

# science goals and mission

## Section A-1

Table A  
Science Objectives, Research Focus Areas, and New Near-Term Missions\*  
(Implementation Begins 2003-2007)

Science Objective	Research Focus Area	Mission Entering Implementation 2003-2007																
		NGST	Con-X	ACCESS	LISA	SIM	TPF	MEP	Europa Lander	Pluto-Kuiper	Titan Explorer	CNSR	Astrobiology	Solar Probe	MMS	GEC	MagCon	SDO
Understand the structure of the universe, from its earliest beginnings to its ultimate fate	Identify dark matter and learn how it shapes galaxies and systems of galaxies	<input type="checkbox"/>																
	Determine the size, shape, age, and energy content of the universe		<input type="checkbox"/>															
Explore the ultimate limits of gravity and energy in the universe	Discover the sources of gamma ray bursts and high energy cosmic rays			<input type="checkbox"/>														
	Test the general theory of relativity near black holes and in the early universe, and search for new physical laws using the universe as a laboratory				<input type="checkbox"/>													
	Reveal the nature of cosmic jets and relativistic flows				<input type="checkbox"/>													
	Learn how galaxies, stars, and planets form, interact, and evolve					<input type="checkbox"/>												
	Observe the formation of galaxies and determine the role of gravity in this process						<input type="checkbox"/>											
	Establish how the evolution of a galaxy and the life cycle of stars influence the chemical composition of material available for making stars, planets, and living organisms							<input type="checkbox"/>										
	Observe the formation of planetary systems and characterize their properties								<input type="checkbox"/>									
	Use the exotic space environments within our Solar System as natural science laboratories and cross the outer boundary of the Solar System to explore the nearby environment of our galaxy																	
	Look for signs of life in other planetary systems									<input type="checkbox"/>								
	Discover planetary systems of other stars and their physical characteristics										<input type="checkbox"/>							
	Search for worlds that could or do harbor life											<input type="checkbox"/>						

Table A (continued)

Science Objective	Research Focus Area	Mission Entering Implementation 2003–2007															
		NGST	Con-X	ACCESS	LISA	SIM	TPF	MEP	Europa Lander	Pluto-Kuiper Explorer	CNSR	Astrobiology	Solar Probe	MMS	GEC	MagCon	SDO
Understand the formation and evolution of the Solar System and Earth within it	Inventory and characterize the remnants of the original material from which the Solar System formed									■							
	Learn why the planets in our Solar System are so different from each other									□	□						
	Learn how the Solar System evolves									□	□	■					
Probe the origin and evolution of life on Earth and determine if life exists elsewhere in our Solar System	Investigate the origin and early evolution of life on Earth, and explore the limits of life in terrestrial environments that might provide analogues for conditions on other worlds			□							□						
	Determine the general principles governing the organization of matter into living systems and the conditions required for their emergence and maintenance of life										□						
	Chart the distribution of life-sustaining environments within our Solar System and search for evidence of past and present life									□							
	Identify plausible signatures of life on other worlds					□											
Understand our changing Sun and its effects throughout the Solar System	Understand the origins of long- and short-term solar variability						□										
	Understand the effects of solar variability on the solar atmosphere and heliosphere							■									
	Understand the space environment of Earth and other planets									■							
Chart our destiny in the Solar System	Understand forces and processes, such as impacts, that affect habitability of Earth										□						
	Develop the capability to predict space weather										□	□	□				
	Find extraterrestrial resources and assess suitability of Solar System locales for future human exploration									□							

\* ■=key (most important) research focus area addressed by a mission or program; □=other research focus areas addressed (a mission may have more than one). Projects in the Discovery and Explorer programs of community-formulated missions that will proceed to implementation in the 2003–2007 period have not been proposed or selected yet, but are expected to make focused contributions in numerous areas.

Table B  
Science Objectives and Representative Mission Concepts  
(For Possible Implementation After 2007)

		Science Objectives			
		Understand the formation and evolution of the Solar System and Earth within it	Probe the origin and evolution of life on Earth and determine if life exists elsewhere in the Solar System	Understand our changing Sun and its effects throughout the Solar System	Chart our destiny in the Solar System
Representative Mission Concepts	Understand the structure of the universe, from its earliest beginnings to its ultimate fate	Learn how galaxies, stars, and planets form, interact, and evolve	Look for signs of life in other planetary systems		
	Space infrared interferometric telescope	■	■		
Filled aperture infrared telescope		■	■		
Space VLBI	■	■	■		
X-ray interferometry pathfinder	■	■			
Orbiting wide-angle light collector	■	■			
Cosmic microwave background polarization	■	■			
Space ultraviolet optical telescope	■	■			
High resolution x-ray spectroscopy mission					
Energetic x-ray imaging survey telescope					
Interstellar probe		■			
Planet imager		■			
Life finder		■			
Future Mars Exploration		■			
Neptune orbiter					
Venus surface sample return					
Saturn ring observer			■		
Europa subsurface explorer					
ITM wave imaging				■	
Solar polar imager				■	
Future Living With a Star				■	