

**SCIENTIFIC AND PROFESSIONAL ACTIVITY OF
PROFESSOR VLADETA S. MILOVANOVIĆ****N. Bratuljević¹, M. Dačić² and Z. Cvetković²**¹*Faculty of Civil Engineering – Institute for Geodesy, Bul. revolucije 73/I,
11000 Beograd, Yugoslavia*²*Astronomical Observatory, Volgina 7, 11000 Beograd, Yugoslavia*

(Received: September 13, 1996)

SUMMARY: The scientific and professional activity of our distinguished geodesist and astronomer Professor Vladeta S. Milovanović (26.11.1928, Bogovadja-Valljevo – 16.12.1995, Beograd) is presented and his bibliography is listed.

As the year 1995 was nearing its end, from the circle of relatively few of those acting in the astro-geo sciences parted Professor Dr Vladeta Milovanović, the leading personage in the field of geodetic astronomy not only within Yugoslavia, but much wider. By his researches he took an important part in the development of geodesy and astronomy, contribution to the reputation of our science in general by his results.

Professor Vladeta Milovanović was known as a one capable to connect theoretical concepts with practical needs. His activity, as a scientist, as an engineer, or a university teacher, was characterised by completeness and tenacity. He started the realisations of his ideas only after a thorough and detailed consideration and checking.

With great skill he used the existing literature and in presentations he always quoted the results of his predecessors. He had a fine way of expressing and a feeling of responsibility for every written word and advocated standpoint.

Vladeta Milovanović's engagement in geodetic astronomy begins as early as 1954 when he took degree at the Department of Geodesy of the Faculty of Civil Engineering. After three years spent working in the "Savezna geodetska uprava" (Federal Geodetic

Administration), in late 1957, he becomes assistant for the subject of Geodetic Astronomy.

As a young and promising specialist he became an Alexander-von-Humboldt fellow in 1963 to spend several years abroad for the purpose of advancing his studies. Thanks to his talent and tenacity, he obtained his PhD in 1967 with an excellent mark at the Technische Universität Berlin.

In his PhD thesis Prof. Milovanović demonstrated that the disagreement between the internal and external accuracies in the measuring results of geodetic astronomy are due to the instrument effects, rather than to those of atmosphere and refraction anomaly as it had been thought earlier. There he indicated the methods of measuring and the techniques of temperature protection of the instrument. This can produce a significant decrease of the change of condition of parts of an instrument by which the precision and efficiency of determinations in geodetic astronomy is enhanced. This standpoint of his characterised his ambitions and results obtained throughout his further work.

Prof. Milovanović's scientific field contributed to his cooperation with astronomers of Belgrade Astronomical Observatory lasting for years. In addition, during his long scientific career Professor was

engaged over a few years at the Astronomical Observatory where he, from 1968 on was successfully directing the Latitude Service and since 1969 also the Time and Longitude Service.

Just there, in the Latitude Service of the Belgrade Observatory Professor's skill of connecting the theoretical approach with practical solutions was fully expressed. Due to his insisting and under his skilful direction improvements were introduced which significantly enhanced the accuracy of latitude determination with the Zenith Telescope of the Astronomical Observatory in Belgrade. These novelties diminished to a high degree the temperature effects on the instrument and the conditions of observations. The possibility of diminishing or excluding the effects of some parameters on the measuring results by a special way of data treatment was profited to the full.

In consequence of all this the mean-square error of latitude determination from one Talcott's pair with the Belgrade Zenith Telescope was reduced to a value of $\pm 0''.146$ from the old one of $\pm 0''.272$ (Grujić et al. 1989). Besides, the outer accuracy of latitude determination placed these results in the highest international class.

After assuming office at the Faculty of Civil Engineering in 1972, where he first became a reader and then (in 1979) a lecturer of Geodetic Astronomy, he continued his teaching and educational work.

It should particularly be emphasized that Professor Milovanović through his endeavouring, readiness to aid and advise, in general, through his attitude towards younger colleagues acquired a great popularity among the students. That is why he was the supervisor for many bachelor, master-of-science and PhD theses.

Dr Vladeta Milovanović's activity involved the following fields: geodetic astronomy, geodetic metrology, geodetic reference networks, geodetic refraction and theory of instruments.

Geodetic astronomy, the basic field of V. Milovanović, is treated in the following references:

1, 3, 4, 5, 6, 14, 16, 17, 19, 20, 21, 24, 29, 35, 46, 49, 65, 75.

Professor Milovanović's papers bearing on geodetic metrology appear as a result of his tenacious work and a great number of measurements performed. Knowing splendidly the development of measuring methods and techniques he initiated the question of regulating the matters of geodetic metrology to be settled in the framework of national metrological legislation. To this group belong papers with the following numbers:

25, 32, 34, 36, 42, 43, 44, 48, 49, 51, 52, 53, 54, 58, 59, 61, 66, 74, 78.

Great importance was attached by Prof. Milovanović to the retreatment of the existing and to the formation of new national geodetic reference networks (astrogeodetic, gravimetric and levelling) and to their linking with the EUREF. Here he particularly advocated the application of the GPS technology in the formation of a new national reference network. In connexion with the reference networks the following papers were published:

26, 39, 45, 46, 47, 53, 54, 55, 61, 67, 70, 76.

To the field of geodetic refraction, a phenomenon having an important role in geodetic measurements, belong papers with the following numbers:

23, 41, 60, 64, 77.

The measuring methods, instrument adaptation and improving of the constructive solutions were subjects of special interest of Prof. Vladeta Milovanović. The papers concerning the application of inertial techniques for the purpose of azimuth determination had a wide response. As for the instruments themselves, the original solution for astrolab Ni002 should be mentioned – tested in the INTAL'86 campaign in Germany along with the Professor's contribution to the construction of the Czech circumzenithal VUGTK used in field astrogeodetic measurements. Thereto belong the papers:

2, 8, 9, 11, 12, 13, 15, 18, 19, 22, 23, 27, 28, 31, 33, 34, 37, 38, 40, 43, 44, 48, 50, 51, 52, 55, 56, 57, 61, 66, 67, 68, 69, 71, 72, 73, 74, 78.

In addition, Prof. V. Milovanović showed a strong inclination towards the applying of probability theory and mathematical statistics in treating the measuring results in geodesy and astronomy. He derived the rules for calculating the semi-axes of error ellipse and its orientation for different models of determination of geodetic points. Here should be added his works concerning the study of possibility of deriving the weight coefficients and the effects of rough errors in mathematical models used in smoothing by the least-square method. To this group belong the papers:

7, 9, 10, 11, 15, 30, 62, 63.

Of special interest is the paper (No 10) in which the examination of correlation between two accidental quantities containing both independent and dependent random errors was presented, was cited by Prof. Wolf in his textbook of smoothing calculation, giving a complete information on this problem.

For needs of teaching he wrote, together with Prof. B. Ševarlić a textbook "Geodetska astronomija 1" (Geodetic Astronomy) which, though accepted, has not been published yet. He complemented this textbook with five written lectures which can be found in the library of the Civil-Engineering Faculty. On special postgraduate courses organised by the Army Geodetic Service he taught a subject "Mathematical Models in Geodetic Astronomy" for which he wrote the lectures.

In his last paper to be published in the monograph "Geodetske referentne mreže SRJ" (Geodetic Reference Networks of the FRY) V. Milovanović speaks about the importance of the astrogeodetic determinations:

"With regard to the modern concept of formation of fundamental reference networks the determinations in geodetic astronomy have a somewhat changed role. Namely, their application is centred on the determination of the detailed geoid form because the astrogeodetic vertical deviations are obtained without hypotheses about the internal structure of the Earth. Hence they are important in the comparative examinations of the plumb-line deviations obtained by using other methods. On the other hand, the determinations of geodetic astronomy preserve their calibrating function for the inertial reference frames and gyrotheodolites in particular."

The cooperation of Belgrade astronomers with Dr Vladeta Milovanović ran over the last years through projects "Multidisciplinary Studies of Latitude Variations" (Osnovna zajednica nauke, Beograd 1989 – 1991.) and "Multidisciplinary Studies of the Current Movements of the Earth's Crust in the region of Yugoslavia" (Savezno ministarstvo za nauku, tehnologiju i razvoj, od 1994.). In this joint research the analysis of astrogeodetic observations was particularly stressed.

The Professor's witty comments and suitably used quotations will be long remembered. Following every conversation and consultation new and fresh ideas resulted. In fact, every meeting with the Professor was a rich event. He would impress to his colleagues and coworkers in an unimposing way that the subject of an investigator's engagement had a national importance and that the action should be honestly and completely finished. This really was, the Professor's attitude concerning the scientific work.

During his long career Prof. Milovanović took part, as a collaborator or head in eight scientific projects. He participated also in working out studies, projects and surveys, more than thirty of them during two decades.

Among others he attended many international scientific meetings and he was the chairman of the Organising Committee for the International Workshop on Atmospheric Refraction held September 3-5 1987 in Belgrade.

He was a member or an official in several international scientific associations such as: International Astronomical Union (member of Commission 19), International Geometer Federation (GE Commission), International Geodetic Association (Special Study Group 1.78), also associated member of UELN, etc.

At the moment of his death he was Chairman of the National Committee of Geodesy and Geophysics.

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**НАУЧНА И СТРУЧНА ДЕЛАТНОСТ
ПРОФЕСОРА ВЛАДЕТЕ С. МИЛОВАНОВИЋА**

Н. Братуљевић¹, М. Дачић² и З. Цветковић²

¹*Грађевински факултет – Институт за Геодезију, Бул. револуције 73/1,
11000 Београд, Југославија*

²*Астрономска опсерваторија, Волгина 7, 11000 Београд, Југославија*

УДК 929 (497,11)”19/19”М:52(092)
Стручни чланак

У раду је приказана научна и стручна делатност нашег истакнутог геодете и астронома професора Владете С. Миловановића

(26.11.1928, Боговађа-Ваљево – 16.12.1995, Бео град) и дата је библиографија.