SPACE

Better Maps With Satellites

Information from satellites can save money, make travel routes shorter and safer, and result in the best maps man ever made by employing fewer triangles to measure distance.

By JOHN DOBBIN

➤ A WINK from the earth-orbiting satellite Anna may be unromantic compared to a wink from the planet Venus, but Anna's wink can mean money in your pocket.

Anna and other geodetic satellites, those used in measuring the earth, will help engineers make maps more cheaply and accurately than ever before. Only satellites of these types can provide a practical way to measure distances, such as those between continents and between continents and islands far removed from large land masses.

More accurate measurements of distances will mean shorter and safer travel routes and lower travel fares. Other benefits will come when map-makers can use to the fullest extent the information collected by satellites.

Satellite information will enable scientists to determine more accurately than ever before the shape of the earth, its size, and where its center is. This will allow better measurement of distances than before.

Satellites give scientists broad views of the earth, needed to improve the quality of maps. Earth-orbiting devices "view" the sweep of whole continents and oceans so that scientists no longer need to measure long distances piecemeal, thus increasing precision.

Better Accuracy

Without satellite measurements, surveyors cannot know within a mile or so the distances between two places, such as islands remote from a mainland. Now they will know within hundreds of feet. Scientists even anticipate measuring within one or two parts per million of the actual distance. Especially at sea, satellites will do away with slow, uneconomical measurements by ships that have difficulty maintaining their positions long enough to make even a single measurement.

Other uses, in addition to mapping, will be made of information gathered by satellites.

There will be better methods of searching for persons in distress at sea or in air accidents.

Satellite methods have detected icebergs and ice floes much sooner and over much wider areas than was possible previously. Satellites could be used to warn skippers of storms so they could sail their ships around them. Satellites can be used to help avoid collision by warning of the nearness of other vessels.

Besides the loss of lives in sea disasters, weather damage claims alone are filed each year for about 800 ships of 500 gross tons or more. The U.S. Navy estimates that, even without satellite methods, about two to three million dollars could be saved each year because ship travel time could be shortened by as many as 14 hours for each trip. Using satellite methods, Navy officials feel that even further savings in travel time can be realized when satellite and other new methods are combined to determine the very best and shortest routes for ships.

More efficient and less costly air traffic control also is anticipated. Even in this jet-aircraft age, scientists expect satellites will help prevent collisions of two planes that may not otherwise know they are near each other.

Authorities predict that present air traffic control systems, as good as they may be, will prove inadequate with the great increase in supersonic craft in the near future. They expect satellite methods will aid solutions of future air traffic control problems.

Although neither Anna nor other earth-orbiting satellites can give all of the answers needed to solve man's many problems, they have given man a capability not enjoyed by any previous generation—that of using satellites instead of previously costly, slow, ineffective or inefficient methods. This is partly because satellites can gather information so fast that it is more meaningful and timely than ever before.

The essential benefit of the new satellite measurements is that information is gathered from several places on earth at the same time.

Anna, one of the satellites used to make the measurements described, weighs about 350 pounds and is one yard in diameter. Anna is equipped with a powerful battery that is recharged by the sun's rays. The intervals between Anna's winks are used in making measurements. Other satellites reflect sunlight and, like Anna, are photographed against a background of stars from two or more places on the earth's surface at the same time.

Few Triangles Needed

By choosing appropriate earth points from which to observe the satellite, engineers can measure between different points and construct continent-wide or even intercontinental sets of triangles. From the triangles, they compute distances by the same methods as used in geometry classes. As few as five triangles could be used to measure the distance across the United States.

The U.S. Coast and Geodetic Survey plans to extend the network from the mainland U.S. to Puerto Rico, the Bahamas, Bermuda and Panama. It also may extend it to the northeast coast of South America and to Alaska and the Aleutian Islands.

Engineers then could connect this series to the Tokyo Datum (one of the many reference places throughout the world from which measurements are made) and proceed from there to include southeast Asia, the southwest Pacific and Australia.

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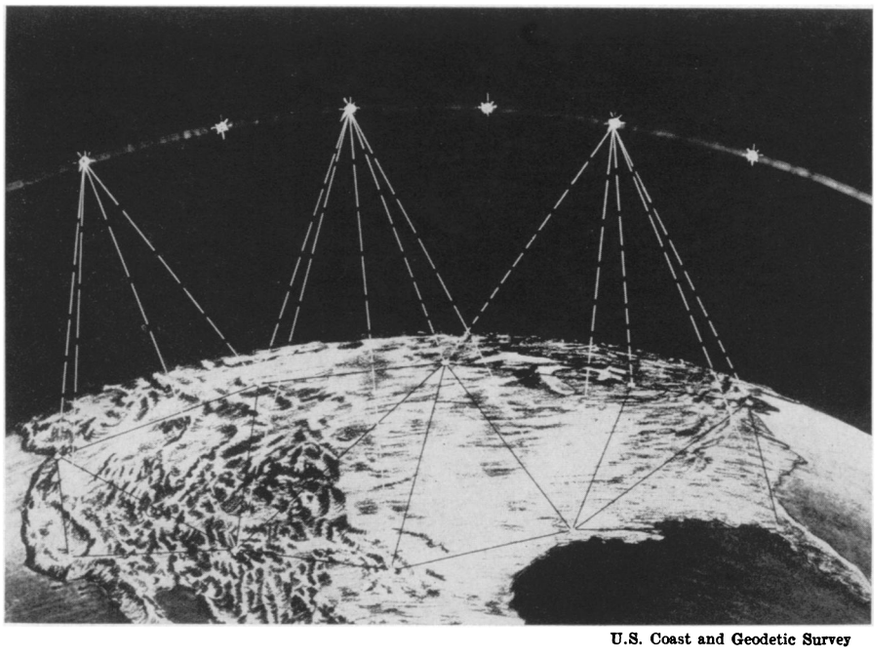

U.S. Coast and Geodetic Survey

MAPPING BY SATELLITE—Use of this most modern method means only a few triangles would be needed to measure the distance across the United States as against hundreds or thousands with older procedures.