



Steven Soter CV 2016

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RECENT ACTIVITIES

Research in planetary astronomy and geoarchaeology. Teaching at New York University: courses on Scientific Thinking and Speculation, Geology and Antiquity in the Mediterranean, Life in the Universe, Climate Change, and Energy and Environment. Co-writer of *Cosmos: A Spacetime Odyssey*, received 2014 Emmy award for Outstanding Writing for Nonfiction.

BACKGROUND AND EDUCATION

Born in Los Angeles, California, May 1943

BSc in Astronomy/Physics, 1965
University of California at Los Angeles

PhD in Astronomy, 1971
Cornell University, Ithaca, New York

PREVIOUS POSITIONS

1964-66	Research Assistant, Radio Astronomy Project, Aerospace Corporation, El Segundo, California
1966-71 1973-79	Research Assistant, Center for Radiophysics and Space Research, Cornell University, Ithaca, N.Y.
1971-73	Postdoctoral Fellow, Miller Institute for Basic Research in Science, UC Berkeley
1973-79	Assistant Editor, <i>ICARUS: International Journal of Solar System Studies</i> (Carl Sagan, editor)
1977-80	Co-Writer and Head of Research, <i>COSMOS</i> Television Series, KCET/Los Angeles
1980-87	Senior Research Associate, Center for Radiophysics and Space Research, Cornell University
1988-97	Special Assistant to the Director, National Air and Space Museum, Smithsonian Institution, Washington, DC
1997-03	Scientist, Hayden Planetarium American Museum of Natural History, New York
2004-14	Research Associate, Department of Astrophysics, American Museum of Natural History, New York
2005-07	Scientist-in-Residence, Center for Ancient Studies, New York University, New York
2008-14	Visiting Professor, Environmental Studies Program, New York University, New York
2014-2016	Resident Research Associate, Department of Astrophysics, American Museum of Natural History, New York

TELEVISION AND FILM DOCUMENTARIES:

Cosmos (1980), a 13-hour television series on astronomy, produced by KCET/Los Angeles. Written by Carl Sagan, Ann Druyan and Steven Soter. Head of Research.

Confessions of a Weaponeer (1987), NOVA television documentary on George Kistiakowsky, Presidential Science Advisor; produced by WGBH/Boston. Written by Carl Sagan, Ann Druyan and Steven Soter.

Blue Planet (1990), an IMAX film on the global environment seen from orbit, produced by the National Air and Space Museum, IMAX Systems Corporation, and Lockheed. Scriptwriter and science advisor.

Spacefaring (1992), a film about truth and fantasy in science fiction films, produced for the National Air and Space Museum's gallery *Where Next, Columbus?* Writer.

Destiny in Space (1994), an IMAX film on the future of space exploration, produced by the National Air and Space Museum, IMAX Systems Corporation, and Lockheed. Scriptwriter and science advisor.

Cosmic Voyage (1996), an IMAX film on the scale and evolution of the universe, produced by the National Air and Space Museum, the Motorola Foundation, and the National Science Foundation. Content development. Scriptwriter and science advisor.

Cosmos: A Spacetime Odyssey (2014), a 13-hour television series, produced for Fox Entertainment and National Geographic. Written by Ann Druyan and Steven Soter, who shared an Emmy award for Outstanding Writing for Nonfiction.

PLANETARIUM SHOWS:

Passport to the Universe (2000), inaugural show for the new Hayden Planetarium, American Museum of Natural History. Concept and script by Ann Druyan and Steven Soter, narration by Tom Hanks.

The Search for Life: Are We Alone? (2002), Hayden Planetarium show. Concept and script by Ann Druyan and Steven Soter, narration by Harrison Ford.

MUSEUM EXHIBITIONS:

A Piece of Mars? (1989), an exhibit of a Martian meteorite, in the gallery *Exploring the Planets* of the National Air and Space Museum. Curator.

Where Next, Columbus? (1992), a gallery about the next 500 years of exploration, for the Columbus Quincentenary exhibition at the National Air and Space Museum. Content development and advisor to the curator, Dr. Valerie Neal.

Rover Expo (1992), a two-day demonstration of 16 engineering prototype vehicles for remote planetary surface exploration, conducted on an accurately simulated Martian landscape on the Mall in Washington. Sponsored by the National Air and Space Museum, NASA and the Planetary Society. Project manager.

How Things Fly (1996), a permanent gallery at the National Air and Space Museum, on the principles of aeronautics and spaceflight. Science curator.

Hall of the Universe (2000), a permanent exhibition on modern astrophysics, at the Rose Center for Earth and Space, American Museum of Natural History. Co-writer.

Visions of the Cosmos (2009), an exhibition on astronomy and cosmology featuring rare books and manuscripts, at the Rubin Museum of Art, New York. Curator of the Western Medieval and Renaissance section.

EDITED POPULAR VOLUMES:

Steven Soter & Neil deGrasse Tyson, editors (2000). *Cosmic Horizons: Astronomy at the Cutting Edge*, a collection of 24 invited essays by contemporary astrophysicists describing their research. New York: The New Press.

Carl Sagan (2006). *The Varieties of Scientific Experience: Science and the Search for God*. The 1985 Gifford Lectures, edited by Ann Druyan, illustrations and science editor. Penguin Press.

POPULAR ARTICLES, LETTERS AND REVIEWS:

Steven Soter (1967). On the apparent solar motion seen from Mercury. *Sky & Telescope* 33, 135.

Steven Soter (1972). Review of *Habitable Planets for Man*, Second Edition, by Stephen H. Dole. *Icarus* 17, 226-228.

Steven Soter & Carl Sagan (1975). Pattern recognition and Zeta Reticuli. *Astronomy* 3(7), 38-40, and 3(9), 16-17.

Thomas Gold & Steven Soter (1979). North Seaquakes. *New Scientist* 83, 542.

Steven Soter (1981). Hydrocarbons in Earth. *Chemical & Engineering News* 59(49), 4.

Steven Soter (1983). Review of *Lightning, Auroras, Nocturnal Lights, and Related Luminous Phenomena*, by William H. Corliss. *Icarus* 56, 615.

Thomas Gold & Steven Soter (1986). Biogenic and abiogenic petroleum. *Chemical & Engineering News* 64(16), 2-3.

Thomas Gold & Steven Soter (1985). Fuel requirements. *Aviation Week & Space Technology* 123(18), 96.

Steven Soter (1985). Intelligence and catastrophe: the cosmic quarantine hypothesis. *Planetary Report* 5(1), 20-21.

Steven Soter (1987). SDI survey. *Science* 235, 831.

Steven Soter (1998). Galileo's Saturn. *Natural History* July-Aug, p. 4.

Dora Katsonopoulou & Steven Soter (1998). Archaeological news from the area of Helike [in Greek]. *Archaologia kai Technes* 66 (March), 41-45.

Steven Soter (2002). Sifting truth from Pelée's ashes. *Natural History* 111(8), 76-78.

Steven Soter (2004). The wrong stuff. *Natural History* 113(5), 14+67.

Steven Soter (2005). SETI and the cosmic quarantine hypothesis. *Astrobiology Magazine* (17 Oct), online.

Steven Soter (2006). Teaching what a planet is: The scientific issues, 4. *Astronomy Education Review* 5(2), and online.

Steven Soter (2007). What is a planet? *Scientific American* 296(1), 34-41 (January).

Steven Soter (2007). Are planetary systems filled to capacity? *American Scientist* 95, 414-421 (September/October). Also published (2008) in German, French and Spanish language editions of *Scientific American*.

Steven Soter (2014). Defending Giordano Bruno: A response from the co-writer of *Cosmos*. *Discover Magazine*, online.

Steven Soter (2014). Battle of the Cosmos, Round 3. *Discover Magazine*, online.

REFEREED SCIENTIFIC PUBLICATIONS:

Peter Goldreich & Steven Soter (1966). Q in the solar system. *Icarus* 5, 375-389.

Steven Soter (1966). Mercury: infrared evidence for nonsynchronous rotation. *Science* 153, 1112-1113.

John P. Oliver, Eugene E. Epstein, Ronald A. Schorn & Steven Soter (1967). M 17 and Tau A: 3.4-mm brightness distribution. *Astronomical Journal* 72, 319 [abstract].

Ronald Schorn, Eugene E. Epstein, John P. Oliver, Steven Soter & William J. Wilson (1967). Quasars: 88-GHz flux measurements. *Astronomical Journal* 72, 319 [abstract].

Steven Soter & Juris Ulrichs (1967). Rotation and heating of the planet Mercury. *Nature* 214, 1315-1316.

Eugene E. Epstein, Steven Soter, John P. Oliver, Ronald A. Schorn and William J. Wilson (1968). Mercury: observations of the 3.4-mm radio emission. *Science* 157, 1550-1552.

Ronald A. Schorn, Eugene E. Epstein, John P. Oliver, Steven Soter & William J. Wilson (1968). Quasi-stellar radio sources: 88-GHz flux measurements. *Astrophysical Journal* 151, L127-131.

Eugene E. Epstein, John P. Oliver, Steven Soter, Ronald A. Schorn & William J. Wilson (1968). Venus: on an inverse variation with phase in the 3.4-mm emission during 1965 through 1967. *Astronomical Journal* 73, 271-274.

Thomas Gold & Steven Soter (1969). Atmospheric tides and the resonant rotation of Venus. *Icarus* 11, 356-366.

Thomas Gold & Steven Soter (1970). Apollo 12 seismic signal: indications of a deep layer of powder. *Science* 169, 1071-1075.

Thomas Gold & Steven Soter (1971). Atmospheric tides and the 4-day circulation on Venus *Icarus* 14, 16-20.

Steven Soter (1971). The dust belts of Mars. Center for Radiophysics and Space Research Report 462.

William K. Hartmann, Donald R. Davis, Clark R. Chapman, Steven Soter & Richard Greenberg (1975). Mars: satellite origin and angular momentum. *Icarus* 25, 588-594.

Thomas Gold and Steven Soter (1976). Cometary impact and the magnetization of the Moon. *Planetary & Space Science* 24, 45-54.

Steven Soter, Joseph A. Burns & Philippe L. Lamy (1977). Radiation pressure and Poynting-Robertson drag for small spherical particles. *Comets, Asteroids, Meteorites: Interrelations, Evolution and Origins* (A.H. Delsemme, editor), pp. 121-125. University of Toledo Press.

Steven Soter & Alan Harris (1977). Equilibrium figure of Phobos and other small bodies. *Icarus* 30, 192-199.

Steven Soter & Alan Harris (1977). Are the striations on Phobos evidence for tidal stress? *Nature* 268, 421-422.

Thomas Gold & Steven Soter (1979). Theory of the Earth-synchronous rotation of Venus. *Nature* 277, 280-281.

Thomas Gold & Steven Soter (1979). Brontides: natural explosive noises. *Science* 204, 371-375.

Joseph A. Burns, Philippe Lamy & Steven Soter (1979). Radiation pressure on small particles in the solar system. *Icarus* 40, 1-48.

Thomas Gold & Steven Soter (1980). The deep-Earth-gas hypothesis. *Scientific American* 242(6), 155-161.

Joseph A. Burns & Steven Soter (1980). A simple derivation of the radiation forces felt by scattering particles. *Solid Particles in the Solar System* (I. Halliday & B.A. McIntosh, editors), pp. 282-284. International Astronomical Union.

Thomas Gold & Steven Soter (1980). The deep Earth gas hypothesis. *Bull. Verein Schweiz. Petroleum-Geologen und -Ingenieure* 46, 11-35.

Thomas Gold & Steven Soter (1981). Natural explosive noises. *Science* 212, 1297-1298.

Thomas Gold & Steven Soter (1982). Abiogenic methane and the origin of petroleum. *Energy Exploration & Exploitation* 1(2), 89-104.

Thomas Gold & Steven Soter (1983). Methane and seismicity: a reply. *Eos* 64, 522.

Thomas Gold & Steven Soter (1985). Fluid ascent through the solid lithosphere and its relation to earthquakes. *Pure & Applied Geophysics* 122, 492-530.

Steven Soter (1987). Comment on the paper "On the influx of small comets into the Earth's upper atmosphere." *Geophysical Res. Letters* 14, 162-163.

Dora Katsonopoulou & Steven Soter (1991). Ancient Helike [in Greek]. *Chronika tou Archaialogikou Deltiou* 46, 159-162.

Dora Katsonopoulou & Steven Soter (1993). The oracular cave of Herakles of Boura [in Greek]. *Archaologia* 47 (June), 60-64.

Joseph A. Burns, Douglas P. Hamilton, Francois Mignard & Steven Soter (1996). The contamination of Iapetus by Phoebe dust. *Physics, Chemistry and Dynamics of Interplanetary Dust* (A.S. Gustafson and M.S. Hanner, eds.), pp. 179-182.

Yannis Maniatis, Yorgos Facorellis, Steven Soter, Dora Katsonopoulou & B. Kromer (1996). Locating archaeological horizons with ¹⁴C sediment dating: the case of the lost city of Helike. *Radiocarbon* 37, 931-942.

Dora Katsonopoulou & Steven Soter (1996). Research on ancient Helike by the American School of Classical Studies: 1988-1995 [in Greek]. In *Proceedings, First Conference on Archaeological Work in Peloponnesos and West Greece (Patras)*.

D.M. Huddleston, M.L. Stokes, J.D. Anderson & S. Soter (1997). Interactive exhibit for the Smithsonian Institution's *How Things Fly* gallery. *Computer Applications in Engineering Education* 5(1), 13-20.

Doria Kutrubes, Steven Soter & Dora Katsonopoulou (1997). The search for ancient Helike: a GPR case study. *Symposium on Application of Geophysics to Engineering & Environmental Problems, Proceedings*, pp. 973-982.

Steven Soter (1998). Holocene uplift and subsidence of the Helike Delta, Gulf of Corinth, Greece. *Coastal Tectonics* (Iain Stewart & Claudio Vita-Finzi, eds.), Geological Society, London, Special Publications 146, 41-56.

Steven Soter & Dora Katsonopoulou (1998). The search for ancient Helike, 1988-1995: Geological, sonar and bore hole studies. *Ancient Helike and Aigialeia* (D. Katsonopoulou, S. Soter & D. Schilardi, eds.), Athens: Helike Society, pp. 67-116.

Steven Soter & Dora Katsonopoulou (1998). Geophysical observations on the hill of Agios Georgios, possible site of the acropolis of Helike. *Ancient Helike and Aigialeia*

(D. Katsonopoulou, S. Soter & D. Schilardi, eds.), Athens: Helike Society, pp. 153-161.

Steven Soter (1998). The Aigion earthquake of 1995: Macroscopic anomalies. *Ancient Helike and Aigialeia* (D. Katsonopoulou, S. Soter & D. Schilardi, eds.), Athens: Helike Society, pp. 495-517.

Steven Soter & Dora Katsonopoulou (1999). Occupation horizons found in the search for the ancient Greek city of Helike. *Geoarchaeology* 14, 531-563.

Steven Soter (1999). Macroscopic seismic precursors and submarine pockmarks in the Corinth-Patras Rift, Greece. *Tectonophysics* 308, 275-290.

Steven Soter, Patricia Blackwelder, Christos Tziavos, Dora Katsonopoulou, Terri Hood & Carlos Alvarez-Zarikian (2001). Environmental analysis of bore hole cores from the Helike Delta, Gulf of Corinth, Greece. *Journal of Coastal Research* 17, 95-106.

Doria L. Kutrubes, Steven Soter, Dora Katsonopoulou & Ariane Heinze (2003). Ground penetrating radar in the search for ancient Helike, Greece. *Symposium on Application of Geophysics to Engineering & Environmental Problems (SAGEEP), Proceedings*, pp. 92-106.

I.K. Koukouvelas, D. Katsonopoulou, S. Soter & P. Xypolias (2005). Slip rates on the Helike Fault, Gulf of Corinth, Greece: New evidence from geoarchaeology. *Terra Nova* 17, 158-164.

Steven Soter & Dora Katsonopoulou (2005). Studies on the geoarchaeology of the Helike Delta: 1991-2000. *Third International Conference on Ancient Helike and Aigialeia: Archaeological Sites in Geologically Active Regions* (D. Katsonopoulou, S. Soter & I.K. Koukouvelas, eds.), Athens: Helike Society, pp. 169-182.

Carlos A. Alvarez-Zarikian, Steven Soter & Dora Katsonopoulou (2005). Microfaunal evidence for paleoenvironments of the Helike Delta: 1991-2000. *Third International Conference on Ancient Helike and Aigialeia: Archaeological Sites in Geologically Active Regions* (D. Katsonopoulou, S. Soter & I.K. Koukouvelas, eds.), Athens: Helike Society, pp. 183-195.

Steven Soter, Vincent Murphy, Dora Katsonopoulou & Roger Reeves (2005). A strong magnetic anomaly at the Bronze Age site of Mitrou, Lokris, Greece. *Third International Conference on Ancient Helike and Aigialeia: Archaeological Sites in Geologically Active Regions* (D. Katsonopoulou, S. Soter & I.K. Koukouvelas, eds.), Athens: Helike Society, pp. 303-310.

Steven Soter (2006). What is a planet? *Astronomical Journal* 132, 2513-2519.

Carlos A. Alvarez-Zarikian, Steven Soter & Dora Katsonopoulou. (2008). Recurrent submergence and uplift in the area of ancient Helike, Gulf of Corinth, Greece: Micro-faunal and archaeological evidence. *Journal of Coastal Research* 24(1A), 110-125.

G.N. Tsokas, P.I. Tsourlos, A. Stampolidis, D. Katsonopoulou & S. Soter (2009). Tracing a major Roman road in the area of ancient Helike by resistivity tomography. *Archaeological Prospection* 26, 251-266.

Steven Soter (2011). Radiocarbon anomalies from old CO₂ in the soil and canopy air. *Radiocarbon* 53, 55-69.

Steven Soter & Dora Katsonopoulou (2011). Submergence and uplift of settlements in the area of Helike, Greece, from the Early Bronze Age to late antiquity. *Geoarchaeology* 26, 584-610.

Joseph A. Burns, Philippe L. Lamy & Steven Soter (2014). Radiation forces on small particles in the solar system: A reconsideration. *Icarus* 232, 263-265.

Max Engel, Kirsten Jacobson, Katrin Boldt, Peter Frenzel, Dora Katsonopoulou, Steven Soter, Carlos A. Alvarez Zarikian & Helmut Brückner (2016). New sediment cores reveal environmental changes driven by tectonic processes at ancient Helike, Greece. *Geoarchaeology* 31, 140-155.

EDITED SCIENTIFIC VOLUMES:

Dora Katsonopoulou, Steven Soter & Demetrius Schilardi, editors (1998). *Ancient Helike and Aigialeia: Proceedings of the Second International Conference*. Aigion, Greece, December 1995. Athens, 517 pp.

D. Katsonopoulou, I.K. Koukouvelas & S. Soter, editors (2005). *Third International Conference on Ancient Helike and Aigialeia: Archaeological Sites in Geologically Active Regions* (D. Katsonopoulou, S. Soter & I.K. Koukouvelas, eds.), Athens: Helike Society.

CONFERENCE PRESENTATIONS:

Steven Soter (1972). Martian satellite debris. Division of Planetary Sciences, American Astronomical Society, Kona, Hawaii. *American Astronomical Society Bulletin* 4, 368 [abstract].

Steven Soter (1974). The brightness asymmetry of Iapetus. IAU Colloquium 28. Cornell University.

Dora Katsonopoulou & Steven Soter (1996). Ancient Helike in the light of recent discoveries. Archaeological Institute of America, 98th Annual Meeting, New York, December. Abstract in *American Journal of Archaeology* 101, 378 (1997).

Steven Soter (1998). Holocene tectonics of the Helike fault, Gulf of Corinth, Greece. IGCP/INQUA meeting on "Rapid Coastal Changes in the Late Quaternary", Corinth, Greece, September.

Steven Soter & Dora Katsonopoulou (2000). Geoarchaeology of the Helike Delta. Third International Conference on Ancient Helike and Aigialeia: Archaeological Sites in Geologically Active Regions. Nikolaiika, Achaia, Greece, October.

Steven Soter, Dora Katsonopoulou & Ioannis Koukouvelas (2002). Archaeological evidence of earthquakes in the area of Helike, Achaia, Greece, from the Early Bronze Age to Late Antiquity. Conference on "Environmental Catastrophes and Recovery in the Holocene", Brunel University, UK, September.

Dora Katsonopoulou & Steven Soter (2003). Classical Helike and its Early Bronze Age predecessor. Archaeological Institute of America, 104th Annual Meeting, New Orleans, January.

Dora Katsonopoulou, Steven Soter & Ioannis Koukouvelas (2003). Evidence of earthquakes in Helike from the Early Bronze Age to Roman times. 4th Symposium on Archaeometry, Athens, May.

Dora Katsonopoulou, Steven Soter & Ioannis Koukouvelas (2004). Historical earthquakes in the area of Helike. The evidence of geoarchaeology. 5th International Symposium on Eastern Mediterranean Geology, Thessaloniki, April.

Steven Soter (2006). What is a planet? Division of Planetary Sciences, American Astronomical Society, Pasadena, October.

Steven Soter (2008). The utility of the dynamical-based (IAU) definition of a planet. Great Planet Debate Conference, Applied Physics Laboratory, Johns Hopkins University, Laurel, Maryland, August.

Steven Soter (2008). Planets and dynamical dominance: history and prospects. Division of Planetary Sciences, American Astronomical Society, Ithaca, October. Abstract in *Bulletin, American Astronomical Society* 40, 397.

Steven Soter (2013). Abiotic hydrocarbons on other worlds. Kazan Workshop on Abiotic Hydrocarbons, Kazan Federal University, Russia, 13-17 April.

Steven Soter (2015). Hydrocarbons on other worlds. International Science Meeting, Deep Carbon Observatory, Munich, Germany, 28-28 March.