United States General Accounting Office

GAO

Fact Sheet for the Chairman, Subcommittee on Space Science and Applications, Committee on Science, Space, and Technology, House of Representatives

April 1989

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SPACE OPERATIONS

Listing of NASA Scientific Missions, 1980-2000

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GAO

United States
General Accounting Office
Washington, D.C. 20548

Information Management and
Technology Division

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April 7, 1989

The Honorable Bill Nelson
Chairman, Subcommittee on Space Science
and Applications
Committee on Science, Space,
and Technology
House of Representatives

Dear Mr. Chairman:

As requested by your office on March 14, 1989, ~~we are providing~~ a list of the National Aeronautics and Space Administration's (NASA) active and planned scientific missions, 1980-2000.[1] ~~We have~~ included missions with the following status:

launches prior to 1980, and those since 1980 that either ended after 1980 or are currently approved by NASA and remain active; and planned launches that have been approved or proposed by NASA.

As ~~agreed, our~~ compilation covers the following four major scientific disciplines: (1) planetary and lunar, (2) earth sciences, (3) space physics, and (4) astrophysics. Appendixes II-V present this information, including mission names and acronyms, actual or anticipated launch dates, and the actual or expected end-of-mission dates, in tables and figures. As requested, we did not list other types of NASA missions in biology and life sciences, manufacturing sciences, and communication technology.

During this period, NASA has or plans to support 84 scientific missions in these four disciplines:

Table 1: Summary of NASA's Scientific Missions, 1980-2000

	Active January 1980 - March 1989	Planned April 1989 - December 2000	Total
Planetary and Lunar	5	7	**12**
Earth Sciences	3	27	**30**
Space Physics	6	20	**26**
Astrophysics	2	14	**16**
Totals	**16**	**68**	**84**

[1] Missions include NASA joint ventures with other countries, as well as NASA scientific instruments flown on foreign spacecraft.

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NASA officials told us that a combined, current list of active and planned missions was not available. Accordingly, we compiled this information from various documents and interviews with officials from NASA's Office of Space Science and Applications (OSSA), which is responsible for the overall management of the space exploration program.

Where source documents were based on graphics that did not give precise launch and end-of-missions dates, we worked with OSSA officials to convert the depicted graphic information into months and years.

Our work was conducted during March 1989. We discussed this report with NASA officials to verify that the information presented is correct. More detail on our objectives, scope, and methodology are discussed in appendix I.

We are sending copies to other appropriate congressional committees; the Administrator, NASA; and other interested parties upon request.

This work was performed under the direction of Samuel W. Bowlin, Director for Defense and Aeronautics Mission Systems. Other major contributors are listed in appendix VI.

Sincerely yours,

Ralph V. Carlone

Ralph V. Carlone
Assistant Comptroller General

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Abbreviations

IMTEC	Information Management and Technology Division
GAO	General Accounting Office
NASA	National Aeronautics and Space Administration
OSSA	Office of Space Science and Applications

Objectives, Scope, and Methodology

The Subcommittee on Space Science and Applications, House Committee on Science, Space, and Technology, requested a list of NASA's scientific missions, for the time period 1980 to 2000.[1] We have included missions with the following status:

- launches prior to 1980, and those since 1980 that either ended after 1980 or are currently approved by NASA and remain active; and
- planned launches that have been approved or proposed by NASA.

As agreed, we focused on missions in four major scientific disciplines: (1) planetary and lunar, (2) earth sciences, (3) space physics, and (4) astrophysics. As requested, we did not list other types of NASA missions in biology and life sciences, manufacturing sciences, and communication technology.

OSSA officials explained that a combined, current list of active and planned missions was not available. Accordingly, we interviewed OSSA officials and compiled this information from various sources, including:

- Flight Project Data Book, 1989, OSSA, NASA, March 1989;
- Payload Flight Assignments: NASA Mixed Fleet, Transportation Services Office, NASA, January 1989;
- Mission Requirements and Data Systems Support Forecast, Goddard Space Flight Center, NASA, March 1989;
- U.S. Exploration of the Solar System: Research and Flight Programs, FY 1989 Plan, Solar System Exploration Division, OSSA, NASA, March 1989;
- NASA Pocket Statistics, Office of Management, NASA, January 1988;
- Space Log: 1957-1987, TRW, Redondo Beach, CA, 1988; and
- graphs prepared by the Astrophysics, Space Physics, and the Earth Science and Applications Divisions, OSSA.

We conducted our work in March 1989 at OSSA offices in NASA headquarters in Washington, D.C.

[1] Missions include NASA joint ventures with other countries, as well as NASA scientific instruments flown on foreign spacecraft.

Planetary and Lunar Missions, 1980-2000

Table II.1: Planetary and Lunar Missions, 1980-2000

Mission Name	Actual/Planned Launch Date	Expected End
Pioneer 10[a]	3/1972	2000[b]
Pioneer 11[a]	4/1973	2000[b]
Voyager 1	8/1977	2000[b]
Voyager 2	9/1977	2000[b]
Pioneer Venus Orbiter[d]	5/1978	1992[e]
Magellan[f]	4/1989	4/1991
Galileo[g]	10/1989	10/1997
Ulysses[h]	10/1990	9/1995
Mars Observer (MO)	10/1992	9/1995
Comet Rendezvous Asteroid Flyby (CRAF)[i]	8/1995	2003
Cassini (Saturn Orbiter/Titan Probe)[k]	4/1996	2006
Lunar Observer (LO)[l]	1996[m]	2000

[a]Missions to the outer solar system will explore the solar sphere, interstellar space, and the search for gravitational effects of a possible tenth planet

[b]Expected mission life beyond year 2000

[c]Missions to the outer solar system, including Jupiter, Saturn, Uranus, and Neptune will investigate Jupiter and Saturn's planetary systems, and study the interplanetary space between Earth and Saturn

[d]Mission to Venus will study its atmosphere and ionosphere

[e]Calculated date of entry into Venus atmosphere.

[f]Mission to Venus will investigate Venus's origin and evolution by obtaining a global radar image of at least 70 percent of the planet

[g]Mission to Jupiter will investigate the chemical composition and physical state of atmosphere and satellites

[h]Mission to the sun will investigate the three-dimensional structure and dynamics of the solar chromosphere and corona

[i]Mission to Mars will conduct an orbital mapping mission to determine the global and elemental characters of the Martian surface and to investigate the Martian climate

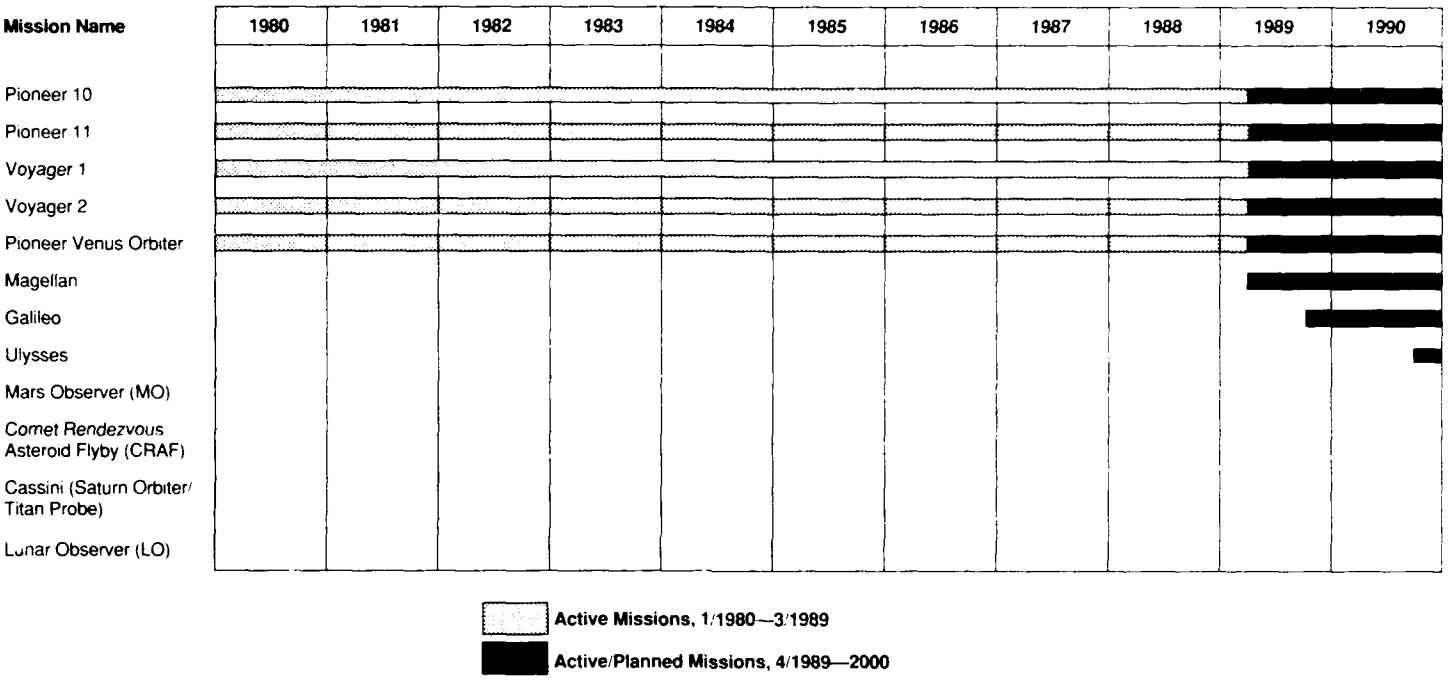
[j]Mission to conduct a close flyby of a main belt asteroid, fly in close formation with a comet to study it during both quiet and active phases, and deploy a penetrator/lander into the core of the comet to determine subsurface properties and composition

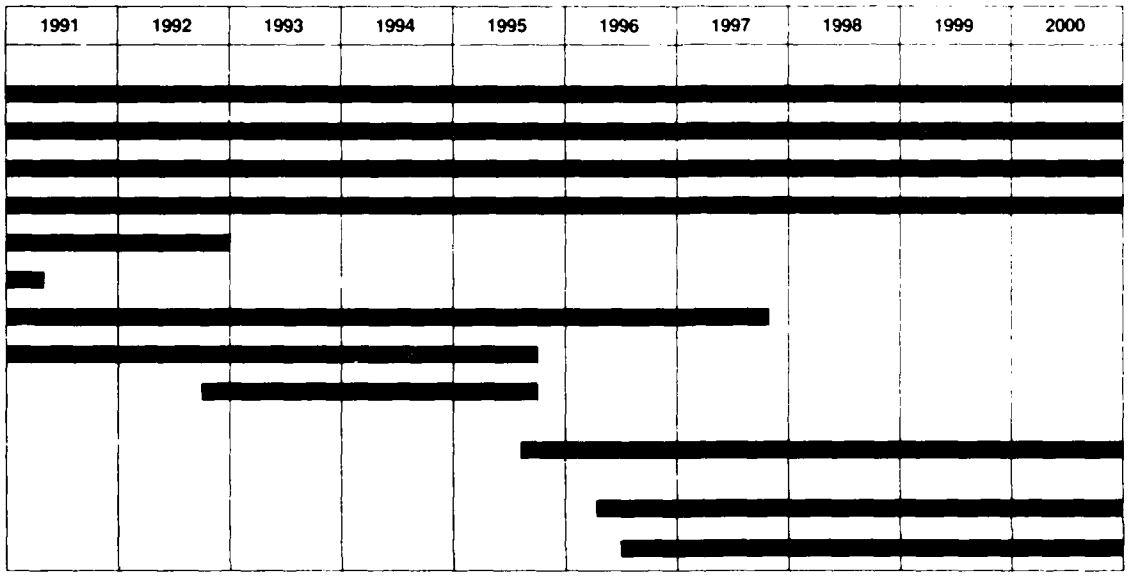
[k]Mission to Saturn and Titan will deliver an atmospheric probe to Titan and place a spacecraft in orbit around Saturn for detailed study of the rings and bodies of the Saturnian system

[l]Mission to the Moon will carry a long-term orbital survey of the global characteristics of the Moon

[m]Approximate

Figure II.1: Planetary and Lunar Missions, 1980-2000

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Earth Science Missions, 1980-2000

Table III.1: Earth Science Missions, 1980-2000

Acronym	Mission Name	Actual/Planned Launch Date	Expected End
NIMBUS 7	Nimbus 7	[illegible] 1978	12/1990
SME	Solar Mesosphere Explorer	[illegible] 1981	10/1989
ERBE	Earth Radiation Budget Experiment	[illegible] 1984	6/1991
SSBUV-1	Shuttle Solar Backscatter Ultra Violet	[illegible] 1989	10/1989
SSBUV 2	Shuttle Solar Backscatter Ultra Violet	4/1990	4/1990
SSBUV-3	Shuttle Solar Backscatter Ultra Violet	[illegible] 1990	12/1990
ATLAS 1	Atmospheric Laboratory for Applications and Science	5/1991	5/1991
EP TOMS 1	Earth Probe Total Ozone Mapping Spectrometer	8/1991	8/1993
LAGEOS II	Laser Geodynamics Satellite	8/1991	2000[5]
SeaWIFS	Sea Viewing Wide Field of View Sensor	10/1991	10/1994
UARS	Upper Atmosphere Research Satellite	10/1991	4/1993
SRL 1	Space Radar Laboratory 1	5/1992	5/1992
ATLAS 2	Atmospheric Laboratory for Applications and Science 2	6/1992	6/1992
TOPEX	Ocean Topography Experiment	6/1992	6/1995
SSBUV 4	Shuttle Solar Backscatter Ultra Violet 4	6/1992	6/1992
ORFEUS	Orbiting and Retrievable Far and Extreme Ultraviolet Spectrometer	9/1992	9/1992
SRL 2	Space Radar Laboratory 2	2/1993	2/1993
CRISTA	Cryogenic Infrared Spectrometer Telescope for Atmosphere	5/1993	5/1993
ATLAS 3	Atmospheric Laboratory for Applications and Science 3	5/1993	5/1993
SSBUV 5	Shuttle Solar Backscatter Ultra Violet 5	5/1993	5/1993
EP TOMS 2	Earth Probe Total Ozone Mapping Spectrometer 2	7/1993	7/1996
ATLAS 4	Atmospheric Laboratory for Applications and Science 4	4/1994	4/1994
RADARSAT	Radar Satellite	6/1994	10/1997
SRL 3	Space Radar Laboratory 3	9/1994	9/1994
EP TOMS 3	Earth Probe Total Ozone Mapping Spectrometer 3	2/1995	2/1998
NSCAT	NASA Scatterometer	2/1995	2/1998
EP TRMM	Earth Probe Tropical Rainfall Measurement Mission	1/1996	6/1998
Eos 1	Earth Observing System 1	10/1996	2000[5]
EP GRM	Earth Probe Geopotential Research Mission	1/1998[4]	6/1999
Eos 2	Earth Observing System 2	1/1998	2000[5]

[1]Operations will continue as long as data are useful

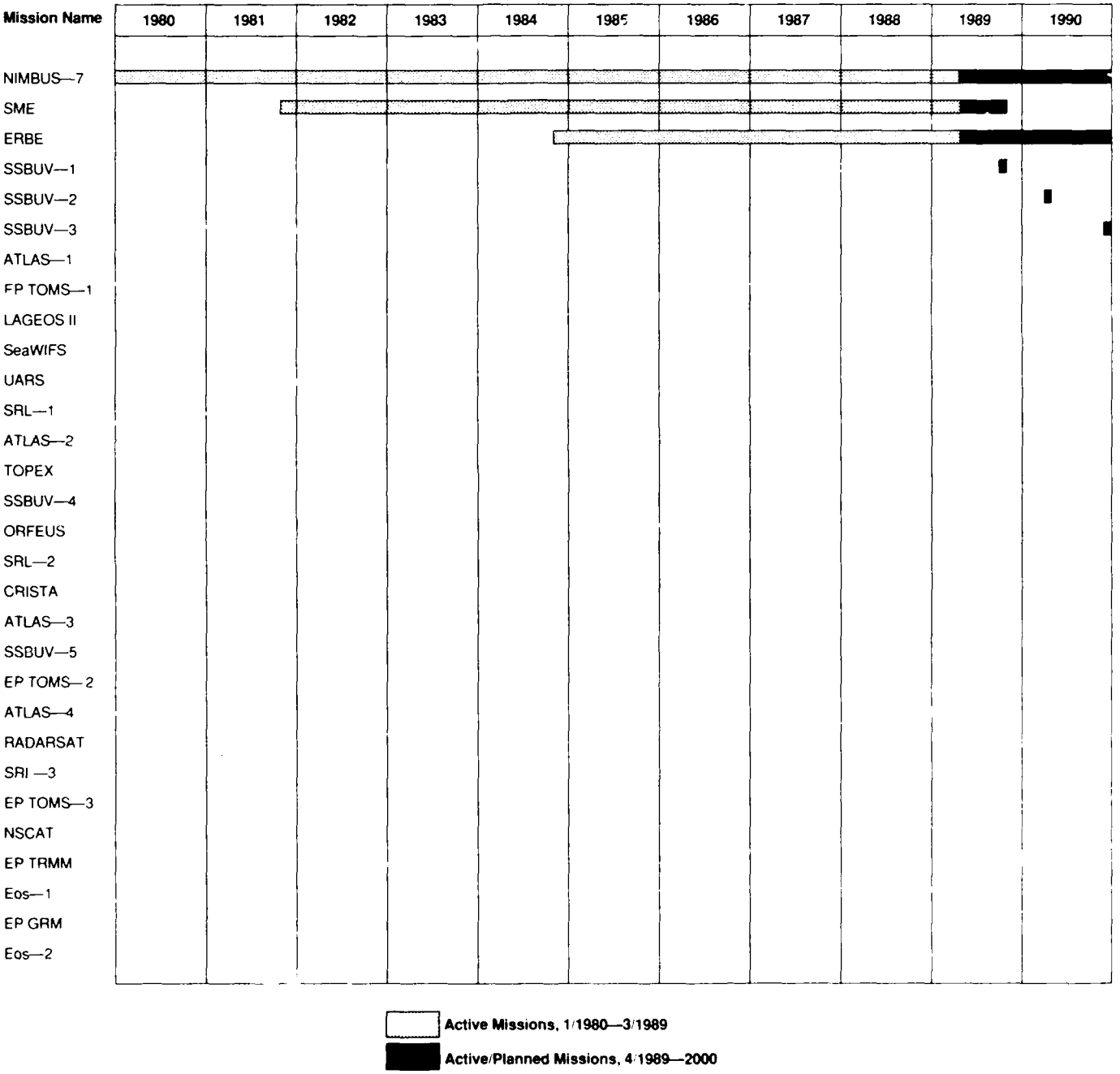
[2]NASA will transfer SME to the University of Colorado for use as a teaching tool

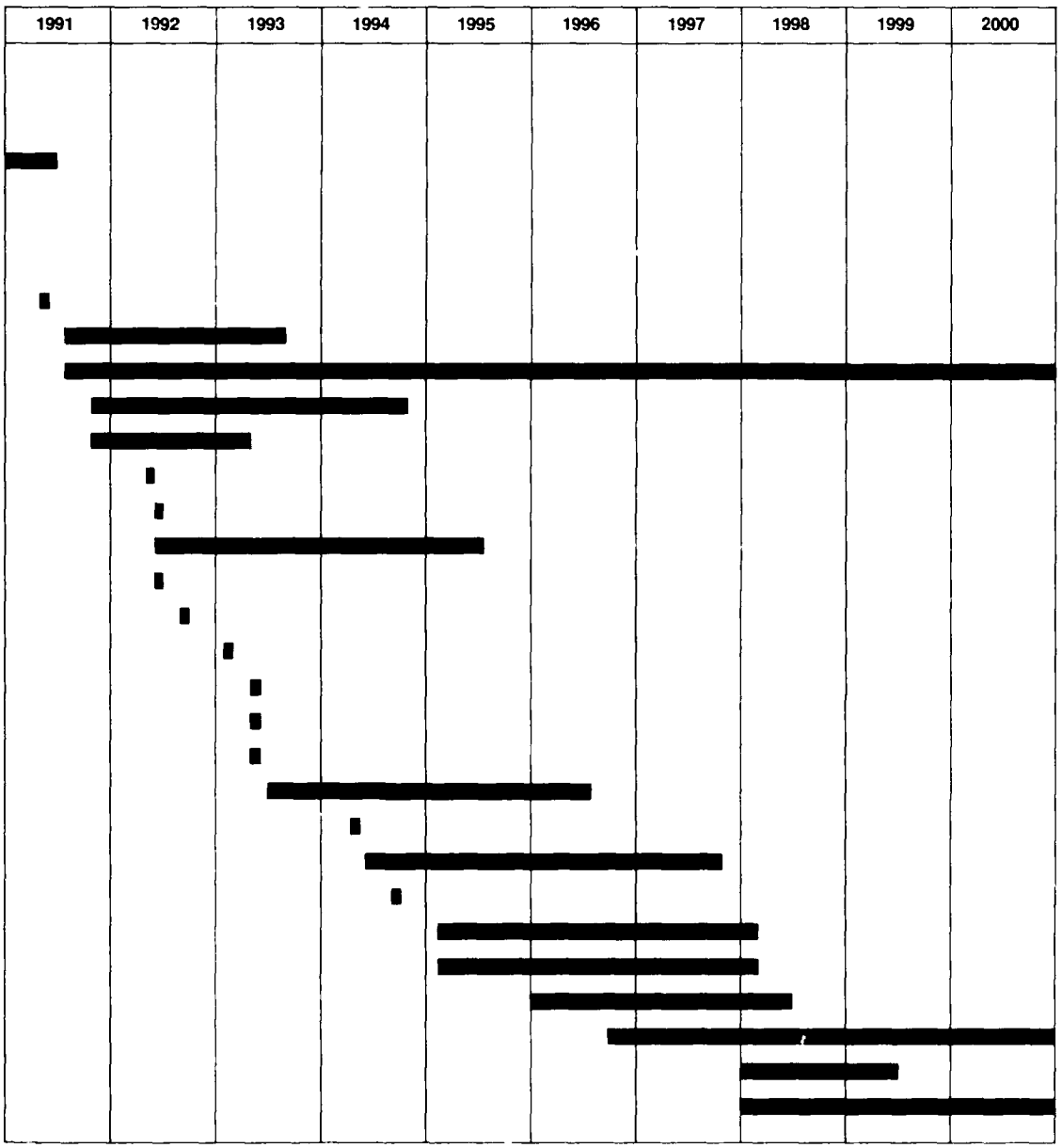
[3]The series of ATLAS missions include both earth sciences and space physics experiments

[5]Expected mission life beyond year 2000

[4]Approximate

Figure III.1: Earth Science Missions, 1980-2000

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Space Physics Missions, 1980-2000

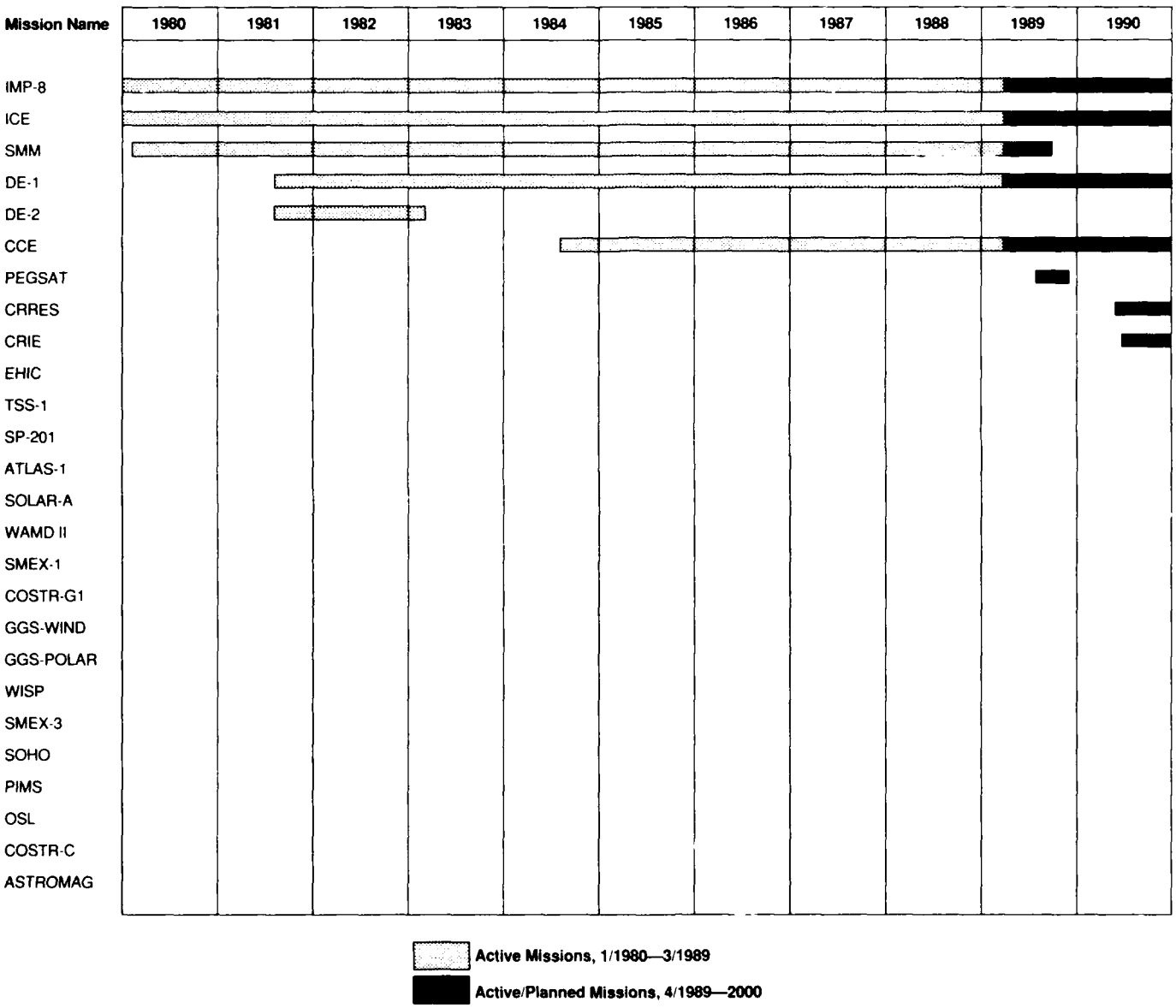
Table IV.1: Space Physics Missions, 1980-2000

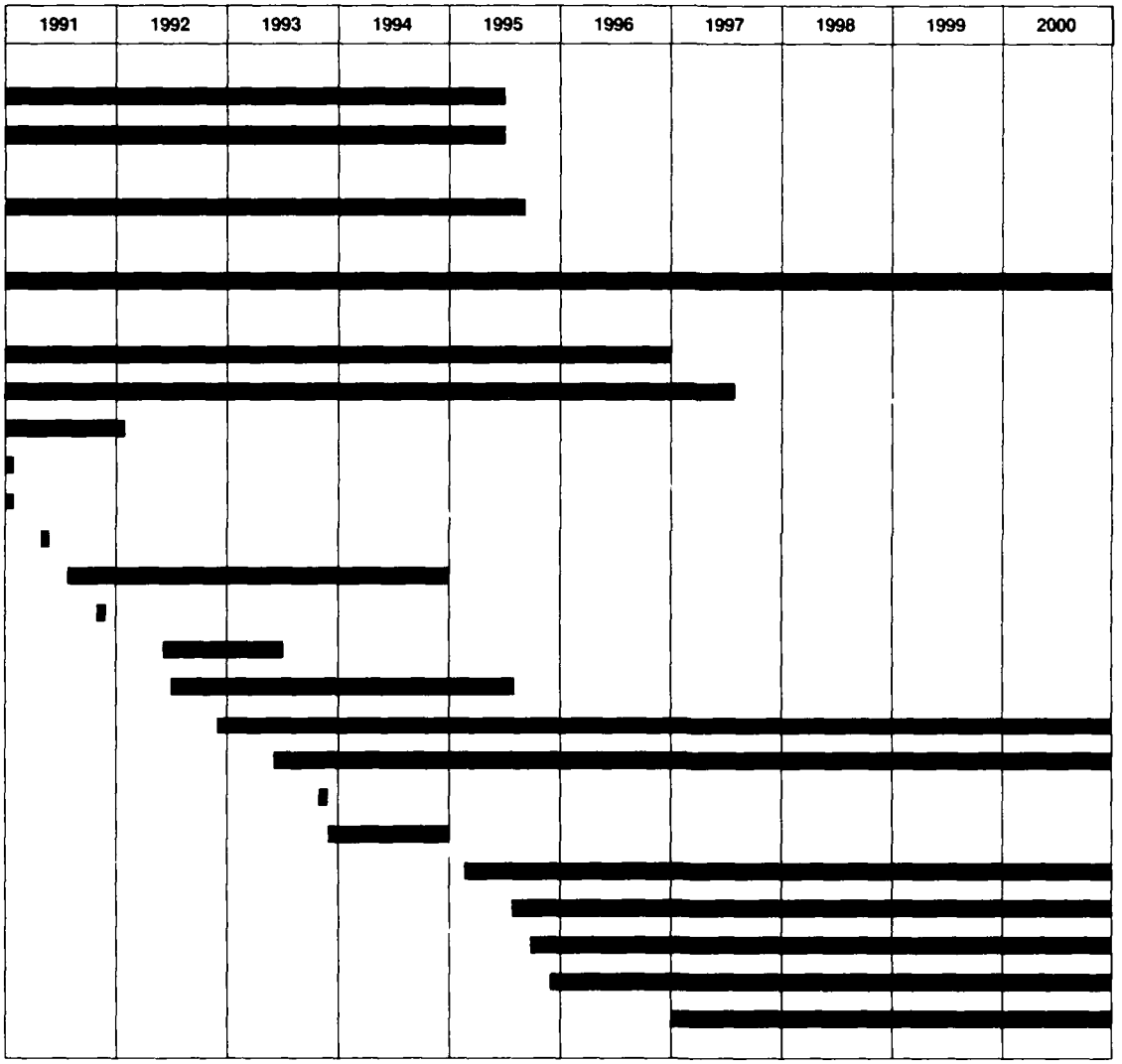
Acronym	Mission Name	Actual/Planned Launch Date	Actual/ Expected End
IMP-8	Interplanetary Monitoring Platform 8	9/1972	6/1995
ICE	International Cometary Explorer	8/1978	6/1995
SMM	Solar Maximum Mission	2/1980	9/1989
DE-1	Dynamics Explorer 1	8/1981	8/1995
DE-2	Dynamics Explorer 2	8/1981	2/1983
CCE	Charge Composition Explorer	8/1984	2000[a]
PEGSAT	Pegasus ELV Chemical Release	8/1989	11/1989
CRRES	Combined Release Radiation Effect Satellite	6/1990	12/1996
CRIE	Cosmic Ray Isotope Experiment	7/1990	7/1997
EHIC	Energetic Heavy Ion Composition Experiment	1991[b]	1/1992
TSS-1	Tethered Satellite System 1	1/1991	1/1991
SP-201	Spartan Solar Physics Mission	1/1991	1/1991
ATLAS-1	Atmospheric Laboratory for Applications and Science 1	5/1991	5/1991
SOLAR-A	Solar Physics Experiment	8/1991	12/1994
WAMD II	Wide Angle Michelson Doppler Imaging Interferometer	11/1991	11/1991
SMEX-1	Small-Class Explorer 1	6/1992	6/1993
COSTR-G1	Collaborative Solar-Terrestrial Research - Geotail 1	7/1992	7/1995
GGS-WIND	Global Geospace Science - Wind	12/1992	2000[a]
GGS-POLAR	Global Geospace Science - Polar	6/1993	2000[a]
WISP	Waves in Space Plasmas	11/1993	11/1993
SMEX-3	Small-Class Explorer 3	12/1993	12/1994
SOHO	Solar and Heliospheric Observatory	3/1995	2000[a]
PIMS	Plasma Interaction Monitoring System	8/1995[b]	2000[a]
OSL	Orbiting Solar Laboratory	10/1995[b]	2000[a]
COSTR-C	Collaborative Solar-Terrestrial Research - Cluster	12/1995	2000
ASTROMAG	Particle Astrophysics Magnetic Facility	1997[b]	2000[a]

[a]Expected mission life beyond year 2000

[b]Approximate

Figure IV.1: Space Physics Missions, 1980-2000

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Astrophysics Missions, 1980-2000

Table V.1: Astrophysics Missions, 1980-2000

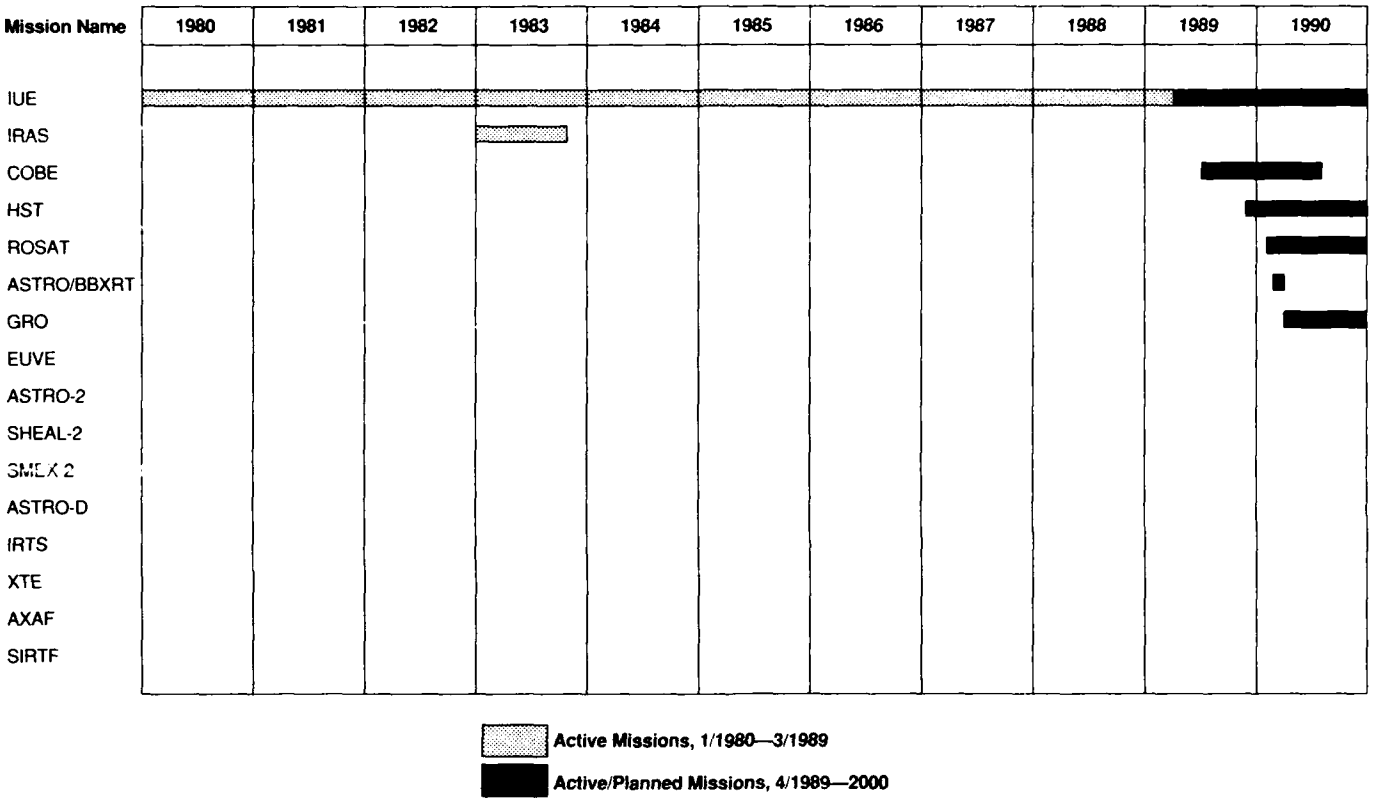
Acronym	Mission Name	Actual/Planned Launch Date	Actual/ Expected End
IUE	International Ultraviolet Explorer	1/1978	9/1991
IRAS	Infrared Astronomical Satellite	1/1983	10/1983
COBE	Cosmic Background Explorer	7/1989	7/1990[a]
HST	Hubble Space Telescope	12/1989	2000[b]
ROSAT	Roentgen Satellite	2/1990	2/1994
ASTRO/ BBXRT	Broad Band X-Ray Telescope	3/1990	3/1990
GRO	Gamma Ray Observatory	4/1990	10/1995
EUVE	Extreme Ultraviolet Explorer	8/1991	5/1994
ASTRO-2	Astrophysics Spacelab	8/1992	8/1992
SHEAL-2	Shuttle High Energy Astrophysics Laboratory 2	9/1992	9/1992
SMEX-2	Small Class Explorer 2	6/1993	6/1994
ASTRO-D	Astro-D	10/1993	9/1997
IRTS	Infrared Telescope Satellite	10/1993	11/1993
XTE	X-Ray Timing Explorer	1/1994	8/1997
AXAF	Advanced X-Ray Astrophysics Facility	9/1996	2000[b]
SIRTF	Space Infrared Telescope Facility	9/1998[c]	2000[b]

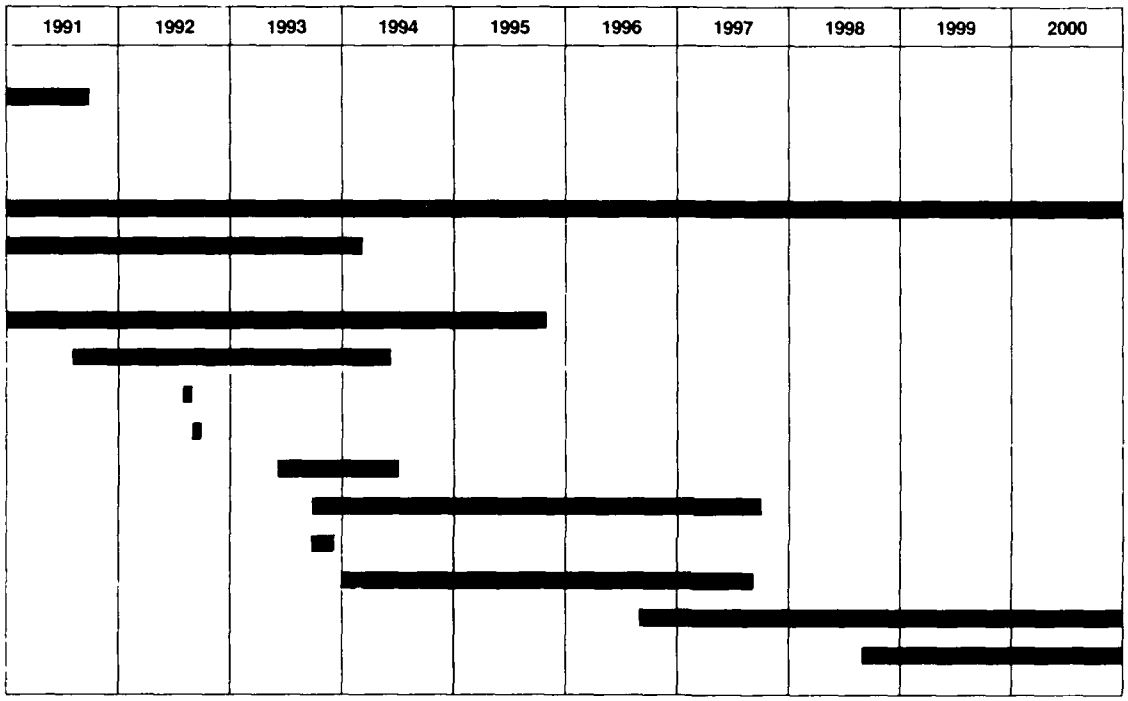
[a]Estimated end of initial mission, cryogenic fuel expended.

[b]Expected mission life beyond year 2000.

[c]Approximate.

Figure V.1: Astrophysics Missions, 1980-2000

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