Hollywood Comes to Socorro

Filming Contact at the Very Large Array

By Dave Finley

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Introduction

Socorro, New Mexico, has a written history going back more than 400 years. The National Radio Astronomy Observatory's Very Large Array (VLA) radio telescope is well known to professional and amateur astronomers around the world. However, millions of people undoubtedly first heard of Socorro and the VLA when Warner Brothers released the movie *Contact* in July of 1997.

When a large contingent of Academy Award winning actors, filmmakers and technical specialists descended upon Socorro to begin filming *Contact*, both the visitors and the townspeople were introduced to a different culture. Socorro and Hollywood have little in common. However, despite the differences between the high-power intensity of moviedom's capital and the more relaxed pace of a small town on the Rio Grande, the film crew and many local people worked together to meet numerous challenges and complete an extremely demanding filming schedule.

The result is a film that brings to the screen the excitement of discovery, the intrigue of international politics, and the drama and beauty of the VLA as a technological monument in the high desert plains. Here is the story of how Oscar winners, scientists, technicians and people from all walks of life worked together in the desert for a few days to make a fascinating story come to life for millions of moviegoers.

Carl Sagan and Contact

Carl Sagan became the world's most famous astronomer in 1980, when his television series *Cosmos* was viewed by record audiences. In that highly-acclaimed series, Sagan led viewers through a colorful tour of the universe and the history of man's attempts to understand it. Cosmos now has been seen by an estimated 500 million people in 60 countries. As a book, *Cosmos* became the top-selling work on science ever published in English. Reviewing the book for the *New York Times*, famed author James A. Michener called *Cosmos* a "cleverly written, imaginatively illustrated summary of [Sagan's] geological, anthropological, biological, historical and astronomical ruminations about our universe." wife, Ann Druyan, was co-writer of the television series, which won Emmy and Peabody Awards.

Cosmos, the book and the TV series, turned Sagan, already a prolific author, into a media celebrity. Born in 1934, Sagan had built a reputation as a planetary scientist, serving on the scientific teams of the Mariner, Viking, Voyager and Galileo space probes. A professor at Cornell University, he served as chairman of several scientific organizations and was co-founder and president of the Planetary Society.

After *Cosmos*, Sagan lectured widely, wrote numerous articles for popular magazines such as *Parade*, and made many appearances on a variety of television shows. Whenever a big astronomical discovery was announced or a space probe visited a new part of our Solar System, the TV networks wanted Sagan on the air to explain things to their viewers.

As a successful and enthusiastic science popularizer, Sagan inspired millions of people to think about the universe and undoubtedly contributed to a long-running boom in amateur astronomy as a hobby. Today, a number of young scientists with fresh Ph.Ds trace their initial decision to pursue science to Sagan's books, articles, or TV appearances.

In 1985, Sagan published *Contact*, his first and only novel. The topic of extraterrestial civilizations was one he had covered many times, including in *Cosmos*. Anyone who writes or lectures about astronomy receives numerous questions about extraterrestials. Sagan thought deeply about the answers to these questions, and gathered all those answers, along with his philosophy on many other topics, into *Contact*.

Contact was a best-seller, but Sagan's foray into fiction met with less success than *Cosmos*. He packed much science into *Contact*, and carefully built the plot around the world's scientific, political, and religious reactions to the astounding reception of radio signals coming from the vicinity of the star Vega. He was, however, more adept at explaining science than at keeping a plot moving. A typical reaction to the novel is found in Gregory Benford's review of it in the *New York Times*: "Unfortunately, the reader will reach the novel's more enjoyable last third only if drawn by strong curiosity and buffered by tolerance for many first-novelist vices."

Still, *Contact* produced a sizeable following, and Sagan's own popularity, along with the enduring fascination of the public with the idea of alien civilizations, brought the novel to Hollywood. The fictional story centers around Dr. Eleanor "Ellie" Arroway, an astronomer who becomes fascinated with space and the idea of extraterrestial civilizations as a young girl. She pursues her dream of discovering signals from alien beings through college, graduate school and research jobs, eventually becoming director of a search program based at the VLA. Just as it appears her program will be closed down, she discovers the signal from Vega.

Science quickly gives way to politics, and Ellie finds herself in the midst of a worldwide storm of debate over how to react to the message from afar. She is thrust into a complex, frustrating world far removed from her scientific refuge at the VLA.

If the novel moved slowly, that is not so for the screenplay by Michael Goldenberg. The movie script packs the essence of Sagan's story into a fast-paced, gripping drama, with lots of impressive visual appeal. Sagan and Druyan served as co-producers and story contributors for the film.

Sadly, Carl Sagan died on December 20, 1996, while the filming of *Contact* still was underway.

Radio Astronomy and the VLA

The Very Large Array (VLA) is one of the world's most impressive scientific installations, and its research accomplishments more than match its visual grandeur. When it was formally dedicated on October 10, 1980, it was the culmination of nearly a half-century of technological advances in radio astronomy. Almost two decades later, the VLA has been used by thousands of scientists from many nations and is unquestionably one of the most important research facilties in astronomy. It has contributed significant new knowledge about nearly every type of object known in the universe.

Radio astronomy is a relatively recent scientific discipline. It began with an accidental discovery in 1932, when Karl Jansky, a young engineer at Bell Telephone Laboratories in New Jersey, found a mysterious source of radio static coming from beyond the Earth. Jansky had been given the task of locating the causes of static in shortwave radio reception. His employers were considering using shortwave equipment to carry telephone conversations across the oceans. Much of the static he detected came from thunderstorms, both near and distant, but in addition he found a source of radio "noise" that further investigation showed was coming from the center of our home galaxy, the Milky Way.

Jansky's discovery received widespread publicity, but the only person to immediately follow up on his work was another engineer, Grote Reber, an avid ham-radio operator. Reber devoted much time and energy to the problem of receiving radio emissions from the sky. In 1937, he built a 31.4-foot parabolic dish antenna in his back yard in Wheaton, Illinois. This was, of course, long before satellite dishes became common fixtures in residential yards, and the strange contraption spurred many rumors among Reber's neighbors. After much experimentation, Reber succeeded in detecting cosmic radio emissions in 1939. He went on to make a radio "map" of the sky, and the results of his radio astronomy experiments were published in a number of professional scientific and engineering journals.

Following World War II, the availability of surplus military radar equipment fueled a rapid growth in radio astronomy activity among professional scientists. As more and better radio telescopes were built, their value as tools for understanding the universe became more apparent.

Stars, galaxies and other celestial bodies naturally emit light that astronomers collect with optical telescopes such as those at Palomar Mountain, California; Kitt Peak, Arizona; and Mauna Kea, Hawaii. Once collected by a large telescope, that light can be used to produce an image of the faraway object at which the telescope was aimed. Similarly, radio telescopes collect radio waves that are naturally emitted by celestial bodies. Computer processing then can produce an image of those bodies, as "seen" by the radio telescope.

For a radio telescope to "see" the same amount of detail as an optical telescope, it must be much larger. This is because radio waves, while the same electromagnetic phenomenon as light waves, have much longer wavelengths. By the early 1960s, radio astronomers wanted to match the scale of detail seen by the best optical observatories, but, they realized, that would require a radio telescope some 20 miles in diameter. Fortunately, British scientists had shown that this could be accomplished, not by building a single tremendous structure, but by using smaller radio-telescope antennas, widely separated. The electronic signals from the individual antennas could be combined to produce an image with the same amount of detail as from a single, large antenna.

In the late 1960s, this technique grew into specific design work for a large array of radio telescopes -- the "Very Large Array." The National Radio Astronomy Observatory, which already operated important radio telescopes at Green Bank, West Virginia, was given the job of building this array for the National Science Foundation. After an extensive search of sites in several states, scientists chose New Mexico's Plains of San Agustin, a high, flat area about the size of Connecticut, for the VLA. appropriated the funds in 1972. Congress Construction began in 1974, and the VLA was finished -- on time and under budget -- in 1981.

The VLA consists of 27 dish antennas, each weighing 230 tons. The dish of each antenna is 82

feet, or 25 meters, in diameter. The antennas are arranged in the shape of a "Y," with each arm of the "Y" 13 miles long. The antennas are placed on sets of concrete piers, and can be moved from one set of piers to another by special-purpose, diesel-hydraulic transporter machines that themselves weigh 90 tons. The transporters move on double sets of railroad tracks. The radio signals received by all the antennas are brought into the central control building, where they are combined to produce the data from which astronomers make their radio images.

Since its first scientific observation in 1976, while still under construction, the VLA has been used by thousands of scientists to study nearly every type of object known in the universe. An extremely versatile scientific tool, the VLA was called "one of the most productive observatories of the past decade" by Britain's *Economist* magazine. Research results from the VLA are published regularly in the world's most prestigous scientific journals.

Ironically, while *Contact* has perhaps spread the fame of the VLA farther than ever before, searching for signals from exterrestrial civilizations is one of the few types of astronomical research *not* done at the VLA. For a number of technical reasons, a multi-antenna radio telescope designed specifically to make highly-detailed images of celestial bodies is not the tool of choice for searching large areas of sky for intelligently-produced signals. Thus, the VLA has not been a part of such search programs.

Some recent discoveries resulting from VLA observations are:

- In 1997, the VLA helped provide some of the first real evidence needed to solve a 30-year astronomical mystery. Since the 1960s, scientists had known that highly energetic explosions are creating bursts of gamma rays from random locations in the universe. Even after three decades, however, no one knew what was causing the explosions or even how far away in space they are happening. In May of 1997, the VLA detected radio emission from one of these explosions -- the first such detection ever. That and subsequent studies will help scientists decipher the riddle and eventually learn the nature of these powerful explosions.
- Along with many other observatories around the world, the VLA was used to study Comet Hyakutake in 1996 and Comet Hale-Bopp in 1996 and 1997. Radio telescopes can give scientists valuable information about the chemicals in a comet's coma and tail.
- Like most other professional and amateur observatories, the VLA observed Jupiter in 1994 when the fragments of Comet Shoemaker-Levy 9 plowed into the planet. The VLA observations

produced a surprising result, showing that, thousands of miles above Jupiter's cloud tops, charged particles in the planet's radiation belts did not react to the comet impacts as theorists had predicted.

- **Researchers** frequently use the VLA to observe radio emission coming from exploding stars, or supernovae. These tremendous stellar explosions usually are discovered by optical astronomers, including amateurs. The VLA can study the radio emission from the explosion, providing data that helps astronomers learn about the explosion itself and the star that exploded.
- The VLA has produced a wealth of information about galaxies, giant systems of billions of stars, many similar to the Milky Way Galaxy in which we live. Not only has the VLA shown details of the inner workings of individual galaxies but it also has revealed that perhaps most galaxies have collided with neighbors and that such collisions are an important astronomical process.
- Though not designed for spacecraft communications, the VLA was used to receive the signals of the Voyager spacecraft as it passed by the distant planet Neptune in 1989 and the Galileo probe as it descended into the atmosphere of Jupiter in 1995. In both cases, the VLA was chosen because of its ability to detect very weak signals.

Over several years, the VLA was used to exhaustively survey the sky. The results of these efforts, which required thousands of hours of observing time, are available on the Internet to anyone. The purpose was to create a valuable resource of information about celestial objects as seen with this powerful radio telescope. The storehouse of data, now used extensively by professional scientists, is equally available to students and the public. More information may be found on the National Radio Observatory's World Wide Web Astronomy homepage at http://www.nrao.edu.

As one of the best-known facilities in astronomy, the VLA is a popular tourist attraction. Every year, thousands of tourists from all 50 states and more than 40 foreign countries visit the VLA. The VLA Visitor Center and self-guided walking tour are open to the public from 8:30 a.m. until sunset every day.

The striking visual images of giant antennas rising above the desert floor constantly find their way into magazine and newspaper articles, advertisements and television commercials around the world. In 1984, parts of the movie 2010 were filmed at the VLA.

Contact: The Film and the Filmmakers

In 1979, while producing the television series *Cosmos*, Carl Sagan came to the VLA for several days of filming. During this visit, he got to know

Amateur Radio: A Space-Age Hobby

In Contact, the young Eleanor Arroway and her father. Ted, are amateur radio operators, commonly known as "hams" or "ham operators." Amateur operators use a wide variety of radio technology in a popular, growing hobby. Today's amateurs use radio for activities. including many computer-to-computer communications; local, nationwide and international two-way links; communications through orbiting Earth satellites; and experimental work. Many astronauts on the Space Shuttle and cosmonauts on the Mir space station are hams, and routinely communicate via ham radio with classes and individual school amateur operators on the ground.

Amateur radio dates back nearly to the beginning of the 20th Century. Radio astronomy grew out of early amateur experiments that proved the usefulness of the shortwave radio frequencies. The world's second radio astronomer, Grote Reber, was an avid amateur operator. The founder of Ohio State University's radio observatory and author of a classic textbook on radio astronomy, John Kraus, is a prominent amateur operator. Today, many leading radio astronomers credit their youthful participation in ham radio with spurring their interest in a scientific career. These include Dr. Joseph Taylor of Princeton University, winner of the 1993 Nobel Prize in Physics. About 10 percent of the employees at the National Radio Astronomy Observatory, including senior scientists and engineers, hold ham licenses.

In the U.S., amateur operators are licensed by the Federal Communications Commission (FCC) after passing examinations that cover electronics theory, radio technology, operating procedures and FCC rules. There are more than 700,000 licensed hams in the U.S. and several million worldwide.

Hams enjoy a wide variety of radio-related activities, including designing and building electronic equipment; contacting other amateurs around the world; participating in on-the-air contests; using their communications skills to assist organizers of parades, athletic competitions and other events; conducting training classes for new operators; and even traveling to remote and exotic places to operate "dxpeditions."

Hams have a long tradition of service during times of emergency. With communications equipment that is easily portable and can be operated with emergency power sources, hams move into action when disaster strikes, assisting local authorities and emergency-relief agencies. Amateurs have provided life-saving communications service to authorities when other links, including cellular telephones and police radio systems, were put out of action. In recent years, hams have given vital assistance to communities struck by hurricanes, earthquakes, floods, airplane crashes, and the Oklahoma City bombing.

For more information about amateur radio and how to join this fascinating hobby, contact the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494, telephone (860) 594-0200, email: hq@arrl.org, or visit their World Wide Web site at http://www.arrl.org some of the NRAO staff well. Thus, it is not surprising that when he later began writing a novel involving radio telescopes, he chose to place much of the action at the VLA. When the novel was turned into a screenplay, the VLA remained the obvious choice for many scenes.

The movie was a Warner Brothers production, and Sagan and Druyan actively participated in their roles as co-producers and story contributors.

The Observatory's involvement in the movie production began early in 1995, when Sagan called Miller Goss, director of the VLA. Goss was out of his office at the time, and when he returned the call, spoke to Druyan, who asked if NRAO would consider allowing Warner Brothers to film at the VLA. The answer was yes. This was followed by numerous calls and visits from the film's locations staff.

At that time, George Miller was director. Miller never came to New Mexico, but production and technical people from the *Contact* crew came to the VLA for scouting visits in April and May of 1995. In late May, a second-unit crew came to the VLA for four days of filming and still photography. The schedule called for filming to resume at the VLA, with the first unit and actors, in September of that year. However, before that could happen, Miller left the project.

It was the following year, 1996, before much activity on *Contact* resumed. Robert Zemeckis, winner of the 1994 Best Director Oscar for *Forrest Gump*, took over, bringing to the *Contact* project many of the award-winning filmmaking professionals who had helped win the Best Picture Oscar for *Gump*.

In April 1996, Zemeckis and key members of the production crew came to Socorro to look at the VLA. They flew directly from Los Angeles to Socorro's municipal airport in a Warner Brothers Gulfstream twin-engine jet. Accompanied by officials from the Observatory and the New Mexico Film Office, the filmmakers toured the VLA extensively.

According to some crew members, Zemeckis and his assistants had discussed whether or not to film any scenes at the VLA, and considered filming instead on a set in California, using backdrops and models of the VLA's antennas. The director's visit resolved the question; there would be filming at the VLA. Zemeckis seemed quite impressed by the scale of the VLA.

Standing in the shadow of the huge Antenna Assembly Building, Zemeckis asked an NRAO employee, "How much did the VLA cost?"

About \$200 million in today's dollars, he was told.

"Hell, for that you could make a movie!" Zemeckis replied, with a broad grin.

After this visit, the film crew and the Observatory were in frequent contact by telephone and FAX, as the filmmakers sought additional details about the VLA and its operations. Zemeckis made another visit to the VLA in June. In the June visit, Zemeckis and the crew made detailed plans for specific scenes, deciding on exact locations for filming, camera angles, and where actors would stand and walk.

Though the screenplay was written, Zemeckis and his assistants made many changes based on the location and their feelings about what would actually work when the cameras were rolling. A screenplay, while providing the plot and dialogue, is only a bare framework for a movie. The look, feel and success of a film are largely in the hands of the director and his assistants, who make thousands of decisions, large and small, that affect the final result.

Movie crews tend to treat directors of Zemeckis' stature like gods. Zemeckis seemed well aware of this, and wanted to avoid having "yes-men" around him. To make sure he got the benefit of the considerable expertise in his crew, he kept asking questions about how scenes should be shot. When he offered his own opinions, he frequently said things like, "Now, I'm just thinking here," and "This is just an idea," to seek honest assessment of his proposals.

During both these scouting visits, the *Contact* crew, armed with pocket cameras, shot hundreds of photos of many areas of the VLA, both indoors and outdoors. These photos later were used to plan and rehearse each scene in great detail, providing data for the artists who drew "storyboards" to accompany the script.

As finally assembled, the cast and crew of *Contact* comprised an impressive assembly of professionals, counting at least 11 Academy Awards - among them.

Jodie Foster played the lead role of Ellie Arroway. Foster began her film career at the age of eight with a role in Napoleon and Samantha. Youthful performances in Alice Doesn't Live Here Anymore in 1975 and Taxi Driver in 1976 propelled her to fame, the latter film bringing her an Oscar nomination. She won Best Actress Oscars for her work in The Accused and The Silence of the Lambs. In addition to acting roles in numerous other films, Foster both acted in and directed Little Man Tate, and directed and produced Home for the Holidays.

Matthew McConaughey, star of A Time to Kill, played the part of Palmer Joss, a spiritual leader and advisor whose path becomes intertwined with that of Ellie. John Hurt, veteran of stage, television and more than 40 films, including *Midnight Express* and *The Elephant Man*, played mysterious billionaire S.R. Hadden. National Security Advisor Michael Kitz was played by James Woods, who starred in the heavy role of a racist murderer in *The Ghosts of Mississippi*. Woods' television credits include Emmies for roles in *Promise* and *My Name is Bill W*, and a Peabody Award for *Citizen Cohn*. Woods also was seen in *Killer, Salvador, Nixon, The Specialist* and other films.

Tom Skerritt, another Emmy winner, got the role of David Drumlin, a former scientific colleague of Ellie's who competes with her in the race to represent Earth to the Vegans. With more than 35 films to his credit, including $M^*A^*S^*H$, The Turning Point, Alien, and Top Gun, Skerritt also has starred in numerous television productions, including Picket Fences, Cheers and The China Lake Murders.

David Morse plays Ellie's dad, Ted Arroway. Morse, who had roles in *The Rock, Extreme Measures* and *The Long Kiss Goodnight*, also starred in television's *St. Elsewhere* and in Broadway's *On the Waterfront*. William Fichtner got the role of Kent Clark, Ellie's blind scientific partner in her long search for extraterrestrial signals. Fichtner, with film roles in *Albino Alligator, Going West, The Underneath* and *Heat*, also appears in the comedy series *Grace Under Fire* and appeared in the stage productions *The Fiery Furnace, Raft of Medusa, The Balcony Scene* and *Starting Monday*.

Religious leader Richard Rank is played by Rob Lowe, whose experience includes stage and television performances, in addition to roles in the films The Outsiders, Class, the Hotel New Hampshire, St. Elmo's Fire, and others. Golden Globe winner Angela Presidential Bassett played advisor Rachel Constantine. Bassett began her career on stage and played in Broadway productions Ma Rainey's Black Bottom and Joe Turner's Come and Gone. She then moved to television and film work, and appeared in What's Love Got to Do With It, Waiting to Exhale, and Malcolm X.

Foster, Woods, Skerritt and Fichtner, along with cast members Max Martini, Geoffrey Blake, Neal Matarazzo, Haynes Brook, Fritz Sperber, Dan Gifford, Marc Miles, Vance Valencia and Tony Haney, came to the VLA.

For his first film since the highly-acclaimed Forrest Gump. Zemeckis, who was both director and producer. assembled a talented crew of award-winning filmmakers, many of whom had worked with him on previous box-office hits such as Gump, the Back to the Future Series and Who Framed Roger Rabbit? In addition to directing, Zemeckis has been executive producer for The Frighteners, the Public Eye and Trespass. He co-wrote the latter film with Bob Gale, with whom he also wrote 1941. He also has directed television productions and worked on both film and TV projects with Steven Spielberg.

The producer was Steve Starkey, who won an Oscar as a producer of *Gump*. Starkey worked with Zemeckis on *Who Framed Roger Rabbit*? and two of the *Back to the Future* films. Starkey worked with George Lucas as an assistant film editor on *The Empire Strikes Back* and *Return of the Jedi*, and also has worked with Steven Spielberg.

Executive producer Joan Bradshaw is another veteran of the *Back to the Future* series, and worked on *Death Becomes Her*, *Nine Months* and *Mrs. Doubtfire*. She also worked on *Indiana Jones and the Last Crusade*. Lynda Obst, another executive producer, is a former author and editor for the *New York Times*, who also wrote the non-fiction bestseller *Hello He Lied*.

Other outstanding members of the Contact crew included Director of Photography Don Burgess, Production Designer Ed Verreaux, Editor Arthur Schmidt, Composer Alan Silvestri, Costume Designer Joanna Johnston, and Visual Effects Supervisor Ken Ralston, president of Sony Imageworks. Ralston is a five-time Academy Award winner, with Oscars for Forrest Gump, Death Becomes Her, Who Framed Roger Rabbit?, Cocoon and Return of the Jedi.

Following the June scouting visit to the VLA, the shooting schedule for *Contact* was established. The VLA would be the site of the first filming of the project, in late September 1996. From mid-August onward, the pace would increase, with numerous visits by movie personnel, until, early in September, filmmaking activity would become a steady presence at the observatory.

Preparing to Film

Shooting *Contact* at the VLA was a new and unique experience for both the moviemakers and the observatory staff. Normally, when a film crew shoots on location, they rent whatever facility is to be the movie set and take it over completely, exercising total control of the facility during the filming. This could not be done with the VLA. Astronomers compete heavily for observing time on the VLA, which operates 24 hours a day, seven days a week. It was unthinkable to cease scientific work for a week of moviemaking. The studio and the observatory had to work out a plan of action that allowed filming and scientific observing to go on simultaneously.

The details of this plan were hammered out over several weeks of negotiations. Location manager Paul Pav, who began his career as a stage actor in Hungary, became a familiar personality to several observatory employees as he handled the negotiations for the studio. The large number of film people coming to the VLA and the great extent of their needs while on the site meant that many people from the observatory, including the director and other managers, as well as scientists and technicians, were involved in the planning.

Though much filming could be done without interfering with the VLA's normal observing, there were scenes in which Zemeckis wanted the giant dishes pointed in specific directions. This meant that astronomical observing could not be done during those times. Naturally, the movie crew wanted as much time as possible with control of the dishes and the observatory wanted as little of that as possible. For some scenes, normal astronomical observing could continue, but the filmmakers wanted to make sure that no observatory people or vehicles moved into the camera's field of view. In addition, the filming would require the cooperation and assistance of many observatory employees.

These details as well as many others, such as safety and liability considerations, were worked into an agreement between Warner Brothers and the observatory. Because the VLA is a tax-supported institution and cannot use taxpayer money to help make a commercial film, the studio reimbursed all observatory expenses associated with the filming. In addition, Warner Brothers made a donation to help upgrade the VLA Visitor Center.

Under the agreement, the studio got several hours of time in which the dish antennas would be pointed to meet the needs of the film crew. This time was taken from scheduled maintenance and testing periods, without reducing the observing time for any astronomer.

The schedule for the movie shoot at the VLA was dictated by the observatory's own schedule for moving the antennas. The VLA antennas are placed in four standard configurations, remaining in each one for about four months. In one configuration, they are spread out along the entire length of the 13-mile arms of the "Y." In another, they are all concentrated at the array's center. The two others have intermediate spacings. The *Contact* crew, like nearly all photographers who visit the VLA, wanted to shoot with the antennas all concentrated closely together. The antennas would be in the close-together configuration only until the end of September. Though this rushed the moviemakers somewhat, the shoot was scheduled for the last week of September.

Much of the movie's action takes place in the VLA's control room, where telescope operators handle the details of observing for the astronomers. Early on, it was decided that these scenes would have to be shot on a set, rather than in the actual VLA control room; filming in the working control room would make normal operations impossible.

During their scouting visits, the *Contact* crew had measured and photographed the control room and

other indoor areas at the VLA. As set design and construction proceeded at the California studio, the filmmakers frequently contacted the observatory, asking questions about details of the facilities. Production designer Ed Verreaux and set decorator Michael Taylor insisted on meticulous realism.

That insistence included matching paint colors and carpet, window dimensions and blinds. The set decorators obtained copies of observatory technical documents, posters and forms. They asked NRAO employees to submit photos of their families and pets to be duplicated and placed in various locations on the sets. In the VLA control building, the walls are decorated with photos of other radio observatories around the world. The *Contact* crew borrowed these photos, made copies of them to be framed and hung on set walls, and returned them to the VLA.

Two sets were constructed to re-create the VLA control room, one indoors at the California studio and one at the VLA itself. At the VLA, the set was built as an elevated platform west of the actual control building. The site was selected for the excellent view of massed antennas it offered. NRAO employees who visited both sets remarked that the filmmakers' passion for realism had paid off; the movie control rooms were remarkably similar to the real thing.

Radio interference was a major concern for the observatory. The VLA is an extremely sensitive radio receiving system, collecting faint emissions from celestial objects at unimaginably great distances. Radio signals billions of times fainter than the weakest signal discernable to an ordinary communication system are "strong" to the VLA. The movie crew was of walkie-talkies, bringing scores wireless microphones and other radio transmitting equipment. Prior to filming, the studio sent some of this equipment to the observatory, where it was checked out in the electronics laboratory to make sure it would not interfere with astronomical observations. Also, upcoming astronomical observations that were particularly vulnerable to such interference were scheduled for times when the movie crew would not be present.

Close cooperation was required for the scenes in which VLA antennas would be pointed in directions dictated by the movie crew. VLA antennas are pointed through a computer interface that uses a celestial coordinate system. This system was, obviously, designed for astronomical observations. It requires that a pointing sequence be prepared in advance, then run on the control computers when the time comes for its execution. This was not as easy a task as the movie crew hoped. After much consultation between the filmmakers and scientists, computer specialists and telescope operators at the VLA, a series of pointing sequences was prepared. The movie crew enlisted considerable help from Kelly Cosandaey of the New Mexico Film Office and Susan Martinez of the Socorro County Chamber of Commerce in making lodging, transportation and other arrangements for the crew's stay in Socorro. During the week of filming, the crew filled all available rooms in several Socorro motels.

To recruit extras, casting specialists advertised in Socorro and Albuquerque newspapers and placed posters at the observatory. Potential extras were interviewed and photographed, then notified about their selection several weeks prior to filming. About 50 extras were hired for the New Mexico portion of filming.

As the date for filming neared, a construction crew built a platform alongside the VLA's West Arm, where the control-room set would later be erected. This platform was used for preliminary motion-picture and still photography. The stills were made into translights -- huge photographic transparencies that would be used as backdrops in the California studio.

For a production office and screening room for newly-shot film, the crew moved into the VLA's cafeteria building. The cafeteria was shut down for budgetary reasons several years ago, so this space was readily available. Temporary telephone lines were brought in and movie projectors installed for this facility. This "war room" was to be the hub of activity for a week.

Behind the VLA's Antenna Assembly Building, Warner Brothers established their "base camp," an impressive assembly of tents, trailers and vehicles of various types. The site was selected because, on the west side of the giant building, the movie equipment would be out of sight from locations that would actually appear in the film.

Filmmaking Week at the VLA Monday, Sept. 23, 1996

Over the previous weekend, a steady stream of movie equipment had arrived. The VLA, normally a relatively quiet and orderly place, had been transformed. People and vehicles were moving everywhere. The studio's helicopter flew overhead. From a large, mobile electric generator, thick, black power cables snaked around and between the buildings. Telephone lines, too, were strung along the ground. In the parking lot of the VLA control building, the walk-through Craft Services trailer, bulging with snacks and quick meals, had been parked, and already was drawing hungry crew members.

The movie base camp had become a small city, with a huge, gleaming kitchen trailer parked alongside a dining tent large enough to seat more than 200 people. Equipment trailers sat nearby, holding costumes, lights and a large assortment of other gear. From the base camp, shuttle vans ran regularly to the cafeteria "war room" and the various shooting locations. Nearly everywhere, there were movie people with walkie-talkies, and through their efficient radio network one could locate anyone on the site or summon a shuttle nearly instantaneously.

The movie crew was settling in. A few would stay in the small rooms normally used by astronomers coming to observe. House trailers, set up in the Visitor Center parking lot, were ready for Zemeckis, Starkey and Foster. For most of the crew, however, Socorro motels would be their home for the week, with shuttle vans making the hour-long run between the VLA and town throughout the day and night.

Most of the cast was booked at Socorro's Holiday Inn Express, with some staying at the San Miguel motel. Though a trailer was available for her at the VLA, Foster and her entourage spent most nights at the Eaton House Bed & Breakfast. Other crew members were distributed among these motels, in addition to the Super 8, Econolodge, Best Western and Motel 6. (During the week, Woods would become notorious in Socorro as word spread around town that he had ignored the rules and smoked a cigar in a non-smoking room at the Holiday Inn Express.)

A studio-hired guard was posted at the entrance to the VLA grounds. This week, for the first time ever, the observatory and its Visitor Center would be closed to the public. Warner Brothers had insisted on this, for the security of its equipment and people. News outlets throughout New Mexico had been notified of this, to help minimize the number of visitors who would travel to the VLA for nothing.

Rehearsal was the activity of the day. As scenes were rehearsed and decisions made about changing them, a sense of urgency prevailed, for tomorrow the film would roll. The rehearsals included observatory personnel, as the routines for turning and pointing antennas were tried out with Zemeckis watching.

The key person for getting the antennas pointed where Zemeckis wanted them was Bryan Butler, a planetary astronomer working for NRAO. The previous week, Butler had flown to California to serve as technical advisor during studio rehersals. A recent Ph.D. graduate of Caltech, the pony-tailed Butler had won immediate acceptance from the film crew. Throughout the coming week, he would prepare computer routines and work with the VLA's operators to turn the dishes on cue. Between movie takes, he used the VLA himself to observe Comet Hale-Bopp, still several months away from its spectacular display in the night sky as the "Comet of the Century."

Most of the day was free time for the actors. In early afternoon, Jodie Foster, confident but unassuming in shorts and T-shirt, walked into the war room and asked about getting up inside one of the VLA antennas. The observatory's liason man was happy to oblige. With one of Foster's assistants, they walked toward the antenna that is on the route of the public walking tour. Foster asked numerous questions about the antennas and their operation. Her questions indicated that she had been doing substantial reading about radio astronomy in preparation for her role in this film. (Her preparation, in fact, included visits with Sagan prior to his death and with Dr. Jill Tarter, director of the SETI insititute, a private organization devoted to searching for signals from extraterrestrial civilizations.) The small group went up the giant antenna, all the way to the inside of the dish itself, now pointed straight upward. This visibly impressed Foster, as it does most people on their first such visit.

Monday was brought to a close by a spectacular Southwestern sunset, with the western sky painted in subtle pinks and oranges, mixed with pastel blue. Around the VLA, filmmakers stopped to admire this show. It was the last favor nature would do them for several days.

Tuesday, Sept. 24, 1996

The film crew was busy before 6:00 a.m. In the predawn darkness, the road coming into the VLA resembled a seemingly endless string of sparkling, moving jewels as vehicle lights snaked toward the site.

With the sunrise, preparations accelerated for the first actual filming of the movie. The scene would be shot at the rear door of the VLA's control building. First Assistant Director Bruce Moriarty supervised the placement of cameras, vehicles and equipment for the shoot. The First A.D. is a combination of First Sergeant and Mother Hen on a movie set, responsible for ensuring that people and things are where they are needed, when they are needed. Moriarty, a short, solidy-built Canadian native given to chewing toothpicks, brought a keen sense of organization, decisiveness, a quick wit, and leather lungs -- all useful attributes -- to the task.

The average moviegoer can hardly imagine the effort that goes into shooting even a seemingly simple scene. Every object that appears on film is there by design. The dirt on vehicles has been carefully applied. Furniture and equipment, even parts of buildings, are "aged" by set decorators. Even in broad daylight, lighting specialists use either lights or large reflective panels to assure the desired "look."

Most cameras used at the VLA were combined film/video units. Light coming through the lens goes to a video camera in the brief time between exposures of the movie film. This allowed rapid checkout of the scene both before and after shooting. After each take, the videotape could be rewound and the shot reviewed by Zemeckis and others.

The first scene to be shot involved Max Martini, playing Willie the telescope operator, William Fichtner and Geoffrey Blake. As Martini practiced fly-casting into a child's toy pool, Fichtner and Blake drove up to the control building in a van. Preparations included numerous rehearsals, and also involved enlisting two NRAO engineers to help tie fishing flies. Then, the film rolled. Several takes later, at 10:20 a.m., Zemeckis announced for the first time, "it's a print," indicating the first take that was a "keeper." Applause erupted. Several crew members congratulated Joan Bradshaw, the unit production manager, who, under two directors, already had worked on Contact for nearly two years.

When shooting finished at the control building, the crew began to redeploy their equipment to a site alongside the VLA's North Arm, a location which would see much filming in the coming days. As the movement of equipment and people progressed, an unexpected obstacle arrived -- rain. As late as that morning, nothing of the sort had been predicted by the meteorologists.

Preparations continued at the North Arm, with equipment covered, and crew members sheltering in tents whenever possible. As the rain continued, the clay-rich soil turned to a thick, sticky mud, clinging in pound-sized globs to everyone's shoes. While Zemeckis and Foster waited under a tarp, crew members discussed with Zemeckis a message from Sagan, suggesting some small script changes to improve technical accuracy.

The plan was to shoot a scene in which Ellie drives alongside the North Arm toward the control building in her vintage Chevy Impala convertable. In this scene, she drives while calling in the celestial coordinates of her suspected alien signal to the control room. While waiting for the weather to break, Foster was introduced to Miller Goss, the VLA director, and Dick Sramek, a deputy director. Foster consulted with the two astronomers about the proper phraseology for these coordinates, and wrote the information on her hand as a cue.

For a long time, the Impala waited under tarps. Finally, there was a small break in the rain and the Impala was hooked up to a powerful, flatbed truck called the "Shotmaker." The Shotmaker would tow the car while cameras mounted on the truck filmed the scene. The scene was shot when the rain got light enough that the drops wouldn't show on film. That was to be the last shooting done for the day as the weather worsened. It was dark before activity ceased on the North Arm, and the evening shutdown produced a near traffic jam on the dirt road alongside that arm.

During a movie shoot, after the final scene for the day is wrapped, the Director, Producer and their top assistants, along with leading cast members, gather for a meeting called "dailies." Usually, film shot a day or two before is shown for review. Since this was the first day of filming, there was no processed film to show, but the meeting was held to plan the next day's work.

The rain had cost valuable time, and made an already tight schedule very daunting. Somehow, the shooting that was rained out would have to be made up. Looking at the time available and what still needed to be done, Zemeckis remarked, "I can't believe we actually thought we could come here and do this" in four days of shooting. Eventually, as plans emerged to shoot two, or even three, scenes at once, the mood lightened somewhat. Zemeckis joked with Butler about buying some of his Hale-Bopp observing time from him.

Butler had just gotten his first taste of working with the movie crew to move the VLA antennas on cue for a real scene. It was very different from the way the VLA is used for astronomy. At the evening meeting, Starkey asked Butler if this was "harder than what you would normally do here?" Butler replied, "Yes, it's like the first time I ever came here to observe."

The meeting produced plans for long hours and intense work for the next three days. When it was over, the sky, as if to mock the filmmakers, had cleared completely, and the moon and stars shone clearly.

Wednesday, Sept. 25, 1996

The predawn brought a nasty surprise -- thick fog that limited visibility to a few feet. This was bad news; if you can't see, you can't shoot movies. Especially a scene like the one planned for this morning. The scheduled shot was a big one -powerful Army Blackhawk helicopters arriving at the VLA, bringing government officials from Washington. This scene required a clear day.

So the crew set up their cameras and waited. They had a lot of company, for this was the scene full of extras. The extras included local residents, New Mexicans from other cities, observatory employees, police officers, and National Guard troops. In addition, television cameramen and reporters had been brought from several cities to add to the desired aura of a media invasion of the VLA. One TV reporter was Conroy Chino of Albuquergue's KOB-TV, a familiar face to New Mexicans. Chino was playing the part of a TV reporter -- easy enough for him. One TV cameraman also came from KOB-TV and, though the set was officially "closed," with no cameras or recorders allowed by the studio, Chino and his cameraman managed to get some videotape of the shooting and even to sneak a couple of interviews with participants.

While all these people milled around, socialized and exchanged jokes, the production staff fretted about the weather. Fog is not common on the Plains of San Agustin, where moisture of any kind is at a premium. Everyone, including the meterologists, agreed it would burn off. It was just a question of when. By midmorning, the Blackhawks approached, and everyone could hear them. Talking by radio with the movie crew, the Blackhawk pilots reported that, at an altitude of only 500 feet, the day was perfectly clear. That didn't help, though, for they needed to see through the fog to land. They turned around and landed in Magdelena, 25 miles to the East.

The waiting continued. Between the rain and the fog, the *Contact* crew had lost the use of much of the scheduled time in which they could control the aiming of the dish antennas. In urgent discussions, observatory officials worked out schedule changes that would allow making up some of this time.

Finally, the fog lifted, and final preparations for the big helicopter scene got underway. The choppers arrived and landed near the control building. Costumers went through the crowd of extras, handing out clothes to those whose attire didn't match the costume plan. Despite the chill air, jackets were out -short sleeves were the prescribed look. One NRAO employee, upon being handed a garish, hand-me-down shirt of approximate 1970 vintage, remarked to the costumer, "You must be a popular sight at yard sales."

While everyone waited for action to begin on the movie, they got a show in the sky. Apparently not wanting to let the Army helicopters have the day to themselves, Air Force F-16 jet fighters appeared overhead. Directly over the assembled crowd, they performed a series of aerobatic maneuvers, then engaged in mock dogfights, complete with dropped parachute flares, used in combat to decoy heat-seeking missiles.

With everything ready at last, shooting began. Actors, including Woods, boarded the Blackhawks and the choppers lifted off. They rose 100 feet or so, backed off, then began a gentle descent, landing and disgorging their costumed passengers. Escorted by National Guard troops, the "official party" from the choppers waded through the crowd of "onlookers" and "media people" toward the building.

For this scene, a specialized camera, called the Steadicam, was used. The Steadicam is a very heavy, gyroscopically-stabilized camera that a single man wears almost like a suit. Brackets fit over the cameraman's shoulders, and the whole affair makes him look like a robot from a cheap sci-fi movie. With this, the cameraman could walk through the crowd, getting a moving perspective for the film, but with great steadyness and no jerky home-movie-like movements that give viewers headaches.

Zemeckis wanted to get a lot of takes of this scene. After each take, he would call out, "one more time," a refrain the crew, particularly the extras, came to dread. With that, the hairdressers would descend on the actors, touch them up, and send them back to the choppers. Someone would quickly remove stray tumbleweeds loosened by the choppers' rotor wash, and production assistants would round up the extras and get them back into their initial positions. As the choppers lifted off again, Mark O'Kane, the highly-respected Steadicam operator, would re-shoulder his heavy burden and prepare to do it all again. Shooting for this scene lasted so long that production assistants had to pass out bottled water, lip balm and even eyedrops to people standing in the now-dry air and dust stirred up by the helicopters.

After many takes, the hoped-for words came: "That's a wrap."

In the afternoon, a scene was shot at the back door of the control building. Foster drove the Impala convertible to the door, still talking on her cell phone, and entered the building. This scene, too, required numerous takes. Another spectacular sunset offered a colorful backdrop for this scene. Looking at this sunset, Zemeckis remarked that "people will think it's a painting."

Later, into the evening, shooting was done along the VLA's North Arm. This, too, involved the convertible. Though they got the film they wanted, the crew had to overcome many glitches in this scene, including the car stalling, then slamming into a dirt bank. In addition, at least one take was lost because a camera jammed.

Despite the long day with its seemingly interminable wait for the fog to lift, the mood at dailies that night was considerably brighter than the previous night. The weather report, however, was not good. A cold front was coming.

Thursday, Sept. 26, 1996

If Wednesday had been chilly, Thursday was downright cold. As activity began around 4:30 a.m., a light rain fell. Happy that at least it wasn't foggy, people searched the sky for signs of a break in the clouds. They wouldn't find it for most of the day.

Continuing rain turned unpaved areas into a sea of mud. Crew and cast members, VLA employees, and everyone involved in the filmmaking drove and slogged through the thick, pasty substance. Already dubbed "Dr. Birkenstock" by the film crew for his ubiquitous sandals, Butler gratefully accepted the loan of a pair of boots from Wardrobe. Despite the rain, a morning shot of a convertible-driving scene was completed successfully. Between takes, crew members wiped the car's windshield and seats dry. By midday, activity had moved once again out to the North Arm. The scene to be shot, in which Ellie sits on the ground with the VLA's antennas behind her, was called the "Princess of the Desert" scene. This shooting was considerably delayed by rain. As the cold front approached, squalls passed, bringing not only rain, but also hail, prompting numerous comments that "the only thing we haven't had is snow."

Snow seemed a possibility to those enduring the wet cold. Everyone had on whatever cold-weather gear they had brought. Crew members who had begun the week in shorts and T-shirts now were happily sporting ski jackets and insulated caps.

However, the costume scheme for the "Princess of the Desert" scene called for Foster to wear summer pants and a light blouse. This meant that a heated blanket and portable kerosene heater had to be brought to the set to keep her warm.

While cameramen and the lighting crew set up and adjusted their equipment, Foster's double, Jill Stokesberry, played a key role. While working as an actress in Florida, Stokesberry had been found to have an amazing resemblence to Foster. By the time Contact was filmed, she had worked extensively as Foster's double, a job that not only was good work itself but also gave her valuable contacts leading to acting roles on her own. Those contacts led Stokesberry, an avid rock-climber and outdoorswoman, to move to California to further boost her movie career.

For the "Princess of the Desert" scene, Stokesberry, in wardrobe identical to Foster's, sat on the ground, providing a subject for the lighting technicians and cameramen to use while adjusting their equipment. When everyone was ready to shoot, Foster could take her place. In other shots, Stokesberry would fill on-camera roles where the scene did not include close-ups of Foster's face. Creative use of a double can considerably ease the workload on a leading actor as well as allow multiple scenes to be shot simultaneously. When makeup artists, hairdressers, and costumers were finished with both Foster and Stokesberry, the resemblence was uncanny. In at least one case, a pair of extras approached Stokesberry, fully convinced they were going to get a chance to talk to Foster.

In the afternoon, the action moved to the platform set serving as a "VLA control room." The rain and mud made this shot particularly difficult, for the set had been built without a roof. Now, crew members frantically tried to keep it dry, using sheets of black plastic and duct tape. The effort consumed much time. The 25 feet between the platform and the nearest gravel road was a foot deep in mud. A VLA crew hurriedly brought gravel to build a makeshift path to the platform, and boards were laid over the path. Still, everyone who arrived at the platform did so caked with mud. Actors had to be re-costumed. Zemeckis fumed about the lack of a roof and the delay it was causing.

The shot at the platform included both the inside of the room and the windows showing the antennas of the VLA. By now, the cloud cover was varying greatly as squalls quickly passed through the area. Each time the outside lighting changed, the artificial light inside the set also had to be changed.

Despite the weather and mishaps including Max Martini slipping on the muddy floor and falling, the scene was completed.

By the time the platform shot was wrapped, everyone had put in a full day, but another lengthy shot awaited. This would take place at the Visiting Scientist Quarters, the VLA's motel-room-style accommodations for observers. The scene seemed an easy one -- Foster would simply walk to one of the rooms, open the door and enter. However, as Zemeckis said frequently, "there are no easy shots." He would prove it with this one.

The scene had to be shot both with and without rain. Ironically, after a full day of rain, the sky was clearing, a full moon was peeking out, and technicians were hooking up fire hoses to Hollywood rain-making apparatus. The fake rain proved to be as much of a problem as the real stuff had been earlier. When the equipment was hooked up and the water turned on, Zemeckis was not happy. It was a full two hours before the fake rain had a look satisfying to the director. Meanwhile, the temperature fell, and people huddled around kerosene heaters whenever they could.

Shooting this scene was particularly miserable for Foster and the camera operators. The water came down on the actress, the plastic-shrouded camera and the crew operating it. Between takes, Foster stood in front of a large heater and the cameramen toweled off the wet spots where their heavy raincoats allowed any leakage.

While this scene was shot and re-shot, nature provided another show. A total lunar eclipse began. Through broken clouds, the crew watched as first one edge, then the entire moon became darkened by the Earth's shadow. Filmmakers began asking astronomical questions of the VLA employees. Explanations of the eclipse circulated around the set, and everyone stole glances at the sky whenever their duties would allow. Using the special effects camera, Ken Ralston rolled some film of the eclipse.

After many takes, Zemeckis finally was satisfied with the scene and announced the "wrap." It was after 11:00 p.m., and people eagerly sought sleep. *Friday, Sept. 27, 1996* The final day of filming dawned with a welcome surprise -- a clear sky, the sight of which seemed to renew everyone's energy. A morning shoot at the now-familiar site on the North Arm was completed in a mere 30 minutes.

The crew then moved to a site where thousands of tourists have shot their own photos over the years -- the antenna that is part of the visitor's walking tour. In this location, they prepared to shoot a scene in which Ellie lectures to a group of visiting schoolchildren. The children were played by a class from the school in Magdalena, about 25 miles East of the VLA.

Stokesberry stood in as the technicians prepared for the shoot. When everything was ready, the schoolkids came in, took their seats on the ground, and Foster arrived. In this scene, children would ask questions of Ellie. Foster performed this scene admirably through several takes. Watching good acting done in person at close quarters is an impressive experience for someone not accustomed to it. Take after take, Foster performed with the same (or improved) emotion, intensity and voice control. When watching a movie on the screen, one expects to see good performing. In person, a performance such as Foster's can inspire great respect for the craft of acting.

In late afternoon, it was back out to the "Hero Dish" on the North Arm, for the last filming at the VLA. With good weather and careful planning, this session would make up for much of the lost time of the previous days. A computer routine was ready to re-point the dish antennas from one direction to another during shooting. This re-pointing sequence was used for nearly simultaneous shooting of three separate scenes. To begin, a fixed camera shot a scene of Ellie jumping from the hood of the Impala into the driver's seat and speeding off. Then, the antennas began to move. With the Impala quickly out of the way, the Shotmaker towed an identical car, shooting a scene of Ellie driving alongside the North Arm as the antennas moved. As the Shotmaker dwindled into the distance, a special-effects camera rolled into place to shoot the movement of the antennas.

After each take, all the equipment was re-positioned, the antennas were moved back to their original pointing position, and the whole sequence would start again. Foster and Stokesberry appeared in separate shots during this sequence.

As evening twilight dimmed, this work was completed. For the last time at the VLA, the crew heard Zemeckis say, "That's a wrap."

Everyone was happy. The first shooting of the film was over. The weather, all agreed, had made this location shoot "brutal." Several crew members remarked that the four days of filming had been "one for the books." Still, despite all obstacles and any doubts, *Contact* was back on schedule, with every planned scene safely "in the can."

At dailies that night, the mood was festive. Film from earlier in the week was shown, and looked good. Congratulations were exchanged between filmmakers and the observatory's employees. People from the two vastly different worlds -- of science and entertainment -- had worked together to get the job done. Tired but happy, everyone headed for some much-needed sleep.

Other Locations

More quickly than they had arrived, the movie people were gone. The small city they had created at the VLA was no longer. Over the weekend, the platform set was disassembled, leaving almost no trace of the frantic activity of the past week. Soon, crews were moving the VLA's antennas to their new configuration.

In Socorro, the movie filming was the talk of the town. *El Defensor Chieftain*, the local newspaper, carried accounts of residents' sightings of movie people in stores and restaurants. Socorro's mayor, Ravi Bhasker, a medical doctor, told the City Council that he'd gotten "to write a prescription for Bob Zemeckis."

For the movie crew, it was only the beginning. The day after the final wrap at the VLA, they were shooting in Canyon de Chelly, Arizona. While at the VLA, they had completed the first four of a scheduled 83 days of filming. Future filming would take them to many other locations, including Washington, D.C.; Cape Canaveral, Florida; Arecibo, Puerto Rico; and, of course, their Los Angeles-area studio. Filming would continue into the Spring of 1997.

Early in 1997, the first TV commercial for *Contact* appeared, during the showing of a thriller called *Asteroid* on NBC. Later, more commercials appeared and previews arrived in theaters. *Contact* opened in theaters across the nation on July 11, 1997.

About the Author

Dave Finley is Public Information Officer for the National Radio Astronomy Observatory in Socorro, NM. He was the Observatory's official liason to the Warner Brothers crew during the production of *Contact*. In his liason function, he accompanied the filmmakers on scouting trips to the VLA, answered innumerable questions about astronomy and observatory operations, gathered materials for the set decorators, and spent the week of filming with the movie crew at the VLA.

He joined the NRAO in 1992. In addition to his official duties, he has served as president of the Socorro Amateur Radio Association and the Socorro County Chamber of Commerce. He was a co-founder of the annual Enchanted Skies Star Party, an event for amateur astronomers that attracts participants from across the nation.

His writings on astronomy, geology and amateur radio have appeared in many newspapers and numerous magazines including Astronomy, Southern Sky (Australia), Sky Observer (Austria), Geotimes, Lite Geology, QST and Radio Fun. His book, Morse Code: Breaking the Barrier, was published by MFJ Publishing Company in 1998.

When asked about the glamor of working with movie stars and Oscar-winning filmmakers, Dave responds, "The 'glamor' of the movie business was standing in a cold rain, shivering, with mud up to my ankles, a walkie-talkie in each hand and unreasonable requests coming from each one!"