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Roman Teisseyre (1929–2022) In Memoriam

Wacław M. ZUBEREK

University of Silesia, Faculty of Earth Sciences, Department of Applied Geology, Sosnowiec, Poland (retired)

✉ waclaw.zuberek@us.edu.pl

The death of Roman Teisseyre, an outstanding Polish geophysicist and scientist, means that those of us who knew him a little closer and longer should try to summarize his immense scientific achievements and bring his extraordinary figure closer to younger colleagues and alumni. This is not an easy task as his achievements are impressively large, enormous, and comprehensive.

Professor Roman Teisseyre was mainly a theoretician dealing with seismology and the physics of the Earth interior and a great part of his output concerns seismology, geodynamics, and thermodynamics of the processes of rock deformation and electromagnetic fields. A number of earlier works he devoted to one of the most difficult and controversial problems of seismology – earthquake prediction and, in particular, the generation of electromagnetic fields in the process of earthquake development and preparation.

Undertaking a (somewhat subjective) attempt to present his most important achievements I would count among them works in the field of:

- diffraction of electromagnetic field on a wedge (his PhD thesis – 1959),
- development of the foundations of the dislocation theory of earthquakes (together with Z. Droste) which takes into account interactions between fractures and explains the mechanism of large elastic energy release,
- development of dynamic relations and generalization of dislocation theory of earthquakes (habilitation treatise – 1961),
- introducing a generalized micromorphic description of the medium into seismology which allows, among other things, a broader explanation of the process of deformation and wave dispersion,
- development of the basis of the theory and interpretation of phenomena occurring before earthquakes, in particular, the development of the theory of stress build-up, induced changes of electric resistivity, and generation of electric fields in seismic areas,
- development of thermodynamical fundamentals of earthquake generation,
- the study and interpretation of telluric precursors of earthquakes in Italy, Greece, and China,

- development of a generalized model of a continuous medium with defects and with nucleation of deformations of the rotation and torsion type, and the theoretical demonstration and empirical confirmation of the existence of rotation waves propagating also in the Earth.

In his publications, the author sometimes used a conceptually advanced apparatus of theoretical physics, and, as a result, these works are not always easy to read and, additionally, understanding them requires adequate preparation.

A very important and significant contribution of Prof. Roman Teisseyre is the editing and co-authorship of a number of multi-volume and unique monographs on the physics and evolution of the Earth's interior, often published in English by reputable foreign (Academic Press, Elsevier) and domestic (PWN) publishing houses. These works try to synthesize the whole of the scientific problems of the physics of the Earth's interior and its evolution and constitute a major contribution to the world geophysics.

Despite the fact that Prof. Roman Teisseyre was mainly a theoretician, a number of his works and research had a clear practical and utilitarian character, which include:

- Initiation of modern mining observations; in particular, one should cite here the first work of this type implemented at the Miechowice coal mine in Bytom (together with S.J. Gibowicz, Z. Droste, J. Hordejuk, and M. Wernik) back in the 1960s. Roman Teisseyre's special achievements include the development of a model of the focus of the shock taking into account the non-shearing mechanism in the source. These works explained the mechanism of destruction taking into account the change of volume in the source, which was some surprise in seismology at that time, presented and discussed quite extensively at a conference in Cracow entitled "Problems of Geodynamics and Rock Bumps" in 1972, organized by the Mining Committee of the Polish Academy of Sciences;
- In 1962 he initiated innovative studies of glacier seismicity, which he continued in three geophysical expeditions to Spitsbergen (1974, 1978, 2000);
- In connection with the International Geophysical Year (1957–1958), Roman Teisseyre initially became secretary of the Committee of the Geophysical Year of the Polish Academy of Sciences, and then, in 1956–1959, an organizer and leader of the Polish geophysical expedition to Vietnam, where he organized two geophysical observatories – at the venues in Phu-Lien and Cha-Pa.

The result of such effective scientific activity was his rapid scientific advancement, as seven years after graduation (1952) he defended his PhD dissertation (1959), only two more years later (1961) he was habilitated and at the age of 38 he became an associate professor (1967) and in 1974 a full professor, at that time regarded as the most talented geophysicist in Poland. At the age of 40, he was appointed a correspondent member of the Polish Academy of Sciences, and in 1980 he became a full member of the Polish Academy of Sciences.

The achievements and merits of Prof. Teisseyre are associated not only with scientific work strictly defined, but also with many organizational functions he held in the scientific community. In 1953, he organized first the Department and then the Institute of Geophysics of the Polish Academy of Sciences in Warsaw, where until 1979 he headed the Department of Seismology, and since 1979 the Department of Dynamics of the Earth's Interior. For a number of terms, he served as a deputy director of the Institute, and in 1970–1972 also as a director of the Institute of Geophysics of the Polish Academy of Sciences (IG PAS), which soon became one of the leading scientific centers of the Polish Academy of Sciences in Poland. For many years he served as a chairman of the Scientific Council of the IG PAS. Also in the Polish Academy of Sciences itself, he held a number of responsible and managerial positions. He was deputy secretary of the Department of Math. Physics and Chemistry in 1973–1976 and Secretary of the Department of Earth and Mining Sciences in 1980–1993, while in 1981–1983 he was a member

of the Presidium of the Polish Academy of Sciences. He chaired the Committee on Geophysics of the Polish Academy of Sciences many times (for a number of terms), was also the Editor-in-Chief of *Acta Geophysica Polonica* and *Publications of the Institute of Geophysics, Polish Academy of Sciences*, inspiring and initiating editions of original scientific papers.

Roman Teisseyre's activities outside Poland are also rich and extensive, as he was repeatedly invited to and worked closely with the leading scientific centers of world geophysics. The following should be mentioned here:

- working as a UNESCO expert at the Institute of Seismology and Earthquake Engineering in Tokyo from 1965 to 1966,
- visiting professor at the Trieste-International School of Advanced Studies at the Center for Theoretical Physics in 1979–1980,
- University of Strasbourg (1984),
- University of Hokkaido-Sapporo, Institute of Seismology and Volcanology (1979).

He had scientific cooperation with Japan, USA, Italy, and Greece in the field of seismology and physics of the Earth's interior, which resulted in a number of joint works. For many years he was a member of the expert group of the UN Disarmament Committee in Geneva on the detection and identification of seismic phenomena (1972–1976), and was also a member of the European Advisory Committee in Strasbourg on earthquake prediction assessments. He also held numerous positions in international organizations:

- Vice President (1970–1976) and President (1976–1978) of the European Seismological Commission,
- member of the Executive Committee of the International Association of Seismology and Physics of the Earth's Interior (IASPEI),
- he was also a member of the editorial committees of *Garlands Beitraege, Bolletino di Geofisica Theoretica e Applicata* and *Pure and Applied Geophysics*.

He became a member of the Finnish Academy of Sciences and Literature as early as 1979, and a Doctor Honoris Causa of the AGH University of Science and Technology in Cracow in 2004. He was the initiator and also the organizer of numerous meetings, symposia, conferences, and scientific gatherings, among which I would like to highlight the Polish-Czech-Slovak symposia of mining, engineering, and environmental geophysics initiated in 1967 and continuing to this day.

A separate area to which he devoted considerable effort was the training of young scientists. He promoted as many as approx. 20 PhDs and served three terms as a member of the Central Qualification Commission for Academic Titles.

It should be emphasized that he came from a family of great merit in Earth sciences with a name well known to all Polish geophysicists and geologists. He was a man with patriotic traditions, since as a young boy he belonged to the secret scout organization "Szare Szeregi". He took part in the Warsaw Uprising and was awarded the Warsaw Uprising Cross in 1986, the Officer's Cross in 1961 and the Commander's Cross in 1969 of the Order of Polonia Restituta, as well as other Polish and foreign awards.

With such outstanding achievements and merits, his personality traits were particularly endearing: his openness and friendliness and especially kind attitude towards young people, his love of sports, for example, downhill skiing, and his extraordinary diligence. Although it is said that nobody is indispensable, the death of Professor Roman Teisseyre has created a gap among Polish geophysicists, which, I fear, will not be easily or quickly filled.

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