

SPACE BENEFITS TO MANKIND AS SEEN FROM A FRENCH POINT OF VIEW

By Jean-Pierre M. Pujes
Scientific Attaché
Embassy of France
Washington, D. C.

Being an aerospace engineer, I feel deeply concerned about the attacks against space research coming from the general public; i. e., students and politicians, as well as the man in the street.

I would like to show what benefits space has already brought to mankind and those to come in the future.

I will choose the French space program, as an example.

The French Space Program

In France, like in most other countries, the space program started as a military effort in the late fifties. At the beginning of the sixties, a complete series of rocket engines were available as a result of the first phase of the "Force de Frappe" (the French deterrent) development. But in 1962, though a certain number of rockets had been launched for scientific purposes, civilian space research had yet to be fully organized on a national basis.

The French Government then created the Centre National d'Etudes Spatiales; i. e., National Center for Space Studies (CNES), the French space agency. One of the first tasks of the CNES was to control the development of the French satellite launch-vehicle DIAMANT. From 1966 up to now, seven satellites have been launched by DIAMANT (six French satellites and a German one, DIAL). In addition, two French satellites were launched by U. S. Scout rockets as a result of a joint Franco-American program. The first DIAMANT-launched satellite was purely technological. The following ones were merely assigned to scientific research. However, the last French satellite, launched by a NASA Scout rocket from Wallops Island, Va., in August 1971, was already an applications satellite. This satellite is part of a multinational meteorological program, EOLE. According to this program a few hundred balloons have been launched by the French from Argentina.

These balloons fly at a constant altitude and are pushed away by the winds. They are located and interrogated by the satellite to which they give the values of the temperature and pressure of the atmosphere around them. Then the satellite sends back that information to the nearest ground station. The interest of using a satellite is to know, simultaneously, the characteristics of the atmosphere at very distant points over deserts and oceans, where no meteorological stations exist on the ground.

From the positions of the balloons, meteorologists will derive the directions of the winds, and using the telemetered informations, should be able to predict the evolution of the numerical parameters of the atmosphere. This is important because, until now, the photographs taken by the former satellites gave only a qualitative and not a quantitative idea of the atmosphere.

This satellite is an example of what France intends to do in space during the coming years. The purely French national program will consist of only a few small satellites, either technological or scientific. Their number will be limited to the minimum necessary to maintain the high level of knowledge of the space industry and research laboratories. The most important efforts will be directed toward applications, and they will be made in cooperation with other countries either on a bilateral basis or through multinational organizations.

International Cooperation

France is already involved in many international programs:

1. With Germany and Belgium, France is building a telecommunications satellite system, Symphonie.
2. The Russians are to launch a French

technology satellite before the end of the year; also they plan to use the Guiana equatorial launch site for some of their sounding rockets.

3. India, as well as Pakistan, is building French sounding rockets under license.

4. France is also one of the most affluent members of such European organizations as the European Launcher Development Organization (ELDO), which is building launch vehicles, and the European Space Research Organization (ESRO), which is making satellites.

5. Last but not least, France and the United States have cooperated since the beginning of space research on many projects, and the cooperation still continues. This cooperation is considered so important that France has a permanent representative in Washington, who is in charge of space problems. As far as scientific research is concerned, French scientific experiments will be flown on two American satellites, the Orbiting Solar Observatory (OSO-1) and the High Energy Astronomy Observatory (HEAO-B). On the other hand, U. S. sounding rockets are to be launched from the French Kerguelen Islands, close to the Antarctic. Furthermore, French scientists are studying lunar samples and they are, after Great Britain, the most important national group outside the United States to do so.

On applications programs, apart from the International Telecommunications Satellite Consortium, INTELSAT, France has an agreement with the United States regarding the ECOLE project mentioned above, and collaboration on a future data collection satellite. The Television Infrared Operational Satellite (TIROS-N) is on its way. The AeroSat systems project of air traffic control over the oceans, which was initially a French project in relation with the Concorde supersonic airplane, is now a joint U. S. - European program. MeteoSat is also a joint program, which was at the beginning a French-American meteorological project. Finally, France is looking forward to participating in the post-Apollo program (Space Shuttle and Station), if the conditions are acceptable. All this cooperation has proved useful, as it has considerably lowered, for each nation, the cost of space projects involved.

Space Benefits to Mankind

Though the part of the French gross national product given to space activities is very small (less

than 0.4 percent), the results achieved have been great.

Space research is no longer a way to gain prestige only for the French Government. Nor is it a means to improve technology in other fields of activity, except, perhaps, for some cases (participation in the post-Apollo Shuttle program might be justified by its consequence for the French aeronautical industry).

The direct benefits are by far the most important ones.

Scientific satellites help increase our knowledge of the universe. Astronomers can look at the stars from a satellite, for instance, without being hampered by atmospheric radiation absorption. Space astronomy is particularly important. Though some scientists do not accept the idea, it can be confessed that one of the reasons why space astronomy experiments are financed is that the results may help understand the process of energy being produced by nuclear fission. Such an energy production exists in stars, whereas on earth, the only way of producing nuclear fission energy is still the hydrogen bomb, which is not of a very convenient use.

Solar observation satellites are useful, too, since the sun is by far our most important source of energy and as the weather is dependent on solar activity. As a matter of fact, solar observation satellites are, in the long run, meteorological satellites. However, direct application satellites will soon bring benefits to mankind. Meteorological application satellites have proved useful saving many lives forecasting hurricanes. New developments, like EOLE, will help much more to accurately forecast the weather. Data collection systems, inspired by the EOLE technology, will authorize collection of data coming from very remote areas on the oceans as well as on earth. One can expect to get a better knowledge of the streams by replacing EOLE balloons, for instance, by buoys. This could be useful to the meteorologists, as well as to the oceanographers or the sailors.

Communication satellites are, of course, such a convenient solution to communication problems, particularly across the oceans, that within 20 years the cable industry will encounter a lot of difficulties if it does not react rapidly.

Navigation satellites will help programming aircraft landing and will save passengers time, permit

better air traffic control and better communications between airports and airplanes, and increase the airlines' efficiency and help reduce the fares.

Satellites, at least, will help to obtain a better knowledge of earth resources through remote sensing. The United Nations is sponsoring an action on this subject. France has already done some preliminary work with aircraft and balloons, showing how much better results are when increasing the altitude from which observations are made. Until now, some forests in the south of France, for

example, which were believed to be sound, proved to be completely infested. This fact would not have been easily known through conventional means.

Conclusion

Space research has been very useful. Direct benefits have already proved very important and more are coming. In addition, space research has helped develop cooperation between nations, thus preparing a better world to live in.