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NEWS RELEASE

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Address
by
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National Aeronautics and Space Administration

ANNUAL MEETING OF THE AMERICAN RED CROSS
Washington, D.C.
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Forecasting ten years of progress in space exploration in the next twenty minutes is a task more formidable than I feel competent to undertake. Not only is our nation's space program too broad and varied to make it possible, but the rate of progress which is being made in science and technology makes it exceedingly hazardous for anyone to try to be a prophet.

With your permission, therefore, I would like to concentrate today on some areas of activity which are of particular interest to the Red Cross--areas in which space activity may help make your job less difficult in the years ahead.

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For almost a century, the great international organization of which you are a part has been a source of aid and comfort to the survivors of natural disasters such as famine, floods and hurricanes. Today, to a limited extent, and in the future, to a much greater extent, there is promise that meteorological satellites will spot many of these disasters in advance, before they have a chance to wreak their mischief, and thus reduce the job that the Red Cross is required to do.

During the past three years the National Aeronautics and Space Administration, in cooperation with the United States Weather Bureau, has orbited six experimental weather satellites in the Tiros series. One of these remarkable satellites, Tiros VI is still operating. TIROS V set a record in transmitting more than 58,000 useable weather pictures before it ceased operation early in May after $10\frac{1}{2}$ months in orbit.

The Tiros satellites have, for the first time, given us a global look at the weather, taking pictures of clouds and other weather phenomena and transmitting the data back to earth. In many cases, the photographs have covered areas remote from air routes and surface vessel lines, providing our Weather Bureau's meteorological experts with information that they could not obtain by any other means.'

The Tiros television cameras are programmed to take pictures whenever they are pointing at the earth, store them, and play them back when they come in range of one of our two ground receiving stations on the east and west coasts. Since we do not have a worldwide meteorological tracking network, we are somewhat limited in the pictures we can take. We can give the satellite instructions for only a single pass at a time, and because of this and other limitations, the Tiros satellite can cover only about 15 per cent of the earth's surface in a single day.

This would, of course, be a serious shortcoming for an operational satellite, but Tiros was never intended to be anything more than a research satellite. Even so--and this is remarkable--it has had a number of very important operational applications.

A number of Tiros satellites, for example, have spotted hurricanes and other severe storms and tracked them over a period of days, observing changes in force and direction, and permitting areas lying in the path to brace for the blow. This success has been achieved because the data has been analyzed as soon as it is received, and the information has been disseminated, many times to foreign weather services, in time for action to be taken. Weather data must, of course, be used immediately. If we were to store it for a day or so and then disseminate it, the weather would long since have changed.

Satellites are much more effective than aircraft in the search for hurricanes, but aircraft are still needed to measure wind strength. Also, it is helpful to correlate satellite and aircraft observations. The knowledge we gain will some day ensure an adequate job with satellites alone, or at least employ the aircraft more economically. It also should be possible to eliminate most or all of the dangerous missions that involve flying aircraft into the "eye" of the storm.

Weather satellites are showing more and more versatility as more is learned about interpreting their data. A satellite television camera will photograph just about anything that reflects sunlight and has a sufficiently large area to be resolved by the camera's lens. The satellite can spot cloud bands, marking almost precisely the location of a weather front, and will clearly depict snow and ice.

By taking snow pictures in a given area, several days apart, it is possible to determine how the snow cover is changing. Skilled interpreters can use these photographs to make accurate calculations of run-off, a subject that our western states find extremely important. I am told that approximately 107 million acre feet of irrigation water are used in the west each year. Every acre foot costs \$15, bringing the total value to more than 1.5 billion dollars. Even a small percentage saving through more efficient use of run-off could result in a great savings in dollars.

Dr. Fred Singer, Director of Satellite Programs, U.S. Weather Bureau, has recently pointed out some other interesting possibilities of weather satellites. For example, photographs of the ice in the St. Lawrence seaway obtained by Tiros satellites have demonstrated that it is feasible to make large-scale surveys of the ice situation. Again, a sizeable economy factor is involved, particularly as it relates to the efficient use of ice reconnaissance aircraft and icebreaker vessels. The Weather Bureau made a study of this with the Canadians which indicates that in the Gulf of St. Lawrence alone this operation offers potential savings of \$1.7 million a year. For example, if the satellite photographs show that the ice is completely fast and not breaking up, there is obviously no point in sending reconnaissance aircraft or icebreakers. Conversely, if the ice is already cleared out, there is again no point in sending them. The satellite, therefore, will quickly establish the intermediate regions that either need to be looked at more accurately at close range, or which can be broken up by means of icebreakers.

The weather satellite program has also been an important factor in fostering improved international relations. We have been cooperating with many countries all over the world ever since the program began, and sending weather advisories and other information to the weather services of countries lying in the paths of hurricanes, typhoons, tropical storms, and so forth.

The Weather Bureau has received many letters of appreciation from foreign governments expressing gratitude for Tiros data.

Let me quote a paragraph from a typical one received from the Colony of Mauritius, in the Indian Ocean, in October, 1962:

"The telegrams of vortices detected by the Tiros satellite were so particularly interesting and more regular for our tropical depression named "AMY" in the period 5th to 13th October, that I feel I should write particularly on this occasion to thank you for this service which you are providing.

"The satellite reports materially assisted us in detecting, following, and warning for this tropical depression and aircraft crews flying across from South America and Australia through Mauritius were particularly appreciative of a briefing including mention of the bands of cloud and bad weather."

Similar letters have been received from various other countries, including one from the Japanese weather service expressing appreciation for advance warning of a severe storm. As our weather satellites become more refined, this kind of cooperation should become more and more important, particularly to some of the underdeveloped countries that do not at present have adequate weather systems or communications systems. This offers us a great challenge, because many of these countries are located in areas--for instance, the tropics--where weather conditions are often violent, and severe storms are very prevalent. In addition, many of these countries are predominantly agricultural, and their economy is therefore highly dependent on the weather.

Dr. Singer has pointed out several other examples of the use of weather satellites for humanitarian purposes which may be of particular interest to this audience, as members of the world's foremost humanitarian organization.

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In India, for example, the planting season is dictated by the onset of the monsoon. Proper timing is essential, because if the farmer plants too soon, the seeds will not get the rain they need in time, and will dry up. If he plants too late, the seeds will sprout, but will not get the full benefit of the rain during the rest of the growing season. Meteorological satellites will take much of the guesswork out of choosing the best time to put in the crops.

Another indirect benefit arising from the weather satellites, Dr. Singer points out, is one that we aren't likely to think too much about in this country -- the detection of locusts. Just as in the great plagues of biblical times, there are still their modern-day counterparts -- great areas of Africa and Asia where clouds of locusts, so thick they hide the sun, swarm down to destroy the crops. Weather satellites can detect the path of these swarms, through an analysis of prevailing wind currents and other factors, so that steps can be taken as soon as possible to combat them.

For all these reasons, the weather satellite program is going to be of tremendous benefit to the whole world, particularly when we move on from Tiros to Nimbus, our first operational weather satellite, which we hope to launch by the end of this year.

Nimbus is a much larger satellite than Tiros, which will be able to photograph all areas of the earth. It will be launched in an orbit that takes it over the poles instead of around the equator, and, as the earth rotates beneath it during its orbital journey, its television cameras will scan every part of the world every day. Since its orbital path always will take it very near the poles, we can place our read-out station at a very high latitude -- in this case, at Fairbanks, Alaska, and thus be sure of catching the data stored in its tape recorders every time it comes around.

Another important improvement in Nimbus is that its cameras will always be looking at the earth. The Tiros satellites now in orbit point their cameras out in space part of the time, and thus lose part of their coverage.

Another feature of Nimbus will be a new, experimental direct read-out photo system called APT, for Automatic Picture Transmission. If the experiment goes according to plan, simple ground stations can be set up quite inexpensively anywhere on earth to read data directly from the satellite. Hopefully, this will permit meteorologists at ground stations to get immediate readings of their local cloud situations -- the kind of information needed to make shortrange weather forecasts with accuracy. This promises to make the weather satellite system even more useful to the countries, large or small, that participate.

Let me turn now to another area in which we are making great progress -- the communications satellites which relay radio, radio-telephone, and television communications over long distances. Many of you here today have undoubtedly seen our first passive reflector satellite, the Echo balloon, 100 feet in diameter, which shines like a star as it crosses the night sky. Echo carries no electronic equipment, but is simply a reflector from which signals can be bounced or reflected to distant ground stations. It has been in orbit since August 1961.

More recently there have been the highly successful active repeater satellites called Telstar and Relay, which carry receivers and transmitters to pick up signals from one point, amplify them, and transmit them at another frequency back to ground stations thousands of miles away. These satellites have made transatlantic television broadcasts possible for the first time.

Telstar was funded by the American Telephone and Telegraph Company. Relay was funded by NASA. Both satellites have proved the feasibility of such systems, which will unquestionably play extremely important parts in all our communications of the future.

There are many other areas of activity I would like to tell you about if time permitted, such as our orbiting observatories, our plans to search for life elsewhere in the universe, our space probes such as Mariner II which gave us so much new information about the planet Venus, and so on. Instead, I will use the time which remains to tell you about Project Apollo, the nation's program to explore the moon with men before this decade is out.

In Project Apollo we have set for the nation a clear and impressive goal, one that will focus our efforts, and at the same time enable us to establish a broad base of space power for whatever purpose the national interest may require.

Project Mercury, recently completed with Gordon Cooper's highly successful flight of more than 34 hours, will be followed by Project Gemini, in which two men will orbit for as long as two weeks, learn more about the effects of weightlessness, and practice the techniques of joining two spacecraft in flight. Then will come the tests of the Saturn boosters and the Apollo three-man spacecraft, flights of the Apollo spacecraft in earth orbit for periods of three weeks or more, and the first flight to the vicinity of the moon. Finally, an Apollo spacecraft will be placed in orbit around the moon, two men will descend to the lunar surface and man at last will have conquered one of the great challenges of human history.

Many benefits will be obtained in the course of gearing the nation for exploration of the moon -- benefits which may prove to be of far greater value than the actual landing itself. Among them are:

Advances in the state of the art in science and technology which will give the nation the ability to operate in and use space for whatever purpose the national interest may require.

Development of high thrust boosters with payload capabilities exceeding any others now known to exist in the world.

The experience and knowledge gained in orbital and trans-lunar flight, including the development of superior guidance and control, the perfection of rendezvous and docking techniques, and the ability to maneuver accurately in the space environment.

Establishment of a structure of facilities to assemble, test and launch space vehicles which will serve the nation's needs for many years to come.

Establishment of a strong industrial base which will be available to undertake development and manufacture of any space systems required in the future.

Development of great scientific competence in the nation's universities and research laboratories on a broad basis throughout the nation.

Training of scientists and engineers through the NASA policy of placing research work with the universities, where it is conducted in a teaching environment, and of supporting predoctoral training of students in these institutions.

Training of a reservoir of technicians in industry, of astronauts, and of military personnel in services such as the Corps of Engineers, which is responsible for about 75 per cent of NASA construction.

Also of vital importance, however, are some of the less tangible considerations involved in our space effort--factors which we cannot, as a great nation, ignore.

For the first time in this history of mankind the rocket engine, which can operate in a vacuum by carrying its own oxygen supply, has given us the opportunity to leave the earth and explore the solar system. Only two nations, the United States and the Soviet Union, have the resources with which to exploit this opportunity. Were we, as the symbol of democratic government, to surrender this opportunity to the leading advocate of the Communist ideology, we could no longer stand large in our own image, or in the image that other nations have of us and of the free society we represent.

The hard facts of international life leave no doubt that we are in a contest with the Soviet Union, and that space achievement is and will be a symbol of national character and national strength. It has been said that "prestige is the faculty enabling a great power to avoid final, miserable choices between surrender and war the ingredient of authority in international affairs." -more-

Project Apollo offers us our greatest opportunity to overcome the lead in manned space exploration now held by the Soviet Union. It gives us assurance that if an American is not first on the moon, he certainly will not be far behind. And most important of all, it demonstrates to all the world that we in the United States have the capability and the determination to carry out those things which we have declared seriously that we intend to do.

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