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the possible polar ice deposits on Mercury and the Moon, impact cratering processes on the icy moon Ganymede, identifying possible "source craters" for the Martian meteorites, and the possibility that impact craters on Mars could excavate evidence of subsurface lifeforms. I utilize information from the following spacecraft missions in my research: *Viking* (Mars), *Mariner 10* (Mercury), *Clementine* (Moon), *Lunar Orbiter*, *Mars Global Surveyor*, *Galileo* (Jupiter), and the *Mars Odyssey*."

Nadine was recently involved in choosing a landing site for the 2003 Mars Exploration Rovers.

Best Part: "Having the freedom to work on the type of research that interests me, and to involve students in those research projects."

Worst Part: "Grading."

Challenges

"I had a lot of people tell me I could not become an astronomer because I was female, but I also had strong family encouragement and supportive mentors who told me to follow my dream. Math and physics were not always easy for me, but I always kept in mind that they were the "means to an end" so I could achieve my goal of being an astronomer."

Nadine says that she sometimes has problems fitting into established departments. "As a planetary scientist," she explains, "I am in a very specialized area which does not fit easily into the traditional academic departments. Astronomy departments feel I am too geology-oriented while geology departments argue that I am too astronomy-oriented."

Insights

Space Dreams: "I still vividly remember watching Neil Armstrong take the first step on the lunar surface. I hope to see humans (including women!) walking on the surface of Mars within my lifetime. I love what I'm doing, i.e., research into the processes which created the surface features we see today on the planets and moons, and would like to remain involved in this area in the future. I hope to eventually be selected as a participating scientist for some of the upcoming Mars missions.

"I believe that by understanding the universe around us we gain a better appreciation for our own Earth. I do not feel that it is a coincidence that the environmental movement really got going at the same time that we were receiving our first spacecraft images of the other planets in our solar system. Once we see Earth from space and see how fragile it appears, then look at the other planets and see how hostile conditions are there, it really emphasizes the fact that we need to take good care of our home planet because no other place we could go to will be quite as accommodating to us."

Nadine wants "to better understand how Mars has changed with time. We are accumulating a large amount of evidence that Mars at one time was much more Earth-like, with a thicker atmosphere, warmer surface conditions, abundant liquid water on its surface, and maybe even the development of life. Today Mars is cold, dry, and very hostile to life as we know it. What happened? And could something similar happen to the Earth?"

Advice: "My advice to students considering a career in astronomy or planetary science is to take all the math and science classes they can throughout school, but to also be sure to take courses in computer science, writing, speech, and foreign language. Scientists use computers all the time these days and knowing one or more programming languages is very important. We also have to write a lot, from proposals requesting funding for our research to professional journal articles and books describing our research. We also do a lot of speaking, both to the general public as well as to our colleagues at professional conferences. Many of the scientists we collaborate with are in other countries where English is not the primary language. Although most scientists can speak at least some English, it is useful to know at least one other language so you can communicate with other people (secretaries, taxi drivers, hotel personnel, etc.) when you visit those countries."

Mary-Frances Bartels

Amateur Radio Operator and Solar System Ambassador

Mission: Doing her part to further space exploration

Earth Coordinates: Adams County, Colorado, USA

Personal Background

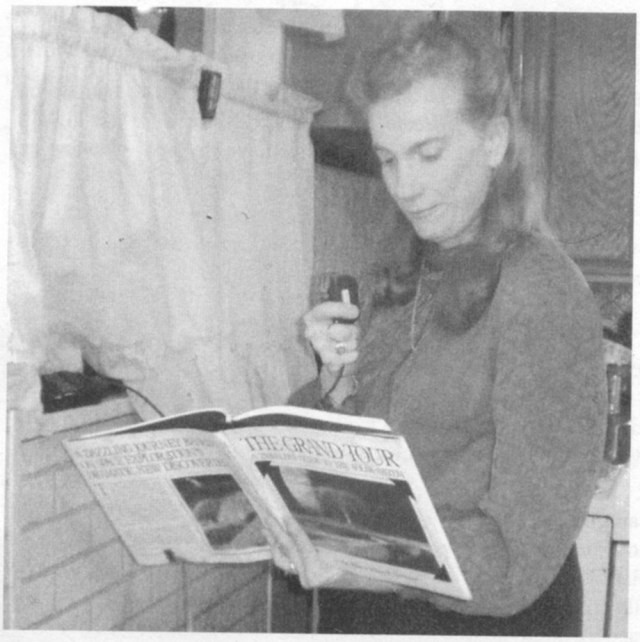
"I do not remember a time in my life that I was *not* interested in space. I was brought up watching the developing space program on TV. In March 1970, when I was just eight years old, my dad built me a pinhole projector so we could see a solar eclipse from our backyard in southern New Jersey. I was enraptured as the world dimmed, the Moon gradually blocking out 97% of the sun's light. My late childhood and teen years saw the launches and discoveries of the *Pioneer* and *Voyager* spacecraft. I followed these events closely and am still interested in *Pioneer* and *Voyager* developments."

Professional Background

Mary-Frances was a computer specialist for the U.S. Geological Survey (USGS) in New Jersey and Colorado for 17 years. "I worked," she explains, "with programs and databases on water quality, ground water and surface water. We used satellites to transmit real-time data."

Current Job

Job Title: Mother, amateur radio operator, Edge of Space Sciences Education Committee Chair and NASA Solar System Ambassador (SSA).



Mary-Frances hosts her weekly on-air astronomy meeting

Explanation: Mary-Frances has been a stay-at-home mom for the past six years. She home schools two of her three boys.

As an amateur radio operator, Mary-Frances has for the past three and a half years participated in a local weekly on-air meeting for astronomy and space enthusiasts. The Colorado Astronomy Net was started by her friend Burness Ansell and is part of the NASA Solar System Ambassador program.

As the Edge of Space Education Committee chair (www.eoss.org), Mary-Frances is responsible for the outreach activities of Edge of Space. She explains, "We use amateur radio and high altitude balloons to launch experiments to an altitude of 100,000 feet, the edge of space. Most of our work is with colleges and universities, particularly those involved in NASA's Space Grant Consortium. We've also worked with private industry contracted by NASA to develop technologies for Mars exploration. We've worked with Pioneer Astronautics in helping to develop a balloon to be flown on Mars."

Most of her Solar System Ambassador activities have involved running the once-a-month Colorado Astronomy Net. She explains, "I gather articles on astronomy, space weather, planetary exploration, space flight, and sometimes even history, poetry, and literature as they pertain to space science, and share the information with participants. A roundtable discussion follows.

"The job of an SSA is to get the public excited about solar system exploration. My 'pay' is being one of the first to hear about the latest discoveries as well as learn about future plans. It is so exciting being a part of the NASA extended family. As small as it is, I can do my part in helping NASA accomplish some of its goals."

Mary-Frances has also given presentations to local schools and a 4-H club. She writes newsletter articles for home schoolers on opportunities available to students in space science. Mary-Frances also runs an astronomy web site at http://www.keeplookingup.net.

Insights

Space Dreams: "To visit the space station or possibly Mars some day. I would love to see the Earth floating in space. I would also like to learn more about the Sun, where its atmosphere ends (heliopause) and how it effects the planets, especially our home planet.

"Though man has explored the heavens for thousands of years, space is still a vast frontier and is largely unexplored. There is *so* much left for us to learn about what lies beyond the confines of our planet. I find it absolutely awesome, fascinating."

Encouraging the Public: "Personally, I would like to see more general media coverage of space-related events. Watching the Moon shots was fascinating, and so was viewing live pictures of the Saturn system from *Voyager*. Not everyone has access to NASA TV.

"It is also imperative that people see how space exploration enriches their everyday lives. So many products and technologies we have today are directly attributable to the space program."

Advice: "If a woman is fascinated with space exploration, she should keep her eyes and options open for opportunities to play a part. This part might be large or small and may be completely different than originally planned. When I was a child, I dreamed of being involved in the space program. Being a SSA was not exactly what I had envisioned, but I have found great enjoyment in learning about space purely for the joy of it and passing that excitement on to others, especially the next generation."