Hipparcos, it was the funding of the payload
- For the Comet/Geos3 mission, it was the necessary re-assessment to transform it into a really cometary mission.

In March, SPC solved the first problem (and this is probably the most miraculous part of the adventure) and, letting time for the re-assessment of the cometary mission, Hipparcos found itself as the ONLY approved mission!

What followed is interesting. The re-assessment of the cometary mission, becoming Giotto, put ESA in an awkward situation: the non-approved mission was evidently more urgent because of Halley's orbit. We had an additional SAC meeting end of June or July. I do not have documentation on it, but I remember well how insistently Trendelenbourg (Director of Science) tried to convince me (as he assumed I was the toughest proponent of Hipparcos), that I should accept that Hipparcos be delayed by a year or so, to allow the maximum money to be spent on Giotto. Of course, SAC unanimously agreed and the next SPC followed the recommendation.

The decision of the SPC that the payload should be the responsibility of ESA was taken very seriously and ESA started to study how to manage it. In the October 1980 meeting of SAC, the Executive presented a document which described the management as we have known it, and SAC approved it.

Best regards,

Jean

Catherine Turon agreed to this later the same day, and did not want to add anything.

EH wrote on 2008.05.26:

The reports mentioned by Catherine have been received (ESA 1980c and d). They spell out in detail what Jean has said in his two letters. Finally, therefore, the summary of the ESA committee meetings in January to July of 1980 can be written and is placed at the end of section 2.

5. In case the approval had failed

It appears that the approval could well have failed in which case I am sure Hipparcos would never have been realized. This proposition has been countered by a colleague: "You can never know that, something could have happened." But please consider the situation of astrometry at that time. For decades up to 1980 the astrometry community was becoming ever weaker, the older generation retired and very few young scientists entered the field. I myself would have lost the faith that the astrophysicists would ever let such a mission through, and others would also have left the field of space astrometry.

If someone would have tried a Hipparcos revival one or two decades later the available astrometric competence would have been weaker, and where should the faith in space astrometry have come from? When Hipparcos became a European project in 1975 and the hopes were high for a realization, the competence from many European countries gathered and eventually was able to carry the mission. This could not have been repeated after a rejection of the mission.

But NASA could have realized a Hipparcos-like mission? No, for two reasons: The American astrometric community had much less resources of competence to draw from than there were in Europe, and secondly, as an American colleague said: "You can convince a US Congressman that it is important to find life on other planets, but not that it is important to measure a hundred thousand stars."

Thanks to the completion of the Hipparcos mission a strong astrometric community now exists in Europe which has been able to propose and develop the Gaia mission and which will carry it to a successful completion. Without Hipparcos the faith in the much more difficult CCD technology of Gaia would have been missing.

Acknowledgements: I am grateful to Catherine Turon for

providing the reports ESA 1980a-d, to Edward van den Heuvel for permitting his letters to be included here, and to Jean Kovalevsky for providing more information from the ESA meetings. I also thank all of them and Holger Pedersen for comments to earlier versions of this report.

6. References

ESA 1980a, Astronomy Working Group: report ASTRO(80)2, dated 30 January 1980.

ESA 1980b, Science Advisory Committee: report SAC(80)7, dated 11 February 1980.

ESA 1980c, To the Wide Scientific Community from E.A. Trendelenburg, Director of Scientific Programme: report D.Sci/EAT/ga/3846, dated 17 March 1980.

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