

## Solar System Inner Planets Chapter Prentice Hall

"Through the contributions of more than sixty leading experts in the field, Comparative Climatology of Terrestrial Planets sets forth the foundations for this emerging new science and brings the reader to the forefront of our current understanding of atmospheric formation and climate evolution"--Provided by publisher.

The Encyclopedia of the Solar System, Third Edition—winner of the 2015 PROSE Award in Cosmology & Astronomy from the Association of American Publishers—provides a framework for understanding the origin and evolution of the solar system, historical discoveries, and details about planetary bodies and how they interact—with an astounding breadth of content and breathtaking visual impact. The encyclopedia includes the latest explorations and observations, hundreds of color digital images and illustrations, and over 1,000 pages. It stands alone as the definitive work in this field, and will serve as a modern messenger of scientific discovery and provide a look into the future of our solar system. New additions to the third edition reflect the latest progress and growth in the field, including past and present space missions to the terrestrial planets, the outer solar systems and space telescopes used to detect extrasolar planets. Winner of the 2015 PROSE Award in Cosmology & Astronomy from the Association of American Publishers Presents 700 full-color digital images and diagrams from current space missions and observatories, bringing to life the content and aiding in the understanding and retention of key concepts. Includes a substantial appendix containing data on planetary missions, fundamental data of relevance for planets and satellites, and a glossary, providing immediately accessible mission data for ease of use in conducting further research or for use in presentations and instruction. Contains an extensive bibliography, providing a guide for deeper studies into broader aspects of the field and serving as an excellent entry point for graduate students aiming to broaden their study of planetary science.

Current state of play in astrobiology, including exoplanets and their atmospheres, habitable zones and the likelihood of evolution elsewhere.

It presents equations and derivations starting from a level that permits one to see the underlying physical ideas. There is no other book that does this on the market. The book presents an up-to-date overview on all essential topics but is concise where possible to keep it a practical resource for courses. The book is based on extensive experience in the class room. Its contents have been field-tested for years by students.

Long before Galileo published his discoveries about Jupiter, lunar craters, and the Milky Way in the Starry Messenger in 1610, people were fascinated with the planets and stars around them. That interest continues today, and scientists are making new discoveries at an astounding rate. Ancient lake beds on Mars, robotic spacecraft missions, and new definitions of planets now dominate the news. How can you take it all in? Start with the new Encyclopedia of the Solar System, Second Edition. This self-contained reference follows the trail blazed by the bestselling first edition. It provides a framework for understanding the origin and evolution of the solar system, historical discoveries, and details about planetary bodies and how they interact—and has jumped light years ahead in terms of new information and visual impact. Offering more than 50% new material, the Encyclopedia includes the latest explorations and observations, hundreds of new color digital images and illustrations, and more than 1,000 pages. It stands alone as the definitive work in this field, and will serve as a modern messenger of scientific discovery and provide a look into the future of our solar system. · Forty-seven chapters from 75+ eminent authors review fundamental topics as well as new models, theories, and discussions · Each entry is detailed and scientifically rigorous, yet accessible to undergraduate students and amateur astronomers · More than 700 full-color digital images and diagrams from current space missions and observatories amplify the chapters · Thematic chapters provide up-to-date coverage, including a discussion on the new International Astronomical Union (IAU) vote on the definition of a planet · Information is easily accessible with numerous cross-references and a full glossary and index

An introduction to the planets of our solar system and other features such as asteroids, meteoroids, comets, and moons.

This is our SPACE SCIENCE – SOLAR SYSTEM – PLANETS section of our INFO CARDS series. In this set, learn about the 8 planets of our solar system. These Info Cards provide in-depth information on the 8 planets, as well as other bodies in our solar system, like Pluto and other dwarf planets, meteors, asteroids, comets, and moons. Also included are Fact Cards on the 8 different planets, which includes interesting facts about each planet. Bonus material in the form of a timeline and diagram is also included. Included in this set are: - Teacher Guide - 8 Planet Info Cards & Fact Cards - Other Bodies & Classification Info Cards - Solar System Space Exploration Timeline - Solar System Diagram Use these Info Cards to help students get to know the planets in our solar system.

Volume 68 of Reviews in Mineralogy and Geochemistry reviews Oxygen in the Solar System, an element that is so critically important in so many ways to planetary science. The book is based on three open workshops: Oxygen in the Terrestrial Planets, held in Santa Fe, NM July 20-23, 2004; Oxygen in Asteroids and Meteorites, held in Flagstaff, AZ June 2-3, 2005; and Oxygen in Earliest Solar System Materials and Processes (and including the outer planets and comets), held in Gatlinburg, TN September 19-22, 2005. As a consequence of the cross-cutting approach, the final book spans a wide range of fields relating to oxygen, from the stellar nucleosynthesis of oxygen, to its occurrence in the interstellar medium, to the oxidation and isotopic record preserved in 4.56 Ga grains formed at the Solar System's birth, to its abundance and speciation in planets large and small, to its role in the petrologic and physical evolution of the terrestrial planets. Contents: Introduction Oxygen isotopes in the early Solar System - A historical perspective Abundance, notation, and fractionation of light stable isotopes Nucleosynthesis and chemical evolution of oxygen Oxygen in the interstellar medium Oxygen in the Sun Redox conditions in the solar nebula: observational, experimental, and theoretical constraints Oxygen isotopes of chondritic components Mass-independent oxygen isotope variation in the solar nebula Oxygen and other volatiles in the giant planets and their satellites Oxygen in comets and interplanetary dust particles Oxygen and asteroids Oxygen isotopes in asteroidal materials Oxygen isotopic composition and chemical correlations in meteorites and the terrestrial planets Record of low-temperature alteration in asteroids The oxygen cycle of the terrestrial planets: insights into the processing and history of oxygen in surface environments Redox conditions on small bodies, the Moon and Mars Terrestrial

oxygen isotope variations and their implications for planetary lithospheres Basalts as probes of planetary interior redox state Rheological consequences of redox state

Take a journey around the solar system's inner planets and find out about the space race that is going on between countries to have the first humans to reach them. Learn all about Mars, Venus and the other planets and discover the incredible technology behind how we know about them.

Astronomy: A Complete Introduction will ensure you recognize what you are seeing in the night sky. You will investigate the sun, moon, planets comets and stars and learn how to observe them. This comprehensive guide, complete with star charts, will map out the skies and allow you to impress your friends with your knowledge of the sky at night.

Astronomy: A Complete Introduction includes: Chapter 1: Introducing Astronomy Chapter 2: The spinning sky Chapter 3: Sky-watchers Chapter 4: The astronomer's telescope Chapter 5: Into space Chapter 6: The Sun Chapter 7: The Moon Chapter 8: The Sun's family Chapter 9: The inner planets Chapter 10: The outer planets Chapter 11: Minor members of the Solar System Chapter 12: The stars Chapter 13: Pattern of stars Chapter 14: Double and variable stars Chapter 15: The life and times of a star Chapter 16: The Star-clusters and nebulae Chapter 17: The depths of the universe Chapter 18: Into the future - life beyond the Earth

Since the first edition of this book appeared in 1990, planetology has seen a number of fascinating discoveries that have increased our knowledge of the Solar System. These have come from both ground- and space-based observational programmes. Although some space probe missions have ended in failure, even they have added to our store of information about the planetary environment. The Galileo probe, despite being crippled by its incompletely deployed main antenna, has already achieved some spectacular results. For the first time we have obtained pictures of asteroids, with the images that Galileo returned of Gaspra, Ida, and the latter's satellite, Dactyl. The main objective, the dropping of an instrumented capsule into Jupiter's atmosphere, and prolonged in-situ investigation of the planet, will take place at the end of 1995. Saturn's turn will come early in the next century with the Cassini mission (to be launched in 1997), which will study the planet for an extended period and attempt to land the Huygens probe on the surface of Titan. NASA's Magellan mission proved to be a great success, with its highly detailed radar mapping of the surface, and atmospheric studies. The exploration of Mars was less fortunate with the failure of both spaceprobes of the Soviet Phobos mission, as well as NASA's Mars Observer probe. Despite this setback, plans are in hand for future, collaborative exploration of the planet, using both surface stations (possibly active rovers), surface penetrators and balloon probes, as well as orbiters.

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Despite their proximity to Earth, much remains to be learned about the origins and conditions of Mercury, Venus, and Mars. The three smallest planets in our solar system and the three closest to the Sun—Mercury, Venus, and Mars—differ greatly from each other and from the place we call home. This far-reaching volume travels to each of the inner planets in turn and details the physical characteristics as well as the exploration efforts made in order to learn more about our closest planetary neighbors.

For the first time in 4.6 billion years, your First 100 lessons regarding planets are here. A fascinating tour through space awaits you! This is your ideal introduction to Astronomy. The chapters take you to all eight major planets of our Solar System. All lessons are one-to-a-page. These are the first lessons to learn about planets. Learn the unique qualities and the highlights of each planet. Take an epic journey - as far as the eye can see!

In *Life in the Solar System and Beyond*, Professor Jones has written a broad introduction to the subject, addressing important topics such as, what is life?, the origins of life and where to look for extraterrestrial life. The chapters are arranged as follows: Chapter 1 is a broad introduction to the cosmos, with an emphasis on where we might find life. In Chapters 2 and 3 Professor Jones discusses life on Earth, the one place we know to be inhabited. Chapter 4 is a brief tour of the Solar system, leading us in Chapters 5 and 6 to two promising potential habitats, Mars and Europa. In Chapter 7 the author discusses the fate of life in the Solar system, which gives us extra reason to consider life further afield. Chapter 8 focuses on the types of stars that might host habitable planets, and where in the Galaxy these might be concentrated. Chapters 9 and 10 describe the instruments and techniques being employed to discover planets around other stars (exoplanetary systems), and those that will be employed in the near future. Chapter 11 summarizes the known exoplanetary systems, together with an outline of the systems we expect to discover soon, particularly habitable planets. Chapter 12 describes how we will attempt to find life on these planets, and the final chapter brings us to the search for extraterrestrial intelligence, and the question as to whether we are alone.

Given the universal interest in whether extraterrestrial life has developed or could eventually develop, it is vital that an examination of planetary habitability go beyond simple assumptions. This book has resulted from a workshop at the International Space Science Institute (ISSI) which brought together experts to discuss the multi-faceted problem of how the habitability of a planet co-evolves with the geology of the surface and interior, the atmosphere, and the magnetosphere.

The sources, distributions, and transformation of organic compounds in the solar system are active study areas as a means to provide information about the evolution of the solar system and the possibilities of life elsewhere in the universe. There are many organic synthesis processes, however, and ambiguity surrounds the relative effectiveness of these processes in explaining the distribution of organic compounds in the solar system. As a consequence, NASA directed the NRC to determine what processes account for the reduced carbon compounds found throughout the solar system and to examine how planetary exploration can advance understanding of this central issue. This report presents a discussion of the chemistry of carbon; an analysis of the formation, modification, and preservation of organic compounds in the solar system; and an assessment of research opportunities and strategies for enhancing our understanding of organic material in the solar system.

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\*\*This is the chapter slice "The Inner Planets" from the full lesson plan "Solar System"\*\*\* Thrill young astronomers with a journey through our Solar System. Find out all about the Inner and Outer Planets, the Moon, Stars, Constellations, Asteroids, Meteors and Comets. Using simplified language and vocabulary, concepts such as planetary orbits, the asteroid belt, the lunar cycle and phases of the moon, and shooting stars are all explored. Chocked full of reading passages, comprehension questions, and hands-on activities, our resource is written for remedial students in grades five to eight. Science concepts are presented in a way that makes them accessible to students and easier to understand. Use our resource effectively for whole-class, small group and independent work. Color mini posters, Rubric, Crossword, Word Search, Comprehension Quiz and Answer Key are all included. All of our content meets the Common Core State Standards and are written to Bloom's Taxonomy and STEM initiatives.

The new edition of UNIVERSE means the same proven Seeds/Backman approach and trusted content, fully updated with the latest discoveries and resources to meet the needs of today's diverse students. Available with InfoTrac Student Collections <http://gocongrate.com/infotrac>. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Lunar and Planetary Surface Conditions considers the inferential knowledge concerning the surfaces of the Moon and the planetary companions in the Solar System. The information presented in this four-chapter book is based on remote observations and measurements from the vantage point of Earth and on the results obtained from accelerated space program of the United States and U.S.S.R. Chapter 1 presents the prevalent hypotheses on the origin and age of the Solar System, followed by a brief description of the methods and feasibility of information acquisition concerning lunar and planetary data, either from fixed terrestrial observatories or from instrumented or manned space probes. Chapter 2 reviews all conditions pertaining to the surface aspects of the closest celestial neighbor, the Moon. Sections in this chapter deal sequentially with the atmosphere, temperature conditions, subsurface stratification, field intensities (gravitational, electric, and magnetic), and lastly with the biological conditions existing on the lunar surface. This chapter also provides information on the density of the lunar atmosphere under quiescent or high-flux transient conditions, on the topography of the lunar surface, and on the probable proportion of crater-covered areas in the highlands and on the Maria. Chapter 3 is a detailed treatment of the surface conditions on the terrestrial planets, comprising Mercury, Venus, and Mars, while Chapter 4 deals with similar information relating to the so-called Jovian planets (Jupiter, Saturn, Uranus, Neptune) and Pluto. This book will prove useful to lunar and planetary mission planners, both those concerned with the purely scientific aspects of surfaces and immediate subsurfaces, and those involved in the development of roving exploration vehicles.

Updated third edition introduces undergraduates to the Solar System's bodies, the processes upon and within them, and their origins and evolution.

In recent years, planetary science has seen a tremendous growth in new knowledge. Deposits of water ice exist at the Moon's poles. Discoveries on the surface of Mars point to an early warm wet climate, and perhaps conditions under which life could have emerged. Liquid methane rain falls on Saturn's moon Titan, creating rivers, lakes, and geologic landscapes with uncanny resemblances to Earth's. Vision and Voyages for Planetary Science in the Decade 2013-2022 surveys the current state of knowledge of the solar system and recommends a suite of planetary science flagship missions for the decade 2013-2022 that could provide a steady stream of important new discoveries about the solar system. Research priorities defined in the report were selected through a rigorous review that included input from five expert panels. NASA's highest priority large mission should be the Mars Astrobiology Explorer Cacher (MAX-C), a mission to Mars that could help determine whether the planet ever supported life and could also help answer questions about its geologic and climatic history. Other projects should include a mission to Jupiter's icy moon Europa and its subsurface ocean, and the Uranus Orbiter and Probe mission to investigate that planet's interior structure, atmosphere, and composition. For medium-size missions, Vision and Voyages for Planetary Science in the Decade 2013-2022 recommends that NASA select two new missions to be included in its New Frontiers program, which explores the solar system with frequent, mid-size spacecraft missions. If NASA cannot stay within budget for any of these proposed flagship projects, it should focus on smaller, less expensive missions first. Vision and Voyages for Planetary Science in the Decade 2013-2022 suggests that the National Science Foundation expand its funding for existing laboratories and establish new facilities as needed. It also recommends that the program enlist the participation of international partners. This report is a vital resource for government agencies supporting space science, the planetary science community, and the public.

This thesis investigates the timing and source(s) of water and volatile elements to the inner solar system by studying the basaltic meteorites angrites and eucrites. In chapters 2 and 3, I present the results from angrite meteorites. Chapter 2 examines the water and volatile element content of the angrite parent body and I suggest that some water and other volatile elements accreted to inner solar system bodies by ~2 Myr after the start of the solar system. Chapter 3 examines the D/H of this water and I suggest it is derived from carbonaceous chondrites. Chapter 4, 5, 6, and 7 addresses eucrite meteorites. Chapter 4 expands on existing models to explain geochemical trends observed in eucrites. In Chapter 5, I examine the water and F content of the eucrite parent body, 4 Vesta. In chapter 6, I determine the source of water for 4 Vesta and determine that carbonaceous chondrites delivered water to this body. Chapter 7 discusses degassing on 4 Vesta while it was forming.

The second edition of Solar System Astrophysics: Background Science and the Inner Solar System provides new insights into the burgeoning field of planetary astronomy. As in the first edition, this volume begins with a rigorous treatment of coordinate frames, basic positional astronomy, and the celestial mechanics of two and restricted three body

system problems. Perturbations are treated in the same way, with clear step-by-step derivations. Then the Earth's gravitational potential field and the Earth-Moon system are discussed, and the exposition turns to radiation properties with a chapter on the Sun. The exposition of the physical properties of the Moon and the terrestrial planets are greatly expanded, with much new information highlighted on the Moon, Mercury, Venus, and Mars. All of the material is presented within a framework of historical importance. This book and its sister volume, *Solar System Astrophysics: Background Science and the Inner Solar System*, are pedagogically well written, providing clearly illustrated explanations, for example, of such topics as the numerical integration of the Adams-Williamson equation, the equations of state in planetary interiors and atmospheres, Maxwell's equations as applied to planetary ionospheres and magnetospheres, and the physics and chemistry of the Habitable Zone in planetary systems. Together, the volumes form a comprehensive text for any university course that aims to deal with all aspects of solar and extra-solar planetary systems. They will appeal separately to the intellectually curious who would like to know how just how far our knowledge of the solar system has progressed in recent years.

*Physics and Chemistry of the Solar System*, 2nd Edition, is a comprehensive survey of the planetary physics and physical chemistry of our own solar system. It covers current research in these areas and the planetary sciences that have benefited from both earth-based and spacecraft-based experimentation. These experiments form the basis of this encyclopedic reference, which skillfully fuses synthesis and explanation. Detailed chapters review each of the major planetary bodies as well as asteroids, comets, and other small orbitals. Astronomers, physicists, and planetary scientists can use this state-of-the-art book for both research and teaching. This Second Edition features extensive new material, including expanded treatment of new meteorite classes, spacecraft findings from Mars Pathfinder through Mars Odyssey 2001, recent reflections on brown dwarfs, and descriptions of planned NASA, ESA, and Japanese planetary missions. \* New edition features expanded treatment of new meteorite classes, the latest spacecraft findings from Mars, information about 100+ new discoveries of planets and stars, planned lunar and planetary missions, more end-of-chapter exercises, and more \* Includes extensive new material and is amply illustrated throughout \* Reviews each major planetary body, asteroids, comets, and other small orbitals

"Is the solar system ordered? Or is it simply the result of random and chaotic accidents? This book takes the reader on a compelling and powerful journey of discovery, revealing the celestial spheres in their astonishingly complex patterns. Movements of the planets are found to correspond accurately with simple geometric figures and musical intervals, pointing to an exciting new perspective on the ancient idea of the 'harmony of the spheres'. Hartmut Warm's detailed presentation incorporates the distances, velocities, and periods of conjunction of the planets, as well as the rotations of the Sun, Moon, and Venus. Numerous graphics - including color plates - illustrate the extraordinary beauty of geometrical forms that result when the movements of several planets are viewed in relation to one another. Moreover, the author describes and analyzes concepts of the 'music of the spheres', with special emphasis on Kepler's revolutionary ideas. The book also discusses current scientific beliefs about the origin of the universe and the solar system, enabling the reader to understand fully how this remarkable research supplements contemporary materialistic views of the cosmos. The appendix includes his mathematical and astronomical methods of calculation, as well as a detailed discussion of their accuracy and validity based on modern astronomical algorithms."--Publisher's description.

Volume 1 provides a broad overview of the chemistry of the solar system. It includes chapters on the origin of the elements and solar system abundances, the solar nebula and planet formation, meteorite classification, the major types of meteorites, important processes in early solar system history, geochemistry of the terrestrial planets, the giant planets and their satellite, comets, and the formation and early differentiation of the Earth. This volume is intended to be the first reference work one would consult to learn about the chemistry of the solar system. Reprinted individual volume from the acclaimed *Treatise on Geochemistry* (10 Volume Set, ISBN 0-08-043751-6, published in 2003)

Nothing can be more breathtaking than the spectacle of a volcano erupting. Space-age lunar and planetary missions offer us an unprecedented perspective on volcanism. Starting with the Earth, *Volcanoes of the Solar System* takes the reader on a guided tour of the terrestrial planets and moons and their volcanic features. We see lunar lava fields through the eyes of the Apollo astronauts, and take an imaginary hike up the Martian slopes of Olympus Mons--the tallest volcano in the solar system. Complemented by over 150 photographs, this comprehensive and lucid account of volcanoes describes the most recent data on the unique and varied volcanic features of Venus and updates our knowledge on the prodigiously active volcanoes of Io. A member of the Association of European Volcanologists, Charles Frankel has directed documentary films on geology, astronomy and space exploration and has authored a number of articles on the earth sciences.

*Physics and Chemistry of the Solar System* focuses on planetary physics and chemistry. This book consists of 12 chapters. Chapters I to IV cover the general properties and environment of the planetary system. The solar system beyond Mars is elaborated in Chapters V to VIII, while the inner solar system is considered in Chapters XI to XII. In these chapters, this compilation specifically discusses the limitations on big bang nucleosynthesis; structure and classification of galaxies; and mass and angular momentum distribution. The radio wave propagation in space plasmas; interiors of Jupiter and Saturn; density and composition of icy satellites; and evaporation and non-gravitational forces are also deliberated. This text also explains the physical properties of meteorites; geology of the Moon; geophysical data on Mars; and search for extraterrestrial intelligence. This publication is a good reference for first-year graduate students who intend to take graduate courses in specialized areas of planetary sciences, as well as practicing Ph.D. scientists with training in physics, chemistry, geology, astronomy, meteorology, and biology.

Readers will want to grab a telescope and explore the night skies after finishing this overview of our solar system. Our solar system consists of eight planets, as well as numerous moons, comets, asteroids, and meteoroids. For thousands of years, humans believed that Earth was at the center of the Universe, but all of that changed in the 17th century.

Astronomers like Nicolaus Copernicus, Galileo Galilei, Johannes Kepler, and Isaac Newton proposed the unthinkable theory that Earth and the other planets actually revolved around the Sun. This engaging book chronicles the beginning of the modern age of astronomy, then follows later discoveries, including NASA's current missions in space. On September 15, 2017, the Cassini spacecraft sent its final transmission to the Earth as it entered the atmosphere of Saturn, ending its historic 13 year mission at the ringed planet. This book is a beautifully illustrated journey of discovery through the Saturn system. Cassini's instruments have revealed never seen before details, including the only extraterrestrial lakes known in the solar system, and have provided unprecedented views of the rings, moons, and the planet itself. Results from Cassini's dramatic Grand Finale of ring-grazing and planet-skimming orbits are included in this expanded and updated second edition. Saturn is the jewel of the solar system. The Cassini spacecraft has been exploring the ringed planet and its moons and rings since 2004 and has helped us solve many of its mysteries while generating a wealth of new questions. Cassini has observed the bizarre mountains of Iapetus, the geysers of Enceladus, the lakes of Titan, and the dynamic and evolving rings. Along the way, this book explores and explains the fundamental processes that shape not just the Saturn system, but planets and moons in general. Written for the general audience with an emphasis on the fundamental physics of planetary systems, *The Ringed Planet* is a fascinating exploration of the Saturn system that places Saturn in the context of the solar system as a whole. Cassini's instruments have revealed Enceladus and Titan to have subsurface oceans of liquid water. Its cameras have returned stunning images of rings in turmoil, a tumbling moon, the only extraterrestrial lakes known in the solar system, a hexagon of clouds, some of the highest mountains in the solar system and much more. More than a journey of discovery at Saturn, *The Ringed Planet* is also an introduction to how planetary systems work.

This book investigates Venus and Mercury prospective energy and material resources. It is a collection of topics related to exploration and utilization of these bodies. It presents past and future technologies and solutions to old problems that could become reality in our life time. The book therefore is a great source of condensed information for specialists interested in current and impending Venus and Mercury related activities and a good starting point for space researchers, inventors, technologists and potential investors. Written for researchers, engineers, and businessmen interested in Venus and Mercury exploration and exploitation.

Richly illustrated with full-color images, this book is a comprehensive, up-to-date description of the planets, their moons, and recent exoplanet discoveries. This second edition of a now classic reference is brought up to date with fascinating new discoveries from 12 recent Solar System missions. Examples include water on the Moon, volcanism on Mercury's previously unseen half, vast buried glaciers on Mars, geysers on Saturn's moon Enceladus, lakes of hydrocarbons on Titan, encounter with asteroid Itokawa, and sample return from comet Wild 2. The book is further enhanced by hundreds of striking new images of the planets and moons. Written at an introductory level appropriate for undergraduate and high-school students, it provides fresh insights that appeal to anyone with an interest in planetary science. A website hosted by the author contains all the images in the book with an overview of their importance. A link to this can be found at [www.cambridge.org/solarsystem](http://www.cambridge.org/solarsystem).

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