

ASTRONOMER TIBERIU OPROIU TURNED 80

ALEXANDRU POP¹, MIHAI BĂRBOSU²

¹*Astronomical Institute of the Romanian Academy, Astronomical Observatory Cluj-Napoca, Cireșilor 19, 400487 Cluj-Napoca, Romania*

Email: andi_pop@yahoo.com

²*Rochester Institute of Technology, School of Mathematical Sciences, Rochester, NY, USA*

Abstract. We prepared this paper for the special volume dedicated to Dr. Tiberiu Oproiu, prominent personality in Romanian Astronomy.

Key words: History of astronomy–In Honour .

Born on September 22, 1939 in Galați village, town of Pui, Hunedoara county, Tiberiu Oproiu attended the elementary school in his native village and then continued in the city of Petroșani. In 1959 he became student of the Faculty of Mathematics-Theoretical Mechanics, Department of Computation Machines, within the “Babeș-Bolyai” University of Cluj, which he graduated in 1964. The same year he becomes Assistant Researcher at the Astronomical Observatory of the same university. Between October 15, 1971 and August 15, 1972 he completes a research training at the Astronomical Observatory of the University of Warsaw, being the recipient of an UNESCO scholarship. On May 21, 1975 he defended his Ph.D. thesis and received the title of Doctor in Mathematics, with concentration in Astronomy. His thesis was entitled *Contributions to the Theory of Motion of Artificial Satellites in a Resistant Environment* (i.e. atmospheric drag) and his Ph.D. advisor was Professor Árpád Pál.

During his career, Dr. Oproiu went through all the levels of the professional hierarchy: Scientific Researcher (1970), Scientific Researcher III (1990), Scientific Researcher II (1990) and Scientific Researcher I (1993). At the same time, together with the Research Group of the Astronomical Observatory from Cluj-Napoca, he went from the “Babeș-Bolyai” University to the Center for Astronomy and Space Sciences of the Central Institute of Physics in Bucharest (1977), and then to the Astronomical Institute of the Romanian Academy (1990). In 1990 he was elected Head of the Research Group of the Astronomical Observatory from Cluj-Napoca, a position he held until his retirement, in 2013. The same year he applied for and was granted accreditation to serve as Ph.D. director of theses in Mathematics with a specialization in Astronomy.

Dr. Tiberiu Oproiu was a pioneer and had substantial contributions in the area of optical observations (visual, photographic and photometric) of artificial satellites and the field of computer processing of observational data. In addition, he developed the first computational programs for astronomical data processing with the help of the

first Romanian transistor computer, DACICC-1. These programs were intended for the computation of ephemerides and orbit determination of artificial satellites along with the estimate of the high atmosphere state parameters, based on the orbital drag data. With the help of computers he also studied the motion of artificial satellites by numerically integrating the equations of motion.

Over the years, Dr. Oproiu had significant results on several theoretical problems from Celestial Mechanics, like the restricted three-body problem (determining real motion domains, zero velocity surfaces, etc.) or the influence of resistant environment, light pressure and non-centrality of the Earth's gravitational field on the dynamics of artificial satellites and near-Earth objects (NEO); in this context, he used the high accuracy Everhart numerical integration method. He also developed methods based on spline functions in solving various astronomical problems and collaborated with other researchers in carrying out studies on the physical and geometric properties of some relativistic stars. Last but not least, we mention his inspiring studies of archaeoastronomy on the astronomical meanings of the Dacian sanctuaries from Sarmizegetusa Regia. From Dr. Oproiu's research topics we generated the word cloud given in Figure 1.

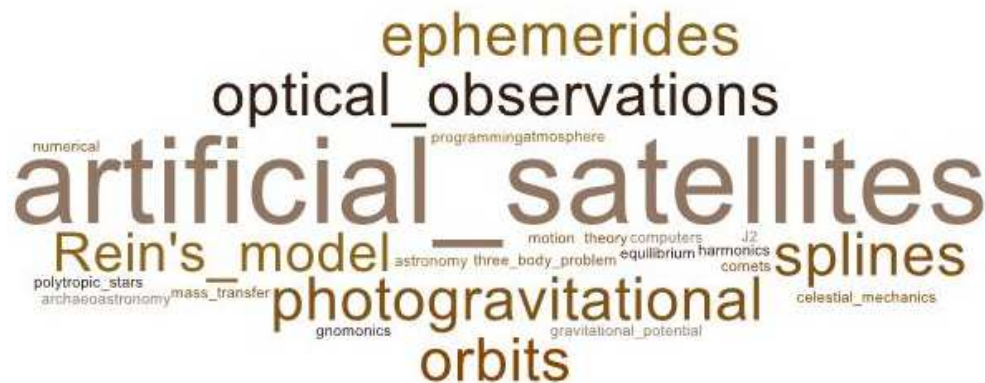


Fig. 1 – Dr. Tiberiu Oproiu: research topics word cloud.

The scientific activity of Dr. Tiberiu Oproiu materialized in the publication of over 150 scientific papers. Here are some of the journals where his works were published: *The Astrophysical Journal*, *Acta Astronomica*, *Highlights of Astronomy*, *Nabliudeniia ISZ*, *Romanian Astronomical Journal*, *Publications of the Astronomy Department of the Eötvös University*, *Studii și cercetări de astronomie*, *Revue d'Analyse Numerique et de Théorie de l'Approximation*, *Revue Roumaine de Mathématiques Pures et Appliquées*, *Studia Universitatis Babeş-Bolyai — Seria Mathematica*, *General Mathematics*, *"Babeş-Bolyai" University — Faculty of Mathematics and Physics Research Seminars (Seminar of Celestial Mechanics and Space Research and Semi-*

nar of Stellar Structure and Stellar Evolution) and *Visual Observations of Artificial Earth Satellites made at Station No. 1132 – Cluj* (between 1965 and 1977). Dr. Tiberiu Oproiu was also the co-author of several books: *Space Rockets* (in Romanian, Editura Științifică și Enciclopedică, 1978), *Guide to the Total Solar Eclipse of August 11, 1999* (in Romanian, Dacia Publishing House, 1999) and *Astronomy. Collection of Exercises, Problems and Computer Programs* (in Romanian, University of Cluj-Napoca, Faculty of Mathematics, 1985, 1989) which, if not the very first, then one of the first works presenting algorithms and programs for astronomical computations in Romanian; the fifteen computer programs presented in this book (in BASIC) covered topics in Fundamental Astronomy, Celestial Mechanics and Astrophysics.

Dr. Oproiu's research was beautifully complemented by his teaching activity, which was something he was very fond of and an area where he demonstrated a lot of talent. He revealed his passion and teaching skills since the beginning of his activity at the Astronomical Observatory, where he conducted recitation seminars and labs for Astronomy and Mechanics, Fluid Dynamics and later on, at the Faculty of Mathematics and Computer Science, where he taught Celestial Mechanics and Space Dynamics. Between 1999 and 2007 he held an Associate Professor position in the Department of Mathematics at the Faculty of Sciences of the "Lucian Blaga" University, in Sibiu. There he taught General Astronomy, Astrophysics and Advanced Mathematics. Throughout his career, he has overseen and directed numerous undergraduate and master level projects and theses of students from "Babeș-Bolyai" University and "Lucian Blaga" University. As Ph.D. advisor, Dr. Tiberiu Oproiu directed the doctoral activity of six researchers from the Astronomical Institute of the Romanian Academy: three from the Astronomical Observatory of Bucharest, two from the Astronomical Observatory of Cluj-Napoca and one from the Astronomical Observatory of Timișoara. Many other Romanian Ph.D. students in Astronomy have benefited from his experience and knowledge, as he has always been very generous with his time.

Through his activity, Dr. Tiberiu Oproiu has been affiliated with several scientific organizations: *Romanian National Committee on Astronomy* (1974), *Romanian Society of Mathematical Sciences* (1976), *International Astronomical Union* (1976), *European Astronomical Society* (1990), *Romanian Society of General Gravity and Relativity* (1990).

In 1969, together with professors Gheorghe Chiș and Árpád Pál they received the second Prize of the Ministry of Education for a series of papers focused on the use of optical observations on artificial satellites in the study of the physical parameters of high atmosphere. Six years later, in 1975, the Smithsonian Astrophysical Observatory (USA) presented him the Certificate of Appreciation as a result of his outstanding contributions to the Moonwatch artificial satellite observation program, coordinated by this institution.

As Head of the Research Group of the Cluj-Napoca Astronomical Observatory for over 23 years, Dr. Oproiu cultivated a research culture that encouraged collaboration, promoted open discussions, mutual respect and created a highly appreciated work environment, after an authoritarian era. He became a role-model, as he constantly encouraged and supported the new generations of astronomers on a variety of challenging and modern paths, both with scientific advice and research equipment.

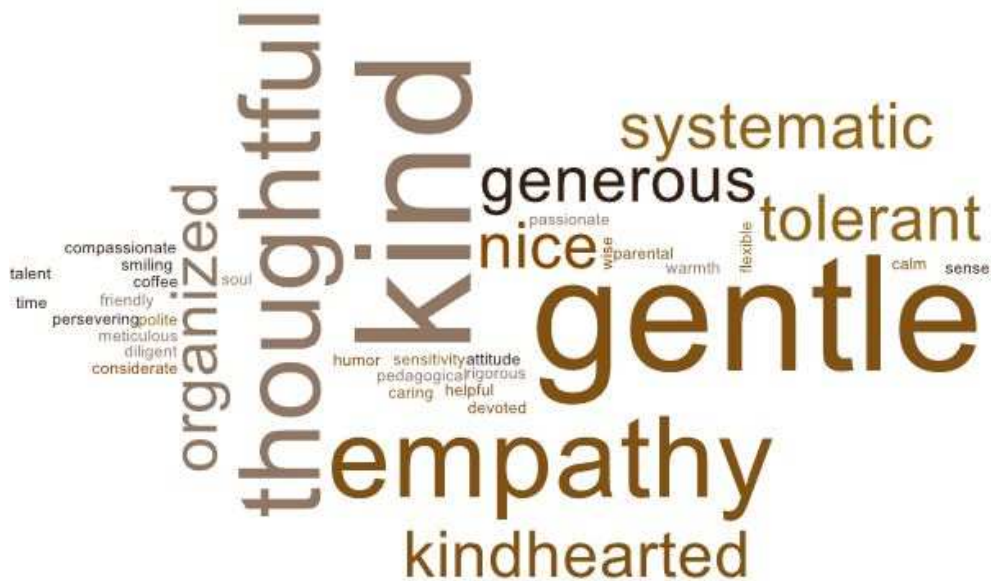


Fig. 2 – Dr. Tiberiu Oproiu: Personality word cloud.

When we started writing this article, we talked to several current and former colleagues of Dr. Oproiu, who wanted to express their views and feelings about him. From their thoughts, we generated the word cloud (Figure 2), which captures some of his scientific and human qualities.

Prof. Vasile Pop, a lifetime friend and collaborator of Dr. Oproiu added: *he is contemporary with the beginnings of space exploration, humble, discreet and a first-rate personality in Romanian astronomical research; I am very grateful for having enjoyed his friendship for over 50 years.*

Likewise, Prof. Bazil Părv noted: *I am honored to consider myself Dr. Oproiu's disciple; with his kindness and willingness to help others, competence and vast scientific culture, tenacity and optimism, he has been an outstanding mentor and a symbol for many generations of mathematicians and astronomers.*

Received on 15 November 2019