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Imperial Land Survey and Geographical Survey Institute as a seat of Geodesy

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C.F. Gauss defined the figure of the earth as an equipotential surface of its gravitational field, which is known as the geoid. Physical Geodesy was established as a separate discipline. To visualize the geoid became the central issue of geodesy. Geoidal undulations, or departures of geoid from the surface of reference ellipsoid, can be derived from deflections of the vertical. By the year 1909, the first order triangulation survey over the whole of Japan was completed, which was conducted by Japanese Imperial Land Survey(JILS) affiliated to General Staff Office. From 1 923 onward, JILS carried out observations of astronomical latitude and longitude, and astronomical azimuth as well, at first order triangulation stations. JILS took over the preceding study by Japanese Geodetic Committee, which revealed that the deflection of the vertical of Japan was remarkably large. On the basis of accumulated results, K. Atsumi(1933) and Y. Kawabata(19 37) investigated the geoidal undulation of Japan. It is important to see that purely academic studies were undertaken within JILS, even though the proper function of which was surveying and mapping for military purposes.
After the end of World War II, JILS was disorganized. Geographical Survey Institute(GSI) was set up to take over the work of surveying and mapping. In 1947, the first order triangulation survey was carried out to redetermine the position of stations affected by the Nankai Earthquake. Astronomical observations were made at 7 stations in south Shikoku. Since then, a systematic astronomical survey had been conducted.
For the projection of geodetic observations on a reference ellipsoid, the ellipsoidal height should be used. However, the geoidal height was not yet known. Therefore, the projection was made by using the orthometric height. No practical inconvenience was caused because of this manipulation. It is of important significance to note that the astronomical survey had been carried out for the purely academic research, that is, for the determination of the figure of the earth which was the fundamental problem of Geodesy.
The situation shifted with the advent of the artificial satellite. Determinations of its orbit enable us to elucidate the gravitational field of the earth. In place of reference ellipsoids, which were different in every country, International Ellipsoid was introduced. Geoidal undulations can be determined with reference to this ellipsoid.
GSI introduced VLBI and satellite observations and had come to perform a part of international cooperation in this new field. The traditional astronomical survey had gone into history. In scientific research, a traditional approach is often superseded by applying a new technology. This produces a new trend in research as is naturally expected. Long-established research is apt to be less valued than it deserves.
Every separate discipline has its own fundamental subject of studies. As satellite geodesy was realized, geodesy marked a stage of the work. Toward the next stage, if it continues to exist, the fundamental subject should be reformulated, though it is not yet necessarily clear.
In GSI, an atmosphere of freedom in academic research was enhanced as compared with that in JILS. Researchers made remarkable achievements. However, this condition has strikingly changed in progress of time. Everything is organized so that the work is fit for administrative purposes.

There remains little room to display originality. The Japanese research system as a whole suffers from bureaucracy driven by centralized structures. It should be stressed that academic research was once recognized as a part of activities of governmental organizations in JILS and in the early years of GSI.

Keywords: Imperial Land Survey, Geographical Survey Institute, Geodesy, Astronomical Survey, Deflection of the vertical, Geoid