

Will we 'keep Malthus in his grave' through the space program?

by Marsha Freeman

The 45th Congress of the International Astronautical Federation was held from Oct. 9-14 in Jerusalem, with the main theme, "Space and Cooperation for Tomorrow's World." Nearly 900 delegates from 40 nations participated in an intensive week of technical presentations and discussions, a number of which addressed the question of using space technology to promote economic development.

Some conference discussions reflected a growing demoralization in the industrialized, space-faring nations, due to shrinking space and defense budgets and the resulting unemployment of tens of thousands of technical professionals. Such pessimism was also evident in the perpetration of environmental hoaxes and scare stories as juxtaposed to the historical view of space as proving that there is no "closed system" for man. The pessimism was contrasted to the continued optimism of space visionaries, and of developing sector nations. The Middle East itself poses the question most directly.

Israeli Prime Minister Yitzhak Rabin has said that the major challenge to peace in the region is that Israel is an "island of prosperity in a sea of poverty." Israeli officials acknowledged that peace will depend upon how quickly that prosperity grows, and that there is no room for pessimism.

People are resources

The opening ceremony on Oct. 10, following informal sessions over the weekend, was addressed briefly by Israeli President Ezer Weizman. Even the Israeli people, who see television programs every day via satellite, he said, do not appreciate the importance of space technology. "The average man should be more familiar with the benefits," he suggested to the space professionals who should take that responsibility.

Prof. Yuval Ne'eman, who heads the Israel Space Agency, welcomed the participants, most of whom had never been to Israel before. He explained that one-third of the Jewish people in the world live in Israel. The reason they live there, he quipped, was that Moses wandered through the desert for 40 years and found the only place in the Middle East without oil.

For Israel, therefore, "the main resource is the people." They have a tradition of literacy, he explained, because historically, almost every Jewish male could read and write. In the past, "defense threats were another boost to use our learning skills to develop science and technology-based industries." Today, he continued, there are "local threats," but the overall situation has changed.

With one-tenth of 1% of the world's population, Israel produces 1% of the world's scientific papers, he reported, but, "I am sorry to say in the space field, we're under the 1%." The Israel Space Agency still plays a relatively minor role in science and technology.

"Jews have a tradition of worrying about the world," he concluded. "Using space, we have the modern tools to do something about it, not just worry. Even if we're small in the cosmos," he said, "we have the capability to create our own purpose."

Dr. Alvaro Azcarraga from Spain, the president of the International Astronautical Federation, criticized those who say that too much money is spent on space, by reporting to the participants that space activities in the world are equivalent to \$2 per person per year. "It's peanuts," he said.

Although U.S. National Aeronautics and Space Administration (NASA) Administrator Dan Goldin tried to strike an upbeat note by stating that, in terms of the economic impact of technology, "we keep Malthus in his grave through the space program," neither he nor the heads of the European or Russian space agencies could report that their budgets for space development were growing.

Liu Jiyan, president of the Chinese Society of Astronautics, spoke for many developing nations when he stressed the importance of strengthening international cooperation, since his country does not have a "strong economic or science and technology base." Last year, he reported, the China National Space Administration was established (he heads it), and it is interested in signing agreements for international cooperation.

Clearly, the space-faring nations have a responsibility to help bring their technology to bear on the economic challenges of the developing nations, and to push forward on the

frontiers of science and exploration.

The battle lines between science and economic development on the one side, and zero-growth environmental hoaxes on the other, were drawn most clearly in presentations that debated the ideas of the late space visionary Krafft Ehrlicke. Ehrlicke was a German space pioneer who worked on the V-2 rocket during World War II, and came to the United States after the war with Wernher von Braun's team of rocket specialists. While working in the aerospace industry, he developed the liquid hydrogen Centaur rocket upper stage, and spent two decades working on advanced plans for the colonization of space.

Controversy over Krafft Ehrlicke's vision

This writer presented a paper at a session at the congress on the history of astronautics, titled "Krafft Ehrlicke's Extraterrestrial Imperative." Ehrlicke's idea, that there is no limit to growth because there are no limits to man's creativity except those that he imposes upon himself, was a matter of common sense to some in the audience, and quite controversial to others.

Ehrlicke quite dramatically drew the consequences of a no-growth approach in a chart he produced for his still-unpublished book, *The Extraterrestrial Imperative*. Anti-science movements, chauvinistic ideologies, stagnation and regression, and eventually revolutions and wars would be the harvest of no-growth policies in a closed system. As I stated in my presentation, "In 1970 these forecasts doubtless seemed a bit alarmist. When one looks around the world today, they seem quite prescient."

Ehrlicke believed that the opposite policies—using science and technology to uplift mankind—would lead to international cooperation, overcoming the limitations of resources, a global industrial revolution, and the preservation of the biosphere. Ehrlicke proposed that the exploration of space was the pathway by which such economic growth would be realized. He spent two decades developing a detailed program for the industrialization of the Moon as the concrete expression of that idea.

Interested as to how Ehrlicke would have viewed the events of the ten years since his death, one member of the audience from the British Interplanetary Society asked if Ehrlicke had thought the zero-growth philosophy that began in the 1960s had gotten worse later in his life. This writer recalled that in 1981, upon returning from a trip to Germany where Ehrlicke had spoken at college campuses, he had remarked that the irrational nature of the anti-nuclear movement reminded him of Nazi Germany in the 1930s. Irrationality had once again become the basis of political movements.

A second question was from an agitated young man from Great Britain who objected to the paper, insisting that industrial development is damaging to trees, flowers, and nature in general. He proposed, instead, that "sustainable development" be the goal. I responded that clearly Krafft Ehrlicke



Prof. Yuval Ne'eman, the head of the Israel Space Agency, maintains that Israel's main resource is its people. "Jews have a tradition of worrying about the world. Using space, we have the modern tools to do something about it, not just worry. Even if we're small in the cosmos, we have the capability to create our own purpose."

saw no inherent conflict between industrialization and nature, and believed that protecting the environment required the use of more advanced technologies. Sustainable development, on the other hand, was a policy that would go hand-in-hand with shutting down "offending" facilities, such as has been done in eastern Europe, leaving people unsustainably unemployed.

At a session titled "A Comprehensive Rationale for Astronautics," the issue of Krafft Ehrlicke's vision versus perceived "practical considerations" again arose, when R.C. Parkinson from British Aerospace reviewed what he described as the different rationales for space activity.

According to Parkinson, "colonizers seek to extend human activity beyond the Earth and into space," such as "Krafft Ehrlicke's Extraterrestrial Imperative." He accurately stated that "arguments used by colonizers include breaking 'limits to growth,' " but then complained that the "passion" behind their arguments involves the value judgment that "space flight is a good thing in its own right." He characterized these arguments as having a "quasi-religious aspect."

Marco Bernasconi, an aerospace engineer from Switzerland and co-chairman of the session, countered this negative

characterization in his paper, "Humanity Facing the Future: A Role for Astronautics?" by drawing extensively on Krafft Ehrlicke's work.

Characterizing the current times, Bernasconi concluded that "a fight has resumed: The forces we believed defeated in the last two centuries are staging a come-back." These, he says, can be referred to as the Luddites, who are today's ecologists and environmentalists. They have incorporated the "moral fervor of the old socialist critique of cupidity with hostility to modern technology . . . abandoned in favor of the characteristic medieval utopian preference for ascetic and egalitarian poverty."

Bernasconi stated that "with respect to democracy, what the Luddites often seem to have forgotten is Ehrlicke's admonition that one cannot build democracy in a society of misery." The contrary philosophical approach to the Luddites, Bernasconi called "astronautical humanism," which he based on the concepts of what he calls the "first generation of space researchers," including Ehrlicke, Wernher von Braun, and others.

For them, "astronautics was soon seen as the means not only for solving material issues confronting humanity but also—and just as significantly—to catalyze (through the exploration endeavors) a new renaissance and to provide a continuously open frontier."

Throughout the space congress, the differences between the two philosophical views were expressed, often with Krafft Ehrlicke's work as a reference point.

Space technology for education and development

A number of representatives from developing nations presented papers describing the current use of space for economic and social progress, and their plans for the future.

One of the most interesting was given by medical doctor Thais Russomano from the Institute of Cardiology and the Varig Pilots Association in Brazil. He described a space science education project run by the Space Sciences Informative Work for the General Public, a non-profit, voluntary group which directs its activities toward informing children, doctors, pilots, and adults in general about topics related to space science. Dr. Russomano is the first Brazilian physician to earn a graduate degree in aerospace medicine at Wright University in the United States.

His group publishes two articles per month in magazines, and two per week in daily newspapers. One publication, *Today's Sciences for Children*, has printed articles about space science news and space history. Articles in periodicals for adults have included such topics as the space program in India, lunar bases, and living in space. Dr. Russomano reported that future plans include a radio program about space news and a children's play about space science.

The world's two most populous nations—China and India—have made extensive use of satellite technologies par-

ticularly to uplift the large rural populations of their countries. Prof. U.R. Rao from the Space Commission of the Government of India provided an overview of India's extensive space efforts. Mass education has been a primary focus of the country's space technology program, and according to Professor Rao, over the past decade, the INSAT series of orbital satellites has provided access to 550 television stations to 80% of the Indian population. Regional services have been introduced which allow language- and culture-specific programs to be provided to India's diverse population. In addition, over 1 million Direct Satellite Reception sets, which are used for community viewing, now serve remote rural populations.

The Indian government is developing interactive educational programs using one-way video and two-way audio transmissions, which will allow scientists to plan dedicated satellite systems to assist rural development and improve literacy, he reported.

Satellite communications are also being used in India for critical meteorological and disaster warning systems, and over 150 disaster warning receivers have been installed along the cyclone-prone east coast of the country. Remote sensing images are now regularly employed to inventory water resources, locate underground resources, monitor droughts, and measure snow melt in the Himalayas to prepare for optimal use of the run-off.

In a presentation on his country's space activities, Liu Jiyuan from the Chinese Society of Astronautics reported that China is using 1,200 satellite ground relay stations to bring educational programs to millions of people. In a joint paper, Profs. Yang Jia-chi and Chen Fang-yun from the Chinese Academy of Space Technology outlined future space applications programs that they are hoping their government will adopt. These would include the use of very small and inexpensive satellites for more frequent remote sensing coverage, a plan which has been put forward as an item for Asia-Pacific Multilateral Cooperation in Space Technology and Applications.

Global mobile satellite information systems are of great interest in a country as large and rural as China. Different kinds of orbit systems are being studied, to connect rural villages to the rest of the country via satellite.

The potential of satellite technology

The joint China-Brazil Earth resources satellite program is one part of a multifaceted Brazilian space effort that was discussed by Decio Castilho Ceballos from the National Institute for Space Research. Looking at the region as a whole, Ceballos stated that the potential market for satellite communications in the "tropical belt" could include 82 nations. Brazil is using satellites for communications, navigation, and the collection of remote sensing data.

From June 20-23, 1994 a workshop on Small Satellites for Latin America was held at the National Institute for Space

Research in Brazil at the initiative of the Subcommittee on Small Satellites for Developing Nations of the International Academy of Astronautics. Representatives from Argentina, Brazil, Chile, and Mexico attended, as well as from Canada, France, Germany, Ireland, the United Kingdom, and the United States.

One of the workshop topics was the use of systems providing mobile communications between any two points in the country using multiple low-Earth orbiting satellites. Telemedicine is one of the most promising applications of this technology. Such a system would allow the transmission of information obtained by simple sensors on a patient directly to complex medical processing units in large medical centers, where it can be properly interpreted by physicians. In the same vein, a fax of an electrocardiogram could be sent to a hospital in the case of a medical emergency in a remote area.

Small Earth observation systems with portable ground stations could provide local regions with direct downlink data, without having to wait for the information to be processed by central facilities. This real-time access to data could be important in monitoring forest and brush fires, fish, tropical storms, volcanic activity, earthquakes, and other potential disasters.

Presenting a concrete example of how satellite remote sensing can keep an inventory of water resources, Dr. N. Ben Yosef from the Hebrew University in Jerusalem described the use of remote sensing images from the SPOT satellite, which can monitor the 200 open water reservoirs used in Israel, mainly for agriculture.

Dr. Yosef explained that these reservoirs can become polluted with algae and bacteria. They deteriorate both chemically and biologically, he explained, and in order to protect crops, scientists must be able to discriminate clean water from polluted reservoirs.

Using 99 of the reservoirs as a sample, they compared satellite images of them over time. The discrimination is based on what is called the volume of reflectance, or the measure of the light-scattering properties of various constituents in the water. In this way, the scientists can determine both what is causing the pollution and to what extent the water has become polluted. This method has been very successful, and will obviate the need to physically sample the reservoirs, which is expensive and time-consuming.

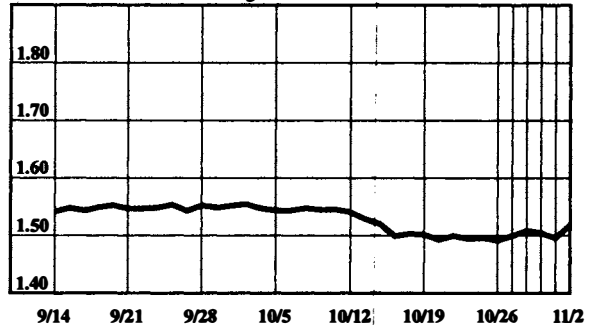
Most representatives of developing nations presented ideas for turning the fabulous technology developed through space exploration toward solving the problems they face today. A few chose to blame the current state of their underdeveloped nation on overpopulation and environmental degradation, supposedly caused by too much development.

For the majority, there was an expressed understanding that the space frontier not only has created the possibility to accelerate their rate of development, but also that space exploration engages the interest of young people, in particular, to strive to excel in science.

Currency Rates

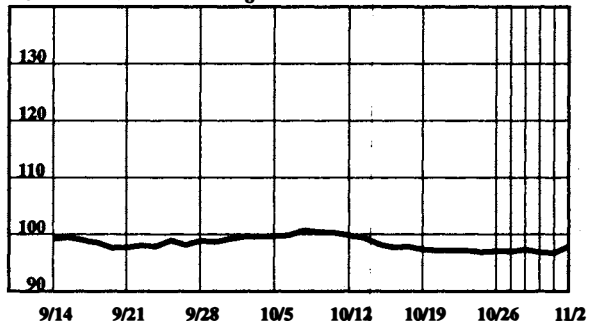
The dollar in deutschemarks

New York late afternoon fixing



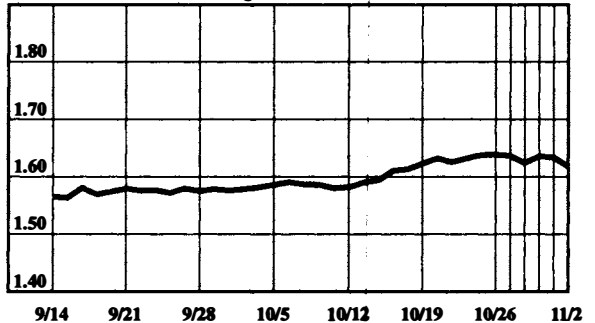
The dollar in yen

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing



The dollar in Swiss francs

New York late afternoon fixing

