

contained atmosphere. This would be going quite a bit further than air conditioning. Such "planet conditioning" would make life away from earth a little more comfortable. Here, as on the moon, nuclear power would be necessary to provide local surface transportation, probably by means of electric battery-operated vehicles charged by nuclear power systems.

I believe the deeper into space we go, the more vital communication will become to us. Unfortunately communication also becomes far more difficult at great distances and requires much greater levels of energy. The Mariner IV radio near Mars, using about 10 watts of transmitted power, was able to send 20 fairly low-resolution photographs in about a week. At the orbit of Pluto, the transmission of even this small amount of information would require about 7 kilowatts, and a single voice channel would require over a hundred times this much power. For this reason alone, we must plan on the need for large amounts of energy as we move away from earth.

Back to earth again

For a few final thoughts, let us come back to earth—or at least somewhat closer to earth than the moon and the distant planets we have been thinking about. As suggested earlier, our space activities are going to bestow many direct benefits on those of us who decide not to become astronauts for a while. We have already seen some of these benefits—for example, the Tiros and Early Bird satellites—and we will be seeing more in the future. The remarkable picture in Figure 7 indicates the benefit that can be gained in weather prediction using the vantage point of space for weather photographs. Among other exciting benefits will probably be a system of communications satellites that will make possible not only the transmission of television from any place in the world directly into the home but also such communications marvels as have been suggested by the highly imaginative science writer Arthur C. Clarke. For example, Clarke foresees the orbital post office providing the delivery of copies of letters anywhere in the world only minutes after original letters are posted, the orbital newspaper bringing us detailed news in any language from anywhere in the world at any time of the day or night, and global conference facilities making international business meetings as common in the future as local telephone calls are today.