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It's no wonder that both U.S. and Canadian Coast Guards now use Ashtech exclusively to provide differential corrections for navigation safety.

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G12 EVALUATION KIT—40% DISCOUNT Call 1-800-922-2401 for this limited-time offer. Kit includes G12 GPS board, antenna, power supply, cables, and Windows® Evaluation software.

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density distribution.

In general, given the same gravity-measurement instrumentation technique, the wavelength resolution improves the closer to the earth's surface the measurements are taken and the slower the vehicle's speed. Thus satellite data, including satellite altimetry, are advantageous as they yield global geographic coverage in a relatively short time, but their resolution is limited presently to wavelengths of about 100 kilometers and greater. For the shorter wavelengths between 100 and 1 kilometers, supplementary measurements from aircraft, ships, and static gravimeters are necessary (albeit obtained more slowly and more subject to regional inconsistencies) to complete the gravity field description. The most recent, complete, and accurate worldwide gravity models were developed from an optimal combination of millions of discrete measurements obtained from numerous platforms employing diverse instrumentation techniques.

GRAVITY DATABASES

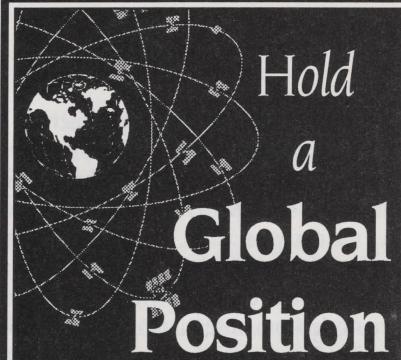
Compiling detailed information about gravity has been a relatively recent endeavor. Although the fundamental mathematical relationships have been known for at least 70 years, reasonably accurate regional or global gravity databases and consistent networks did not exist before the 1950s. In this section I'll look at the historical development of gravity databases and their measurement sources, with particular emphasis on the role of accurate navigation and satellite technology.

Gravimeter Measurements. In the late 1950s and

early 1960s, static gravimeter land measurements were supplemented with measurements from the first developed sea-going gravimeters. These gravimeters generally measure the difference in the scalar gravity magnitude from that measured at an absolute gravity base station. With knowledge of geodetic position to compute the normal gravity magnitude, they can also be used to compute corrected gravity anomalies.

In addition to the obvious need for accurate navigation to compute the normal gravity and to assign a position to the gravity value, surface ship measurements require an accurate knowledge of the east component of velocity. (An east component of velocity is equivalent to an increase in the rotation of the earth. In addition, there is a contribution to the measurement of a gravimeter stemming from the Coriolis force — an apparent force, associated with the earth's rotation, that seems to push objects sideways. The combined correction for these effects is known as the Eötvös correction.) Before the utilization of GPS, the east velocity error — with a sensitivity of 3.9 milligals per meter per second at the equator — had been the dominant error source for all surface ship surveys. These include those of the Naval Oceanographic Office, which has surveyed more than 25 percent of the world's oceans in the northern hemisphere during the last three decades.

Despite the availability of several hundred thousand surface gravimeter measurements by the late 1950s, the need for knowledge of the geoid and vertical deflections over vast land and ocean areas demanded that the database be refined to cover the whole globe.



Ashtech is the leader in precision solutions for global positioning.

We manufacture and market GPS receiver systems and related sub-systems for users worldwide. Our products are used in surveying, mapping, precision navigation, remote sensing, photogrammetry, GIS, agriculture, mining, vehicle tracking, and safety. Position your career with one of the best!

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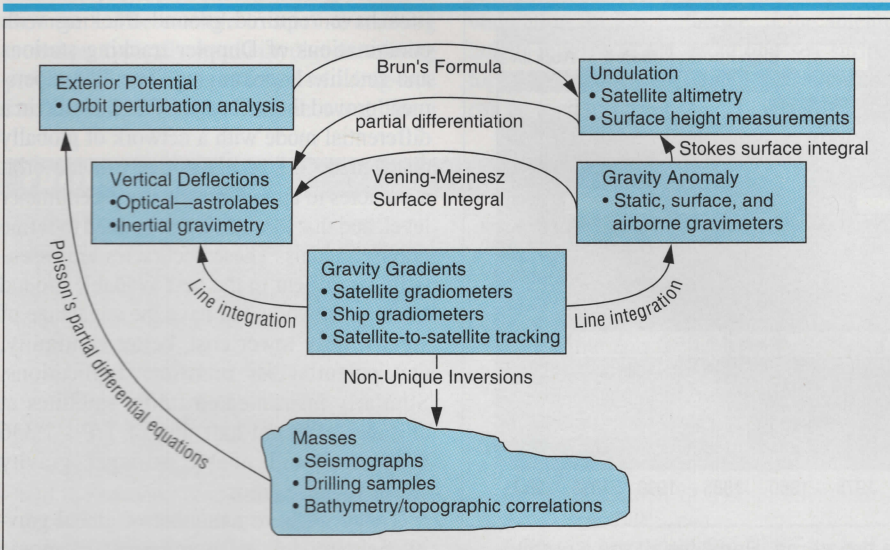
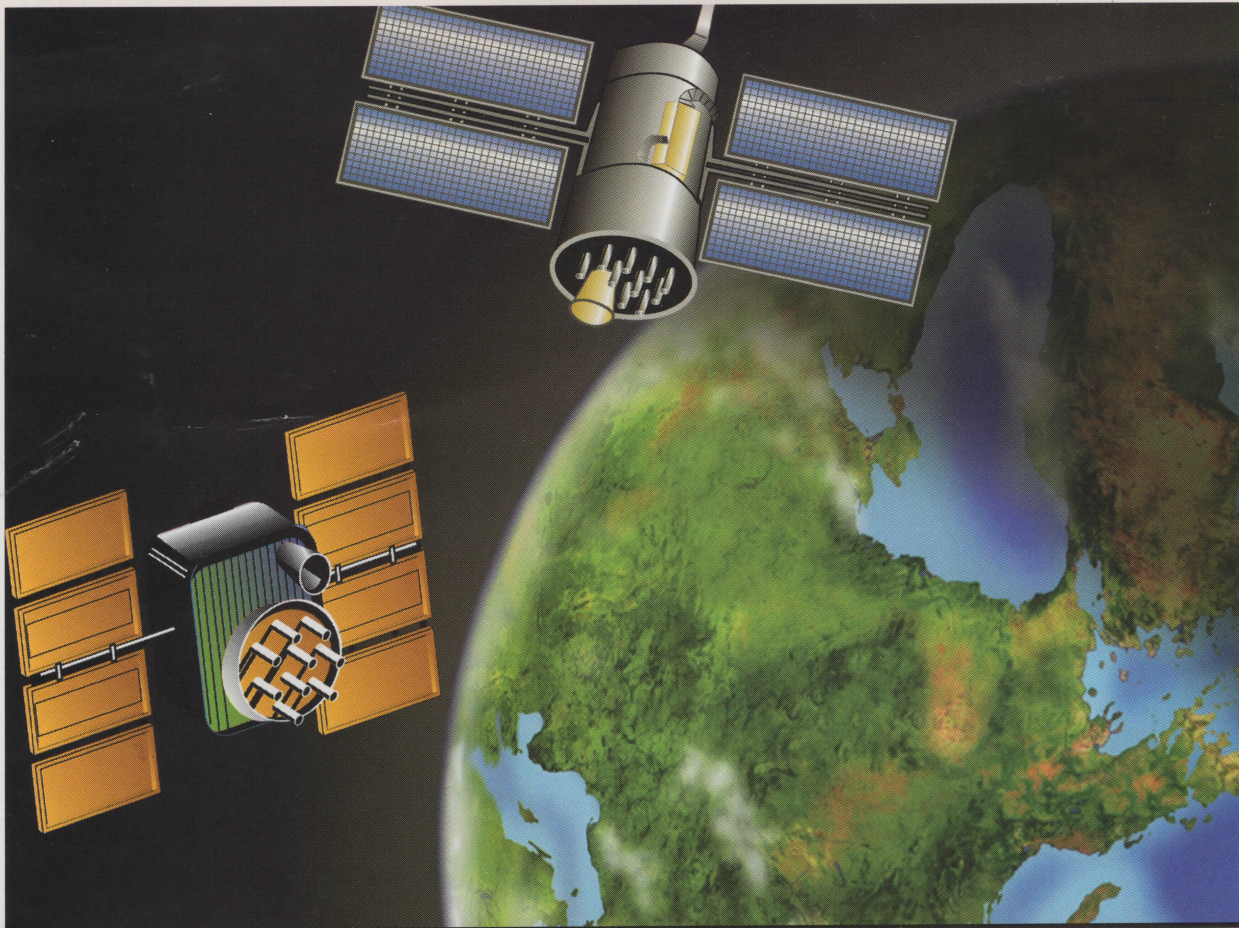


Figure 2. The different gravimetric quantities are related through the theory of the gravity field and are measured by a variety of techniques.

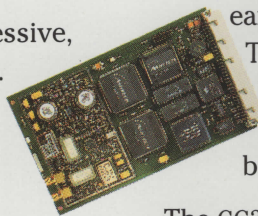


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