many of the harmful rays.) Skin aging in general also would be accelerated by increased ultraviolet exposure. Changes in solar radiation levels could harm phytoplankton in the oceans, which produce much of the earth's oxygen. Insects see in a portion of the ultraviolet spectrum and light intensity changes in this region could affect insects' perception of skylight, flower colors and sexual markings. And many plants, particularly agricultural species, are damaged by ultraviolet light.

The growing concern over fluorocarbons and the ozone layer has led to the formation of a special NAS study committee. The members include McElroy and Rowland; atmospheric chemist Donald M. Hunten of Kitt Peak National Observatory, chairman; Francis S. Johnson, executive director of the Center for Advanced Studies at the University of Texas at Dallas, and chemist Harold S. Johnston of the University of California at Berkeley. The group will meet later this month to consider the reports and decide whether to recommend the formation of a permanent study group to the governing board of the National Research Council. Another NAS group, the climatic impact committee, is already studying the climatic effects of SST exhaust, fluorocarbons, and other man-made pollutants.

The Manufacturing Chemists Association, a trade group representing members in North America, Europe, Australia and Japan, is currently funding several studies on the environmental effects of fluorocarbons. James E. Lovelock, atmospheric scientist at the University of Reading in England, is making direct measurements on the concentrations of fluorocarbon 11 in the stratosphere. James N. Pitts and O. C. Taylor from the University of California at Riverside are studying the reactivities of fluorocarbons at various altitudes. And Camille Sandorfy from the University of Montreal is making the first experimental measurements of reaction rates under simulated stratospheric conditions.

Although the predictions are strong, industrial spokesmen are quick to point out that little experimental data exists and judgment should be suspended until more information is available. McElroy says he does not recommend taking immediate action to terminate fluorocarbon production or use. "All of these models are just that—models. Although they are based on what we believe to be good work, atmospheric chemistry is very difficult and it is easy to miss something. Direct measurements on a vastly accelerated scale must take place" to test the theoretical models, he says.

But he emphasizes that expanded research on the subject is urgently needed. This situation is different from most kinds of science, he says, where a theoretical paper will "sit on the shelf" until it is confirmed. "We can't afford to wait the normal 10 years." McElroy says, "because if the theories are correct, by that time the effects will be pronounced." □

Energy: Inflation for some, disaster for others

The mountain may yet come to Mohammed, if the Arabs have their way. Though President Ford's address to the World Energy Conference in Detroit last week signaled a new, tougher stance in the face of continued high oil prices from the Organization of Petroleum Exporting Countries (OPEC), Sheikh Ahmad Zaki Yamani of Saudi Arabia responded by patiently explaining why oil producers will not be moved by threats and then lectured the United States on the evils of "economic imperialism." Meanwhile, several developing countries continue to slide toward famine and economic chaos.

Ford's address spearheaded a carefully orchestrated diplomatic offensive to unite energy-importing countries for mutual protection while preparing the way for a tougher stance in bargaining with OPEC nations. Artificially high prices "run the risk of worldwide depression and threaten the breakdown of world order and safety," he told the conference delegates. This warning was echoed by Secretary of the Treasury William E. Simon, who likened OPEC policies to killing the goose that laid the golden egg. In New York, Secretary of State Kissinger pointedly endorsed a recent tentative agreement among petroleum importing nations to share their limited resources, calling it "an encouraging first step." And in Washington, Federal Energy Administration head John C. Sawhill used the toughest language of all: "There comes a point where the conditions under which oil is supplied lose their commercial character and become issues of national survival. At that point—and we have long since passed it—we must explore the full range of options at our disposal to protect the national interest."

Photos: John H. Douglas

Ford and Yamani (inset) dispute energy policy at World Energy Conference.

An immediate response came from the chief conference spokesman for the OPEC nations, Saudi Arabia's oil minister, Yamani. With the cool logic and intonation of a Boston Brahmin (he studied international law at Harvard) Yamani said OPEC members were not subject to the forces that usually break up cartels—loss of market advantage when one member refuses to withhold his goods in order to drive up prices. "The rewards of conservation . . . are far greater than any immediate gain engendered by expansion of sales," he said in his prepared text, meaning that nations that leave their oil in the ground will eventually be able to sell it at even higher prices. The exporting countries take their newly found power very seriously, he said, and have no intention of bankrupting the West. Nevertheless, in his view, most of the world's economic problems are not caused by OPEC oil prices nearly so much as by the profligate use of energy built up in the days when oil was cheap.

Privately, some Western delegates agreed with him. One pointed to the convention city of Detroit as a symbol of energy waste in big cars; another responded to a question about the tougher Administration stance by asking sarcastically, "Just what are you going to threaten them with?" The managing director of Japan's petroleum association, H. Kumeda, told SCIENCE

NEWS that demand for petroleum in his country dropped 5 percent last year, compared with previous annual increases of around 15 percent. He saw little hope for lower prices in the near future and said Japan is counting on its technological ability to help open up alternative energy sources and offer the Arab states something more important than money: refineries in their own lands.

Hardest hit, however, are developing countries that have moved beyond subsistence farming but now find themselves dependent on imported petroleum and fertilizer in order to survive. The depths of despair now growing in these nations was poignantly expressed at the conference by I. G. Patel of India, who is deputy administrator of the United Nations Development Program. If one fixes as a goal the raising of per capita income from its present $200 a year in developing countries to $800 (still less than a third of annual income in industrialized nations) a steady growth rate of 6 percent a year for the next 40 years would be required, he said. But this, in turn, would require a growth of energy consumption of some 8 to 10 percent in the developing nations, whereas now consumption is falling. The world's poor are thus getting steadily poorer.

(As he spoke, the possible extent of famine in India and other parts of the developing world was becoming grimly clearer. Early frost in the American Midwest destroyed much of what was left of corn and soybean crops after a summer of drought. The wheat crop in India appeared to have fallen below expectations by an amount equivalent to the food necessary to feed 50 million people. President Ford pledged increased food-dollar aid, but with rising prices, the amount of food sent abroad may still continue to decline. Some officials fear that November's World Food Conference may come too late to avert a major famine, even if major new aid projects were adopted. With India's antique transportation system, food delivered then would surely not reach stricken regions of the interior in time.)

Yamani's response to delegates concerning the progressively more desperate situation in the poorest countries was that several development funds are being established by the OPEC countries. Such aid is "high on our list of priorities," he said, but cautioned that investments in less developed countries have been stymied by a lack of local financial institutions capable of handling the funds.

Yamani reiterated the Saudi position that oil prices should come down a little (about $2 a barrel) and expressed an openness to further cooperation with industrialized nations: "We certainly want to exchange our oil for technology and the development of our country." But many delegates went away wondering how long their nations could hold out and whether renewed Middle East fighting might bring new shocks to the world's financial and political stability. A few returned to nations on the brink of starvation and bankruptcy.

Satellites hampering radio astronomy

Communications between astronomers, who study what nature puts in the sky, and government agencies (especially NASA) whose job it is to put artificial things in the sky, have not always been good. Some years ago radio astronomers went up in arms over a proposal to scatter thousands of little metallic dipoles in earth orbit to improve long-distance communications. They feared the metal strips would interfere with observation of celestial radio signals. When the Vietnam War was at its height, a proposal was floated to put up a giant reflector to light Vietnam at night. This aroused optical astronomers to strong protest, and it was never implemented.

In the past, the satellites and probes launched by NASA and others successfully avoided conflict with the radio frequency bands reserved for radio astronomy. But now there is trouble.

The trespassers are two major U.S. satellites launched in May: ATS-6, which hangs in synchronous orbit over the Galapagos Islands, and SMS-1, which hangs over the Atlantic east of Brazil. The ATS signal is very close to a channel on which much stellar observing is done, and there are slopover problems. The SMS signal overlaps a radio astronomy channel. The ATS problem was realized before the satellite was launched, but too late to change its transmitter.

When either of the satellites is on or near the line between an observer and what he wants to study, the work is rendered difficult or impossible. More than a dozen radio telescopes in the United States, Canada and Great Britain are affected. The only real solution would be to shut off the satellites' transmitters. Since such things have finite lifetimes, there is hope of a future when that will happen. Meanwhile the problem can be worked around—with some inconvenience—by avoiding times when the satellites are in the way.

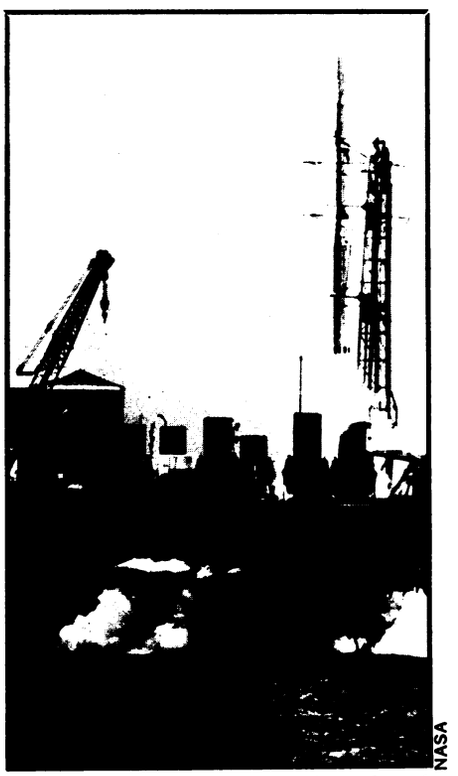
Frank J. Kerr of the University of Maryland, a spokesman for the National Academy of Sciences' Committee on Radio Frequencies, says radio astronomers may be able to live with one or two such interlopers. Twenty or a hundred would be a catastrophe for radio astronomy. □

An orbiting monitor of the X-ray sky

On a converted oil drilling rig some three miles out to sea, an Italian crew is preparing to launch a British-built satellite aboard an American rocket off the coast of Kenya. Set for launch Oct. 15 into a 500-mile-high circular orbit, UK-5 stands to make an important contribution to the growing repertoire of orbiting devices studying the sky by X-ray.

Among its half-dozen instruments is one that combines functions of an early warning system, a sentry for long-term studies and a coordinator for other observation posts in orbit and on the ground. Called the "all-sky X-ray monitor," it will be the first X-ray imaging device ever flown capable of taking in 180 degrees of sky at a single glance, so that the entire sky will be seen every time the spin-stabilized satellite turns once on its axis.

This means that besides serving as a mapping tool, the monitor can spot transient events such as X-ray flares for examination by other, more directional experiments. Also, since all of the major X-ray sources in the sky will be observed virtually continuously for the life of the satellite, the monitor will be


NASA

Water surrounds San Marco launch pad.