

Deriving SSE Roadmap Objectives from Current Resource Documents

SSE Roadmap Goals

Derived Objectives

| <u>SSE Roadmap Objectives</u> | <u>SSES White Paper Draft</u> | <u>SSE 2003</u> | |
|--|--|---|--|
| 1 Learn how the sun's family of planets and minor bodies originated | Understand conditions in the solar accretion disk and processes marking the initial stages of planet formation | Understand conditions in the solar accretion disk and processes marking the initial stages of planet formation | Understand the initial stages of planet and satellite formation Wh pla Ove anc (Ur Jup |
| | Understand the external and internal processes that determined the earliest characteristics of solar system bodies | Learn about the earliest processes occurring on the surfaces and interiors of planets and minor bodies | Study the processes that determined the original characteristics of the bodies in the solar system How sol this em |
| | Learn what the solar system tells us about the development and evolution of extrasolar planetary systems and vice versa | Learn what the solar system tells us about the development and evolution of extrasolar planetary systems and vice versa | Learn what our solar system can tell us about extra-solar planetary systems Wh the pla |
| 2 Determine how the solar system evolved to its current diverse state including the origin and evolution of the Earth's biosphere | Understand why the terrestrial planets differ so dramatically in their evolution | Understand why the terrestrial planets differ so dramatically in their evolution | Understand why the terrestrial planets are so different from one another Wh dra |
| | Determine the nature, history, and distribution of volatile and organic compounds in the solar system that contribute to the emergence of life | What environmental factors were required for the emergence and sustenance of life? | Determine the nature, history, and distribution of volatile and organic compounds in the solar system Wh our evo |
| | Examine Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere | Determine the historical relationship between Earth and its biosphere | Study Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere Wh evo Wh esp |
| 3 Explore the space environment to discover potential hazards and search for resources that would enable permanent human presence | Determine the inventory, dynamics and physical characteristics of bodies that may pose a hazard to Earth | Determine the inventory and dynamics of bodies that may pose a hazard to Earth | Determine the inventory and dynamics of bodies that may pose an impact hazard to Earth Wh pre |
| | | Determine the physical characteristics of comets and asteroids | |

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| Characterize the hazards to human explorers in space and on destination bodies in the solar system | Characterize the hazards from radiation in space and other planets to improve forecasting and mitigation capabilities | Identify and study the hazards that the martian environment will present to human explorers |
| Inventory and characterize planetary resources that can sustain and protect humans as they explore the solar system | Inventory and characterize planetary resources that can sustain and protect humans as they explore the solar system | Inventory and characterize martian resources of potential benefit to human exploration |

4 Understand the processes that determine the fate of the solar system and life within it

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| Understand the processes that shape the character of planetary bodies and how they operate and interact | Learn how the processes that shape planetary bodies operate and interact | Determine how the processes that shape planetary bodies operate and interact | How con ope |
| What planetary processes are responsible for generating habitable worlds, where are the habitable zones in our solar system, and what environmental factors are responsible for the emergence and sustenance of life | | Identify the habitable zones in the solar system | Wh for wor in c |

5 Determine if there is or ever has been life elsewhere in the solar system

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| Determine if life exists or ever existed on other solar system bodies, in particular Mars and Europa | Determine if life exists or ever existed on other planetary bodies | Search for chemical and biological signature of past and present life on Mars | Do |
| Investigate the geology, climatic and hydrological characteristics and history of suspected solar system bodies for evidence of habitable environments | | Characterize the present climate on Mars and determine how it has evolved over time | |
| | | Investigate the history and behavior of water and other volatiles on Mars | |
| | | Study the chemistry, mineralogy, and chronology of martian materials | |
| | | Determine the characteristics and dynamics of the interior of Mars | |
| | | Investigate the character and extent of pre-biotic chemistry on Mars | |