

Tourists' Guide to Mars

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Appendix II - Supplemental

Free and easily available information for anyone can be found here. These links and additional information for this book are also available from our website at www.LatheCity.com

What is next?

As of today, 4/16, five satellites orbit Mars (MAVEN, Mars Odyssey, Mars Reconnaissance Orbiter all NASA as well as India's Mars Orbiter & Mars Express from ESA)¹ and two NASA rover (out of seven) are still operational. Seven landings on Mars; ~39 missions to Mars.² What is next?

2018 <https://www.nasa.gov/feature/the-ins-and-outs-of-nasa-s-first-launch-of-sls-and-orion>

2018 SpaceX announced on 4/27/16 that they would test land their unmanned Dragon space capsule on Mars in 2018.³

2020 <http://www.nasa.gov/press/2014/july/nasa-announces-mars-2020-rover-payload-to-explore-the-red-planet-as-never-before>

2022 The Japanese space agency (JAXA) and NASA apparently jointly plan to return a sample (10 g of regolith) from a Mars moon (Phobos) by 2022 – called Martian Moons eXploration (MMX) mission.

http://www.spacefacts.de/schedule/e_schedule.htm planned crewed flights to ISS

<http://www.spacefacts.de/> statistical data of space flights

What is next? - Asteroid sample return project, OSIRIS-Rex, 2016-2023

<http://www.nasa.gov/osiris-rex> main NASA site

http://www.nasa.gov/mission_pages/osiris-rex/index.html various movies

<http://www.nasa.gov/content/goddard/bennus-journey/>

https://en.wikipedia.org/wiki/101955_Bennu

https://en.wikipedia.org/wiki/Planetary_Defense_Coordination_Office

<https://en.wikipedia.org/wiki/OSIRIS-REx>

OSIRIS-Rex visits near-Earth asteroid Bennu (size 500 meters, 1,650 foot); launch 2016; sample return 2023;

Infrared Spectrometer for composition analysis; mapping asteroid geometry using LASER radar system (LIDAR); REXIS - Regolith X-Ray Imaging Spectrometer for composition analysis (X-ray source is the sun); early building block of universe; time capsule; origin of life; carbon rich asteroid; measure Yarkovsky effect (heat-radiation effect on trajectory)

Past and Future Missions to Mars

<http://solarsystem.nasa.gov/missions/target/mars> (perhaps start here)

<http://exploration.esa.int/mars/45801-european-heritage/> Patriotic hymn about success in space programs, this time European version of it.
<http://exploration.esa.int/mars/56504-missions-to-mars/> List of missions to Mars

Colonizing (Mars)

Shortest flight time from earth 6-7 months; surface water ice; nearly pure CO₂ atmosphere; -60C average surface temperature

https://en.wikipedia.org/wiki/Colonization_of_Mars
https://en.wikipedia.org/wiki/Human_mission_to_Mars
https://en.wikipedia.org/wiki/Interplanetary_spaceflight
https://en.wikipedia.org/wiki/Space_colonization
<https://en.wikipedia.org/wiki/Portal:Spaceflight>

NASA Plans

- <http://www.nasa.gov/press-release/nasa-releases-plan-outlining-next-steps-in-the-journey-to-mars>
- <http://www.nasa.gov/content/nasas-journey-to-mars>
- <http://www.nasa.gov/press/2014/july/nasa-announces-mars-2020-rover-payload-to-explore-the-red-planet-as-never-before>

NASA Documents for Mars Mission Planning

Very detailed PDF documents are available from NASA's website (see also https://en.wikipedia.org/wiki/Mars_Design_Reference_Mission).

- http://www.nasa.gov/pdf/373665main_NASA-SP-2009-566.pdf "human exploration of Mars design reference architecture" That is still NASA's current reference document, Version 5.0 You may want to read section 7 which is a summary of the 83 pages document. Over the decades, a number of versions of these "Reference Architectures" were released by NASA: 3.0 in 1998, 4.0 in 1999 + other texts, current version is 5.0 in 2009. The latest version V5.0 is detailed in my guide.
- <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20010020400.pdf> "Portree, David, Humans To Mars: Fifty Years of Mission Planning, NASA-SP-2001-4521,"
The author seems not to be a NASA employee, but this book was officially released by NASA's history division. The motivation of this text "This monograph provides ... a very valuable overview of how much planning has already been done." (page V) The document describes the motivation of sending humans to Mars as a "political question" (page V). Whoa. One of the more interesting notes I found is that Mars travel pans today may be considered in the distant future as we consider today ideas of Leonardo da Vinci (page Vii). (That was actually a citation from someone else.) According to this text "more than 1000 piloted Mars mission studies" were conducted (page vii). The document here is basically a summary of mission logistics, similar to part II of my book, but driven by the motivation to preserve the historic aspects of past plans. The text summarizes apparently about 50 historic mission plans on 160 pages. Only few images are included, this is straight text. Anyway, this is a quite interesting document with much probably not too well-known historical information.
- <http://ston.jsc.nasa.gov/collections/TRS/techrep/TP-2001-209371.pdf> "Stephen J. Hoffman (ed.), The Mars Surface Reference Mission: A Description of Human and Robotic Surface Activities, NASA/TP-2001-209371"
- http://history.nasa.gov/90_day_study.pdf "report of the 90-day study on human exploration of the moon and mars" (1989)

Serious and Current Plans by Others

- <https://en.wikipedia.org/wiki/SpaceX> Private ! company resupplying the international space station with ambitions apparently for Mars trips.
- <http://www.spacex.com/mars> watch the movies !
- <http://buzzaldrin.com/> Apollo 11 (the 1st that landed on the moon) astronaut has written several books about his vision of Mars missions, watch the movie at <http://buzzaldrin.com/space-vision/advocacy/cycling-pathways-to-occupy-mars/> which describes his concept somewhat (similar to some of this books). Collaboration with Purdue University did exist to work out his concept
<https://engineering.purdue.edu/AAE/Academics/Courses/aae450/2015/spring>
- http://physicswiki.net/index.php/Mars_Direct

Plans by Others

- <http://www.mars-one.com/> (One way trip to Mars, they collected already one million or so for this project, good job.)
- <http://www.shackletonenergy.com/> Mining the earth moon

Private Space Station

- <http://bigelowaerospace.com/> Expandable space habitat manufactured by a private company, Bigelow Aerospace. Genesis I and II appear to be in orbit since 2006! Blow up your space station. They target apparently tourism and services for NASA.
- <http://www.nasa.gov/content/bigelow-expandable-activity-module> NASA test on international space station, 2016

Non-Government Companies with Space Flight Capabilities

United Launch Alliance and [SpaceX](#) provide cargo flights to the international space station. [SpaceX does plan to transport also astronauts soon.](#)

- Sierra Nevada Corporation <http://www.sncorp.com/>
- Boeing <http://www.boeing.com/defense/>
- Lockheed Martin <http://www.lockheedmartin.com/us/ssc/orion-ef1.html>
- SpaceX <http://www.spacex.com/>
- Bigelow Aerospace <http://bigelowaerospace.com/> (blow-up space station, no kidding)
- Blue Origin <https://www.blueorigin.com/>
- United Launch Alliance <http://www.ulalaunch.com/> (Lockheed Martin Space Systems and Boeing Defense, Space & Security)
- <https://www.nasa.gov/feature/commercial-crew-program-marks-a-year-of-progress>

Mars Clubs & Societies and alike

<http://www.marssociety.org/>

Mars Society

<http://www.marshome.org/>

Mars Foundation

<http://mmp.planetary.org/index.html>

Planetary Society

<http://www.4frontierscorp.com/company/index.php>

www.spacefrontier.org

Space Frontier Foundation

<http://www.nss.org/>

National Space Society

Founded 1987 based on the National Space Institute which was founded in 1974 by Wernher von Braun !

<http://www.mars-one.com/>

<http://www.space-explorers.org/>

Association of Space Explorers

(Membership in ASE is open to individuals who have completed at least one orbit of the Earth in a spacecraft.

Send me an e-mail when you become a member, please. Anyway, there website includes a list of basically all astronauts, I guess.)

<http://spaceflorida.gov/home>

<http://www.photostospace.com/>

Basically advertisement web sites “devoted” to space travel/astronomy

<http://www.spaceflightinsider.com/>

<http://www.spaceshirts.com/>

knickknacks

<http://wereportspace.com/>

A few Astronauts

- https://en.wikipedia.org/wiki/Astronaut_birthplaces_by_US_state
- https://en.wikipedia.org/wiki/List_of_Apollo_astronauts
- <http://buzzaldrin.com/>
the moon), Buzz Aldrin
- https://en.wikipedia.org/wiki/Helen_Sharman
or <http://helensharman.drupalgardens.com/content/about-helen>
- <http://marklarson.com/genecernan/>

astronauts by state
Apollo astronauts
Apollo 11 (1st group on

1st UK astronaut
Helen Sharman
last man on the moon,

or <http://genecernan.com/>

Eugene Cernan

Space telescopes

<http://jwst.nasa.gov/>

https://en.wikipedia.org/wiki/List_of_space_telescopes

http://www.nasa.gov/mission_pages/webb/main/index.html

<http://spacetelescope.org/>

https://www.youtube.com/embed/9XV0UE5Gb_Y?rel=0

telescope detecting atmosphere on exoplanets

Search for Life

<http://hubblesite.org/newscenter/archive/releases/2016/33/video/c/> Water at Europa moon

Life Support Systems

https://en.wikipedia.org/wiki/In_situ_resource_utilization

https://en.wikipedia.org/wiki/Sabatier_reaction

Sabatier reaction

[http://dx.doi.org/10.1061/\(ASCE\)AS.1943-5525.0000201](http://dx.doi.org/10.1061/(ASCE)AS.1943-5525.0000201)

http://settlement.arc.nasa.gov/teacher/course/h2o_gen.html

Propulsion Systems

<https://en.wikipedia.org/wiki/SpaceX>

Private ! company

https://en.wikipedia.org/wiki/Delta_Cryogenic_Second_Stage

ICPS-Cryogenic Propulsion Stage

https://en.wikipedia.org/wiki/Solar_sail

Misc.

• http://science1.nasa.gov/science-news/science-at-nasa/2000/ast13nov_1/

• <http://www.astrodigital.org/mars/index.html>

Mars info site !

• <http://www.nasa.gov/centers/ames/research/technology-onepaggers/advanced-life-support.html>

• <http://www.mars-one.com/news/press-releases/mars-one-contracts-paragon-for-mars-life-support-systems>

• http://www.nasa.gov/sites/default/files/atoms/files/edu_marssurvkit_pdf_2015_0.pdf

Mars for kids

• http://www.nasa.gov/topics/technology/features/star_trek.html

• <http://www.cnn.com/specials/space-science>

The radiation myth – here are the facts

NASA measured the radiation on the way to Mars as part of the Curiosity rover mission in 2012.

(published in the May 31 edition of the journal Science): 1.8 milliSieverts per day on its journey to Mars which is acceptable.

https://www.nasa.gov/home/hqnews/2013/may/HQ_13-165_MSL_Radiation_Findings.html | most quantitative document

<https://www.nasa.gov/jpl/msl/mars-rover-curiosity-pia17600.html>

<http://spaceflight.nasa.gov/spaceneeds/factsheets/pdfs/radiation.pdf>

https://www.nasa.gov/audience/foreducators/postsecondary/features/F_Space_Radiation_Project.html

https://www.nasa.gov/sites/default/files/files/1_NAC_HEO_SMD_Committee_Mars_Radiation_Intro_2015April7_Final_TAGGED.pdf | PowerPoint, long & detailed but not very quantitative

Water on Mars

https://en.wikipedia.org/wiki/Water_on_Mars

<http://mars.jpl.nasa.gov/mro/news/whatsnew/index.cfm?FuseAction=ShowNews&NewsID=185>

Science in Space

http://www.nasa.gov/mission_pages/station/research/experiments/experiments_by_expedition.html#4344

[How to Fly without Air? \(Orbital Mechanics\)](#)

<https://www.esa.int/esaKIDSen/Technology.html>

basic (!) knowhow, good site not only for

kids

<http://solarsystem.nasa.gov/basics/toc.php> Very detailed outline, basics

<http://solarsystem.nasa.gov/basics/editorial.php> Very detailed

http://www.braeunig.us/space/index_top.htm Cool website

<http://www.braeunig.us/space/orbmech.htm#launch> Advanced outline

https://en.wikipedia.org/wiki/Gravity_assist

https://en.wikipedia.org/wiki/Mars_cycler

https://en.wikipedia.org/wiki/Lunar_cycler

https://en.wikipedia.org/wiki/Circumlunar_trajectory

https://en.wikipedia.org/wiki/Trans-lunar_injection

http://map.gsfc.nasa.gov/mission/observatory_12.html Lagrange points

http://www.esa.int/Our_Activities/Space_Science/What_are_Lagrange_points Animation of Lagrange points

<http://www.spaceworkssoftware.com/products/mobile/orbitsim.shtml>

<http://www.spaceworkssoftware.com/>

Public access to NASA-funded research data

<https://www.nihms.nih.gov/db/sub.cgi>

<http://www.nasa.gov/open/researchaccess>

Research with NASA e.g.

<http://psi.nasa.gov/index.html>

analyzing data for NASA, see Physical Sciences Informatics System

Space Tourism Today

According to ref.⁵, (p. 51) 600 people made it into Earth orbit, 12 walked across the moon (as of 2016). Commercially suborbital test flights were apparently accomplished, but none of these companies is apparently ready to offer commercial flights to space tourists (as of 2/27/16). The international space station indeed did see private visitors with Russian transportation (\$20-\$40 million/seat; administered by “space adventures” a US company). Zero-g flights for tourists (<http://www.gozerog.com/>) are available for ~\$5,000/seat – not bad, perhaps I try that (depending on sales of this book, -☺).

• <http://www.virgingalactic.com/>

• <http://www.virgingalactic.com/human-spaceflight/fly-with-us/>

\$250,000/seat (suborbital)

• <http://www.spaceadventures.com/>

Lunar orbit

• <http://www.excaliburalmaz.com/>

• Burt Rutan, SpaceShipOne

• <http://www.spacecamp.com/space/adult>

space camps

• http://www.nasa.gov/centers/kennedy/about/information/camp_faq.html

space camps

• <https://www.blueorigin.com/>

Blue Origin, zero g-rocket flights

Space Tourism / info sites

<http://www.spacefuture.com/tourism/tourism.shtml>

https://en.wikipedia.org/wiki/Space_tourism

<http://www.space.com/topics/space-tourism>

<http://www.nss.org/tourism/>

<http://www.space-tourism.com/>

Space Tourism / Books

There may be two dozen books devoted to Space tourism available, a few I saw are listed here:

- Space Tourism: Do You Want to Go?: Apogee Books Space Series 49, 2004, by John Spencer
- Destination Space: How Space Tourism Is Making Science Fiction a Reality, 2010 by Kenny Kemp
- Space Tourism (Machines of the Future), 2011; by Peter McMahon, Andy Mora

- Space Tourism: Adventures in Earth Orbit and Beyond, 2005, Michel van Pelt; 216 pages; hardcover; \$20 (2nd hand); ISBN 0387402136
(If you really have a lot of time, go for it and read this book, otherwise I would rather do something else with my time and money. The more than 10 years old book is now outdated, of course, but besides that, it includes very little information: some anecdotes, some low-leveled science, yes, but it offers a very low information density. Large sections are written as a “reality TV show”. As of today, Dec 2016, there is no space tourism, i.e., the author makes up stories such as astronaut training for tourists, to fill his book. Sorry, but this was not convincing to me, although entertaining to read in part.)

Communication in Space

<http://mars.jpl.nasa.gov/msl/mission/communicationwithearth/>

FAQ – frequently asked questions / answers

<http://www.nasa.gov/offices/marsplanning/faqs/index.html>

<http://www.nasa.gov/offices/marsplanning/faqs/video.html>

<http://www.marssociety.org/home/about/faq/>

Literature – Mars travel planning

- *The Mars Project*, Wernher von Braun, German original Ed. from 1948; English Ed. from 1962 translated by Henry J. White; University of Illinois Press; ISBN-13: 978-0252062278; see also https://en.wikipedia.org/wiki/The_Mars_Project
- *The CASE FOR MARS*, Zubrin, Robert, 328 pages, 1996, ISBN 0684827573; 2nd Ed. 2011, Zubrin/Wagner, ISBN 9781451608113, 382 pages (Probably considered as the “Mars bible” in the hobby astronaut community. I did read mostly the 2nd Ed. which has 382 pages in small print. I hope that you have that kind of time. Anyway, recommended reading, but very wordy outline with many repetitions and not too detailed technical/scientific information. Many historic notes about different (false) concepts. Brief summary of Mars explorations by the various rovers, etc. Engineering concepts, Mars utilization, colonization, etc. Somewhat outdated since basically from 1996, many of the references are from 1990s and earlier.)
- Buzz Aldrin, *Mission to Mars*, 2013, ISBN: 258 pages, 978-1-4262-1468-4 (\$14.95) (A mix of a number of things: autobiography, US space science history, Apollo missions stories, US space science politics, lots of patriotism and US headship speeches, but also outline of a space exploration program including a Mars mission using Aldrin’s cyclo orbit idea. Aldrin is probably the most prominent advocate for a Mars mission, great! Buzz Aldrin was the 2nd human stepping on the moon as an Apollo 11 astronaut and “I’m the first alien ...entering a space craft ... going ... [back to] Earth” (page 88) “Lunar dust ... had ... odor, like burnt charcoal ...” (page 84) Recommended reading. Actually I did personally meet an Apollo astronaut on campus of my university as part of a NASA fellowship award ceremony for students, also see ref.⁶ Unfortunately, it will become harder and harder to meet one of the guys – they are all in the high 80s. About time to make new heroes with a Mars program.)
- *On to Mars: Colonizing a New World* with CDROM (Apogee Books Space Series), Zubrin, Robert, Paperback: 264 pages, ISBN 1896522904
- *On to Mars 2: Exploring and Settling a New World* (Apogee Books Space Series), 264 pages, ISBN 1894959302

Literature Recommended on NASA Website

- Uncovering the Secrets of the Red Planet: Mars**, P. Raeburn, National Geographic Society, Washington, D.C., 1998
- The Exploration of Mars - Searching for the Cosmic Origins of Life**, P. Bizony, Aurum Press, London, 1998
- Destination Mars in Art, Myth, and Science**, J. Barbree and M. Caidin, Penguin Group, New York, 1997
- The Hunt for Life on Mars**, D. Goldsmith, Dutton, New York, 1997
- The Planet Mars: A History of Observation & Discovery**, W. Sheehan, University of Arizona Press, 1996
[\(Online\)](#)
- Water on Mars**, M. Carr, Oxford University Press, Oxford, 1996
- Mars - The Story of the Red Planet**, P. Cattermole, Chapman and Hall, London, 1993
- Mars**, Edited by H. Kieffer, B. Jakosky, C. Snyder, and M. Matthews, University of Arizona Press, Tucson, 1992
- Mars and Its Satellites - A Detailed Commentary on the Nomenclature**, J. Blunck, Exposition Press, Smithtown, New York, 1982
- The Surface of Mars**, M. Carr, Yale University Press, New Haven, 1981
- Atlas of Mars - The 1:5,000,000 Map Series** R. Batson, P. Bridges, and J. Inge, NASA, Washington, D.C., 1979
- The Geology of Mars**, T. Mutch, R. Arvidson, J. Head, K. Jones, and R. Saunders, Princeton University Press, Princeton, 1976
- On Mars - Exploration of the Red Planet 1958-1978** E. Ezell and L. Ezell, NASA SP-4212, Washington, D.C., 1984
[\(Online\)](#)
- Viking Orbiter Views of Mars**, Edited by C. Spitzer, NASA SP-441, Washington, D.C., 1980
[\(Online\)](#)
- The Martian Landscape**, The Viking Lander Imaging Team, NASA SP-425, Washington, D.C., 1978
[\(Online\)](#)
- Scientific Results of the Viking Project**, Journal of Geophysical Research, vol. 82, no. 28, A.G.U., Washington, D.C., 1977
- The New Mars - The Discoveries of Mariner 9**, W. Hartmann and O. Raper, NASA SP-337, Washington, D.C., 1974
- The Mariner 6 and 7 Pictures of Mars**, S. Collins, NASA SP-263, Washington, D.C., 1971

Literature (print) – Orbital mechanics

- Orbital mechanics, J.E. Prussing, B.A. Conway, 1993, Oxford Univ. Press. (A book based on a lecture taught for 22 year. Halleluiah – then it must be good. Indeed, it’s a rather brief outline. When skipping over most of the derivations -which would require days to follow- one can catch the most interesting points fast. Some important derivations are missing and given as homework problems, well, that’s pretty popular, but not too helpful. Brief intro, but good background in physics and math will help. I was not too impressed about this book.)
- Orbital mechanics for Engineering Students, H.D. Curtis, 2010, Elsevier, 750 pages (That’s a modern and didactic textbook with many examples. Probably the best print outline about orbital mechanics I have seen so far, but 750 pages. I did indeed read most of it.)
- Montenbruck, Oliver; Pfleger, Thomas (2009). Astronomy on the Personal Computer. Springer-Verlag Berlin Heidelberg. ISBN 978-3-540-67221-0
- Fly Me to the Moon: An Insider's Guide to the New Science of Space Travel, by Edward Belbruno, Princeton University Press, ISBN 0-691-12822-7, 148 pages (New concepts for space travel based on chaos theory. Popular, general public outline. Autobiographic style. Belbruno is a mathematician and artist who worked a few years for JPL. He was probably the first developing new concepts for space travel. Low energy trajectories. This concept has been used successfully. Recommended.)
- Fundamentals of Astrodynamics, by R.R. Bate, D.D. Mueller, J.E. White, Dover Publications, 1971, 455 pages, ISBN 978-0-486-60061-1 (Good old book with dedication to the US armed forces, well, it is indeed a well written introduction for the beginner, \$5 at Amazon, recommended. I did read most of it.)

Fiction Literature

https://en.wikipedia.org/wiki/Mars_in_fiction

Fiction Movies, DVDs

That’s about what we can do at the moment watching Sci-Fi movies and hope for the real thing to come up. There are many more movies, but not on DVD, a short list is this:

- *Race to Mars*, Riley, Michael (A fairly realistic outline of a Mars trip, that's good, I guess. However, characters somewhat flat and cheapish animations. The race is a minor side story I would say it concerns an unmanned Chinese Mars mission to find water and perhaps live on Mars. It's a Canadian production, a TV miniseries consisting of four or so episodes. Recommended, but it's not Star Trak quality, sorry.)
- *Red Planet*, Val Kilmer (Obscure terraforming story which goes as follows, briefly: CO₂ ice on Mars was forced to melt somehow; the denser atmosphere warmed up Mars due to increased greenhouse effect; planet was seeded with algae to produce O₂; that O₂ disappeared suddenly before human settlement could start; astronauts were sent to investigate and discovered live on Mars, some kind of bugs that eat the algae. Some more tragedies happen alongside this main story. The movie is not too bad, but somewhat wired storyline, unrealistic time line, and scientific parts.)
- *Mission To Mars*, Gary Sinise (Rather wearied story for my taste. Rescue mission to Mars, meeting alien life that started live on Earth in the first place, astronaut taking off with alien. Flat characters. If Mars is your main thing then you have to see all them, I guess. Otherwise, I would skip that one.)
- *The last days on Mars*, Liev Schreiber, Romola Garai (Another version of "Live on Mars", this time bacteria which infect an astronaut team and turns them into zombies. Well, it's probably the worst Mars movie I have seen so far, save your \$.)
- *Robinson Crusoe on Mars*, 1964, Paul Mantee, Victor Lundin, Adam West
- *John Carpenter's Ghosts Of Mars*, 2001, Charlotte Cornwell, Ice Cube,
- *The Martian*, 2016, Jeff Daniels, Matt Damon, Michael Pena (Robinson Crusoe story. An astronaut is left behind on Mars due to an accident. He survives, no wonder, and will be rescued. Anyway, good movie.)
- YouTube movie, try <https://www.youtube.com/watch?v=iEg7dF5rg8Y> (Disney's Mars and Beyond) This seems to date back to 1954 and contacts to Wernher von Braun, see ref. <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20010020400.pdf> (Humans To Mars: Fifty Years of Mission Planning 1950-2000, by David S. E Portree, NASA History Division)

Science Documentary Movies, DVDs

- *NOVA: Is There Life on Mars?*, Nova (~50 min movie about Mars missions with the various NASA rovers. The DVD also includes short PC readable text files, see www.pbs.org/wgbh/nova/mars for more science DVDs and books from the same source)
- *Five Years On Mars* (Documentary about Spirit (2004-2010) and Opportunity (2004-current) two rovers managed by the Jet Propulsion Laboratory. The rovers were supposed to work for 90 days but one of them is still functioning! The images shown are authentic Mars panoramas. The movie outlines the up and down with rovers in a ditch on Mars, a broken wheel, dust in solar panels and optics ... Finding water was the main project. By the way, the rovers have no off switch as I learned in this movie.)
- *Nova Science Now: Can We Make It to Mars* Hosted by Neil Degrasse Tyson (Documentary that highlight different technical difficulties of space flights such as spacesuits, radiation, food, protection against micro meteorites, etc. The movie was apparently NSF funded.)

One can find probably hundreds of YouTube videos related to Mars. Perhaps try the following

<https://www.youtube.com/watch?v=F6hWQNnaxGI> Mars facts
<https://www.youtube.com/watch?v=qMyv7qLNe6g> Colonizing Mars
<https://www.youtube.com/watch?v=syVD6blTXN8> Carl Sagan Mars speech

Original Literature

E.g., in the journal *Science* alone about 5000 studies with the keyword "Mars" in their title have been published. A few are apparently open access such as <http://science.sciencemag.org/content/343/6169/386> (*P. Grotzinger, Science* **343** (6169): 386–387). I included a few original / scientific papers in the numbered reference list to my guide.

Stay in Touch

- Send an e-mail message with the subject line *subscribe* to hqnews-request@newsletters.nasa.gov to receive nearly daily news directly from NASA.
- SpaceX mailing list, see ref.⁷

- If you are in academia or run a small business, similar mailing lists for NASA funding do exist. Good luck with that, within two decades I did get only a few mini NASA EPSCoR seed grants for my research group (see e.g.⁸⁹).
- Most spaceflight companies do have mailing lists.

Most links are from early 2016

Updated 5/8/16

Updated 9/11/16

Updated 1/10/17

References

www.LatheCity.com

1. <http://www.nasa.gov/jpl/mars/traffic-around-mars-gets-busy> (4/6/16)
2. https://en.wikipedia.org/wiki/List_of_missions_to_Mars
<http://nssdc.gsfc.nasa.gov/planetary/planets/marspage.html>
3. <http://www.foxnews.com/science/2016/04/28/spacex-will-launch-private-mars-missions-as-soon-as-2018.html> (4/29/16)
http://www.wsj.com/articles/spacex-sees-unmanned-mars-mission-as-soon-as-2018-1461792067?mod=rss_Business
<http://www.bbc.com/news/business-36155591>
4. R. Zubrin, R. Wagner, The Case for Mars, 1996, 2011, ISBN 978-1-4516-0811-3
5. Mission to Mars, National Geographic, 2015, by B. Aldrin, ISBN978-1-4262-1468-4
6. <https://www.ndsu.edu/news/view/detail/14950/>
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Disclaimer

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About the Author

The author is a physical chemist, a surface chemist, and since 2003 a faculty member at a US college. Born in West-Berlin, he got most of his education in Physics in Germany. After many years of postdoc positions (Italy, USA, Italy, Germany) and a habilitation in Germany (German tenure), he found a faculty position in the US where he obtained tenure in 2009. Although this book project has nothing to do with the university he is employed, more one could find here www.uweburghaus.us He has written several books, (most of these about practical engineering topics), and sells most of those books in the meanwhile by myself, i.e., he owns a part time small business. Details are here: www.LatheCity.com. LatheCity is actually specialized in manufacturing tools for benchtop metal work systems.