

Roving Mars

Production Information

For centuries human beings have contemplated Earth's nearest planetary neighbor, Mars, dreaming impossible dreams of exploring its surface and divining its mysteries. Now the impossible has become possible. In the new Walt Disney Pictures' production, "Roving Mars," presented as a public service by Lockheed Martin, and showing exclusively in IMAX Theatres, award-winning director George Butler ("Shackleton's Antarctic Adventure") and Academy Award[®]-nominated producer Frank Marshall ("Raiders of the Lost Ark," "Seabiscuit") have documented the remarkable Mars mission which sent two intrepid, death-defying explorers -- Spirit and Opportunity, the Mars rovers -- to the Red Planet. Through the eyes of these remarkable robots viewers can now see Mars in a way that no one ever has. The size and clarity of the IMAX screen draws the viewer into an awe-inspiring landscape that has never seen the footprint of an earthling -- until now. But this important expedition accomplished far more than the simple transmission of thousands of Martian images. The rovers actually discovered traces of ice within the rocks of Mars. The discovery marked clear proof that water once ran on the surface -- a giant leap forward in answering that most haunting of questions... is there life on Mars?

"Roving Mars" was directed by George Butler, and produced by Frank Marshall and Butler. Scott Swofford served as executive producer. The film was written by George Butler and Robert Andrus, with narration written by Butler. Philip Glass composed the music. The film, a K-M/White Mountain Films production, is presented as a public service by Lockheed Martin in collaboration with NASA.

ABOUT THE PRODUCTION

The Mars Exploration rovers were launched in 2003 -- Spirit on June 10 and Opportunity on July 7. But the road to those momentous launches stretch back four decades. The Soviet Union sent the probe, Mars 1, to fly past the Red Planet in 1962, and the U.S. probe Mariner 9 successfully orbited Mars in 1971. NASA and JPL landed the immensely successful rover, Sojourner, as part of the Pathfinder mission in 1997, and Spirit and Opportunity followed to capture more

crucial geological data. Those twin crafts measured triple the size and had 1000 times the computing power of their precursor, *Soujourner*.

“*Roving Mars*” can trace its origins to 2000. While working on the IMAX film “*Shackleton’s Antarctic Adventure*,” documentary filmmaker George Butler (“*Pumping Iron*,” “*Going Upriver: The Long War of John Kerry*”) heard about the Mars mission from one of his editors, Tim Squyres. As it happened, Squyres is the brother of scientist Steve Squyres of Cornell University, one of the driving forces behind the expedition.

When Butler learned that the rovers were going to be sending back IMAX-quality images from Mars he was “electrified,” he says. “I thought, ‘There’s a great film waiting to be made.’”

Executive Producer Frank Marshall (“*Raiders of the Lost Ark*,” “*The Bourne Supremacy*,” “*Seabiscuit*”) soon caught Butler’s enthusiasm. In addition to his impressive resume of feature films, Marshall had also produced several IMAX movies including “*The Young Black Stallion*” (for Walt Disney Pictures) and “*Olympic Glory*.”

Marshall says, “I think that the main thing that really sold the project was the fact that we would have the exclusive rights to the digital photographs that were coming back from the Mars surface. That made it more than just a traditional space documentary.”

Disney enthusiastically accepted the project. It didn’t hurt, Marshall says, that “[Chairman of Walt Disney Pictures] Dick Cook is a big fan of the space program.”

They began production in 2003, during the tense months leading to countdown. Butler, Marshall and crew were on hand to document the testing of the rovers, the two rocket launches and the suspenseful hours when NASA held its collective breath waiting to learn two crucial things -- if the machines had hit their targets; and if both were still operational.

During the process, the filmmakers made two creative decisions: that famed minimalist composer Philip Glass would create the ethereal yet dynamic musical score and that Steve Squyres, as the central character, would also narrate the film, giving “*Roving Mars*” additional authority and credibility.

“Steve Squyres is an amazing scientist,” Marshall says. “He’s the chief scientist on the project from Cornell, and he just has that boyhood wonder and that enthusiasm, that can-do attitude. I think it affected everybody on the project. He’s just such a wonderful leader, cheerleader, and believed in these rovers this whole time. Even with all the problems he had to deal with.”

One of the major problems was time. There are only specific times when the orbits of Earth and Mars line up properly so that the rovers could have a fighting chance of hitting their remote target. Once Squyres and his fellow scientists at

NASA and the Jet Propulsion Laboratory (JPL) were given the go-ahead, they entered immediately in a frantic race against time to build and test the rovers and prepare them for launch.

Squyres had documented the entire years-long process in his recent book “Roving Mars” (Hyperion; 2005). Even so, he was eager to be a part of telling the story in this new and exciting way. “IMAX, by its very nature is a very visual medium,” Squyres says. “In a book you can convey the intricacies of the human discussions and interchanges and emotions of the moment as people felt them and expressed them. You can discuss the scientific discoveries in exquisite detail and so forth. But what’s hard to do well in a book is to present the visceral impact of the experience and the event itself. It’s hard to convey that feeling you have in your gut when you see a rocket lift off. Or what it would truly be like to stand on the surface of Mars and look around and see that place as a human would see it if they were there. Or what it feels like to simply stand next to a piece of hardware that’s gonna spend eternity on the surface of another world, and look at it before it leaves and think about the experience it’s about to go through. It’s a medium that by its very nature is complimentary to what you can do in print.”

THE MISSION TO MARS

The Mars Mission took the combined efforts of some 4000 scientists, technicians and laborers over a period of many years at a cost of hundreds of millions of dollars. Spirit and Opportunity actually had to exist on Mars, but everyone else who was intimately involved in the mission also got a taste of what life on the Red Planet was like. For one thing, they had to adjust the very time of day.

Steve Squyres explains: “Mars time is tough. The Martian day – a “sol” -- is not twenty-four hours long, it’s twenty-four hours and thirty-nine minutes. Spirit and Opportunity are solar-powered rovers. They’re awake in the daytime and asleep at night and they don’t know or care if it’s daytime or nighttime in Pasadena, California or Ithaca, New York, where I live, or anywhere else. They only know if it’s daytime or nighttime at their location on Mars.”

In order to adequately monitor the rovers, it was necessary for Squyres and his colleagues to live in a parallel time zone. So they tweaked their clocks to make them run twenty-four hours and thirty-nine minutes a day. That seems simple enough. But according to Squyres, it was anything but.

“Let’s say we have our daily meeting at noon,” he says. “That means tomorrow it’s at 12:39. And the next day it’s at 1:18. Pretty soon, you’re getting

up at two o'clock in the morning to have your lunchtime meeting. It was brutal, let me tell you. But I still carry my Mars time pocket watch.”

If Spirit and Opportunity had similar problems with Mars time, they never complained, but simply went about their work in a professional manner. While the NASA and JPL scientists tried to anticipate any kind of problems they might encounter, the truth is that the entire mission was graced with what can only be called good luck.

“The mission of the rovers was to see if water exists or had existed on Mars, ever,” says Butler, “and that’s the real story of this movie. And of course the rovers methodically proved that there was once water on Mars. Not ice, water.”

The discovery that water once existed on the surface of Mars makes this Mars mission one of the most significant explorations in history. Which puts Spirit, Opportunity, Steve Squyres and his fellow scientists at NASA and JPL in the front ranks of the great explorers of all time.

To Butler, their achievement is one of the towering aspects of “Roving Mars” but it isn’t the only one. He also aspired simply to stun audiences with the power of those remarkable pictures from another world and to deliver them in a story that was both suspenseful and dramatic.

“An IMAX image is a visually splendid photographic image,” he says. “It’s a startling way to present film. Frank Marshall and I really tried to knock the socks off the audience. The good news about this project is that I lucked out with Disney and everyone associated with the project, including NASA and JPL. We simply picked by good fortune the most successful NASA mission since the Apollo landings on the moon. A thousand things could have gone wrong but we got a brilliantly successful mission. And we centered the film on Steve Squyres, who is the heart of the mission. I picked the right guy to be filming.”

ROBOTS WITH PERSONALITIES

In countless movies and novels over the years, innumerable Martians – both horrifying and comic – have invaded Earth. But in real life, Earth beat Mars to the punch. At this very moment there are creatures of Earth walking the surface of Mars – and every day for over two years they have been in constant communication with NASA regarding the wondrous sights they’ve seen and the incredible discoveries they’ve made.

Spirit and Opportunity are two amazingly versatile – and surprisingly hardy – rovers. After their launch, they zoomed through space for seven months before making a pair of picture perfect landings on the deep red surface of the planet. It

was, as one scientist says in “Roving Mars,” like shooting a basketball from Los Angeles to New York and making the basket without even touching the rim.

Spirit and Opportunity were designed to explore the surface of Mars and send back detailed digital pictures. And in this case, “detailed” means razor sharp images that could be blown up to several times the size of an IMAX screen.

Although “Roving Mars” will be shown in IMAX theatres, however, it wasn’t produced entirely with IMAX cameras. Instead, the filmmakers worked with a variety of formats including 35mm, 70mm, and high definition video. Each of the rovers is equipped with nine cameras that range from hazard cameras (or “hazcams”) which exist mainly to help the rover know where it’s going, to the panoramic camera (or “pancam”) which is mounted on an arm that allows it to shoot a full 360 degree vista.

But even though these cameras have been entrusted with sending back precious – and expensive – images from another world, they are in some ways surprisingly low-tech. “They are simple one megapixel cameras,” says Squyres. “They take a picture that is 1000 pixels by 1000 pixels. So they have, in terms of number of pixels, less capability than something you could go and buy at Radio Shack for a couple of hundred bucks.”

But then you probably couldn’t manipulate your home movies in exactly the same way that NASA can.

The landscapes that the rover sends back are actually very high resolution images but they’re not a finished photograph. Some of these might be 2K to 3K in height by 12K to 18k wide. They’re taken as sections with the camera turning further and further and then put together as a mosaic, much like the old yearbook picture would be where the camera started at the left and moved over to the right to get a wide image.

Squyres says that the next step in turning the mosaics into a clear image is accomplished by “taking all the seams out, so it ends up forming one gigantic seamless panorama. A typical panorama from pancam might be 4000 pixels high and 24,000 pixels around and will fill an IMAX screen six times over. It’s a slow and laborious process but we acquire them and stitch them together on the ground and we build up these massive and really very impressive panoramas.”

Since the rovers are not equipped to film themselves, all the footage in the film showing them at work were meticulous digital recreations. Butler explains, “Obviously, a movie composed entirely of still pictures would be quite dull to watch. Dan Maas from Maas Digital has been putting together all sorts of computer models for JPL throughout the course of the mission. He has photorealistic models of the rovers and rockets and has then utilized imagery from Mars to create Martian landscapes. A few of them are actually Martian landscapes into which he’s placed the rover; others he’s created from photographs.” To make

sure the recreations are perfectly authentic, they're scrutinized by Steve Squyres, JPL and NASA.

"There are some shots that'll just blow you away," says Squyres. "Some of these shots actually showing the rover in the terrain on Mars, they're just breathtaking."

When filming on earth, IMAX was obviously always the first choice but was not always suitable to the locations. In addition to Mars, the film was shot on location at the Jet Propulsion Laboratory in Pasadena, California and at Cape Canaveral, Florida. "NASA gave us unparalleled access," notes Butler.

When filming at JPL, a 70mm camera – significantly smaller than the massive IMAX camera – was placed behind glass at a special press area at mission control. Rick Gordon, president of RPG Productions and the film's post production supervisor, says, "T. C. Christensen, the cinematographer, was able to zoom in and capture full shots as well as lots of very interesting close-ups. That material then is inter-cut with a high definition camera that a NASA photographer had in the room."

Frank Marshall adds, "Those IMAX cameras are just loud. You couldn't have a press conference with that camera reeling away. So it was just the nature of the interviews and the situations that we were doing that we would have to choose which formats to use. But any chance that we could shoot in IMAX, we'd do it."

Because of the remarkable clarity of the IMAX image, it might seem that the camera can see far more than the human eye is capable of. But in fact the human eye was the ideal for which the cameras' designers aimed.

Squyres says, "The pancam is built intentionally to have 20/20 vision. The angular resolution of the camera is such that it provides exactly the viewing experience that you would have if you were there with your own eyes. The reason we did that is that Spirit and Opportunity are robot geologists. Their job is to explore just as a human would in the same environment. We know from experience as field geologists that human vision, 20/20 vision, works pretty well in the field. There's centuries of experience of humans walking around in the mountains and doing geology using only their own eyes. And so we had a very strong experience base saying if you give a robot that kind of ability it will show you much of what you need to know."

A NEVERENDING STORY?

When the film “Roving Mars” was born in the imagination of George Butler over five years ago, it was a somewhat different story than the one that ended up on the IMAX screen.

Butler remembers, “My idea was to document how the rovers were conceived and made, and then show how they got to Mars, and show what they did thereafter on Mars itself. That story only changed by virtue of its own success. In other words, we didn’t know how things would go – maybe one rover would work and one rover wouldn’t work. And finally and most important, the scientists publicly said they hoped the rovers would last ninety days. Privately they were saying they hoped the rovers would last thirty days.”

As “Roving Mars” is being released to IMAX theaters, the rovers have been operating for well over two years and are still going strong.

“This,” says Butler, “is a movie about a wildly successful enterprise.”

Frank Marshall says that originally the rovers “were going to be anthropomorphized. We were talking about one as the problem child and the other as the wonder child; one was easy and one was hard. And after giving them these personalities, we were waiting for them to die. We had this whole section where we were going to talk to the scientists about what we had found out, and we had a natural ending when they died. Well, after two years, they’re still going. So we’ve had to write the ending a little differently.”

He continues, “I think it’s George’s extraordinary ability to see what this could have been. He knew that this was a once-in-a-lifetime opportunity, and it was a situation where you couldn’t really say what it was going to be, except that we had the chance to get these images. And if we didn’t start – we couldn’t wait to see what happened, because we had to shoot them being built and shipped and launched and arriving. So there was a big leap of faith that the Walt Disney Company had to take, and it was based upon George’s reputation as a filmmaker, and his passion. He’s a very passionate guy, and very smart about this stuff, and I think he just saw that his vision of this movie and what it could be was what kept everybody together and going until now. I’d say, ‘You think we can finish now?’ And George would say, ‘No no no! What if we finish the cut next week, and the rovers find life [on Mars]?’ It was always me as the producer pushing the creative director, saying, ‘You know, we do have to finish the movie sometime.’ But that was what really made it interesting.”

CONCLUSIONS

To Steve Squyres, “Roving Mars” represents not only a scientific breakthrough and a record of a magnificently successful mission, but a keenly personal look at a place he knows very well. “We really feel like we’ve gotten to know the place,” he says. “We’ve seen Mars in all its seasons. I know what it looks like at sunrise, I know what it looks like at sunset. I know what happens in the middle of the day, I know what it’s like in late afternoon, I know what it’s like at night. We’ve been so many places on Mars and experienced it in such a vicarious and yet at the same time real way through the eyes of these robots that we sort of feel like we’ve been there.”

And now, through the marvelous – even miraculous – images of “Roving Mars” the rest of us can feel as if we’ve been there, too.

“It’s all about adventure and exploration,” says Frank Marshall. “That’s the main reason I wanted to do this. We’ve been explorers since this all started. This is the new frontier, and certainly this is the first time we’ve ever been on another planet – not shooting it from orbit, but standing on the actual surface of another planet. I think that’s extraordinary.”

Butler adds, “Look, it’s Mars. M-A-R-S. It’s one of the most evocative words in the English language. It’s the planet that’s fascinated people on Earth forever. And here were a bunch of people sending these darn rovers to Mars, and the rovers would be spending eternity there, and doing all of this good work in the meantime. And everything about this mission succeeded.”

THE PRODUCTION TEAM:

GEORGE BUTLER (Director/Producer/Writer)

George Butler was born in Chester, England in 1943. He was raised in Wales, Somalia and Kenya. He received his education in Jamaica (West Indies) at Groton. Subsequently he graduated from the University of North Carolina at Chapel Hill, and received an M.A. in Creative Writing from Hollins College in Virginia. In 1968, while working as a reporter for Newsweek, he was drafted. Objecting to the war in Vietnam, he joined VISTA (the domestic Peace Corps) and was sent to the inner city of Detroit where he founded a successful community newspaper, *The Oakland Lion*. Continuing his activities in the peace movement, in 1971 Butler co-edited, (with David Thorne and US Senator John Kerry) of The New Soldier, a highly praised book about the Vietnam Veterans Against War (VVAW).

In 1972, a photo assignment for Life magazine to cover the Mr. Universe Contest in Baghdad led to the publication of Pumping Iron: The Art and Sport of Bodybuilding (Simon and Schuster, 1974), a book that proved to be an unlikely bestseller, eventually running through 15 printings. Butler felt the main character in his book could be a movie star. After a difficult saga, a movie called Pumping Iron launched Arnold Schwarzenegger, put bodybuilding and the gym business on the map and became a classic film.

In 1985, Butler produced and directed Pumping Iron II: The Women. The film, according to Gloria Steinem, redefined the boundaries of femininity.

In 1990, Butler released In The Blood. This film took the controversial position that hunting is an important part of game conservation and that the countries in Africa with the best hunting programs have the most game. The film was shot on location in Kenya, Tanzania and Botswana. It played at Sundance, Leningrad, Denver, Toronto and many other film festivals. It was also a finalist in the IDA award as one of the ten best documentaries of 1990.

In 2000, Butler completed a trilogy of films based on Caroline Alexander's bestselling book, The Endurance: Shackleton's Legendary Antarctic Expedition. The trilogy included an IMAX, a two-hour TV special and The Endurance, a 92-minute theatrical feature. The latter was selected for over 30 international film festivals and is one of the most commercially successful documentaries ever made.

Recently, Butler completed a feature documentary about longtime friend John Kerry and his experiences with the Vietnam War and Peace Movement. Going Upriver: The Long War of John Kerry premiered in 2004 at The Toronto Film Festival and was distributed by Think Film. It won favorable reviews across the country and was recently selected by the Whitney Museum of American Art for its Biennial exhibition.

He is now producing and directing three new films. They are: an IMAX film about lowland gorillas set in the Congo, a feature called Bound For Glory (about Bobby Bowden and the F.S.U. Seminole's football team), and Ivory Bill, a film about the iconic Ivory Billed Woodpecker, one of the rarest birds in the world, recently rediscovered in the Big Woods of Arkansas.

Between films, Butler has published a number of books and his photographs have appeared in most of the major magazines of the world, a one-man show at the International Center of Photography in New York and other galleries around the country.

The filmmaker lives on a farm in Holderness, New Hampshire with writer Caroline Alexander. He has two sons, Desmond and Tyssen.

FRANK MARSHALL (Producer) has an astonishing number of films to his credit as a visionary producer who irrevocably transformed American film. He has also excelled as a director and, transcending his chosen industry, found the time to devote his talents to numerous endeavors in public service and sports.

Among the movies for which he is best known are some of the most-seen films in the last twenty years, including the Raiders of the Lost Ark trilogy, Poltergeist, Gremlins, The Goonies, The Color Purple, An American Tail, Empire of the Sun, Who Framed Roger Rabbit, The Land Before Time, the Back to the Future trilogy, The Sixth Sense, The Bourne Identity and The Bourne Supremacy, and Seabiscuit.

Marshall has over fifty films under his belt as producer. He has already made several trips to the Academy Awards, having been nominated in the Best Picture category in 1982 for Raiders of the Lost Ark and again in the same category in 1985 for The Color Purple with co-producers Steven Spielberg, Quincy Jones and his wife, Kathleen Kennedy. M. Night Shyamalan's 1999 box office smash The Sixth Sense was nominated for six Academy Awards[®], and the critically acclaimed Seabiscuit received seven Oscar[®] nominations including Best Picture.

As a director, Marshall's credits include the summer 1995 hit adventure Congo, based on Michael Crichton's best-selling novel; the sensitive true-life drama Alive from Piers Paul Reid's non-fiction book; the thriller Arachnophobia; and an episode of the Emmy Award-winning HBO miniseries From The Earth To The Moon. He is currently in post-production on his next directorial assignment, Antarctica, for Disney.

Marshall began his motion picture career as assistant to Peter Bogdanovich on the director's cult classic Targets. He was then asked by Bogdanovich to serve as location manager for The Last Picture Show and What's Up, Doc? before graduating to associate producer on the filmmaker's next five movies, including Paper Moon and Nickelodeon.

Marshall was line producer on Martin Scorsese's The Last Waltz, the heralded musical documentary on The Band. He then began a two-film association with director Walter Hill, first as associate producer on The Driver, then as executive producer of The Warriors, both of which have also attained a certain cult status among cineastes. Marshall was also line producer of Orson Welles' legendary unfinished film The Other Side of the Wind, to which he periodically returned from 1971 through 1976.

Raiders of the Lost Ark marked the beginning of Marshall's epochal collaboration with Steven Spielberg, George Lucas and Kathleen Kennedy. Following the productions of E.T.: The Extra-Terrestrial (for which he was production supervisor) and Poltergeist (which he produced), in 1981 he formed

industry powerhouse Amblin Entertainment with Spielberg and Kennedy. During his tenure at Amblin, Marshall also produced such films as Kevin Reynolds' Fandango, Barry Levinson's Young Sherlock Holmes, Gremlins, Poltergeist, the Back to the Future trilogy, Who Framed Roger Rabbit, and Spielberg's Always, Hook and Empire of the Sun, as well as his directorial debut Arachnophobia.

Marshall left Amblin in the fall of 1991 to pursue his directing career, and together with Kathleen Kennedy, the Kennedy/Marshall Company was formed. The company's productions include a remarkably diverse group of films, including The Indian in the Cupboard; Snow Falling on Cedars; A Map of the World; The Sixth Sense; Olympic Glory, the first official large-format film of the Olympic Games; The Bourne Identity; Signs; Seabiscuit; and the box office hit The Bourne Supremacy.

While at UCLA, Marshall ran cross-country and track and was a three-year varsity letterman in soccer. Combining his passion for music and sports, he, along with America's premiere miler Steve Scott, founded the Rock 'N' Roll Marathon, which debuted in 1998 in San Diego as the largest first time marathon in history.

For over a decade, Marshall was a board member of the United States Olympic Committee and is the 2005 recipient of the prestigious Olympic Shield, awarded in recognition of his outstanding contribution to the USOC organization. Currently he is on the board of the Los Angeles Sports Council, Co-Chairman of the L.A. Mentoring Partnership and a member of the UCLA Foundation Board of Governors. He is a recipient of the acclaimed American Academy of Achievement award, the UCLA Alumni Professional Achievement award, and the California Mentor Initiative's Leadership award.

SCOTT SWOFFORD (Executive Producer) has been responsible for some of the most spectacular IMAX films of all-time, having produced the box office hit "Mysteries of Egypt" for National Geographic, "Shackleton's Antarctic Adventure" for NOVA, and "Amazon" (a 1998 Academy Award[®] nominee). He has a reputation for successful production in a wide variety of media including independent features, and award winning documentaries.

Swofford attended Brigham Young University as a Trustees Scholar and graduated cum laude in 1979 with a BA in Theatre and Cinema directing.

He produced or directed seven independent feature films including "Rigoletto," "Buttercream Gang," "Seasons of the Heart," "Wildest Dreams," "Split Infinity," and "Secret of Treasure Mountain."

Swofford has worked in 46 foreign countries, and spent six months in Japan for Columbia Pictures with director Milos Forman. His production company, Vineyard Productions, has produced such acclaimed IMAX films as

“Yellowstone,” “Zion,” “Polynesian Odyssey,” “The Great American West,” “Amazon,” and “To Be an Astronaut.”

His impressive list of credits also includes producing stunts on the IMAX feature, “Mysteries of Egypt” with Omar Sharif for National Geographic, and “Olympic Glory,” (with producer Frank Marshall). Among his other accomplishments, he speaks fluent Japanese, and is a certified SWAT instructor.

Swofford and his wife Debra Kunz have four children: Katharine, Kelli Anne, Clark, and Jessica.

STEVEN SQUYRES (Author of Roving Mars) is Goldwin Smith Professor of Astronomy at Cornell University, and is the Principal Investigator for the science payload on the Mars Exploration Rover Project. He received his Ph.D. from Cornell in 1981 and spent five years as a postdoctoral associate and research scientist at NASA’s Ames Research Center before returning to Cornell as a faculty member. His main areas of scientific interest have been Mars and the moons of the outer planets. Research for which he is best known includes study of the history and distribution of water on Mars and of the possible existence and habitability of a liquid water ocean on Europa.

Squyres has participated in many of NASA’s planetary exploration missions, including the Voyager mission to Jupiter and Saturn, the Magellan mission to Venus, and the Near Earth Asteroid Rendezvous mission. Along with his current work on MER, he is also a co-investigator on the 2003 Mars Express, 2005 Mars Reconnaissance Orbiter and 2009 Mars Surface Laboratory missions, a member of the Gamma-Ray Spectrometer Flight Investigation Team for the Mars Odyssey mission, and a member of the imaging team for the Cassini mission to Saturn. Squyres has served as Chair of the NASA Space Science Advisory Committee and as a member of the NASA Advisory Council. His awards include the American Astronomical Society’s Harold C. Urey Prize, the Space Science Award of the American Institute of Aeronautics and Astronautics, and the American Astronautical Society’s Carl Sagan Award. He was recently elected to membership in the American Academy of Arts and Sciences.

PHILIP GLASS (Composer) is a graduate of the University of Chicago and the Juilliard School. Born in Baltimore, Maryland, Glass spent two years in the early 1960s doing intensive study in Paris with Nadia Boulanger. While there he earned money by transcribing Ravi Shankar’s Indian music into Western notation. Upon his return to New York, he applied these eastern techniques to his own music. By 1974, Glass had a number of significant and innovative projects, creating a large collection of new music for his performing group, The Philip Glass Ensemble, and for the Mabou Mines Theater Company, which he co-founded.

This period culminated in Music in Twelve Parts, followed by the landmark opera Einstein on the Beach, created with Robert Wilson in 1976. Since Einstein, Glass has expanded his repertoire to include music for opera, dance, theater, chamber ensemble, orchestra, and film. His score for Martin Scorsese's Kundun received an Academy Award[®] nomination while his score for Peter Weir's The Truman Show won him a Golden Globe. His film score for Stephen Daldry's The Hours received Golden Globe, Grammy, and Academy Award[®] nominations, along with winning a BAFTA in Film Music from the British Academy of Film and Television Arts.

Glass continues to produce for diverse audiences. Recent film scores include Errol Morris' Academy Award[®]-winning documentary The Fog of War and David Koepp's Secret Window. In 2004 Glass premiered the new work Orion, a collaboration between Glass and six other international artists opening in Athens as part of the cultural celebration of the Olympics in Greece. Premieres in 2005 included Glass' new opera, Waiting for the Barbarians, with libretto by Christopher Hampton, based on the book by J.M. Coetzee; and his Symphony No. 8 with the Bruckner Orchestra. Upcoming film projects in 2006 include his score for Neil Burger's The Illusionist.

Glass continues to tour solo and with Philip on Film, performing live with his ensemble to a series of new short films as well as classics like Koyaanisqatsi, Powaqqatsi, Naqoyqatsi, and La Belle et La Bête.

DAN MAAS (Animator) is a digital artist and visual effects supervisor at Maas Digital, his computer animation studio. Dan has been collaborating with NASA on the Mars rover mission since its inception, building on Hollywood technology and writing special software to visualize the rovers on Mars with unprecedented realism. At the age of twenty-four, Dan received an Emmy nomination for his animation work on the television program Mars, Dead or Alive. Dan's team of five artists was responsible for creating over twelve minutes of animation for Roving Mars.

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