

## OBITUARY

**Antonio MARUSSI**

Born 12.10.1908 and died 26.04.1984 in Trieste. Doctor degree in Mathematics at the University of Bologna in 1931, began his scientific career in the same year at the Geophysical Institute of Trieste; from 1932 at the Istituto Geografico Militare as



Surveying Engineer (with a 3 year break—1933/37 at the Assicurazioni Generali of Trieste). Here started his geodetic interest, from the big geodetic and astro—geodetic surveys (in Italy and in Ethiopia, Albania and Greece) to the solution of the main theoretical geodetic problems. Ph. d. in Topography in 1942, is full professor of Geodesy at the University of Trieste from 1951 (Dean of the Science Faculty 1967—73), where he created in the Faculty of Science the Istituto di Geodesia e Geofisica, which became soon the best geodetic school in Italy, well known also abroad.

His main contribution was in the field of physical geodesy, where he introduced the "intrinsic geodesy" a novel doctrine in

which the problems of Geodesy are dealt with in the three—dimensional environment using geodetic coordinates and astronomical reference frames intrinsically defined within the actual gravity field of the Earth. This theory therefore only considers quantities having physical reality and being consequently conceptually accessible to observation, thus rejecting any fictitious reference system (\*).

The principles of Intrinsic Geodesy have been presented for the first time by prof. Marussi at the General Assembly of the International Association of Geodesy in Oslo, 1948. Since that time, the established theoretical principles have been widely developed by other scholars as well, amongst whom in the first place **Martin Hotine** to whom we are indebted for his celebrated book "Mathematical Geodesy". Special Symposia of the International Association of Geodesy, called "Hotine Symposia", are now dedicated to Mathematical Geodesy, in which various modern schools in Geodesy can find the place to debate the new ideas set forward. All Symposia took place in Italy : Venice (1959), Cortina (1962), Torino (1965), Trieste (1968), Florence (1971), Siena (1975). The next one will be in Rome 1985, and will be called "Hotine — Marussi".

It is remarkable that the ideas of Intrinsic Geodesy have anticipated in the theoretical domain the astonishing progress in the experimental field of Geodesy that took place after the launching of the first Sputnik (1957) followed by the spectacular development of space sciences and electronic techniques.

(\*) — These collected papers are reprinted by Springer Verlag as a volume : "From classical Geodesy to Geodesy in three dimensions".

The extensive use of tensors as the specific tool for the mathematical description of Intrinsic Geodesy has contributed to the development of applications in the theory of affine and conformal mapping, and of connections, in the three-dimensional space. Practical uses are expected in the application of these studies to inertial navigation and in the definition of geodetic World Reference Systems. Studies on these lines are followed by several schools in Italy, Germany, and the United States.

He has also studied the structure of a microgravitational field as existing in the interior of a spatial vehicle considering its eventual rotation, and made application to the case of a gravitationally stabilized satellite. Application has been made to the "tethered satellite" proposed for the study of the microgravity field.

In the experimental field, he initiated in the course of the International Geophysical Year experimental studies on Earth-tides by constructing a pair of big horizontal pendulums which gave remarkable results in the study of oceanic and atmospheric loading effects on the crust, on the free oscillations of the Earth, and on the effect of absorption of Solar gravitation by the Moon. He also designed and constructed tiltmeters and, in collaboration with the National Physical Laboratory of Teddington and the Cavendish Laboratory of the Cambridge University, U.K., conceived and constructed an apparatus for the measurement of the gravitational constant and organized and led some relevant Italian geo-expeditions to Karakorum and Hindu Kush (1954, 1955 and 1961).

During these expeditions, he performed extended gravimetric and geomagnetic studies which fill the gap existing between the Russian surveys to the North and the Indian ones to the South. It was also possible to draw for the first time the map of the geophysical parameters for one of the greatest and most complex orogenic system on the world.

For having further and more direct information on the crustal structures in this region of the highest geodynamic interest, Marussi organised in 1974, 1975 and 1978 – in cooperation with Pakistan, Soviet and Indian geophysicists – a Deep Seismic Profile from Karakul Lake in Pamir to Kashmir, through Karakorum and the Indian plain, and promoted also the ALGEDOP project with the purpose of performing the potential anomalies in the alpine region and in the central Mediterranean by means of the Doppler observation of the TRANET satellites, in connection with the geoid determined on sea by SEASAT.

From 1975 he initiated a promotional activity with China, through regular trips and contacts, which brought to an agreement with the National Institute for Geodesy and Cartography in Peking for the realisation of 11 absolute gravity stations (in 1981, by Istituto di Miniere e Geofisica Applicata, Università di Trieste) and of gravimetric profiles through the Karakorum and Himalaya mountains.

All these activities derived from a specific aspect of his character : his open-minded interest in all the news. Connected with his exceptional intuition, this is also the background for his specific scientific production. The validity and importance of which is becoming more and more recognized with time.

The scientific activity is documented by 105 publications and one volume on the Geophysics of the Karakorum (Brill, Leiden, 1964).

The main official acknowledgments have been :

- President of the Italian Geodetic Commission (1969–1977) ;

- President of the International Association of Geodesy (1967–1971) ;Honorary President since 1971 .
  - Member of the Istituto Veneto di Scienze, Lettere ed Arti, Venezia (1977) ;
  - National Member of the Accademia Nazionale dei Lincei, Roma (from 1969) ;
  - Price 1962 for Astronomy, Geodesy and Geophysics by the Ministero della Pubblica Istruzione ;
  - Golden Medal for Science by the same Ministry ;
  - Foreign Member of the Royal Astronomical Society, London (from 1969) ;
  - Member of the Council of the United Nations University (1972–1980) ;
  - Dr. Techn. Wiss. h.c. at the Technical University of Graz (1977) ;
  - Fellow of the American Geophysical Union (1977) ;
  - Corresponding Member of the Association Nacional de Ingenieros Géografos, Madrid.
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