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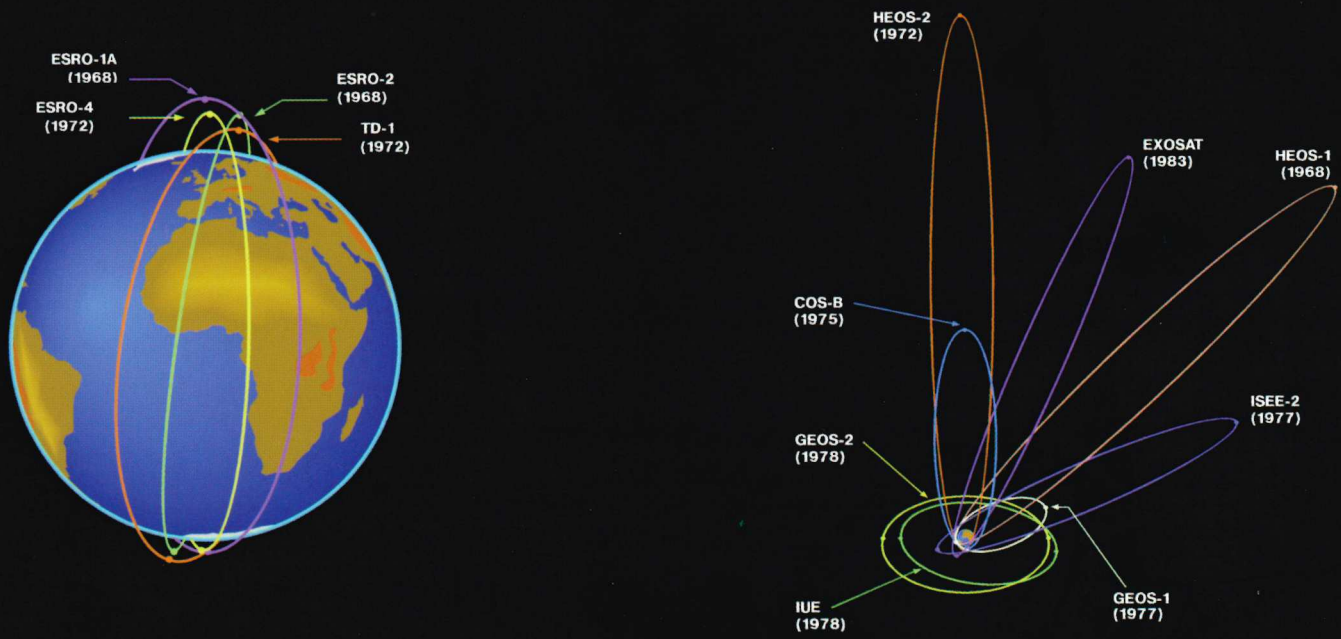
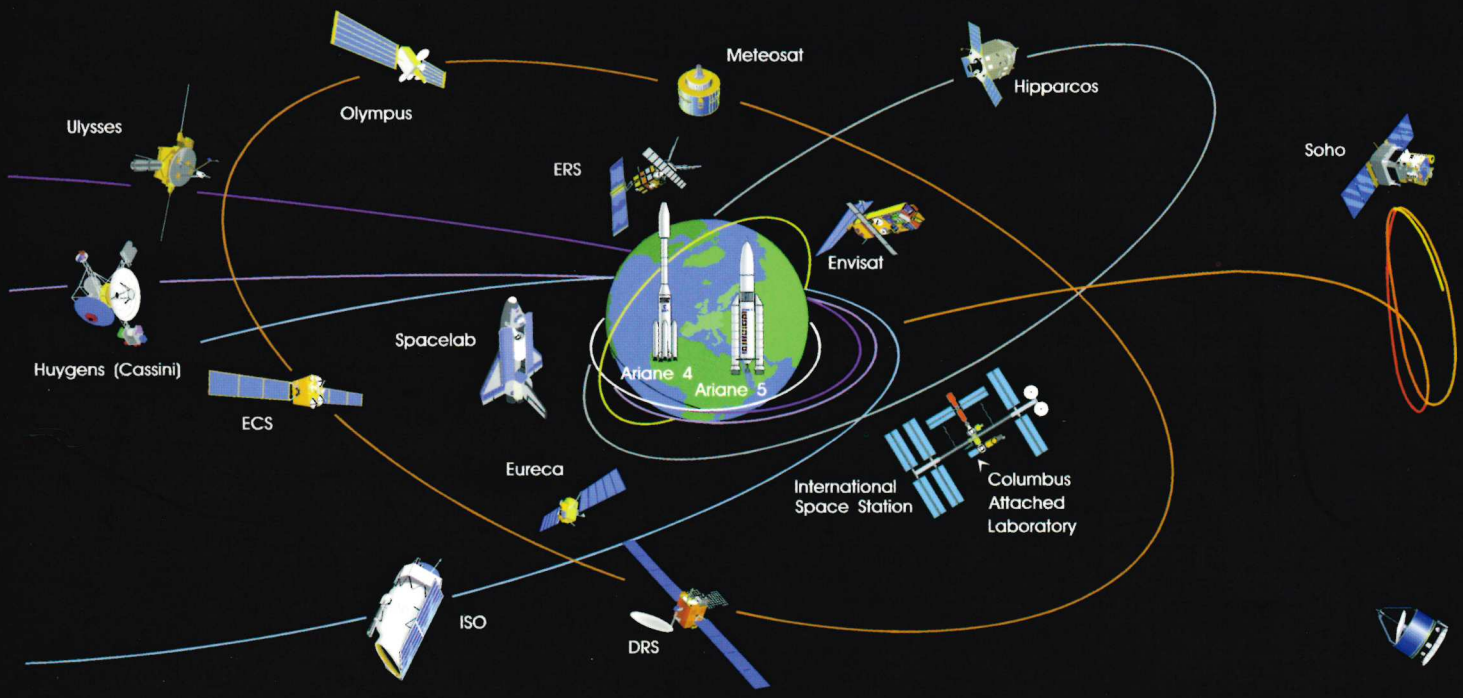
Belgium's Participation in the European Space Adventure





European Space Agency
Agence spatiale européenne

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Belgium's participation in the European space adventure

by
Dawinka Laureys

European Space Agency
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I would like to thank most warmly those who agreed to be interviewed and without whom this article would not be what it is:
Jean-Pierre Bolland from ETCA, Ambassador Marcel Depasse, Christian Derouck from MBLE, André Dumont from ETCA, ex-Minister Charles Hanin, Baron André Jaumotte, Professor André Monfils, Michel Lorthioir from MBLE, Baron Alexandre Paternotte de la Vaillée, Alain Stenmans, George Van Reeth and Jacques Wautrequin.

The present article is the result of a work in progress. The research is still under way. The gaps will be completed within the framework of a thesis.

by
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1 The Origins of Belgian Participation in the European Space Effort

At the end of the 1950s, Belgium had become a member of several European organisations such as the ECSC (1951) and EEC (1957), but also of a structure heralding European scientific co-operation: Euratom (European Atomic Energy Community). Afterwards, Belgium would become interested in space research and, in this field, move towards a European collaboration. Before this, several factors had raised the interest of the Belgians and stimulated them in this research field. In 1958, at the *World Exhibition* in Brussels, the awareness of a wide range of the population was raised with regard to technological and scientific advances. Among other things, they could admire a model of the Soviet satellite *Sputnik*. Belgian scientists participated in the International Geophysical Year (IGY), which took place from July 1957 to December 1958 and of which Marcel Nicolet was the Secretary General. In the frame of this international scientific undertaking, a Belgian national committee had been set up. Numerous studies were carried out in disciplines close to space research.[1] The population's interest in space exploration and the presence of a scientific potential were indeed essential – but not necessary for Belgium's involvement within a European space institution. *Big science*, in its international context, called for the definition of a scientific policy by the States.[2]

In Belgium, specialised management of science by the State had been institutionalised by the Royal Decree of 16 September 1959. This reform had largely been inspired by the works of the *Commission nationale pour l'étude des problèmes que posent à la Belgique les progrès des sciences et leurs répercussions économiques et sociales* (National Commission for the study of the problems faced by Belgium following scientific advances and their economic and social consequences) set up in January 1957 and presided over by King Léopold III. Placed directly under the responsibility of the Prime Minister, the new science management structure consisted of three levels: the *Comité ministériel de la politique scientifique* (CMPS), the *Commission interministérielle de la politique scientifique* (CIPS) and the *Conseil national de la politique scientifique* (CNPS). The CMPS included all the ministers who had some responsibilities in the field of science; the CIPS gathered the civil servants representing the ministers concerned; whereas the CNPS, made up of key personalities from scientific, academic, economic and social circles, acted as advisor to the government through recommendations.[3]

In the late 1950s, when the Soviets and Americans were gaining real know-how in the development of rockets and artificial satellites, several scientists in Europe began to consider developing a "European

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1 *Année géophysique internationale 1957-1958. Programme de la Belgique, du Congo belge et de l'Expédition antarctique belge.* Tome I, Bruxellis: Academiarum Regiarum Belgicae Classium Scientiarum, 1958; Paulette Doyen, "Les Expéditions Antarctiques Belge" in *Le Mouvement Scientifique en Belgique.* Première Série 1960-1961, s. l.: Fédération Belge des Sociétés Scientifiques, s. d. & Frank Greenaway, *Science International. A history of the International Council of Scientific Unions*, Cambridge: Cambridge University Press, 1996, pp. 149-159.

2 Robert Halleux and Geneviève Xhayet, "La marche des idées" in *Histoire des sciences en Belgique 1815-2000.* Deuxième partie, Brussels: La Renaissance du Livre, 2001, p. 15.

3 Over the years, the structure of this state management of science changed several times. In June 1968, for example, Belgian scientific policy experienced a major reorganisation. The old triptych was modified and completed. A new post of "Minister of scientific policy" was set up. This was under the responsibility of the Prime Minister who was in charge of the coordination. Regarding the CNPS Secretariat, it was converted into a departement of planning called "Services de la Programmation de la Politique Scientifique" (SPPS). During the 1980s, the scientific policy's structures were also under the influence of the federalisation processes in Belgium. In Robert Halleux and Geneviève Xhayet, *op. cit.*, pp. 24-25; Historique des SSTC: principales étapes depuis 1959" in *La Belgique, un panorama*, Brussels: Institut belge d'Information et de Documentation, 1969, pp. 665-680; *OCDE Recherche Scientifique. Rapports par pays sur l'organisation de la recherche scientifique. Belgique*, Paris: Organisation de coopération et de développement économique, n° 16 426, October 1963; *Rapport du Conseil National de la Politique Scientifique. Rapport d'activité 1972-1979…*, pp. 1-7; *SSTC: Informations générales – Historique:* http://sstc.fgov.be/belspo/ostc/geninfo/ministr fr.stm & *SSTC. Services du Premier Ministre. Services fédéraux des affaires scientifiques, techniques et culturelles. Missions et activités*, Brussels, September 1997, pp. 9-10.

space programme". Jean Willems, an influential member of CERN (*Centre Européen de Recherche Nucléaire*) and also vice-president of the *Fonds National de la Recherche scientifique*, the *Fondation Universitaire* and the *Conseil national de la politique scientifique* (from 1959 to 1964), was the first Belgian to be consulted by Edoardo Amaldi and Pierre Auger, two physicists and authors of an *Introduction pour une discussion sur la recherche spatiale en Europe.* Willems informed them of the interest of some Belgian institutions in a joint effort in the field of space research.[4] In 1960, several meetings were held on the same theme: from 9 to 16 January in Nice at a meeting of COSPAR (Committee on Space Research, dependent on ICSU (International Council of Scientific Unions)), then on 29 February in Paris at Pierre Auger's home. Marcel Nicolet, a Belgian scientist who enjoyed a worldwide reputation, represented his country at these two meetings.[5] On 29 April 1960, twenty European scientists met at the Royal Society in London. The Belgian representative was L. M. Malet, Research fellow at the CNPS and Secretary General of the *Centre National de Recherche de l'Espace* (CNRE). He explained that the scientific community and the Belgian government were ready to become involved in any space research body that would be set up.[6] These meetings led to the creation of GEERS, a European study group for collaboration in the field of space research (*Groupe d'Etudes Européen pour la Recherche Spatiale*), the convention of which was signed in June 1960.[7]

In Belgium as well as at the European level, the first impetus towards a common effort in the field of space research came from the scientists. As early as June 1959, at the request of the international scientific organ COSPAR, a *Comité national des recherches spatiales*[8] was created within the Royal Academy of Belgium at the initiative of two Professors of the University of Liège: Marcel Florkin, a specialist in biochemistry and Pol Swings, an astrophysicist who enjoyed a worldwide reputation.[9] During the same month, the *Centre National de Recherche de l'Espace* (CNRE) was set up in Brussels under the joint impulse of members of the Royal Observatory, the Royal Institute of Meteorology, and several universities.[10]

4 J. Krige and A. Russo, *A History of the European Space Agency 1958-1987.* Volume I: *The Story of ESRO and ELDO, 1958-1973*, Noordwijk: ESA Publications Division, SP-1235, 2000, p. 21.

5 *Bulletin de la Classe des Sciences*, Brussels: Ed. Académie Royale de Belgique, 1960, 5e série.–Tome XLVI, p. 292 & Harrie Massey and M. O. Robins, *History of British Space Science*, Cambridge; London; New York; New Rochelle; Melbourne; Sydney: Cambridge University Press, 1986, p. 110.

6 Historical Archives of European Communities (HAEC). COPERS Collection, n° 2. Document: NCSP/80(60). The Royal Society. Western European space research meeting. 29 April 1960. Draft minutes.

7 The signatories of the convention for Belgium were Dr. L. M. Malet, on behalf of the Ministry of Cultural Affairs and the CNPS, and Fredi Darimont, General Director of the Belgian Higher Education and Scientific Research. In HAEC. COPERS Collection, n° 4. Document: "GEERS. Réunions tenues à Paris les 23 et 24 juin 1960".

8 With Jacques Cox as President, professors Florkin and Swings as vice-presidents, Marcel Nicolet as Secretary, as well as fifteen members: L. Bouckaert, Colonel Edgard Evrard, B. Fraeijs de Veubeke, J. Géhéniau, P. Janssens, A. Jaumotte, P. Ledoux, Ch. Manneback, H. L. Vanderlinden, A. Van Hoof, J. Van Mieghem, J. Verhaeghe, as well as H. Koch, E. Picciotto and Jean Vandenkerckhove, as associates. In *Bulletin de la Classe des Sciences*…, 5e série.–Tome XLV, pp.12-14 and 668 & Archives of the Royal Academies of Belgium. File 009162: "Comité national de recherches spatiales".

9 For more information on the role of Professor Swings at the beginning of Belgium's involvement in international space research, see: Dawinka Laureys, "Un petit pays dans la *Big Science*. Contribution de la Belgique aux origines de l'Agence Spatiale Européenne" in *Archives Internationales d'Histoire des Sciences*, Rome: Académie Internationale d'Histoire des Sciences, Vol. 51 – n° 147, December, pp. 318-351.

10 Initially, the Centre was presided over by Jacques Cox, Director of the Astronomy Institute of the Free University of Brussels, with Marcel Florkin as Vice-President, L. Malet as General Secretary, and Marcel Nicolet as Director. In *Bulletin de la Classe des Sciences*…, 5e série.–Tome XLV, p. 65.

2 Belgium in COPERS and ESRO

2.1 Belgium joins COPERS and ESRO

Once it was created GEERS soon appealed to governments and suggested that they establish a *Commission Préparatoire Européenne de Recherche Spatiale* (COPERS), with a view to being able to negotiate the creation of a European space institution at the political level. Following this proposal, the Belgian minister of Cultural Affairs Pierre Harmel asked the advice of the CNPS, which warmly recommended its country's joining this future body.[11] Thus, on 2 December 1960, Belgium approved the Meyrin Agreement setting up COPERS.[12] This organisation aimed: "to consider arrangements for the design, development and construction of space research satellites, and arrangements for the launching of satellites".[13] A temporary body, COPERS progressively set up the structures of ESRO (European Space Research Organisation). In June 1962, ten states, including Belgium, signed ESRO's convention, which came into effect in March 1964. Within COPERS, and then ESRO, Belgium provided financial[14] administrative, scientific, technical and industrial assistance.

COPERS approved the "Blue Book" in October 1961 in Munich. This report planned all the main features of the European Space Organisation with five themes: scientific programme, technology centre, data handling, ranges and launch vehicles. Finally, the commission recommended a scientific programme and the setting up of five institutions: ESTEC (European Space Research and Technology Centre) for the study, the adjustment and the production of sounding rockets and satellites; ESLAB (European Space Laboratory), a research laboratory associated to ESTEC, ESDAC (European Space Data Centre) for questions of data reception, handling and analysis coming from the scientific payloads; Estrack (European Space Tracking and Telemetry Network), designed to receive signals from launched spacecraft and a range for sounding rockets in Kiruna (Sweden). Later, it was decided to set up a laboratory for advanced scientific works in Italy (ESRIN, European Space Research Institute).[15]

2.2 The Redu Station and ESTEC

One of the first activities in which Belgium was directly involved was the setting up of a station for Estrack. Four stations made up the network, at Fairbanks in Alaska, Spitzbergen in Norway, the Falkland Islands near Argentina and Redu in the Belgian Ardennes.[16] Initially, the network was

11 Services du Premier Ministres. Affaires scientifiques, techniques et culturelles Archives (SSTC Archives). Document: "Projet d'accord créant une commission préparatoire pour l'étude des possibilités de collaboration européenne dans le domaine des recherches spatiales (05/07/1960). Annexe: du document CNPS/29, 19 juillet 1960".

12 For Belgium, the protocol was signed by Baron Jaspar, Ambassador of Belgium in Paris. In HAEC. COPERS Collection, n° 15.

13 John Krige, *Europe into Space: The Auger Years (1959–1967),* Noordwijk: ESA Publications Division, ESA HSR-8, May 1993, p. 12.

14 COPERS budgeted 935 000 French Francs, of which Belgium would pay a little more than 4%. At ESRO, in January 1971, the financial contribution of Belgium was estimated at 3,72% for a total budget of about 75 million Dollars. In 1974, Belgium contributed a global percentage of 3,67%. In Pierre-Louis Bernard, "La Belgique et l'espace" in *Aviation et Astronautique. n° 1: L'industrie aérospatiale belge,* Brussels, January 1971, p. 18; *L'Europe spatiale. Etude préparée par l'Organisation européenne de recherches spatiales (ESRO)*, Paris, 3rd quarter 1974, p. 18; HAEC. COPERS Collection, n°15 & Arthur Russo, *ESRO's First Scientific Satellite Programme 1961-1966,* Noordwijk: ESA HSR-2, October 1992, p. 6.

15 J. Krige, *The early activities of the COPERS and the drafting of the ESRO Convention (1961/62)*, ESA HSR-4, Noordwijk: January 1993; J. Krige and A. Russo, *op. cit.*, pp. 48-57 & *Organisations scientifiques internationales*, Paris: publication de l'OCDE, pp. 151-155.

16 For more information on this station, see: "Activités de l'organisation européenne de recherches spatiales. I./ Introduction" in *L'Europe de l'Espace. Faits et perspectives*, collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, May 1969, n° 247, pp. 22-23.

headed by a provisional control centre located at one of ESRO's sites, ESTEC.[17] Negotiations concerning the Belgian station began in 1963 and several sites were considered.[18] Once the Redu site had been selected,[19] invitations to tender were launched for the building of the station.[20] During autumn, the French firm Sonectro was awarded the contract.[21]

In Belgium, the selection of this site for an Estrack station was intimately linked with the history of another site, that of ESTEC. From the point of view of economic effects, the setting up of the tracking and telemetry station would not bring much to the country which would host it on its soil. Belgian authorities were conscious of this from the beginning of 1964, when it was still not certain that a Belgian site would be selected.[22] Despite the absence of financial incentives, Belgium chose to maintain advantageous proposals concerning the establishment of this station. By acting this way, the intention of the Belgian State was to contribute to maintaining a climate of confidence that would raise again the question of the Brussels site for ESTEC.[23] Indeed, the question of the Estrack station arose at a time when the use of the Delft site for ESTEC was being questioned. In 1963, Belgium and the Netherlands hinted that they would take part in ESRO, provided ESTEC was established in the Benelux. France and Great-Britain finally accepted this condition. Then, two sites were proposed: one in the Netherlands and one in Belgium. According to Marcel Depasse, the Belgian offer was seen as better from the technical and financial viewpoint. But, he explained, there was a:

> *coalition des scientifiques anglo-saxons et germaniques contre la proposition belge parce qu'ils avaient envie d'être entre eux*
>
> [coalition of the Anglo-Saxon and German scientists against the Belgian offer because they wanted it to be in their own community.[24]]

The COPERS Council voted for the Delft site with just one more vote in favour of the Netherlands offer, the vote of Austria, which announced a few days later that it would not become involved in ESRO.

The fact remains that in 1964, it was clear that the Delft site could not be accepted. Belgium, which had always hoped that the station would be set up on its soil, presented a thorough file in favour of an

17 In the late 1960s, from the recommendations of the Bannier report, the ESOC (European Space Operations Centre) obtained the network's control. In J. Krige and A. Russo, *op. cit.*, pp. 52-53.

18 For more information on the topic, see: Dawinka Laureys, *op. cit.*, pp. 318-351.

19 The formal agreement on Redu's station should be signed by ESRO and Belgian government on 19 April 1966. In Kevin Madders, A *new force at a new frontier. Europe's development in the space field in the light of its main actors, policies, law and activities from its beginnings up to the present*, Cambridge: Cambridge University Press, 1997, p. 73.

20 See, for example: SSTC Archives. Box entitled: "Ruimtevaart – Rech. Applq. / Gr. Cons. Maritime / Grands sat., etc." File 752. 52. Document: Letter from J. R. Bertrand, adjunct director of COPERS to Mr. Defay of the CNPS, dated 17 March 1964.

21 For more information on the stages of this contract, see: HAEC. ESRO Collection, n° 1244. Document: ESRO/AF/97. Paris, 11 September 1964. "Organisation européenne de recherches spatiales. Comité administratif et financier. Demande d'autorisation pour passation d'un contrat"; ESRO Collection, n° 1042. Document: ESRO/AF/MIN/2. Paris, 14 October 1964. European space research organisation. Administrative and finance committee. Second meeting. Draft summary minutes, pp. 8-10 & ESRO Collection, n° 9373. Document: ESRO/Contrat n° 12/64, rev. 1.

22 Indeed, the tracking station had to employ only a few people and its running expenses had to be limited. Moreover, Belgium would give a free site to the COPERS and it would grant a loan without interest for the building of the station. In SSTC Archives. Box with mention: "Ruimtevaart / Rech. Applq. / Gr. Cons. Maritime / Grands sat., etc." File 752. 52. Document: Letter of unknown origin dated 6 February 1964..

23 SSTC Archives. Box idem. File idem. Document: Unsigned letter to Mr. Herman Biron of the Ministry of Finance, dated 6 February 1964.

24 In Ambassador Marcel Depasse's interview – 12 December 2001 – ESA History Extension Project.

alternative site in Zaventem.[25] To the Belgians' great disappointment, Noordwijk in the Netherlands was finally chosen by ESRO in July 1964.[26]

2.3 Scientific Contributions

The "Blue Book" presented a scientific programme for COPERS, and subsequently for ESRO, of short-, medium- and long-term projects, extending over eight years. This programme included; data handling of sounding rockets, small satellites and finally, large satellites. This scientific programme was more a kind of *manifesto* of interests and expectations than a concrete working proposal.[27] Nevertheless, some of the planned activities were carried out.

From the scientific viewpoint, Belgian researchers took part in many COPERS and then ESRO programmes. They started with experiments launched by sounding rockets. In 1964, 1967 and 1969, the Astrophysical Institute of the University of Liège devised scientific experiments named "artificial comets" which were launched from Sardinia. They aimed to:

> *créer dans la haute atmosphère des nuages de gaz (ammoniac et propylène) et d'observer au crépuscule leur comportement sous l'effet de la radiation solaire.*[28]
>
> […create in the upper atmosphere clouds of gas (ammonia and propylene).]

From 1967 to 1979, the staff of Professor André Monfils, of the University of Liège designed a number of spectrographs to be launched on sounding rockets. The aim was to study the luminous emissions from the *aurora borealis*. The staff took part in twenty launches, the first of which was also the first ESRO launch from the Kiruna range in Sweden.[29] An experiment on the profile of solar rays, conceived by the Astronomical Institute of the Free University of Brussels was also included on an ESRO sounding rocket in 1970.[30] In 1974, three experiments made by the Space Aeronomical Institute of Belgium (IASB)[31] had been launched by sounding rockets provided by ESRO with the support of the French Centre National d'Etudes Spatiales (CNES).[32]

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25 SSTC Archives. Box with mention: "Ruimtevaart / Rech. Applq. / Gr. Cons. Maritime / Grands sat., etc." File 752. 52. Document: Unsigned letter to Mr. Herman Biron of the Ministry of Finance, dated 6 February 1964.

26 For more information on the topic, see: Dawinka Laureys, *op. cit.* pp. 318-351.

27 J. Krige A. Russo, *op. cit.,* p. 51.

28 H. Bredohl, "Ejection d'ammoniac dans la haute atmosphère" in *Nature et origine des comètes. Colloque international tenu à l'Université de Liège les 5, 6 et 7 juillet 1965*, Collection: "les congrès et colloques de l'Université de Liège", Ed. Université de Liège, volume 37, 1966; Léo Houziaux, "L'Astronomie et l'Astrophysique" in *Apports de Liège au progrès des sciences et des techniques*, Liège: Ed. Eugène Wahle, 1981, p. 110; R. Lüst and J. Ortner, "La première campagne de tir de fusées sondes de l'E.S.R.O. (expériences d'éjection)" in *Revue française d'Astronautique. Organe de la Société française d'astronautique. Nouvelle série*, n° 1965-1, January-February 1965, pp. 14-18; *Organisation européenne de la recherche spatiale. Rapport général 1964-1965*, Paris, s. d., p. 19; *Rapport sur l'activité scientifique de l'équipe spatiale de Liège durant l'année 1964*, [followed by:] *Rapport sur l'activité scientifique de l'équipe d'astrophysique spatiale de Cointe,* 1965 à 1973, s. l. & B. Rosen, "Etude d'un nuage d'ammoniac éjecté à haute altitude" in *Revue française d'Astronautique. Organe de la Société française d'astronautique. Nouvelle série*, n° 1965-1, January-February 1965, pp. 18-24.

29 Henry Dorchy, *Histoire des Belges. Des origines à 1991*, 7th edition, Brussels: Ed. De Boeck, 1991, p. 499; Léo Houziaux, "L'Astronomie et l'Astrophysique" in op. cit, p. 110 & *IAL SPACE* – several brochures – [Documents kept by Professor André Monfils].

30 SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "281/MR. Note à Monsieur le Président de la CIPS. Objet: Situation de la recherche spatiale en Belgique", 17 December 1968, p. 11.

31 The IASB was headed by Marcel Nicolet.

32 The experience aimed to measure precisely the clearing speed of mono-atomic oxygen during the night, in the low thermosphere. In Henry Dorchy, *op. cit.*, p. 499 & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "281/MR. Note à Monsieur le Président de la CIPS. Objet: Situation de la recherche spatiale en Belgique", 17 December 1968, p. 14.

The Astrophysical Institute of the University of Liège also participated in the *TD-1* project, an ESRO scientific satellite. Initially, two distinct studies had to be carried out by the University of Liège: an infrared cartography of the sky, under the leadership of Luc Delbouille (COPERS named the experiment *S1*), and a cartography of the sky in the distant ultraviolet, which had been entrusted to André Monfils (experiment *S2*).[33] For financial reasons, experiment *S1* was abandoned by ESRO. Experiment *S2* was at first coupled with a project from Dr H.E. Butler, of the Edinburgh Royal Observatory,[34] then, R. Wilson of University College London became involved. This experiment kept the name of *S2/S68* Liège–Edinburgh and was placed under the technical responsibility of Claude Jamar of the University of Liège. It had to measure the intensity of warm stars in the restricted spectral bands of the ultraviolet, in order to describe the energy distribution of the spectrum in this region. On 12 March 1972, *S2/S68* was launched onboard *TD-1A* by a US Delta rocket. The Astrophysics Department of the University of Mons, headed by Professor Léo Houziaux, played a major role in the theoretical interpretation of the experimental results. Nearly 2000 star spectra were recorded by *S2/S68* and also a great deal of photometric information on 31215 other stars.[35] This experiment was at the root of other scientific missions including *Hipparcos*.

The creation of *TD-2*, a twin of *TD-1*, started in 1967. From April 1968, ESRO's Council stopped this satellite's construction for budgetary reasons. When the programme ended, a Belgian scientific team was already largely involved. It was the IASB,[36] which had contributed to the design of experiment *S97* of the French Institute of Aeronomy. The aim of this experiment was to measure the vertical distribution of the light emission of the oxygen and ionised nitrogen.[37] Moreover, the Belgian scientific community also attempted to get involved in the large *LAS* (Large Astronomical Satellite) programme. It introduced an experiment, which represented a considerable effort for Belgium, but which was rejected.[38] Finally, the *LAS* programme was abandoned for financial reasons.

2.4 Industrial Contributions to Scientific Programmes

Among the COPERS, then ESRO, programmes in which Belgian industry participated there was first a pre-study contract for the small *ESRO II* satellite. In autumn 1963, under the authority of COPERS ACEC (*Ateliers de construction électrique de Charleroi*) obtained this contract which aimed to establish a pre-project for a satellite designed to study solar astronomy and cosmic rays[39]. After six months' work, ACEC were ready to present the results of their preliminary study to the representatives of ESTEC, who seemed satisfied.[40] However, the contract for the development of *ESRO II* was placed with Hawker Siddeley Dynamics Ltd. of Great Britain. Nevertheless, this pre-study contract was, for Belgian industry, a first important experience in the field of devices to be launched into space. The firms which benefited from this experience were ACEC, SABCA (*Société Anonyme Belge de*

33 From what Luc Delbouille said during an interview on 18 July 2001.

34 *L'Europe spatiale. Etude préparée par l'Organisation européenne de recherches spatiales (ESRO)*, p. 66 & HAEC. ESRO Collection, n° 5504. Document: STAR/1, Rev. 1. Paris, 27 August 1964. European Space Research Organisation. Present state of experiments coming under ad hoc group STAR Star and Stellar Systems, p. 2.

35 *IAL SPACE*. [Document kept by Professor André Monfils].

36 This Institute was set up by a royal decree of 25 November 1964; with Marcel Nicolet as its head.

37 *Une importante contribution de la Belgique sur le plan scientifique*, collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, août 1968, n° 238, p. 39.

38 From an e-mail John Krige sent me on 12 June 2002.

39 HAEC. COPERS Collection, n° 61, p. 9 & SSTC Archives. Box entitled: "Ruimtevaart/ ESRO". Binder 752. Documents: COPERS/Contrat n° 8/63 appended to a letter from A. C. Paternotte de la Vaillée to Dr. Spaey dated 26 November 1963 and COPERS/Contrat n°8/63: appended to a letter from A. Vozzi, Head of the COPERS Contracts Office, to Mr. Désirant from the Acec, dated 27 January 1964.

40 HAEC. ESRO Collection, n° 9444. Document: ESRO/ Notes on the meeting with ACEC concerning the Final Report on the preliminary design study for ESRO II held at Delft on 20 April 1964, p. 4.

Constructions Aéronautiques), BTMC (*Bell Telephone Manufacturing Company*) and MBLE (*Manufacture Belge de Lampes et Matériel Electronique*)[41] as subcontractors.[42]

In 1964, a new invitation to tender was launched for the realisation of a programme undertaken jointly by ESRO and NASA, that is the satellite *ESRO-I*. The programme aimed to study the polar ionosphere and the auroral phenomena and it included two models: *ESRO-IA* (renamed *Aurorae*) and *ESRO-IB* (renamed *Boreas*). The project manager was the *Laboratoire Central de Télécommunications* (LCT) of Paris. On the Belgian side, BTMC became one of the two associated firms. This Antwerp-based firm was responsible for the electrical power supplies for *ESRO-IA* and *ESRO-IB*, which were launched into orbit on 3 October 1968 and 1 October 1969 respectively.[43]

COPERS planned that ESRO should launch 400 sounding rockets. It was in this field that SABCA started space research activities. From 1963, SABCA worked on the study, development and integration of payloads for sounding rockets for several Belgian institutes of research, such as the Astrophysical Institute of the University of Liège and the Institute of Astronomy of the Free University of Brussels.[44] From 1965 to 1969, SABCA then carried out a series of projects on European sounding rockets named *Bélier*, *Centaure*, *Dragon* and *Skylark.*[45] At that time SABCA declared: "these projects sometimes reach the limit of our abilities, but they are our entry ticket".[46] In the 1970s, ETCA carried on its activities in the field of sounding rockets.[47]

The Charleroi firm ETCA (Société d'Etudes Techniques et Constructions Aérospatiales)[48] was selected as a co-contractor of the German firm Junkers Flugzeug und Motorenwerke, which was project manager[49] for *HEOS-A1* and *HEOS-A2*, two satellites devoted to the study of the interplanetary magnetic field and the solar particles. For *HEOS-A1*, ETCA was responsible for about one third of the main contract. For *HEOS-A2*, ETCA was notably in charge of the study and realisation of the equipment for the satellite's electrical supply and attitude control.[50] These satellites were respectively placed in orbit on 5 December 1968 and 31 January 1972.

At the end of the 1960s and beginning of 1970s, MBLE and ETCA contributed to the development of *TD-1***,** the most advanced scientific satellite at that time. MBLE, as a subcontractor of the French firm MATRA, built electronic subsystems,[51] whereas ETCA built a four-channel ultraviolet spectrometer

41 Moreover, the Brussels-based company MBLE had decided to undertake at its own expenses a complete preliminary study on the satellite, in spite of the Belgian government's decision to entrust the preliminary study to ACEC. For more information on this, see notably: Dawinka Laureys, *op. cit*., pp. 318-351.

42 SSTC Archives. Box entitled: "Ruimtevaart/ ESRO". File 752. Documents: "Avant-projet de satellite pour l'étude de l'astronomie solaire des rayons cosmiques. Synthèse des dépenses engages". Document from the ACEC, dated 15 June 1964 & Letter from Jacques Spay to Paternotte de la Vaillée, dated 22 June 1964.

43 *Alcatel Space Major Achievements* [document sent by Alcatel Bell (Antwerp)], p. 2; *Belgospace. Rapport du conseil d'administration. Exercice 1969*, s. l., p. 8; *ESRO/CERS*, Paris: Imp. Narboni, January 1967, p. 7; *ESRO-IB*, s. l.: ESRO Ed., s. d., p. 19 & Pierre Sparaco, "Mutation de l'industrie aéronautique belge" in *Aviation et Astronautique. n° 1: L'industrie aérospatiale belge*, Brussels, January 1970, p. 22.

44 *Rapport sur l'activité scientifique de l'équipe spatiale de Liège durant l'année 1964*, s. l., s. d., p. 28 & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "281/MR. Note à Monsieur le Président de la CIPS. Objet: Situation de la recherche spatiale en Belgique", 17 December 1968, p. 14.

45 *Rêves et obstinations de l'industrie aéronautique belge. SABCA 1920 – 1990,* Brussels: Ed. Memo, 1992, p. 114 & Pierre Sparaco, *op. cit.*, p. 18.

46 *Rêves et obstinations*…, p. 114.

47 *L'Europe spatiale*…, p. 194.

48 The firm ETCA, subsidiary of ACEC was set up in January 1964.

49 "Activités de l'organisation européenne de recherches spatiales. I./ Introduction" in *L'Europe de l'Espace. Faits et perspectives*…, p. 29.

50 *Belgospace. Rapport du conseil d'administration. Exercice 1969*…, p. 8; *Recueil financier 1972. 79e année*, Brussels: Etablissement Emile Bruylant, tome III, p. 1758 & *Rêves et obstinations* …, p. 124.

51 *Une importante contribution de la Belgique sur le plan scientifique…*, p. 39.

for the University of Liège.[52] Further, at the beginning of the 1970s, ESRO took the decision to build *Cos B*, a satellite to study galactic cosmic rays. For this satellite, ETCA was responsible for the complete onboard electrical power supply subsystem.[53] In 1972, *TD-1*, the first orbital astronomical observatory, was launched under the aegis of ESRO. MBLE contributed 70 million Belgian francs (out of a total budget of 3000 million Belgian francs) to this achievement.[54]

2.5 The *HEOS-A1* Programme

The *HEOS-A1* (Highly Eccentric Orbit Satellite) scientific satellite programme involved Belgium at various stages. Firstly, at the technical level, Belgian Jean Vandenkerckhove, an engineer and lecturer at the Free University of Brussels, was appointed as Director of the project at ESTEC.[55] Also in ESTEC, the project was headed, from a contractual viewpoint, by another Belgian, George Van Reeth, head of the Contracts Office. It is in the framework of the *HEOS* programme that Van Reeth and his team[56] had the opportunity to develop contract and management methods which, afterwards, would be those used by ESRO.[57]

At the industrial level, the German firm Junkers Flugzeug und Motorenwerke was designated as project manager of the *HEOS-A1* programme[58] despite its lack of experience in the field.[59] On the other hand, ETCA, which was among the co-contractors, already had some experience in the field of space research.[60] Indeed, the Charleroi-based firm had worked on the development of the telemetry station for the *Europa* rocket in the framework of ELDO. In George Van Reeth's opinion, this experience of ETCA and its Director Jean Bolland allowed them to enjoy a rather privileged status in the *HEOS* programme:

> *Et c'est Jean [Bolland], qui a, pas officiellement mais en pratique, fait marcher l'affaire [*HEOS*]. Surtout que ETCA avait en électronique une partie importante (...) et [elle] était donc considérée, mais pas seulement formellement, comme co-contractant, mais adoptée par l'équipe Junkers comme étant des gens extrêmement compétents. Et, ils [les gens d'ETCA] ont eu une énorme influence sur ce projet.*[61]
>
> [It is Jean [Bolland], who, not officially, but practically ran the business [*HEOS*]. Moreover, ETCA had an important share in the electronics (…) and [it] was thus considered, not only

52 *Belgospace. Rapport du conseil d'administration. Exercice 1969*…, p. 8 and 11; *Idem*. *Exercice 1972*, s. l., p. 2; Pierre-Louis Bernard, "Une entreprise spatiale belge. Etudes Techniques et Constructions Aérospatiales" in *Aviation et Astronautique. n° 1: l'Industrie aérospatiale belge*, Brussels, January 1971, p. 22; *L'Europe spatiale*…, p. 194 & *Une importante contribution de la Belgique sur le plan scientifique*…, p. 39.

53 *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, pp. 2 and 8.

54 Henry Dorchy, *op. cit.*, p. 498.

55 H. Bondi, "La coopération européenne en matière spatiale. I./ Les satellites" in *L'Europe de l'Espace. Faits et perspectives*, collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, May 1969, n° 247, p. 9 & Théo Lefèvre, "Pour une contribution plus efficace de l'Europe à la recherche spatiale" in *Revue de la Société Royale Belge des Ingénieurs et des Industriels*, Brussels, October 1969, n° 10, p. 439.

56 At that time, ESTEC's contracts department was particularly small: besides George Van Reeth who was leading the team, there were two or three associates and secretaries. In George Van Reeth's interview - 12 March 2002 - ESA History Extension Project.

57 *Ibidem*.

58 *ESRO/CERS*, Paris: Imp. Narboni, January 1967, p. 6.

59 In George Van Reeth's interview –12 March 2002 – *ESA History Extension Project*.

60 H. Bondi and R. di Carrobio, "Activités de l'Organisation européenne de recherches spatiales" in *Synthèses. Revue mensuelle internationale,* n° 275, May 1969, p. 30.

61 In George Van Reeth's interview –12 March 2002 – *ESA History Extension Project*.

officially as co-contractor, but adopted by the Junkers team as being extremely competent people. And, they [the ETCA people] had an enormous influence on this project.[62]]

From the scientific viewpoint, the Institute of Physics and Astronomy's space research unit at the Free University of Brussels (ULB) was among the groups which participated in the elaboration of *HEOS*' scientific tasks.[63] Professors Raymond Coutrez and C. de Jager from the Utrecht Observatory were then working in the ULB unit.[64] In 1964, this research unit proposed to ESRO a satellite experiment aiming to measure the flux and determine the speed of the low-energy protons emitted by the Sun (solar wind study).[65] The proposal was approved and registered under the name *S58*. It was then associated with an Italian programme, *S73,* to measure the energy spectrum of the positive component of the solar wind.[66]

So, the universities of Bari, Rome and Brussels collaborated.[67] Placed onboard European satellite *HEOS-1*, experiment *S58/73* was launched by a Thor-Delta rocket on 5 December 1968.[68] This experiment was to constitute a first contribution to the knowledge of the interplanetary plasma and of its interaction with the magnetic field, during the period of high solar activity from 1968 to 1971.[69]

2.6 Applications Programmes

From the beginning of the 1960s, it appeared that it would be necessary to embark applications as well as scientific experiments. Among these, it was already clear that telecommunications would be useful to Europe. This new preoccupation of space Europe took an institutional form in May 1963, when the European Conference on Satellite Telecommunication (CETS) took place. Belgium took part in it and from this period, telecommunications became a subject frequently debated by the National Council of Scientific Policy.[70] In November 1966, CETS entrusted ESRO with the task of launching a European telecommunications satellite project. In autumn 1969, the PTTs and the EBU (European Broadcasting Union) entrusted ESRO with defining a TV distribution satellite. In order to satisfy this request, ESRO issued a call for proposals. The Belgian firms SABCA and ETCA thus had the opportunity to participate in the preparation of offers made by the EST and CAESAR industrial consortia.[71] In the field of telecommunications, several projects begun under ESRO, were continued under ESA (European Space Agency), such as the *OTS (*Orbital Test Satellite) programme, *ECS* (first telecommunication satellite system), *Marecs* (a maritime satellite created for improved

62 On the other hand, in the framework of the HEOS project, a first industrial grouping took shape. According to George Van Reeth, it is during this project that the notion of industrial consortium arose. During his interview, he explained: when the programme was completed, the industries joined together for the HEOS' programme upheld their "partnership". Afterwards, these firms and some others gathered together within the COSMOS consortium. In George Van Reeth's interview –12 March 2002 – *ESA History Extension Project*.

63 "Activités de l'organisation européenne de recherches spatiales. I./ Introduction" in *L'Europe de l'Espace. Faits et* perspectives, p. 26.

64 SSTC Archives. Box entitled: "Ruimetvaart / Thor Delta / Sirio / Part. Belge / Exp. ESRO, etc." File 752. 49. Document: Lettre from R. Coutrez to Dr. J. Spaey dated 3 December 1964.

65 R. Coutrez, A. Joukoff and W. Scholiers, "Mesures directionnelles du vent solaire par sonde HEOS I, S 58-73, de l'ESRO" in *Ciel et Terre*, Brussels, 1972, n° 88 , p. 427.

66 HAEC. ESRO Collection, n° 4071. Document: ESRO/ST/6. Appendix 2. European space research organisation. Note on the co-operation between the groups of Bai-Rome and Brussels, concerning the development of plasma probes and their inclusion in a very eccentric orbit satellite of ESRO.

67 HAEC. ESRO Collection, n° 5385. Document: ESRO/PLA/1. 14 June 1964. Report of the first meeting of the PLA ad hoc working group (Paris, 28 May 1964), p.11.

68 R. Coutrez, W. Scholiers, A. Joukoff, G. Debrue and A. Demeyer, "Observation du vent solaire au moyen du satellite européen HEOS-1" in *ELDO-Cecles/* ESRO-*Cers Scient. And Techn. Rev.*, 1972, n° 4, pp. 75-98; *L'Europe spatiale…*, p. 66 & *Organisation européenne de la recherche spatiale. Rapport général 1964-1965*…, p. 41.

69 Raymond Coutrez and Paul Ledoux, "Esquisse du développement de l'astronomie en Belgique. Suite et compléments à la première esquisse contenue dans l'édition 1968 du *Florilège des Sciences en Belgique"* in *Florilège des Sciences en Belgique II*, Brussels: Académie Royale de Belgique, 1980, p. 74.

70 *Conseil national de la politique scientifique. Rapport annuel 1965*, Brussels, pp. 227 and 255.

71 *Belgospace. Rapport du conseil d'administration. Exercice 1969*…, p. 10.

communication between the ships and Earth stations) and *L-SAT* (designed to carry transponders for direct television).

In addition to telecommunications, ESRO also became interested, at the end of the 1960s, in meteorological satellites and also satellites for controlling air traffic.[72] In 1970, it was decided that Belgium would contribute 1.87% to the *Aerosat* aeronautical satellite project.[73] ETCA and Bell Telephone contributed significantly to this programme's study phase.[74] On 12 July 1972, the ESRO Council took the decision of beginning the creation of the *Meteosat* satellite. Belgium would be the sixth country to finance this meteorological programme originally proposed by France.[75] In this framework, ETCA participated in bids and Bell Telephone was entrusted by the MESH consortium with the design of the onboard receiver.[76]

72 H. Bondi, "La coopération européenne en matière spatiale. I./ Les satellites" in *L'Europe de l'Espace. Faits et perspectives*…, p. 10.

73 SSTC Archives. Document: Speech of Gaston Geens, Secretary of State for Science Policy, President of the European Space Conference, during the parliamentary Assembly of the Council of Europe (Strasbourg, 2 October 1975), p. 11.

74 *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 11.

75 SSTC Archives. Document: ESRO/C/APP (72)12. Annexe. ESRO Conseil. "Quarante-septième réunion restreinte tenue le 12 juillet 1972. Projet de Procès-verbal. Neuilly, le 25 juillet 1972".

76 *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 10.

3 Belgium in ELDO

3.1 Belgium joins ELDO

In September 1960, that is two months before the signature of the Meyrin agreement, Great Britain asked some European countries, including Belgium, whether they would be interested to participate in a joint European organisation to build heavy satellite launchers, using the *Blue Streak* rocket as the first stage.[77] In Belgium, the CNPS studied this question and gave its government rather favourable recommendations.[78] This British proposal confronted the Belgian government for the first time with the magnitude of the financial effort needed in order to take part in a European space effort. ELDO's initial programme (based on *Blue Streak*) budgeted £70 million to be spent in five years. Begium's part was initially estimated at about 5%. This was big money; the decision to allocate it could only be taken at the highest level, the CMPS which included Théo Lefèvre, the Prime Minister, and Paul Henri Spaak Foreign Minister. Compared with the *Blue Streak* project, the COPERS activities in 1960-61 involved only a minimal financial effort, which did not require government involvement at ministerial level.[79] The British and French governments invited several European countries to a meeting in Strasburg, from 30 January to 2 February 1961, to discuss the creation of a European organisation for satellite launch vehicles.[80] A Belgian delegation, headed by L. Massart, was sent there.[81]

The project was launched on 3 November 1961 at the Lancaster House conference in London. Belgium, France, Great Britain, Germany, Italy and the Netherlands[82] adopted a convention with a view to creating ELDO (European Launcher Development Organisation). A preparatory group was set up as well as two Committees respectively entrusted with technical and administrative affairs. This last committee was presided over by a Belgian, Marcel Depasse of the Ministry of Foreign Affairs.[83] Afterwards, Depasse was to be elected as chief of ELDO's provisional Secretariat, a post he assumed from the signature of the ELDO Convention.[84] He recalls this transition:

> *(Le poste qu'il occupait comme Président du Comité des affaires administratives) ça n'a pas duré longtemps parce qu'une des premières recommandations de ce Comité administratif a été la nécessité de mettre en place un Secrétariat intérimaire. Et c'est là que Auger et le Britannique (...) Denis de Havilland, au moment où j'ai terminé le rapport en disant: "le Comité propose la mise en place immédiate d'une structure provisoire qui préfigure le prochain Secrétariat general". Et quand j'ai quitté le podium, en présence de ce Comité, ils m'attendaient au pied de l'escalier et ils m'ont dit "(...) vous avez proposé un Secrétariat permanent et bien on vous propose d'être ce Secrétaire". (...) Je suis donc resté là (à Londres) environ six mois pour préparer la mise en place du Secrétariat général qui devait s'installer à Paris.*[85]
>
> [(His presidency of the Committee for Administrative Affairs) did not last very long because one of the first recommendations of this Committee was the necessity to set up a

77 *Rapport du conseil de l'Europe CECLES - ELDO 1960-1965,* Paris: CECLES-ELDO, p. 7.
78 *Conseil national de la politique scientifique. Rapport annuel 1961,* Brussels, pp. 69-70.
79 In a letter from Marcel Depasse dated 27 September 2002.
80 *Rapport du conseil de l'Europe CECLES - ELDO 1960-1965*…, p. 7.
81 The delegation included Professor Baudouin Fraeijs de Veubeke, Michel Lorthioir, representative of the MBLE firm, Mr Golstein, *attaché* at the Ministry of Economic Affairs, and Marcel Depasse, head of the Scientific Division of the Ministry of Foreign Affairs. In "La Belgique participera peut-être au lancement des satellites européens" in *Aviation et astronautique. Revue mensuelle éditée par le Centre de vulgarisation Aéro-Astronautique*, Brussels, February 1961, n° 2, p. 31.
82 Whereas Australia and Denmark were given the status of observer.
83 Michelangelo De Maria, *The history of ELDO. Part 1: 1961-1964,* Noordwijk: ESA HSR-10, September 1993, p. 17.
84 *Rapport du conseil de l'Europe CECLES - ELDO 1960-1965*…, p. 13.
85 In Ambassador Marcel Depasse's interview – 12 December 2001 – *ESA History Extension Project*.

temporary Secretariat. I had finished my report by saying "the committee proposes setting up immediately a provisional structure to prefigure the Secretariat general". When I left the podium Auger and the British Denis de Havilland were waiting for me and told me: "You proposed a temporary Secretariat, so we propose that you become Secretary". (...) So, I stayed there (in London) for about six months in order to prepare the setting up of the Secretariat General, which would be located in Paris.]

The final text of the ELDO convention was signed in March 1962 in London, but it only came into effect on 29 February 1964. Initially, ELDO's budget was set at 2000 million Belgian francs per year, of which Belgium would pay 2.85% during the five first years (that is 56 million Belgian francs per year).[86] However, ELDO's expenses did not stop increasing and in 1964, Belgium spent 80.5 million Belgian francs.[87]

3.2 *Europa* Rocket Guidance Station

At Lancaster House, the Belgian Delegation submitted to ELDO's Secretariat General a proposal to participate in the first production programme for heavy spacecraft launchers by providing the guidance station required by the *Europa* project. This was based on a proposal by ACEC, the Antwerp-based Bell Telephone and the Brussels-based MBLE.[88] Belgium finally obtained the contract and, with this, took on the responsibility for one of the most important electronic units intended for the *Europa* programme, a guidance station that would track the third stage of the rocket launched from Woomera in Australia, and send it trajectory corrections ensuring a perfect injection into orbit.[89] The sharing of responsibilities concerning the guidance station was as follows: MBLE, as it was in charge of the project, dealt with the antennas, its servo-control, pre-amplifiers and the installation of the station in Gove, Australia; Bell Telephone was responsible for the construction of the amplifiers, and the reception of signals from the third stage and ACEC was responsible for the design and production of a tracking receiver on the third stage.[90] In November 1966, the guidance station, which was designed and developed by those three Belgian firms, became operational. This station never had the opportunity of placing *Europa* into orbit, since none of the rockets succeeded in going beyond the atmosphere. However, the various trials which took place indicated that the Belgian station would have had no difficulty in carrying out its assignment.[91]

3.3 Belgium and the Question of a European Launcher

From ELDO's birth, Belgium strongly defended the idea that the *Europa* launcher project was only the first step in an ongoing programme of European space launchers. On 20 and 21 October 1964, during the third session of the general Council, Belgian delegate Alexandre Paternotte de la Vaillée, who was *attaché* at the Ministry of Foreign Affairs, declared that, for him and a number of Belgians concerned, the profitability of space research depended on this acquisition:

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86 Belgium contributed 2,35 million Belgian Francs in 1962; 33,6 million Belgian Francs in 1963; 50,5 million Belgian Francs in 1964, and 76 million Belgian Francs in 1965. In Kevin Madders, op. cit, 1997, p. 53 & SSTC Archives. Document: CNPS/98, 28 May 1962, p. 73.

87 In January 1971, the Belgian financial contribution to ELDO was estimated at 6% of the organisation's total budget (about 88 million Dollars). In Pierre-Louis Bernard, "La Belgique et l'espace" in *Aviation et Astronautique. n° 1: L'industrie aérospatiale belge*…, p. 18 & *Conseil national de la politique scientifique. Rapport annuel 1964*, Brussels, p. 53.

88 HAEC. ELDO Collection, n° 9. Document: ELDO (61) 62. 1 November, 1961. Suggested contribution by the Belgian electronics industry to the first programme.

89 For more information on the topic and especially to read the testimony of Michel Lorthioir, commercial representative of MBLE, see: Dawinka Laureys, *op. cit.*, pp. 318-351.

90 "Brèves nouvelles" in *Revue MBLE, publication scientifique et technique éditée trimestriellement par la s.a. Manufacture Belge de Lampes et de Matériel Electronique*, s. l., vol. VII/n° 2 (8th year) June 1964, p. 146; Christian Derouck's interview (MBLE) – 19 December 2001 – *ESA History Extension Project* & A. C. Paternotte de la Vaillée, "The down range guidance station" in *Hawker Siddeley Review*, s. l.: Special Aerospace Edition, summer 1964, p. 37.

91 For the tests, see: *Belgospace. Rapport du conseil d'administration. Exercice 1969* p. 9 & *Recueil financier 1970. 77e année*…, tome III, p. 1723.

(...) les travaux du programme initial ne seront justifiés aux yeux des Etats membres que si celui-ci est prolongé par des programmes futurs menant à la commercialisation du lanceur.[92]

[… the work of the initial programme will only become justified in the eyes of member states if it is followed by future programmes leading to the launcher's marketing.]

Afterwards, despite the first failures of the *Europa* rockets, Belgium remained, along with France and Germany, one of the three countries to support the idea of European independence in the field of launchers.[93] Other countries, like Great Britain, judged that the launchers could always be bought from the Americans. Minister Théo Lefèvre rejected this solution:

Certains se sont interrogés au sujet du développement d'une capacité européenne autonome de moyens de lancement. (...) L'essentiel est que nous devenions pour les Etats-Unis un partenaire valable. Ceci suppose que nous ne soyons pas dépendants d'eux sur des points majeurs; une coopération ne s'entend qu'en termes d'échanges et ne peut fonctionner à sens unique. Avant de courir avec eux, il faut donc que nous puissions marcher seuls.[94]

[Some raised questions about the development of an autonomous European launching capacity (…). The most important is that we become a good partner for the USA. It supposes that we be independent from them on major points. A co-operation is only possible in terms of exchanges and cannot function one-way. Before running with them, we must first walk alone.]

At the peak of the ELDO crisis in December 1972, Lefèvre explained in front of the Assembly of the Western European Union:

Nous pouvons, à l'étranger, acheter des lanceurs pour la plupart de nos besoins, à des prix qui ne comprennent pas l'amortissement des frais de développement. Mais il est évident que si nous suivons cette voie de facilité chaque fois qu'elle nous est ouverte, c'est-à-dire pour tous les usages compatibles avec les intérêts majeurs de nos fournisseurs, le coût de développement et de la construction d'un lanceur européen destiné aux seules utilisations critiques deviendra prohibitif. (...) Et cependant, c'est avec beaucoup de regrets que je verrais l'Europe renoncer à ses activités dans le développement des lanceurs.[95]

[We can buy launchers abroad for most of our needs at prices which do not include the amortisation of development costs. However, it is obvious that if we follow this easy way out each time it is open, that is for all uses which are compatible with the major interests of our suppliers, the development cost and the building of a European launcher intended only for critical uses will become prohibitive (…) it is however with much regret that I would see Europe give up its activites in the development of launchers]

He then added various arguments: if the launcher project was abandoned, France, which attached great importance to it, risked becoming isolated from the European Community; in the absence of a launching capacity, the European space programme was becoming "particularly vulnerable" because the American policy giving them the possibility to use their launchers could change; the technological

92 HAEC. ELDO Collection, n° 1038. Document: ELDO/C(64)PV/3. "Procès-verbal de la troisième session du Conseil tenue à Paris les 20 et 21 octobre 1964", p. 30.

93 George Van Reeth, *Belgium 2000. La place actuelle et future de la Belgique dans l'Europe spatiale*, s. l., 23/02/1988, p. 1.

94 Théo Lefèvre, "Pour une Europe spatiale" in *L'Europe de l'Espace. Faits et perspectives*, collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, May 1969, n° 247, pp. 4-5 & Théo Lefèvre, "Pour une contribution plus efficace de l'Europe à la recherche spatiale"…, p. 440.

95 General Archives of the Kingdom – Brussels. (GAK). Théo Lefèvre Collection. Classification mark 105. File entitled: "7-12-72 Assemblée de l'Union de l'Europe occidentale sur les programmes spatiaux européens". Speech of Minister Théo Lefèvre. Paris, pp. 1-26.

progress generated by the development of a launcher would have serious effects on the aeronautical field, etc.[96]

In concrete terms, Belgium undertook to finance the Europa programme and provided a technical contribution to the building of its three rockets.[97] From this fact, as early as the launching of the programme, the two firms, FN Herstal (*Fabrique Nationale d'Armes de Guerre*) and SABCA obtained an order for some elements of the first stage of the *Europa I* rocket, the British *Blue Streak.*[98] Because of its mastery in the field of turbine engines and turbojets, FN was chosen by the British firm Rolls-Royce for the building of some parts of the engines.[99] In 1963 and 1971, contracts were concluded between the two firms.[100] From SABCA's side, its participation materialised as subcontracts to the British firms De Havilland in 1963[101] and Hawker Siddeley in May 1964.[102] In 1972, SABCA supplied, among other things, servo-controls for *Europa II* and *Europa III.*[103] BTMC and ETCA were also involved in the programme, but later than FN and SABCA. From 1970, Bell Telephone signed several contracts for *Europa II* and *Europa III*[104] and ETCA took on the task of creating the integrated electrical system for the *Europa III* rocket.[105] If the participation of Belgium was important for the *Europa* programme, the effects for the country were also large. The Belgian financial participation in the *Europa III* programme was 6%, the return from which was then estimated at 110.98%.[106]

Besides the Belgian industrial participation in the guidance station and the rockets themselves, Belgian firms also participated in other ELDO programmes. This is how BTMC, MBLE and ETCA contributed to the PAS (Perigee-apogee-system) programme intended to allow the placing of a satellite into geostationary orbit.[107] Moreover, hoping that, sooner or later, space Europe would be led to use nuclear propulsion, the Belgonucléaire firm continued study work for ELDO.[108] Bell Telephone of Antwerp also participated in the building of a telemetry station in Fortaleza, Brazil, for both ELDO and CNES.[109]

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96 *Ibidem*.

97 See, notably, the decision taken on this topic by the ESC on 22 and 24 July 1970. In GAK. Théo Lefèvre Collection. Classification mark 104. File entitled: "Mars & Mercure". Document: CSE/CM. Brussels, 24 July 1970.

98 Joseph Heymans, "La Belgique et la recherche spatiale" in La recherche spatiale, s. l., s. d., p. 168.

99 For more details on the parts provided, see: *Revue F.N. Organe mensuel du personnel de la Fabrique nationale d'armes de guerre de Herstal*, n° 140, September 1966, p. 12.

100 *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 7 & SSTC Archives. Box entitled: "Ruimtevaart/ Conf. Gouvern./Charges fin/droits et taxes, etc." File 751. 43. 5. Document: Sub-contract dated 14 November 1963.

101 *Le Recueil financier 1964, 71ème année*…, tome I, p. 736.

102 For more information on the conclusion of the contract, see: SSTC Archives. Box entitled: "Ruimtevaart / Conf. Min. ELDO / Com Hauts Fonct/ GR ad Hoc Taxes/ etc." Documents: CIPS/BU/PV/26 dated 27 March 1964; CIPS/BU/PV/32 dated 22 May 1964 & Report from Colonel Nazy to Dr. Spaey dated 13 May 1964.

103 *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 7 & *Recueil financier 1972. 79e année*…, tome I, p. 343.

104 *Ibidem* & Pierre-Louis Bernard, "La Belgique et l'espace" in *Aviation et Astronautique. n° 1: L'industrie aérospatiale belge*…, Brussels, January 1971, p. 18.

105 *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 6

106 J. Krige, A. Russo and L. Sebesta, *A History of the European Space Agency 1958-1987.* Volume II: *The story of ESA from 1973-1987*, Noordwijk: ESA SP-1235, 2000, p. 16

107 The PAS was part of the programme decided during the Ministerial Conference of ELDO in July 1966. For the industrial participation in the PAS, see: SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "281/MR. Note à Monsieur le Président de la CIPS. Objet: Situation de la recherche spatiale en Belgique", 17 December 1968, p. 5.

108 Pierre-Louis Bernard, "La Belgique et l'espace" in *Aviation et Astronautique. n° 1: L'industrie aérospatiale belge…*, p. 18 & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "281/MR. Note à Monsieur le Président de la CIPS. Objet: Situation de la recherche spatiale en Belgique", 17 December 1968, p. 5.
For more technical details, see: *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 6.

109 *Alcatel Space Major Achievements*…, pp. 1 and 9.

3.4 The ELDO Crisis

At the end of the 1960s, several problems arose within ELDO: the *Europa* launcher was still not operational; the expenses planned initially had increased considerably[110] and, most of all, the points of view among the member states as to the necessity of developing a European launcher, differed considerably, bringing into question the body's very existence. As leader of this tendency, Great Britain was taking a rather firm position against the organisation's continuation. It was in this context that Belgian Minister of Scientific Policy Théo Lefèvre became President of the ELDO Council of Ministers in 1968. On 1 and 2 October he presided over the first ministerial conference, in which he had to note the serious differences between Great Britain and France. He asserted that no solution could be foreseen in "the present structures of ELDO".[111] However, he said:

> *Nous sommes tous convaincus qu'il faut construire le progrès économique et social de notre continent dans les voies nouvelles ouvertes par la science et les techniques avancées. (...) C'est évidemment ce qui nous a poussé à la coopération scientifique et technologique et c'est pourquoi nous ne pouvons abandonner la partie même au milieu de difficultés insurmontables comme celles que nous avons à résoudre ici.*[112]
>
> [We are all convinced that the economic and social progress of our continent must be developed along the new paths opened by science and advanced technologies (…) It is obviously what pushed us to cooperate from a scientific and technological point of view and that is why we cannot give up the game even if we are confronted with insuperable difficulties like those we have to solve here.]

A new ELDO meeting was held under his presidency on 11 November 1968 in Bonn. In order to break this deadlock, Belgian Jacques Spaey[113] made a proposal there. It consisted in respecting the British stance by admitting that the British were not obliged to participate in the development of a European launcher. In order to do so, Spaey planned a minimum programme in which each of the ELDO member states had to participate, and, on the other hand, a non-obligatory programme including among other things, the development of launchers.[114] However, neither that proposal, nor others, allowed a definite agreement to be reached at the Bonn meeting. In April 1969, a tentative solution was found to the problem of the continuity of the ELDO programme. France, the Federal German Republic, the Netherlands, and Belgium decided to assume the extra finances which Italy and Great Britain did not want to support, because it was essential for the continuation of the body's activities.[115]

On 5 November 1971, the *Europa* rocket suffered a new launch failure and an enquiry commission headed by French general R. Aubinière was set up in order to try and define the causes of this failure. This was not enough to reassure the already grudging countries. The impending withdrawal of Great Britain, Italy and the Netherlands was becoming obvious. In December 1971, the situation was such that it led to a total reappraisal of the organisation. It was decided that full powers would be given to a new team of men placed under the leadership of General Aubinière with a view to reviving ELDO.[116] On 1 January 1972, General Aubinière succeeded the Italian R. Carrobio di Carrobio as General Secretary. The German Hans Hoffman became technical Director and George Van Reeth, a Belgian, formerly head of the Contracts Office at ESTEC, was appointed as Administrative Director. The latter reported to me the way he received this nomination:

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110 J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 13.

111 *Faits des mois de septembre et octobre 1968*, collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, November 1968, n° 241, p. 9 & J. Krige and A. Russo, *op. cit.*, pp. 345-346.

112 "Extrait du discours de Théo Lefèvre à la Conférence Ministérielle de l'ELDO en octobre 1968" in *L'Europe de l'Espace. Faits et perspectives*, collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, May 1969, n° 247, pp. 6-7.

113 In Belgium, Jacques Spaey was at the same time Secretary General of CNPS and President of CIPS.

114 J. Krige and A. Russo, *op. cit.*, p. 347.

115 Théo Lefèvre, "Pour une Europe spatiale"…, pp. 3-4.

116 After the failure of the *Europa* launcher on 5 November, a board of enquiry – headed by General Aubinière, General Director of the CNES – was set up.

On m'appelle au téléphone. Et c'était Jef Van Eesbeek qui était au téléphone. [Attaché aux Services du Premier Ministre, Jef Van Eesbeek fut un des représentants les plus réguliers de la Belgique aux Conseils et Conférences des organismes spatiaux européens. Par ailleurs, il fut considéré par les autres délégations comme un sage et un fervent défenseur du spatial européen]. Et il dit: "George, le Gouvernement belge a décidé de vous proposer comme Directeur administratif de l'ELDO. Vous acceptez évidemment!". (...) A l'ESTEC, on n'avait aucun respect pour l'ELDO. On trouvait que c'était une organisation aberrante qui ne savait pas ce qu'elle faisait. On avait peut-être tort. On exagérait. Mais c'était très certainement l'opinion à l'ESTEC à ce moment là. (...) Après, j'ai commencé à réfléchir. J'ai dit: "Oui, ça peut être intéressant". Effectivement, j'avais beaucoup de respect pour Aubinière (pas beaucoup de confiance dans sa politique qui n'était pas toujours très européenne, mais très française plutôt), mais beaucoup de respect pour sa personne et sa façon de faire. Je dis: "Avec Aubinière, peut-être qu'on peut remettre de l'ordre dans cette boîte. On va essayer".[117]

[I was called on the telephone. And it was Jef Van Eesbeek who was on the telephone (Attaché in the Prime Minister's Service Jef Van Eesbeek was one of the most regular representatives of Belgium at the Councils and Conferences of the European space bodies). And he said "George, the Belgian government decided to propose your name as Administrative Director of ELDO. You will accept, of course!" (…) In ESTEC we had no respect for ELDO. We felt that it was a crazy organisation that did not know what it was doing. Maybe we were wrong. It was an exaggeration. But it was most certainly the opinion at ESTEC at that time (…). Afterwards, I began to think. I said: "Yes it could be interesting". Indeed, I had much respect for Aubinière (but not much confidence in his policy, which was not always very European, but rather French), but much respect for the person and his way of acting. I said: "With Aubinière, maybe we can create some order. Let us try".]

A little more than six months after the decision taken in December 1971 of continuing ELDO with three partners, the Germans announced that, on second thoughts, they went along with the idea of buying American launchers and that they would leave ELDO. The immediate reaction of the French and Belgians was to continue the fight within ELDO.[118] Then came the ELDO Council of 31 December 1972, which gathered again the three delegations: French, German, and Belgian. It was decided to stop the *Europa III* programme completely.[119] The ELDO Council met less than three months later. In the meantime, the decision had been taken in the European Space Conference (ESC) to merge ELDO and ESRO into a single organisation.

On 27 April 1973, the ELDO Council decided to cancel the *Europa II* programme, to liquidate ELDO, and to set up ESA by 1 January 1974.[120] The "History of the European Space Agency 1958-1987" gives an account of a key moment during the meeting:

The German delegate reminded those present that for almost a year his government had had doubts about the wisdom of an autonomous European launch capability. Now they had finally decided that the Europa II *programme should be cancelled as from 30 April 1973, after which date Germany would pay only the rundown costs. The French delegate accepted this suggestion immediately, leaving the Belgians stunned. Their delegate said that he had only just learnt of the proposal to cancel the rocket, and pleaded for more time to consult his Minister. His counterparts from France and Germany were unrelenting: they were not even prepared to accord him a delay of 15 days. Objecting that the Belgian government had stood by the major participants for 18 months, and that a deal between France and Germany had been brokered without his government being fully involved, the delegate left the meeting. The Council decided, in his absence, and by the votes of France and Germany,*

117 From George Van Reeth's interview – 12 March 2002 – *ESA History Extension Project*.
118 *Ibidem.*
119 J. Krige, A. Russo and L. Sebesta, *op. cit.*, pp. 15-16.
120 *Idem*, pp. 16-17.

that the Europa *programme was to be stopped, and that the firms concerned should be informed of this immediately by telex.*[121]

The Belgian delegate who went out of the meeting in ill-temper was none other than Jef Van Eesbeek. Concerning this meeting and the attitude of the representative of the Belgian services of the Prime Minister, George Van Reeth gives the following testimony:

Bon [lors de] la dernière réunion, les Français avaient décidé eux aussi: "Bon, si les Allemands vraiment ne veulent plus, on est quitte!". Ils n'avaient pas prévenu les Belges! Ils n'avaient rien dit! Et Van Eesbeek qui était là, avec… je ne me rappelle plus qui était là des Affaires étrangères, mais Van Eesbeek était là. (…) M. Lévy avec M. Bignier, qui étaient la délégation française, ont dit: "Bien, voilà. La France non plus ne continue pas". Van Eesbeek était devenu BLANC! Carrément, il s'est mis dans une rage! Et les autres étaient embarrassés. Les Allemands n'osaient pas regarder de son côté. Le seul qui gardait un peu son calme était Aubinière. Moi, j'étais à côté de lui. Les Français ne savaient pas où regarder, même le Professeur [Lévy] qui autrement, enfin… est parfaitement capable de faire face à une situation difficile (…). La délégation belge s'est levée et [les délégués belges] sont partis!.[122]

[Well, (during) the last meeting, the French had also decided: "If the Germans really do not want it anymore, we are finished)" They had not informed the Belgians! They had not said anything! And Van Eesbeek was there with…I do not remember who was there from the Foreign Affairs Department, but Van Eesbeek was there (…). Mr Levy and Mr Bignier, who were among the French delegation, said: "Well, France does not continue anymore". Van Eesbeek had become WHITE! Really, he became furious! The others were embarassed. The Germans did not dare look in his direction. The only one who kept calm was Aubinière. I was sitting next to him. The French did not know where to look, even the Professor [Lévy], who, well, … is perfectly capable of handling a difficult situation (…). The Belgian delegation stood up and [the Belgian delegates] left!]

Several days later, Alain Stenmans, principal private secretary to Théodore Lefèvre wrote in the personal diary he kept all through his career: "le 7 mai 1973: Le Général Aubinière vient nous voir au sujet de la liquidation d'ELDO, suite à la décision franco-allemande de mettre fin au dernier programme de l'organisation: le programme *Europa II*".[123] The dissolution of ELDO started after these events. General Aubinière left the organisation, and alone, George Van Reeth remained as Secretary General in order to keep ELDO alive artificially until the ESA convention would come into effect. The convention's approval extended from 1973 to 1975 and during this period George Van Reeth was the only member of the ELDO personnel, as he reported to France Durand-de Jongh.[124]

Dans cette période, j'ai incarné à moi tout seul une organisation internationale!

[In this period I embodied alone a whole international organisation!]

121 ELDO/C(73)PV/3, meeting on 27 March 1973, document dated 22 June 1973. In J. Krige, A. Russo and L. Sebesta, *op. cit.*, pp. 16-17.

122 From George Van Reeth's interview – 12 March 2002 – *ESA History Extension Project*.

123 From Alain Stenmans' interview – 4 March 2002 – *ESA History Extension Project*.

124 In France Durand – de Jongh, *De la fusée Véronique au lanceur Ariane. Une histoire d'hommes 1945-1979*, Paris: Ed. Stock, 1998, p. 175.

4 Belgium at the European Space Conference (ESC)

4.1 Towards a Space Programme and a Single Agency

Only a few years after its convention came into effect, ELDO went through difficulties and internal tensions. At ESRO, there was greater optimism, but it did not prevent the questioning of and necessity to re-examine its objectives, structure, methods and existing procedures. Moreover, budgetary constraints regularly surfaced. In order to discuss the problems raised by the co-ordination of space activities in Europe, and with a view to defining a common policy, the European Space Conference (ESC) was set up.

The first meeting of the ESC was held in Paris on 13 December 1966. Belgium suggested the creation of a mediation tool. At the initiative of Belgian Prime Minister Paul Vanden Boeynants, the decision was taken to set up an *ad hoc* group entrusted with making a technical and financial inventory of the national and international space programmes. Then, from 1968 to January 1973, Théo Lefèvre assumed, in addition to the presidency of the Council of Ministers of ELDO, that of the European Space Conference.[125]

From November 1968, at the third ESC in Bad-Godesberg, the creation of a single space organisation was presented as a possible solution to space tensions in Europe.[126] However, it was necessary to wait until winter 1972 for a Briton, the Minister responsible for space and sea traffic, Michael Heseltine, to propose the creation of a unique space organisation resulting from the merging of ELDO and ESRO.[127] In October 1972, Théo Lefèvre wrote to his colleagues in order to open a new session of the ESC. France and the German Federal Republic replied that they preferred to wait until the end of the year.[128] Thus, the fifth meeting of the ESC took place in Brussels under the presidency of Théo Lefèvre on Wednesday 20 December 1972. This conference was to lead to an agreement in principle in favour of; a single space agency, a heavy rocket *LIIIS* under the management of the French, the post-Apollo sortie laboratory called *Spacelab*, and the principle of integrating national space programmes at European level. In the diary he was keeping at that time, Alain Stenmans, the General Secretary of the SPPS drew the following conclusion from that ESC:

> *Il y a en tout cas désormais une politique spatiale européenne. Nous le devons à la ténacité de Monsieur Lefèvre.*[129]
>
> [In any case, there is now a European space policy. We owe it to Mr Lefèvre's persistence.]

The ESC of 20 December had led to an agreement in principle, but nothing was settled yet, far from it.

4.2 The American Invitation to Participate in the Post-Apollo Programme

On 21 July 1969, Neil Armstrong walked on the Moon. Less than two months after this event, the post-Apollo programme was presented to the USA, and in October 1969, the Europeans were invited

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125 *L'Europe de l'Espace. Faits et perspectives,* collection "Textes et Documents", Brussels: Ed. du Ministère des Affaires étrangères et du Commerce extérieur, May 1969, n° 247, p. 2.

126 GAK. Théo Lefèvre Collection. Document: Théo Lefèvre, *La politique scientifique en Belgique, une nouvelle approche* [Speech of Théo Lefèvre, Minister of Scientific Policy, in front of the General Affairs Commission of the House of Representatives on 3 December 1968], pp. 21-22 & Théo Lefèvre, "Pour une Europe spatiale"…, pp. 3-4.

127 Heseltine made this proposal on 8 November 1972 during an informal meeting of the ESC and in front of the *Assemblée de l'Union de l'Europe Occidentale* on 7 December 1972.

128 Lefèvre also sent an additional message to his French and German counterparts Charbonnel and Von Dohnanyi. Extract from Alain Stenmans' diary read during his interview on 4 March 2002 – ESA History Extension Project.

128 From Alain Stenmans' interview – 4 March 2002 – ESA History Extension Project.

129 According to an extract from Alain Stenmans' diary read during his interview – 4 March 2002 – *ESA History Extension Project.*

to participate in it. Long negotiations followed between Europe and the United States, which were in great part led by Théo Lefèvre as President of the CSE.

The Europans' first reaction was quite enthusiastic. During the ESC of July 1970, many countries declared they were favourable to European participation in the post-Apollo programme. It was decided to send Théo Lefèvre on a mission to NASA. His task consisted in getting information on the possibility of putting at Europe's disposal the rockets necessary for the launching of European application satellites (under reasonable conditions) in return for Europe's participation in the Post-Apollo programme.[130] In September 1970, a new meeting of the ESC took place in Venice. During this meeting, several European states backed down compared to their position of July and declared that they did not support European participation in the American programme.[131] Finally, only the Belgium – France – FRG trio agreed to go further in this project.[132] Théo Lefèvre continued his exchanges with the United States on this subject, notably with under-Secretary Alexis Johnson. On 4 and 5 November 1970, before the ESC assembly, Lefèvre made a report of his mission to the USA and presented a letter he had received from Alexis Johnson. Dated 2 October 1970, the letter suggested that it would not necessarily be easy to obtain an agreement that the USA launch European application satellites. In spite of this, the Conference's President judged that Europe had to participate in the programme:

> *It opened a new phase in space activities, and the techniques and technologies developed within it would add a new dimension to European efforts and give it a greater responsibility in international co-operation.*[133]

However, Lefèvre did not succeed in convincing all his colleagues. At the end of the meeting, he was compelled to declare:

> *Un large accord sur un programme européen compréhensif,*[134] *allant de pair avec des négociations avec les Etats-Unis, n'a pu être atteint. Dans ces conditions, la France, l'Allemagne fédérale et la Belgique, tout en restant dans l'ELDO et l'ESRO, ont décidé de continuer pour leur propre compte les négociations avec les Etats-Unis et de continuer, entre eux, la poursuite du programme compréhensif européen.*[135]
>
> [A broad agreement on a comprehensive European programme, could not be reached at the same time as negotiations with the United States. Under these circumstances, France, the Federal Republic of Germany, and Belgium, while they will still remain within ELDO and ESRO, have decided to continue their own negotiations with the United States and to continue among themselves, the pursuit of the comprehensive European programme.]

From 1971 to January 1973, Théo Lefèvre kept on corresponding with Alexis Johnson, then with W.P. Rogers, in order to discuss the modalities of European participation in the post-Apollo

130 Lefèvre saw these negotiations through with Mr. Denisse, CNES' President and with Lord Bessborough, British state secretary, in charge of Technology. The meeting was held in Washington with Alexis Johnson, Under Secretary for Political Affairs, and George M. Low, Acting Administrator from NASA.
In GAK. Théo Lefèvre Collection. Document : "L'actualité astronautique. L'Europe spatiale piétine" in *Bulletin de la Fédération des Industries belges*, Brussels, 20 November 1970, n° 29, p. 3371
& J. Krige and A. Russo, *op. cit.*, pp. 360, 401 and 404.

131 There were a lot of complicated reasons for this decision. We will not develop them in the present overview article. "L'actualité astronautique. L'Europe spatiale piétine" in *Bulletin de la Fédération des Industries belges*…, p. 3371.

132 *Ibidem.*

133 J. Krige and A. Russo, *op. cit.*, pp. 360-361.

134 In fact, these negotiations were mingled with those regarding the European launchers' policy. During the meeting, Great-Britain, Italy, Sweden, and the Netherlands did not give their approval for the post-Apollo and European Launchers programmes.

135 "Echec de la Conférence de Bruxelles" in *Aviation et Astronautique. n° 11: L'Europe spatiale,* Brussels, November 1970, p. 19.

programme.[136] In September 1971, the Americans announced their intention to reduce European participation in the programme and hinted that the USA would not launch European telecommunication satellites.[137] These decisions were confirmed during a meeting between the ESC representatives and the United States, held on 14 and 16 June 1972 in Washington. Alain Stenmans, a Belgian and Secretary General of the SPPS, was among the ESC representatives. He has mixed memories about the meeting:

> *Ce fut une réunion tout à fait cordiale parce que les Américains nous ont reçus très gentiment, mais extrêmement dure et décevante parce que, en réalité, ils n'étaient pas du tout prêts à nous associer à des choses importantes.*[138]
>
> [This was a very cordial meeting because the Americans welcomed us warmly, but it was also very harsh and disappointing because in fact they were not at all ready to make us a partner in important projects.[139]]

The Belgian delegation nonetheless participated in the project, but considered it, from that moment on, as an additional activity to the European space programme. In December 1972, Théo Lefèvre declared:

> *Tout compte fait, je crois qu'il reste souhaitable que la collaboration au programme post-Apollo soit réalisée sous la forme où elle nous est encore accessible. (…) Cependant au lieu de se substituer aux activités propres de l'Europe, notamment dans le domaine des lanceurs, elle ne peut plus qu'être complémentaire à ces activités.*[140]
>
> [Anyhow, I think it is still desirable that participation in the post-Apollo programme be realised under the form in which it is still available to us (…) However, instead of substituting it for Europe's own activities, notably in the field of launchers, it can only be complementary to these activities.]

Finally, the project of a European participation was to materialise through an orbital laboratory named *Spacelab*. During the European Space Conference of 20 December 1972, all the member countries agreed on an agreement in principle in favour of *Spacelab* and Lefèvre could thus write to American Secretary William Rogers that Europe had decided to participate in the post-Apollo programme.[141]

4.3 The European Space Conferences of 1973

In January 1973, Charles Hanin succeded Théo Lefèvre in the post of Minister of Scientific Policy and as the president of the ESC. On 22 February 1973, Charles Hanin and Alain Stenmans received a French delegation led by M. Lévy, who explained the project aiming to build the *LIIIS* launcher in order to replace *Europa III*.[142] In order to negotiate the project, French Minister Charbonnel asked Charles Hanin to organise a sixth ESC.[143] The latter started the invitation process. He received answers which were far from enthusiastic, but convened the conference anyway for 12 July 1973. In fact, *LIIIS* was not the only matter at stake during this conference. It was also necessary, for example, to raise the

136 See, notably: SSTC Archives. Documents: CSE/CS (73) 1 add. 1. Letter from the Secretary of State W. P. Rogers to Minister Théo Lefèvre. Neuilly, 22 January 1973 & CSE/CS (73) 1. The European participation in the Post-Apollo programme. Neuilly, 3 January 1973.

137 J. Krige and A. Russo, *op. cit.*, p. 409.

138 From Alain Stenmans' interview – 4 March 2002 – *ESA History Extension Project*.

139 According to George Van Reeth, Lefèvre did not really care about this programme, but he used it as a currency in order to obtain from the Germans, who wished to participate in *Spacelab* at all costs, that they contribute to a European launching programme.

140 GAK. Théo Lefèvre Collection. Classification mark 105. File entitled: "7-12-72 Assemblée de l'Union de l'Europe occidentale sur les programmes spatiaux européens". Document: Speech of Minister Théo Lefèvre., Paris, pp. 1-26.

141 J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 525.

142 According to an extract from Alain Stenmans' diary read during his interview – 4 March 2002 – ESA History Extension Project.

143 From Charles Hanin's interview – 28 February 2002 – *ESA History Extension Project*.

urgent question of participation in the Post-Apollo programme. The Conference started in Brussels. Charles Hanin presided over it and he quickly realised that the meeting was going to lead to a failure since there was such a divergence between the countries' viewpoints. The French wished to develop their *LIIIS* launcher at all costs, the Germans were essentially keen on the participation in the post-Apollo project with *Spacelab*, and the British were only interested in the building of *Marots* maritime communication satellites.[144] The Netherlands, Italy, and Sweden were not yet ready to announce if they would participate in these projects.[145] After around two hours, Charles Hanin suggested that the meeting be adjourned to the end of the month. Following Charbonnel's advice, the Conference's President was entrusted with a liaison task during this fifteen-day break.[146] The tour he began in European capitals was relatively unsuccessful. The only new change was that Great Britain accepted to contribute up to 9.8% to *LIIIS*,[147]

mais dans des conditions assez compliquées.

[but with rather complicated conditions.[148]]

The conference resumed on 31 July. There was some tension: the deadline for defining Europe's position in relation to *Spacelab* was two weeks away and most of the delegations had come to the conference without hoping to reach any result.[149] Each country started by presenting its position and President Hanin had to note that the situation was about the same as that in mid-July.[150] Faced with this situation, he decided to adjourn the meeting and to consult each delegation privately. Charles Hanin explained his steps:

> *Vous savez quand on a affaire à des négociations comme celles-là. Tout le monde, quand il s'exprime en public, garde des atouts dans sa manche. Chacun sait qu'il y a des sacrifices à faire, mais il préfère que ce soit le voisin qui les fasse. Et par conséquent, en public comme ça, c'est très difficile d'obtenir quelque chose. C'est alors que j'ai proposé de voir toutes les délégations les unes après les autres pour essayer d'obtenir qu'elles fassent un effort supplémentaire. (...) Enfin, j'ai réussi à..., comment dirais-je, à obtenir un petit sacrifice d'à peu près tout le monde.*[151]
>
> [You know when you deal with negotiations like these. Everybody, when they speak in public, keeps some trump cards in their pocket. Each of them knows that there are sacrifices to make, but he prefers the neighbour to make them. Consequently, in public, like that, it is very difficult to obtain something. It was at that moment that I proposed to see each delegation one after the other in order to try to get them to make an additional effort (…) Finally, I succeeded in…, how can I put it, in getting a small sacrifice from almost everybody.]

In his opinion, several elements were in his favour, the fact that the main nations had each an objective to which they attached great importance and, concerning the development of a European launcher, "une arme que les Américains m'avaient donnée" by putting very restrictive conditions on the use of their rockets in order to launch European telecommunication satellites.[152] After bilateral conversations, the talks resumed and the Brussels ESC finally succeeded in reaching an agreement which was to provide a new basis for European space activities.

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144 *Ibidem.*
145 Extract from Alain Stenmans' diary read during his interview on 4 March 2002 – ESA History Extension Project.
146 From Charles Hanin's interview – 28 February 2002 – *ESA History Extension Project*.
147 J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 403.
148 Extract from Alain Stenmans' diary read during his interview on 4 March 2002 – ESA History Extension Project.
149 From George Van Reeth's interview – 12 March 2002 – *ESA History Extension Project*.
150 From Charles Hanin's interview – 28 February 2002 – *ESA History Extension Project*.
151 *Ibidem*.
152 *Ibidem.*

Voilà que finalement, on s'est mis d'accord sur tout ! On a décidé que l'on faisait Ariane – ça ne s'appelait pas encore Ariane, c'était LIIIS – on a décidé la participation au programme post-Apollo, on a donné aux Anglais leur satellite et l'on a décidé la fusion d'ELDO et d'ESRO et la mise en place de l'ESA. Tout était fait. C'était une espèce de miracle. Il était cinq heures du matin. On était en réunion depuis 10h00 du matin de la veille. Moi je suis sorti en disant:"Bon, il faut tout de même informer les journalistes". Il n'y en avait plus un. Ils étaient tous partis en disant que de toute façon, c'était perdu.[153]

[Then finally, we agreed on everything! We decided that we would build *Ariane* (which did not yet bear that name, since it was *LIIIS*), we decided the participation in the post-Apollo programme, we gave the British their satellite, and we decided that ELDO and ESRO would be merged and that the ESA would be set up. Everything was done. It was a kind of miracle. It was five in the morning. The meeting had started at 10 am on the day before. I went out saying "well the journalists should be informed". All of them had vanished, as they thought this would lead to nothing.]

In this ambitious programme, Belgium committed itself to contribute up to 5% to *LIIIS*, 4.2% to *Spacelab* and 1% to *Marots*.

153 *Ibidem*.

5 Belgium in ESA

5.1 A Small Country within ESA

After the ESC of 31 July 1973, the convention of the future unified agency was still to be finalised. It was necessary to wait until May 1975, that is more than twenty-two months, for the European Space Agency to be operational. Belgium did not remain inactive during this transitional period. Under the mandate of Minister of Scientific Policy Gaston Geens, who had succeded Charles Hanin in April 1974, Belgian services of scientific policy kept on holding regular bilateral discussions in order to harmonise all viewpoints.[154] The Secretary General of the SPPS, Alain Stenmans, was a witness to and actor in this transitional period. He remembers in particular the weekend of 8 to 10 February 1975, when he was appointed as President of the ESC's *Comité des Suppléants.*[155] This weekend, he recalls, was decisive and the Committee was able to make some progress by unlocking the convention project creating ESA.[156] The following months, things were getting clearer. Dated Monday 10 to Thursday 13 March 1975, a note in the diary kept by Alain Stenmans bears witness to this:

> *De lundi à mercredi, travaux spatiaux. Lundi, entretien chez Monsieur Geens avec Monsieur Gibson, futur Directeur général de l'Agence spatiale européenne. Mardi et mercredi, réunion du Comité des Suppléants à Paris. Tout est pratiquement prêt pour la Conférence ministérielle du 15 avril (...).*[157]
>
> [From Monday to Wednesday, space works. Monday, meeting with Mr Gibson, future Director General of the European Space Agency at Geens' house. Monday and Wednesday, meeting of the Comité des suppléants in Paris. Everything is almost ready for the ministerial conference of 15 April (…).]

On 15 April 1975, the last ESC meeting was held in Brussels under the presidency of Gaston Geens. The text of the ESA Convention was formally adopted. It was also during this meeting that the leading team of the Agency was officially presented, with Roy Gibson as Director General. Among them, George Van Reeth was appointed as Director of Administration. As President of the Conference, Minister Gaston Geens made a presentation on the new tasks to entrust to ESA and on the applications satellites programme. He placed the emphasis on the necessity of co-ordination, rationalisation, integration and internationalisation of all the national techniques and programmes. He also stressed the need to develop a coherent policy which would intensify co-operation between member states.[158]

On Friday 30 May 1975, the ESA Convention was open to signature. At the end of the year, the Agency included eleven countries: Germany, Belgium, Denmark, Spain, France, Ireland, Italy, the Netherlands, Great Britain, Sweden and Switzerland. It should be noted that Belgian involvement in

154 In his diary, Alain Stenmans mentions a lot of meetings about the space affairs in progress between the Belgian Services of Scientific Policy and some representatives of others European nations. On 10 May 1974, the SPPS talked with French engineer Bloch, who was commissioned by Prime Minister Messmer to conduct investigations on European space policy; on 9 December 1974, with the German Minister of Research; on 3 March 1975, with the Dutch Minister of Scientific policy, and so on. In Alain Stenmans' interview – 4 March 2002 – ESA History Extension Project.

155 This body gathered some civil servants of member states commissioned to prepare the work of the Ministerial meetings.

156 From Alain Stenmans' interview – 4 March 2002 – *ESA History Extension Project*.

157 *Ibidem.*

158 J. Krige, A. Russo and L. Sebesta, *op. cit.*, pp. 33-34.

space Europe was constant before, but also after, ESA was set up.[159] In the course of the period studied from 1975 to 1992, this involvement mainly took the form of Belgian financial contribution to ESA. In October 1975, it had been planned that Belgium would pay, for the year to come, 3.89% of the Agency's total mandatory expenses.[160] In 1992, Belgium paid 4.86% of ESA's total budget.[161] In proportion to Belgium's GNP, these contributions were important as explained, among others, by Gaston Geens in front of the parliamentary assembly of the Strasbourg European Council in October 1975:

> *Si l'on fait le total des contributions individuelles des pays-membres aux différents programmes [spatiaux européens] et si l'on compare les pourcentages ainsi obtenus au pourcentage des revenus nationaux à l'intérieur de la communauté spatiale, on constate que quelques pays, notamment la France et la Belgique, contribuent au-delà de la norme alors que les autres restent à des degrés divers en dessous de celle-ci.*[162]
>
> [If we calculate the total of individual contributions from member states to the various (European space) programmes and if we compare the percentages thus obtained to the percentage of national income inside the space community, we see that some countries, notably France and Belgium, contribute above the mean while others remain at various levels below it.]

From around the middle of the 1970s, economic recession struck Europe. This had some consequences for the space field. However, in the beginning, ambitious space programmes were adopted all the same by ESA's member countries. Thus, in July 1973, Belgium had undertaken to participate with 5% in the *LIIIS* launcher programme, 4.2% in the orbital laboratory *Spacelab*, and 1% in the *Marots* maritime satellite programme. Once this first series of programmes was completed or about to be, ESA gradually defined a new programme. It was adopted at ESA's ministerial conferences in Rome, on 30-31 January 1985, and in The Hague, on 9-10 November 1987. The major points of the new programme were *Ariane-5* (a launcher designed to place satellites of 5.8 tonnes into Geostationary Transfer Orbit (GTO)), *Hermes* (a small space shuttle), and the *Columbus* platform, which constituted the European contribution to the new American international space station programme.[163] Belgium

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159 Many of those involved feel that there is a certain continuity in Belgian Space Policy. However, scientific policy had seen a lot of modifications until 1992 (end of the period covered by this study) and it was entrusted alternately to a Minister, a Vice-Prime Minister, or a Secretary of State. After Gaston Geens, a lot of people followed each other: A. Vandenkerkhove [on 3 June 1977, as Minister of Scientific policy], L. Outers [on 3 April 1979, as Minister of Foreign Trade and Scientific Policy], G. Gramme [on 23 January 1980, as Minister of the Interior and Institutional Reforms and Minister of Scientific Policy], J. Demarets [on 18 May1980, as Minister of the Plan and Scientific policy], Ph. Maystadt [on 22 October 1980, as Minister of the Public Service and Scientific Policy, in charge of Environmental Policy and from 17 December 1981, as Minister of Budget, of Scientific Policy and of the Plan], G. Verhofstadt [on 28 November 1985, as Vice-Prime Minister, Minister of Budget and Minister of Scientific Solicy] and L. Bril [on 28 November 1985 also, as Secretary of State at the Public Service and Secretary of State at the Scientific Policy], H. Schiltz [on 9 May 1988, as Vice-Prime Minister, Minister of the Budget and Minister of Scientific Policy] and M. Colla [on 9 May 1988 also, as Secretary of State at the Public Service and deputy of the Minister of Scientific Policy], P. Chevalier [on 16 January 1989, as Secretary of state at the Public Service and deputy of the Minister of Scientific Policy], E. Derycke [on 18 January 1990, as Secretary of State at the Public Service and deputy of the Minister of Scientific Policy], W. Demeester-Demeyer [on 29 September 1991, as Minister of the Budget and Scientific Policy] et E. Derycke [on 29 September 1991 also, as Minister promoting the development of Third World countries and Scientific Policy deputy],W. Martens [on 21 January 1992, Prime Minister, in charge of the Budget and of Scientific Policy], and J.-M. Dehousse [on 7 March 1992, as Minister of Scientific Policy]. In *http://sstc.fgov.be/belspo/ostc/geninfo/tijdsl_fr.stm#4 & La politique scientifique, ses objectifs et ses instruments*, Brussels: Ed. Services de la programmation de la politique scientifique, s. d.

159 SSTC Archives. Document: Speech of Gaston Geens… (Strasbourg, 2 October 1975), p. 10.

160 *Ibidem.*

161 Roland De Beule, *L'Aventure Spatiale Européenne*, Anvers: Ed. Coda, 1993, p. 211.

162 SSTC Archives. Document: Speech of Gaston Geens… (Strasbourg, 2 October 1975), p. 16.

163 J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 207.

decided to contribute up to 6% to *Ariane-5*, 5.8% to *Hermes* and 5% to *Columbus*. This considerable participation of Belgium, made it for some time,[164] the fourth country in terms of the importance of its contribution to ESA (below France, Germany and Italy, but above Great Britain).[165]

However, as the economic crisis continued, the budgets of European space programmes experienced a serious rise. Consequently, in 1991, Belgium was contributing 4100 million Belgian francs to ESA. The new Minister of Scientific Policy Hugo Schiltz and Secretary of State for Science Policy M. Derycke asked ESA to alleviate, to space out or even redirect the *Ariane-5*, *Hermes* and *Columbus* programmes at the next Ministerial Council.[166] In fact, the Belgian worries in the face of the Agency's rising expenses were shared by the other member countries. The ESA Ministry Councils of Munich and Grenada followed in November 1991 and 1992. In Munich, the programmes decided upon at The Hague in 1987 were reconsidered: the *Hermes* programme was abandoned and the *Columbus* programme was considerably reduced.[167] The period covered by this article extends until 1992, with the Grenada Council, but also with the flight of Belgian Astronaut Dirk Frimout aboard mission *Atlas-1*. Indeed the Grenada meeting is a watershed in European space history, whereas Dirk Frimout's flight is a major event in Belgian history.

5.2 Belgian Specificities

It is useful to remind the reader that, at the internal level, Belgium went through a process of federalisation during the 1980s and 1990s. The linguistic and cultural plurality of this small country, which was under the rule of the Latin and Germanic worlds, is at the root of the reforms which led to a revision of the Belgian state's structures as they had been defined in 1830-1831. In order to do so, the Belgian Constitution was revised several times in 1970, 1980, 1988-1989 and 1993. Three cultural communities were born from these juridical reforms – Dutch-speaking, French-speaking and German-speaking – which guarantee a certain cultural autonomy and three regions – Flanders, Wallonia and Brussels – each having a territory and acting mostly in the economic sphere.[168] This federalisation process had some consequences for scientific policy, on which space policy was dependent. The *Services de la Programmation de la Politique Scientifique* (SPPS) remained Federal Services under the Prime Minister's responsibility. However, the 1988-1989 institutional reform led to the creation of the first *Conférence interministérielle de la Politique Scientifique* (CIMPS), consisting of Ministers from the various authorities, federal and federate, in charge of scientific policy.[169] However, in spite of various restructurings and reforms, space affairs were (and still are) dealt with in the federal structures of management of scientific policy and they progressively occupied a major place there.[170]

In such a context, Belgian space policy was quickly faced with the question of regional balance. At the beginning of Belgian participation in space Europe, it was mostly the French-speaking part of Belgium that was involved, at both scientific and industrial levels. In this last sector, it was first the ACEC firm and its ETCA branch (Charleroi), MBLE (Brussels) and FN (Herstal) which became involved, but also

164 In September 1989, it became again the fifth partner. In *Space Connection,* Brussels: Politique scientifique de Belgique, September 1989, n° 3, p. 21.

165 George Van Reeth, *Belgium 2000…*, p. 2 & SSTC Archives. Document: Missions et actions principales des services de la programmation de la politique scientifique. Fiches succinctes, 18 mai 1988, p. 1.

166 Paul Dominique., « Y a-t-il "un" pilote aux commandes de la politique scientifique » in *La Libre Belgique. Recueil des pages Sciences de l'année 1991*, Brussels: Eds "la Libre Belgique", Monday 22 July 1991.

167 From George Van Reeth's interview – 13 March 2002 – *ESA History Extension Project*.

168 http://belgium.fgov.be/abtb/federal/fr_305000.htm

169 Robert Halleux and Geneviève Xhayet, *op. cit.*, pp. 24-25; "Historique des SSTC: principales étapes depuis 1959" in *La Belgique, un panorama…*, pp. 665-680; *OCDE Recherche Scientifique. Rapports par pays sur l'organisation de la recherche scientifique. Belgique*, *op. cit.*; *Rapport du Conseil National de la Politique Scientifique. Rapport d'activité 1972-1979,* Brussels, 1980, pp. 1, 6 and 7; *SSTC: Informations générales – Historique:* http://sstc.fgov.be/belspo/ostc/geninfo/ministr fr.stm; http://www.belspo.be/belspo/scienpol/savoir/cimps_fr.stm & *SSTC. Services du Premier Ministre. Services fédéraux des affaires scientifiques, techniques et culturelles. Missions et activités…*, pp. 9-10.

170 Other fields and funds, such as technology research, were regionalised from 1998. In Jacques Wautrequin's interview – 22 March 2002 – *ESA History Extension Project*.

on the Flemish side, Bell Telephone (Antwerp). From the 1970s, Théo Lefèvre and Jacques Spaey had been conscious that:

> *il fallait que le club industriel belge de l'espace comporte des entreprises des deux régions (...) ou des trois régions.*
>
> [There was a need for the Belgian industrial space "club" to include firms from the two (…) or the three regions.]

As Jacques Wautrequin, former SSTC General Secretary, explained,[171] it was a matter of balance and even of "fair return", a principle that sustained and led Belgian space policy. Gradually, the firms diversified and increased in the country's three regions. Until 1982, BTMC, ETCA, FN and SABCA obtained the majority of the ESA contracts in Belgium (that is, 93% of the contracts between 1972 and 1982).[172] In 1992, however, around twenty other companies were involved in European space production: in Antwerp, Newtec and Verhaert Design & Development; in Boom, Advanced Products; in Brussels, Comsip Automation, Cryptech, Fabricom, Logica, Sabena Technics, SAIT Electronics (SAIT Radio Holland), SAS (Space Applications Services), Spacebel Informatique and Trasys and Tech-Space Aero; in Gosselies, SONACA; in Liège, AMOS, IAL Space, Samtech and Spacebel Instrumentation; in Mol, Elenco; in Oudenaarde, OIP and PEDEO Techniek; in Welkenraedt, Hexcel and in Zwevegem, Bekaert, and also IMEC (Interuniversity Micro-Electronics Centre).[173] Very early, several of these firms gathered together in organisations aiming to protect their common interests and providing them with a favourable place on the market by developing a concerted industrial policy. These organisations were Belgospace (Association belge interprofessionnelle des activités spatiales),[174] Gebecoma (Groupement belge des Constructeurs de Matériel Aérospatial)[175] and later FLAG (Flemish Aerospace Group).[176]

In addition, from 1975 to 1992, space programmes in Europe were characterised by an obvious rise in the number of bilateral agreements, in parallel with the development of European programmes and by a decrease in the number of scientific programmes to the benefit of those of applications and systems for space transportation. From the end of the 1960s and mostly from the beginning of the 1970s, Belgium deliberately chose to direct a part of its space activities outside ESA. The various bilateral or tripartite agreements in which Belgium was involved until 1992 could form the subject of a entire chapter. We will limit ourselves to mentioning some of them in this study. The first was in 1969 with the signature of an agreement between France, Germany and Belgium for the *Symphonie* telecommunications' programme. Belgium was then involved in the *SPOT* earth observation programme with France, then Sweden; in the building of Italian satellite *Sirio-2* (intended to ensure

171 *Ibidem.*

172 SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "La politique spatiale belge", 5 June 1984, p. 2.

173 Roland De Beule, *op. cit.*, pp. 222-257 & *Space Connection*…, September 1989, n° 3, p. 21 and October 1991, n° 8, p. 15.

174 The Belgospace group, gathering the Belgian industries involved in the development of space activities, was founded by the *Fédération des Industries Belges* (FIB) on 19 April 1962. With a view to ensure a good co-ordination and to come up to the official authorities expectations, the industries concerned talked about their common problems and the main options to take by Belgium in the space field. In *Belgospace. Association belge interprofessionnelle des activités spatiales (ASBL fondée en 1962). Rapport des activités 2000*, s. l., s. d., p. 4; Pierre-Louis Bernard, "La Belgique et l'espace" in *Aviation et Astronautique. n° 1: L'industrie aérospatiale belge…*, pp. 17-18 & Royal Army and Military History Museum (Brussels). Air Section. Binder entitled: "ELDO, ESRO, VH/AE 01032". Untitled document devoted to Belgospace, Belgian participation in Eldo and in Eurospace, s. l., April 1962, p. (1).

175 Founded in 1952, Gebecoma brought together the main important industries like Alcatel Bell, FN, SABCA or SONACA. In Roland De Beule, *op. cit.*, pp. 222-257 & *Space Connection*…, September 1989, n° 3, p. 224.

176 The FLAG was founded in December 1980 by the VEV (*Vlaams Economisch Verbond*). It gathered about a hundred industries specialised in advanced technologies and it aimed to promote their abilities in the aerospace field. All their members were located in the Flemish area. In *Space Connection*…, February 1990, n° 4, p. 30.

the distribution of meteorological data and the synchronisation of clocks), in the international telecommunication satellites organisation Intelsat and in the realisation of the German-American Sun observation probe *Helios*.

Despite these bilateral or tripartite agreements, Belgium was still resolutely placed in a European context.[177] Belgium's action was significant mostly for the Agency's major programmes, but it also participated in optional programmes in the field of scientific and applications satellites. Explaining in detail all the ESA projects in which Belgium collaborated for about twenty years is impossible in a synthesis article. Consequently, we will only mention the main Belgian actions below.

5.3 ESA's Space Transport Programmes and Orbital Infrastructures

In the field of space transportation programmes, Belgium supported *Spacelab*, *Columbus*, *Hermes* and, of course, the *Ariane* rockets.

BTMC, SABCA and ETCA participated in the *Spacelab* programme.[178] ETCA acted as a subcontactor of BTMC. The contribution of the latter took the form, among other things, of the development of a "space sled", a research tool in the biomedical field.[179] SABCA's most prestigious achievement in this programme was without any doubt the pressurised wall named *Igloo.*[180] Among others, six Belgian scientific experiments were carried onboard *Spacelab*, three of which had been built by IASB[181] and three others by IRM (*Institut Royal Météorologique*), the Catholic University of Leuven and the State University of Antwerp.[182]

After *Spacelab*, ESA was invited to participate in a new American programme, that of the *International Space Station*. President Reagan formulated his request in January 1984, and in September 1988, a multilateral and intergovernmental agreement was signed between NASA, ESA, Japan and Canada. The European *Columbus* programme was born from that union. The Belgian State and its three major space industries at the time – BTMC, ETCA and SABCA – contributed to the programme.[183]

The small space shuttle *Hermes*, a too-costly project which was finally not completed, raised many hopes on the side of the Belgian State and industry. Indeed, on 17 March 1988, the decision was taken to establish on Belgian soil the training centre for the shuttle's future pilots.[184] This centre's

177 SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, p. 32.

178 Henry Dorchy, *op. cit.*, p. 499.

179 *Belgospace. Rapport du conseil d'administration. Exercice 1979*…, pp. 4-5; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: Activités spatiales de B.T.M.C.", 10 December 1982 & SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, p. 27.

180 For more details on this device, see: *Belgospace. Rapport du conseil d'administration. Exercice 1976*…, pp. 4-5; *Idem*. *Exercice 1979*…, p. 4; Paul Dominique, "L'igloo de Challenger, une technologie belge" in *La Libre Belgique. Recueil des pages Sciences de l'année 1985*…, Monday 5 August 1985; *Rêves et obstinations*…, p. 200; *Space Connection*…, March 1992, special issue, p. 19; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: Activités spatiales de SABCA", 23 December 1983 & SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, p. 29.

181 Amongst the IASB experiments, the creation of grid spectrometers was entrusted to astrophysicist Dirk Frimout.

182 SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, pp. 9-10.

183 *Alcatel Space Major Achievements*…, pp. 3-4; *Space Connection*…, March 1992, special issue, p. 15; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "La politique spatiale belge", 5 June 1984, pp. 4-5; *Rêves et obstinations*…, p. 190 & SSTC Archives. Document: "L'industrie belge dans les secteurs de pointe". Speech of A. Stenmans, General Secretary of SPPS, at the Royal Academy of Rome on 8 May 1985, p. 10.

184 SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Services de Programmation de la Politique Scientifique. Note pour Monsieur le Ministre. Objet: Mise en œuvre du Centre d'entraînement des pilotes *Hermes* en Belgique". Bruxelles, 24 August 1992.

infrastructure was to be set up near Zaventem, close to the aeronautical training centre of the national airline company Sabena; with the air base of Gosselies (near Charleroi) as a training centre.[185] The authorities and bodies which would participate in the programme were: the Walloon Region, the *Régie des Voies Aériennes* (RVA), the *Force Aérienne Belge* (FAB), the international organisation Eurocontrole, the *Administration de l'Aéronautique*, SPPS and ESA.[186] From 1989 to 1991, Bell Telephone, which had become Alcatel Bell, and the firm Sabena Technics conducted successful feasibility studies.[187]

In addition, Alcatel Bell and SABCA worked on the design of the shuttle itself.[188] SABCA, for example, built the interconnection and automated elements and participated in the studies of the automated arm and the European space suit.[189]

We will conclude this part devoted to space transportation by mentioning the Belgian contribution to the *Ariane* programme.

In July 1973, the *LIIIS* programme, later named *Ariane*, was approved. Just after a programme of development based on the setting up and the launching of the fourth *Ariane*-1, ESA decided to create a "promotion series" with the launching of six additional launchers. In January 1980, the marketing, the production and the launching of *Ariane* were entrusted to Arianespace, a commertcial company. From 1980, the development of improved versions of *Ariane-1*, *-2* and *–3* was started. *Ariane-3* flew for the first time on 4 August 1984, while *Ariane*-2 was launched only in 1986. *Ariane-2* and *Ariane-3* were very similar and were able to carry a payload into space which was two or three times heavier than that of *Ariane-1*. From October 1981 ESA studied the development of *Ariane-4*, a more advanced launcher. This one, unlike the previous ones, launches up to six tonnes and several satellites at the same time. The first flight of *Ariane-4* was on 15 June 1988. The ESA Council approved the preparatory programme for *Ariane-5* in June 1985.

From *LIIIS* to *Ariane-5*, Belgium's financial contribution was important (5% for *Ariane-1* and up to 6% for *Ariane-5*). Indeed, Belgium was the fifth main contributor after France, Germany, Italy and Great Britain.[190]

In the frame of this programme, which began with the successful *Ariane-1* flight on 24 December 1979, Belgian industry had the opportunity of emphasising its know-how to the benefit of the four *Arianes* and their traditional launch base in Kourou, French Guyana. Four firms essentially contributed to finalise ground and flight equipment: BTMC, ETCA, FN and SABCA. For the first category of equipment, ETCA was project manager of the checkout system set up in Kourou.[191] Regarding the ground equipment, ETCA, FN and SABCA participated in its production once the *Europa III* programme stopped and *LIIIS* was started. ETCA was mostly present, in addition to the onboard

185 Idem & SSTC Archives. Document: "Missions et actions principales des services de la programmation de la politique scientifique. Fiches succinctes", 18 May 1988, p. 3.

186 SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Services de Programmation de la Politique Scientifique. Note pour Monsieur le Ministre. Objet: Mise en œuvre du Centre d'entraînement des pilotes Hermes en Belgique". Bruxelles, 24 August 1992, pp. 2-3.

187 *Alcatel Space Major Achievements*…, p. 4 & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: Services de Programmation de la Politique Scientifique. Note pour Monsieur le Ministre. Objet: Mise en œuvre du Centre d'entraînement des pilotes *Hermes* en Belgique". Brussels, 24 August 1992, p. 1.

188 *Alcatel Space Major Achievements*…, pp. 3-5 & SSTC Archives. Document: "L'industrie belge dans les secteurs de pointe". Speech of A. Stenmans at the Royal Academy of Rome on 8 May 1985, pp. 9-10.

189 *Rêves et obstinations*…, p. 190.

190 See notably: J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 500.

191 *Alcatel Space Major Achievements*…, pp. 3 and 6; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Activités spatiales de B.T.M.C.", 10 December 1982 & SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, pp. 13-15.

equipment, in the production of various electronic units, such as the rockets' self-destruct system.[192] The activity of FN in the space field concerned exclusively the launchers' programme. FN's Engines division worked on the production of various pieces of the *Viking* engines of the *Ariane*s and contributed to the SEP propulsion system for *Ariane-4*.[193] SABCA's space output was essentially in the field of structures (stabilisers, streamlining) and hydraulic components (such as the engine's steering actuators, including those for *Ariane-5*).[194]

Those three firms were also shareholders in Arianespace, the function of which was to produce and commercialise *Ariane* launchers. In 1991, Belgium held 4.4% of Arianespace's capital.[195] A part of this firm's history is worth mentioning: the "TCI" affair, from the name of the American firm Transpace Carriers Inc. In spring 1984, the firm accused ESA, CNES and Arianespace of the illegal "dumping" of *Ariane* rockets on the world market. For several months, meetings were led by Jeanne Archibald at the head of the American delegation and by George Van Reeth, who was presiding over the European delegation. The case was settled in July 1985 by a note from President Reagan directing that Europe should not be punished.

5.4 Other Agency Activities

In the field of scientific satellites and instruments, Belgium collaborated in various programmes, such as *GEOS 2* (study of the Earth's immediate environment), *ISEE 2* (studying magnetosphere dynamics), *Exosat* determining the position and structure of the celestial sources of-X rays) and *ISPM* (exploration of regions distant from the Earth's orbit).[196] Moreover, in the frame of the ESA-NASA programme for the space telescope, ETCA, the IAL Space group and the Astrophysics and Geophysics Department of the University of Liège, headed by J C. Gérard, contributed to the adjustment of elements for the *Space Telescope* in collaboration with NASA.[197] IAL Space also worked on the

192 *Belgospace. Rapport du conseil d'administration. Exercice 1976*…, pp. 5-6; *Idem*. *Exercice 1979*…, p. 8; *L'Europe spatiale*…, p. 145; Royal Army and Military History Museum (Brussels). Air Section. Box E/VC 027-034. Binder entitled: "*ARIANE*SPACE"; SSTC Archives. Documents: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, p. 28 & "L'industrie belge dans les secteurs de pointe". Speech of A. Stenmans at the Royal Academy of Rome on 8 May 1985, p. 9.

193 *Belgospace. Rapport du conseil d'administration. Exercice 1976*…, p. 6; Idem. *Exercice 1979*…, pp. 7-8; Royal Army and Military History Museum (Brussels). Air Section. Box E/VC 027-034. Binder entitled: "*ARIANE*SPACE"; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Secteur spatial région liégeoise", 8 April 1983 & SSTC Archives. Document: "L'industrie belge dans les secteurs de pointe". Speech of A. Stenmans at the Royal Academy of Rome on 8 May 1985, p. 10.

194 *Belgospace. Rapport du conseil d'administration. Exercice 1976*…, p. 6; Idem. *Exercice 1979*…, p. 7; *L'Europe spatiale*..., p. 146; SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, p. 29; Royal Army and Military History Museum (Brussels). Air Section. Box E/VC 027-034. Binder entitled: "*ARIANE*SPACE"; *Recueil financier 1974. 81e année*…, tome I, p. 1473 & *Rêves et obstinations*…, pp. 125 and 188-189; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Activités spatiales de SABCA", 23 December 1983 & SSTC Archives. Document: "L'industrie belge dans les secteurs de pointe". Speech of A. Stenmans at the Royal Academy of Rome on 8 May 1985, p. 10.

195 Henry Dorchy, *op. cit.*, p. 501.

196 *Ibidem.*

197 The IAL Space group ("Institut d'Astrophysique de Liège" Space group) was an academic division founded and managed by Professor André Monfils. It comes from the Astronomy and Astrophysics Department of the University of Liège. In 1980, ESA concluded with this University a memorandum whereby IAL Space became one of the fourth "coordinated facilities" of the Agency; with the ESTEC in Noordijk, the CNES in Toulouse and the IABG (Industrie Anstalt Betrieb Gesellschaft) in Munich. In 1992, Claude Jamar succeeded to André Monfils at the head of IAL Space, it changed its name in CSL, Centre Spatial Liégeois. In SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Documents: "Secteur spatial région liégeoise", 8 April 1983 and "Etudes techniques et constructions aérospatiales (ETCA)", 26 October 1984 & *IAL SPACE*, September 1988, pp. 1-2. [Document kept by Professor André Monfils].

qualification of the colour camera of the *Giotto* probe which had to cross the path of Comet Halley. It also worked on the telescope of the EIT Instrument (Extreme Ultraviolet Imaging Telescope) aboard the SOHO spacecraft.[198] BTMC and IAL Space also participated in the *Hipparcos* astronomical satellite project for the French firm MATRA.[199] In addition, Belgian researchers were involved in several experiments which were carried on the *Spacelab* missions.[200]

In the field of telecommunications, a Belgian engineer from Verviers, René Collette, played the essential role of promoter from the very beginning of this programme, and later became Telecommunications Director at the Agency. Belgium continued its participation in *OTS*, *ECS* and the *L-SAT* programmes, which had already begun under ESRO. For the first two, BTMC and ETCA carried out preliminary studies and provided various units.[201] An *ECS* transmit receive station was established in Lessive, near Rochefort.[202] The *L-SAT* programme, which was intended to carry direct-to-home television programmes was adopted by ESA in July 1979 with BTMC, among others, participating from Belgium.[203] Belgium also took part in the marine satellite programme named *Marecs* (ex-*Marots*)[204] and worked on the development of the *H-SAT* multifunction satellite platform. ETCA, via the consortium MESH, and BTMC, via Eurosatellite, contributed to this *H-SAT* programme, which was finally abandoned.[205]

Within ESA, Belgium also invested in Earth observation programmes. ETCA provided onboard equipment for the *Meteosat* satellites, which was tested by IAL Space, and IRM processed the data provided by these meteorological satellites.[206] Belgium made a financial and industrial contribution to the remote-sensing satellites ERS 1 and 2 which were launched into polar orbits. Alcatel Bell

198 *Alcatel Space Major Achievements*…, p. 3; Paul Dominique, "GIOTTO: 700.000.000 Km pour un rendez-vous" in *La Libre Belgique. Recueil des pages Sciences de l'année 1986*…, Monday 10 March 1986; E. v. D., "Spacebel est un opticien de l'espace" in *La Libre Belgique. Recueil des pages Sciences de l'année 1991*…, Monday 21 October 1991 & *IAL SPACE*, September 1988, p.2. [Document kept by Professor André Monfils]; "GIOTTO, la sonde kamikaze" in *La Libre Belgique. Recueil des pages Sciences de l'année 1986*…, Thurday 13 March 1986; *IAL SPACE*, September 1988, p.1. [Document kept by Professor André Monfils] & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Etudes techniques et constructions aérospatiales (ETCA)", 26 October 1984.

199 *Alcatel Space Major Achievements*…, p. 3; *IAL SPACE*, September 1988, p.1. [Document kept by Professor André Monfils] & SSTC Archives. Document: "L'industrie belge dans les secteurs de pointe". Speech of A. Stenmans at the Royal Academy of Rome on 8 May 1985, p. 10.

200 We will develop this below.

201 For more details, see: *Alcatel Space Major Achievements*…, p. 2; *Belgospace. Rapport du conseil d'administration. Exercice 1972*…, p. 11; *Idem*. *Exercice 1976*…, p. 7; *Idem*. *Exercice 1979*…, pp. 5-6 & SSTC Archives. Document: "Note sur la participation belge aux programmes spatiaux européens…", 20 October 1980, p. ~~7~~

202 *Alcatel Space Major Achievements*…, p. 1; Francis Laroche, "La station de Lessive fait peau neuve" in *La Libre Belgique. Recueil des pages Sciences de l'année 1991*…, Monday 7 January 1991 & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Activités spatiales de B.T.M.C.", 10 December 1982.

203 *Belgospace. Rapport du conseil d'administration. Exercice 1979*…, p. 6; J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 277; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Activités spatiales de B.T.M.C.", 10 December 1982 & SSTC Archives. Documents: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, pp. 11-12; "Note sur la participation belge aux programmes spatiaux européens…", 20 October 1980, p. ~~11~~ & SSTC Archives. Document: "La politique spatiale belge", 5 June 1984, p. 2.

204 *Alcatel Space Major Achievements*…, p. 2; *Belgospace. Rapport du conseil d'administration. Exercice 1976*…, p. 7 & SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Etudes techniques et constructions aérospatiales (ETCA)", 26 October 1984.

205 J. Krige, A. Russo and L. Sebesta, *op. cit.*, p. 230 & SSTC Archives. Document: "Note sur la participation belge aux programmes spatiaux européens…", 20 October 1980, p. ~~11~~.

206 *Belgospace. Rapport du conseil d'administration. Exercice 1976*…, p. 7; SSTC Archives. Binder entitled: "BTMC, ETCA, SABCA, FN, Université de Liège". Document: "Secteur spatial région liégeoise", 8 April 1983 & SSTC Archives. Document: "L'importance des technologies spatiales pour la Belgique". Speech of Eric BEKA, *Chargé de mission* SPPS, Woluwé-Saint-Lambert, 5 May 1983, pp. 10-11and 28.

(formerly Bell Telephone or BTMC) provided ground-based receiving equipment and ETCA contributed to the construction of onboard power supply systems.[207]

Dirk Frimout, doctor in Physics from the University of Ghent, researcher at the IASB and seconded to ESA from 1978,[208] was the first Belgian – after Tintin – to travel into space. His adventure began with *Spacelab 1*, for which he was entrusted with the building of a scientific payload, the grid spectrometer. He explained:

> *Lorsque l'on m'a confié la conception de cet instrument pour l'étude de l'atmosphère, je me suis intéressé au vol habité. Je ne désirais pas seulement participer à la mise au point de l'expérience, mais je souhaitais aller moi-même la réaliser là-haut sur orbite.*[209]
>
> [When I was entrusted with the development of this instrument for the study of the atmosphere I became interested in manned flight. I did not only wish to participate in the setting up of the experiment, but I wished to go and conduct it myself, there, in orbit],

Then he submitted his application to be an astronaut, but he was not chosen for the first *Spacelab* missions. ESA prefered to appoint him as coordinator in ESTEC's Microgravity Division.[210] In December 1985, he was selected by NASA as reserve *Payload Specialist* for a *Spacelab* mission planned for August 1986.[211] The American shuttle Challenger accident, which occurred on 28 January 1986 would however put his participation into question. The programme was delayed until 1992 and renamed *Atlas-1*.[212] On 10 December 1991, Dirk Frimout was informed that his dream would become reality. On that day he was appointed as payload specialist – to replace an American colleague who was rejected for health reasons. In March 1992, he flew on the *Atlas-1* mission.[213]

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207 *Alcatel Space Major Achievements*…, p. 3; Paul Dominique, "Un oeil européen sur les mers et les océans" in *La Libre Belgique. Recueil des pages Sciences de l'année 1991*…, Monday 1st July 1991; *La politique scientifique, ses objectifs et ses instruments*, Bruxelles: Ed. Services de la programmation de la politique scientifique, s. d., p. 34; *Space Connection*…, February 1990, n° 4, p. 13 & Idem, March 1992, special issue, p. 15.

208 "ESPACE. Un Belge dans *Spacelab* pour la NASA" in *La Libre Belgique. Recueil des pages Sciences de l'année 1991*…, Monday 25 November 1991 & *Space Connection*…, March 1992, special issue, p. 4.

209 *Space Connection*…, March 1992, , special issue, p. 4.

210 *Ibidem*.

211 *Idem*, p. 3.

212 *Ibidem*.

213 During this mission, five research programmes were conducted with the participation of some Belgian researchers for four of those: the ALAE (Atmospheric Lyman Alpha Emissions), the result of a collaboration between the IASB and the Aeronomy's service of the CNRS in France; a new use of the grid spectrometer to which the IASB contributed; ATMOS (Atmospheric Trace Molecule Spectroscopy), the data of which were gathered by the firm ATMOS (Liège) and which were processed by the Astrophysical Institute of the University of Liège; the SOLCON (Measurement of Solar Constant), built and adjusted by the IRM and the SOLSPEC (Solar Spectrum) conceived notably by the IASB. For more details on these instruments' conception and scientific tasks, see: Space Connection…, March 1992, special issue, pp. 9-14 & P. D., "Une année *Spacelab*" in *La Libre Belgique. Recueil des pages Sciences de l'année 1991*…, Monday 30 December 1991.

6 Conclusion

From 1958 to 1992 Belgium did not develop any purely national large space programmes. Several factors prevented this, in particular the fact that, due to its small size, Belgium naturally had a smaller budgetary, industrial and scientific potential than a large European nation. Besides, a national space Agency was never created. However, from the beginning of the European space adventure, some Belgians planned the creation of a unique space agency, like CNES in France or the Nuclear Research Centre at Mol. Belgium deliberately chose the European route and it was always involved in it with the greatest strength. It showed constant loyalty to space Europe, even during hard times, for example, just before ELDO was dismantled. Very often, Belgium adopted positions close to those of the French delegation. In comparison with the other countries, with the exception of France, the Belgian financial contribution was always larger in relation to its GDP. Some Belgian delegates also adopted constructive positions which made it possible to forge ahead. Belgium's action in the space field took the form of a financial, administrative, technical, industrial and scientific contribution to the European space bodies: COPERS, ESRO, ELDO, CSE, CETS and ESA.

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