

Cartography is the science of map making and map revision. Both developing and industrial nations require accurate, current maps depicting natural resources, cultural features, and related topography. Follow-on Apollo Applications flights in earth orbit will enable man by the use of cameras and other remote sensors to scientifically photograph and obtain multi-spectral data from the entire surface of the earth to fulfill these requirements.

Hydrology and water resources

Hydrology is the science concerned with the study of the distribution, composition, quality and quantity of surface water and ground water on the land areas of the earth. Because water is generally a dynamic resource, it should be continuously evaluated, both in time and space, with respect to climatic and physical factors and human use. The availability of water is essential to the continuous human occupancy of any land area on the globe and an abundance of water is needed for vigorous industrial or agricultural progress. Long duration manned flight operations will provide a platform for experiments to develop techniques for the study and inventory of large segments of our water supplies.

Oceanography

Oceanography is that collective science concerned with the understanding of the oceans. By its very nature, it is closely allied to a large number of separate scientific disciplines including biology, hydrology, geology, physics, meteorology, chemistry, and geodesy. Our knowledge of the oceans is not increasing commensurately with our ever increasing activity on and within the ocean itself.

A major objective of Apollo Applications follow-on missions experiments will be to develop methods to effectively utilize the vast economic potential of the oceans. Increased production of fish and other food from the sea is foreseen as well as the increased reliability of predicting sea state conditions. Synoptic and longrun monitoring of the sea/state can be made from orbital space platforms, with attendant estimates of wind strength and direction of the gross storm derived energy flux near coastlines, and of oceanic climatology. Sea ice movement and remote arctic and tropical floods could be monitored, and improved geologic mapping in structurally complex areas could be conducted.

Political and social benefits

The potential benefits in the application of remote multi-spectral sensing are impressive. Today more than two-thirds of the world's people suffer from hunger or malnutrition. The major political and social concerns of many national governments revolve about the problems of feeding their people. A host of international regional, national and private organizations are engaged in "food for peace" and "freedom from hunger" campaigns. All these activities have political and social as well as economic implications.

The economic development of African, Asian and South American countries is highly dependent upon improvement in their agriculture. All programs of agriculture development involve data gathering and processing. In the food-and-fiber surplus countries a continual search goes on for refinements and improvements in their survey and analytical methods. In many food-and-fiber deficient countries, programs are being initiated to develop systems of data gathering and analysis. In both groups of countries remote sensing techniques could greatly accelerate and expand the operations of data gathering and processing. Since individual nations would be involved, an overall policy sanctioned by the United Nations would have to be developed on how this data would be shared and made available to all nations.

Communications and navigation experiments

Within the Apollo Applications capabilities for communications operations in earth orbit and in the vicinity of the moon, some specific follow-on missions experiments under consideration will have a direct impact on the lives of the average citizen of the world during the early 1970's. For example, an Apollo Applications mission in synchronous, equatorial orbit has an enormous potential for conducting advanced communications experiments which involve in particular a combination of multi-kilowatt space power systems and large space erectable antennas; and also very large diameter lenticular passive radio reflectors. The tremendous payload capability of Apollo launch vehicles could be used