

„Der Mohr hat seine Schuldigkeit getan, der Mohr kann gehen“
Fr. Schiller – Die Verschwörung des Fiesco zu Genua, 1782 (Muley Hassan, 3. Akt, 4. Auftritt)

„The Moor has done his duty, the Moor can go“
Fr. Schiller – The Conspiracy of Fiesco at Genoa, 1782 (Muley Hassan, Act 3, 4th perf.)



IN MEMORIAM

DR. SORIN-CORNELIU RĂDAN (1945-2018)

On Sunday, November 11, 2018, our good and beloved colleague **Sorin-Corneliu Rădan** passed away. He was my younger brother. He IS my younger brother. He was, is, and will remain my best and closest collaborator. It is difficult to write an article *in memoriam* for somebody who was so close, not only through professional ties, but also through blood ties, and to remain unbiased. For me, it is hard to talk about him in the past. Our lives and careers have been intertwined. At a distance of nearly two years, we went through the same kindergarten, the same school and the same faculty. Here we have separated, I followed geology, he, a math enthusiast since high school, chose geophysics. We started working in two different research institutes, that are today unified under the Geological Institute of Romania. In 1995, I moved to GeoEcoMar, but as his lab was located in the GeoEcoMar building, our collaboration remained permanent. Over the last two years we have even shared the same office. Our scientific collaboration started in 1973; it comprises several common research projects and dozens of published papers, and is still continuing today, as more joint papers are waiting to be finished. These are the circumstances in which Sorin, my brother, my friend, my colleague, my collaborator, has departed.

LIFE AND MAIN PROFESSIONAL STAGES

Sorin was born on September 13, 1945, in the little parochial house of Melicești village, a settlement spread out on the hills, with no electricity and with no paved roads, not far from Câmpina. He spent his childhood in Slănic Prahova, where he attended school and graduated high school in 1963, as head of his class.

In the fall of the same year, he enrolled at the Faculty of Technical Geology - Geophysical Prospecting Section of the Institute of Oil, Gas and Geology. He graduated in 1968 and became a geophysical engineer. He passed the bachelor's exam with a thesis having as a theme to elaborate a map of the relief of the crystalline basement in the Lower Basin of Strei River on the basis of gravimetric data, a work for which he received the maximum grade. The results of the thesis were subsequently published in a scientific journal of the Romanian Academy (Rădan, 1970). This was the first paper published by Sorin and his only work in the field of gravime-

try. The supervisor of his bachelor's work was Professor Liviu Constantinescu, an academician, who later also supervised his doctoral thesis, a reputed scientist, a professor Sorin admired and loved as his model until the end of life. The respect for his teachers and mentors has always characterized him. Acad. Prof. Marius Visarion was another personality he held in great esteem

In the autumn of 1968, Sorin became a researcher at the Institute of Applied Geophysics (I.A.G), an institute that later merged with the Geological Institute (1974), resulting the Institute of Geology and Geophysics (I.G.G), which, later (1994), became the Geological Institute of Romania (G.I.R). He then went through all the levels of the scientific hierarchy, from scientific researcher to senior researcher grade I (2000). In 2017, already retired, he was granted the title of honorary scientific researcher of the Geological Institute of Romania, status that he accepted with great satisfaction, in acknowledgement of his activity after retirement.

In 1999, he became “Doctor in Geology” with the distinction *„Magna cum laude”*, at the University of Bucharest. His doctoral thesis “Contributions to the study of the magnetic properties of rocks in geophysical and geological context”, synthesizes the results of an activity carried out for a quarter of a century. In 2000, he was awarded the “Gheorghe Munteanu - Murgoci Award” for the year 1998, conferred by the Romanian Academy for the paper titled “Study of the geomagnetic field structure in Tertiary in the context of magnetostratigraphic scale elaboration I - The Pliocene” (Rădan & Rădan, 1998 a).

He retired in 2010, after 42 years of professional activity, but he continued to work at G.I.R. another 2 years with individual work contract – part time, until 2012. Another 6 years of *pro bono* scientific activity followed for the benefit of two institutes - G.I.R. and GeoEcoMar. He was a hard worker and it was his will to continue to pursue the activities that brought him satisfaction throughout his life. For some, he was perhaps just a “bizarre person”, who often stayed late at the office, sometimes, “managing” to miss the last bus home. Friday, November 9, was his last working day. We left the office at 7 o’clock, the next day we went together for a short visit to Slanic, and on Sunday, 11th November 2018 morning, around 7 o’clock, his soul left discreetly the parental home, the place he loved the most, and where he hoped one day to retire.

However, I believe he did not die suddenly on November 11, 2018, as it is known. Deeply passionate about his profession and career, he started to die a little on November 11, 2010 - his first day as a retiree, then after 2 years, on Friday, November 9, 2012, his last day working part-time at the Geological Institute, or, maybe, even on Friday, November 9, 2018, his last working day, after exactly six years of *pro bono* work. The laboratory he created in 1974 began to reduce its activity (due to the diminishing of staff) and its working space (for administrative reasons), the three rooms it occupied being reduced to two, then one, and finally, in the spring of 2017, just half a room, in the office that the two of us shared. The magnetic susceptibility analyzes on bottom and core sediments, performed for almost four decades, ceased by the end of 2015, and were no longer considered useful for the new Danube Delta monitoring approach. His direct contribution was suddenly over. Perhaps, to some, *once his duty was done, he could or should have gone*. He “left” three years later.

The analytical records collected by measurements on thousands of sediment samples from the Danube, the Danube Delta and the Black Sea are, however, an useful and usable database for many specialized studies. Sorin continued to process the stored information, and when he passed away, he was working on a paper to be published in GEO-ECO-MARINA. His collaborators will complete it and other papers will follow.

SCIENTIFIC ACTIVITY

From graduation, to the end of his life, Sorin pursued his professional-scientific activity in the same workplace. For him, it meant loyalty and devotion to the development of a field that he embraced with passion and which he developed until his untimely end. Among others, at a time when G.I.R. has gone through a difficult period, and some researchers have migrated to other institutes, in spite of the fact he had received a “rescue” offer from another institute, he stayed for reasons of loyalty: loyalty for the institute where he formed as a scientist and for the laboratory he had created and developed with much competence, patience, perseverance and determination.

He began his work by initially approaching the domain of magnetometry, but soon, after 1972, his major interest would be polarized by the study of rock magnetism, then of paleomagnetism and magneto-stratigraphy. His initial focus was further extended from the old geological formations to the recent sediments, as well, in riverine, lake and marine areas, initiating the development of new techniques and methodologies, specific to the underwater domain. This fact contributed to the development of the environmental magnetism, the domain to which he has paid the most attention over the past two decades.

The main areas of his professional-scientific activity are presented in the following lines, in more or less chronological order. An exact chronology is difficult to capture, given that over time these areas have overlapped or intertwined.

The beginnings are linked to the period of the Institute of Applied Geophysics (1968 – 1974), and are related mainly to **magnetometry**. He was involved in magnetic and micro-magnetic surveys performed for the elaboration of maps of the vertical component of the geomagnetic field (ΔZ) and for the anomaly of the vertical component of the geomagnetic field (ΔZ_a) for the territory of Romania. During 1968–1972 he led the “Field Team of Magnetometry”, contributing to the realization of the map sheets - Tg.Jiu, Baia de Aramă, Craiova, Sibiu, Braşov, Turnu-Severin, Bacău, Bârlad, Huşi, Fălciu and Iaşi. Some of his first published papers concern the magnetic surveys carried out for the elaboration of these magnetic maps - scale 1:1,000,000, (Airinei *et al.*, 1983, 1985) and scale 1:200,000 – Tg. Jiu sheet (Airinei *et al.*, 1972).

A series of micromagnetic surveys, with applications to mapping the deposits of mineral resources, have been used to explore a magnetite separation within the crystalline rocks from Valea Putnei - Mestecăniş (Roth & Rădan, 1974), or have been tested in geotechnics and archaeology.

The year 1972 represented an important moment for the beginning of his specialization in a more complex discipline – rock magnetism and paleomagnetism. This was a first documentary visit (30 days) at the Institute of Applied Geophysics in Brno (Czechoslovakia), focused on “Field and laboratory methodologies for studying the magnetic properties of rocks”.

In the period following the merge of the Institute of Applied Geophysics and Geological Institute (1974-2012) Sorin began to reduce his involvement in magnetometry activities and started the work for the organization of a rock-magnetic and palaeomagnetic laboratory and a measuring base for (petro)magnetic investigations in the field, in order to enable the development of new fields of research: **rock magnetism, paleomagnetism, magnetostratigraphy** and **environmental magnetism**.

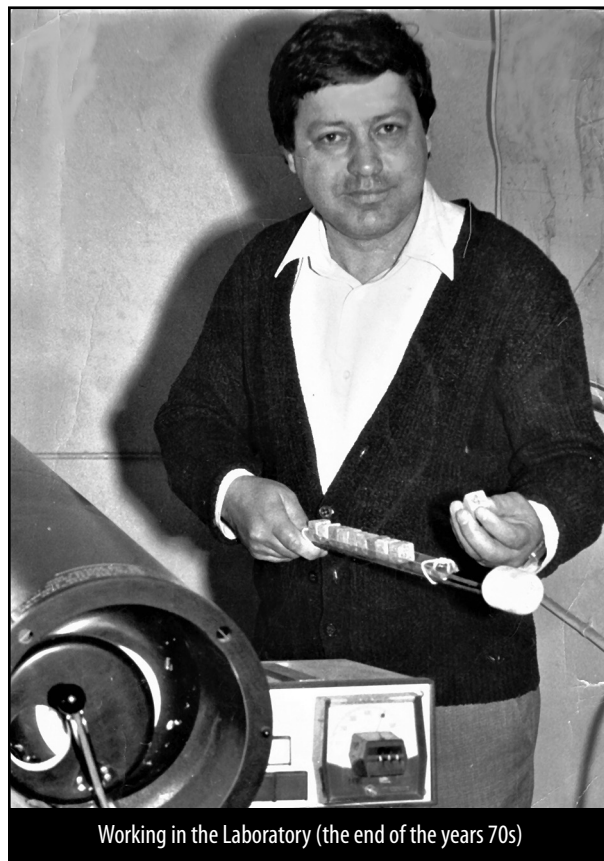
The organization of a modern laboratory would not have been possible without a serious specialization in the new approached areas of investigation and without the tenacity and perseverance required to obtain funds for advanced technical equipment. After the aforementioned visit, there were many other documentation and specialization stages (some at his expense) at petromagnetism and paleomagnetism laboratories in Czechoslovakia (Brno - 1974, 1979, 1990 and Prague - 1974, 1979, 1983, 1985), Ukraine (Kiev - 1975), Russia (1978), Great Britain (Nuffield, Newcastle upon Tyne and Edinburgh - 1980), Hungary (Budapest - 1980, 1983), Germany (Potsdam - 1984), Poland (Warsaw and Belsk - 1986), The Netherlands (Utrecht - 1996).

The documentation stages performed in Brno (1974) and Kiev (1975) have facilitated the personal carrying out of laboratory analyses, that produced the first results of anisotropy of magnetic susceptibility (on rock samples from the perisynclinal area of Iazuri), respectively of paleomagnetism (on a collection of samples of Miocene and Senonian red marls in the area of the Sub-Carpathian Curvature). The data were communicated in 1976, at the National Geophysical Symposium.

In addition, Sorin had a good opportunity to acquire new skills even in our country, during the visits of two scientists specialized in the field of paleomagnetism from the USSR (Russia and Ukraine) in 1977 and 1978, periods (totaling about 3 months) in which progress has been made in both phases of paleomagnetic investigation: field and laboratory.

In this context, the setting up of a laboratory, devoted to activities specific to rock-magnetism and paleomagnetism surveys, was imperative. Sorin took over some of the existing devices, then he intensified the activity dedicated to obtain funding for the future *Laboratory of Palaeomagnetism, Rock Magnetism and Environmental Magnetism*. Finally, he succeeded to acquire the minimum equipment for starting petromagnetic research in the years 1974-1975. Efforts to continuously modernize and expand the field and laboratory metrology base continued with the acquisition of the new proton magnetometers, Geometrics G - 826 (USA). The development of the anisotropy studies of magnetic susceptibility and paleomagnetism, respectively, has become possible in the Institute of Geology and Geophysics since 1978, when, following Sorin's efforts, the "ANISO-10" program (from Czechoslovakia) and the Schonstedt TSD-1 thermal demagnetizer (from the USA) have completed the lab. In 1978, a Romanian proton magnetometer with underwater

sensor (MPP-78) was developed in collaboration with the Institute of Physics and Nuclear Engineering (IFIN) - Măgurele. The technical base was completed in 1982 with equipment from Czechoslovakia (a JR-4 spinner magnetometer, a Kappabridge KLY-2 and a kappametre KT-5), including interface modules for direct connection to computer, printer or plotter.



Working in the Laboratory (the end of the years 70s)

After this period of development, the acquirement of new knowledge (knowhow) and the creation of new research directions, the results did not delay to appear. The development of a new version of the "micromagnetic technique", based on measurements with the proton magnetometers was tested and successfully applied for bauxite lenses of Pădurea Craiului Massif (Rădan *et al.*, 1980, in Rădan, 2014a). The data were used both to evaluate the capability of the high-resolution magnetic survey to map the bauxite lenses, and for the elaboration of a **palaeomagnetic study** by which it has been established a *clockwise rotation of the study area*, interpretation consistent with the existing geotectonic model (Rădan, 2014a).

In the field of rock magnetism, other petromagnetic results, which are among the first published, regard the magnetic susceptibility of the Devonian epimetamorphic schists from the Iazuri perisynclinal zone (Poiana Ruscă Mountains, Southern Carpathians) (Rădan & Rădan, 1980 a,b, 1981, 2012). The huge data bank (50,000 magnetic susceptibility values obtained for cores extracted from 37 exploration wells) led to the first results of magnetic susceptibility anisotropy (Rădan

& Rădan, 1981). Besides, the isosusceptibility maps allowed a (paleo)sedimentological interpretation – the identification of several supply directions for the iron minerals, genetically connected with the volcanogenic material (Rădan & Rădan, 1980 a).

Moreover, also among the first published rock-magnetic data, but for eruptive rocks, are the results provided by the studies carried out on Neogene magmatic structures from Brad area (Metalliferous Mountains). The data obtained offered a clear characterization - from the point of view of the paleogeomagnetic polarity - of the phases of eruption known in the study area (Ghițulescu *et al.*, 1983).

A particular contribution of Sorin to the development of new investigation methods was the introduction of the **magnetostratigraphic and palaeomagnetic** studies in the activity of his laboratory.

The first magnetostratigraphic results were obtained on several Pliocene and Pleistocene sections from Braşov Depression and Perşani Mountains, consisting of volcanic, volcano-sedimentary and sedimentary deposits and were published in the *Guidebook for the INQUA / SEQS field excursion* (Ghenea *et al.*, 1981). The most complex studies of magnetostratigraphy and paleomagnetism were mainly dedicated to the *loess-paleosol sequences* of Dobrogea and to the *Neogene coal bearing formations* from the Dacian Basin.

Since 1982-1983, the magnetostratigraphy has been applied on **loess - paleosol sequences** in order to increase the dating resolution (Rădan & Rădan, 1990, Rădan *et al.*, 1984, 1990, Ghenea & Rădan, 1993). This is the case of the geological map of Romania - scale 1:50,000, particularly the „Peştera” and „Medgidia” sheets. On their imprints, paleomagnetic data associated with the lithostratigraphic columns in Quaternary formations – *North Mircea Vodă*, respectively *East-Nazarcea* were published. Part of the magnetostratigraphic results, *e.g.*, related to *Cernavodă* and *Costineşti-South* sections, were firstly included in the *Guidebook for the KAPG field trip* (Rădan *et al.*, 1984).

A substantial synthesis of the results obtained in Romania in the loess magnetostratigraphy was presented by Sorin in Chapter 2 of the *Field Guidebook* published on the occasion of the *INQUA-SEQS Meeting* held in September 2013, in Constanţa-Romania, devoted to the *Correlations of Quaternary Fluvial, Eolian, Deltaic and Marine Sequences* (Radan *et al.*, 2013). Reinterpretation of a profile from Zimnicea, analyzed in 2000, allowed him to launch the assumption of the *Brunhes / Matuyama* limit interception (0.78 million years), which would represent its first detection in Romania on such cyclic loess-paleosol sequences. In addition, an overview of the data resulted from the magnetic multi-proxy approach of the loess - paleosol sequences from Southern Romania was the subject of a short note (Rădan, 2014b), presented at the *IGCP 596 & 580 Joint Meeting* in Mongolia (August 2014).



Following loess-paleosol sequences in the 2 Mai section
(September 25, 2013)

The second important application of the **rock-magnetism and paleomagnetism/ magnetostratigraphy** was devoted to the investigation of the **Neogene formations** from the Dacic Basin. It is worth to note that in 1969, the regional magnetic measurements made in Northwestern Oltenia in order to draw up the $\Delta Z/\Delta Z_a$ maps, a magnetic anomaly was proved to be produced by a layer of „baked clays” accompanying a coal seam. Additional laboratory investigations on raw and heated clays showed, for the first time, the significant thermoremanent magnetization of porcelanites and, therefore, the disappearance of the clay minerals and the appearance of some magnetic minerals have been revealed (Roşca *et al.*, 1973). This finding, represented *the start of rock magnetism investigations*, and will be intensively approached in the following years. Afterwards, starting with 1982, the magnetostratigraphic studies have been continuously developed and applied on the *coal bearing formations*, well exposed in the lignite quarries from the Western Dacic Basin (WDB). In the following years, Sorin and his team performed numerous integrated studies of rock-magnetism, palaeomagnetism, magnetic survey, thermo-mineralogy, stratigraphy, sedimentology, geochemistry, concerning the Pliocene cyclic lignite-clay sequences. More than 40 papers, notes and reviews have been authored or co-authored by Sorin between 1983-2014, on these topics.



Participants at the 2013 Meeting of INQUA-SEQS at Mircea Vodă loess section (September 25, 2013)

The **paleomagnetic** investigation of the lignite quarries (Lupoaia, Poiana/Rovinari East, Cicani, Pinoasa, Peșteana North, Peșteana South, Jilț South, Husnicioara), the cores from several drillings and some natural outcrops (Berbești, Drănic-Jiu) contributed to the **first chronostratigraphic calibration** of the Dacian and Romanian formations (Rădan, 2000, 2002, Rădan & Rădan, 1996, 1998, 2001, Rădan *et al.*, 1996 a,b, Rădan, in Andreescu *et al.*, 1986, Rădan, in Jipa & Olariu, 2009), with outcomes for the improvement of the lignite layers synonymization and for their spatial and temporal correlation. Additionally, a fragment on the Sarmatian (stage) resulted from the magnetobiostratigraphic investigation of the “Scăricica” section in the Comănești Basin (Rădan & Rădan, 2001, Rădan, 2002). A synthesis of these feats was presented by Sorin in a chapter („Toward a reliable chronostratigraphic and geochronologic framework of the Dacic Basin”) included in a special monograph of the Dacian Basin published by GeoEcoMar (Rădan, 2009, in Jipa & Olariu, 2009).

The rock-magnetic and paleomagnetic data obtained on **porcelanites/clinkers** are of particular interest, due to their fundamental and applicative research qualities. The original raw clays, thermally non-affected, have recorded a reversed polarity, whereas the synchronous porcelanite layers have printed a normal polarity of the geomagnetic paleofield. The former polarity zone was assigned to the *Gilbert Chron*, namely to the lower part of the *C2Ar Subchron* (ATNTS-2004; 4.187 – 3.596 Ma), whereas the latter was assigned to the *Brunhes*

Chron (ATNTS-2004; 0.781 – 0.00 Ma), suggesting the paleo-fire occurring during this last period (Rădan, 2003; 2008). Paleo-/rock-magnetic, thermomineralogical and geochemical signatures were recovered from porcelanites and clinkers — markers of this past natural autocombustion phenomenon — and then, have been analysed within a series of studies presented or published in the framework of specialised conferences, held in Berlin - Germany (*Second International Conference on Coal Fire Research*, 19-21 May 2010), or Guimarães-Portugal (*International Meeting of Fire Effects on Soil Properties*, 15 - 19 March, 2011) (Rădan & Rădan, 2011 a,b). A special achievement was the special chapter concerning the „Paleo-coal fires in the Western Dacic Basin” included in a vast monograph, titled „Coal and Peat Fires: a Global Perspective”, published by Elsevier (Rădan & Rădan, in Stracher *et al.*, 2013).

The introduction of **magnetometry** methods in the **study of submerged areas** represented an original research direction. In 1978, the Romanian proton magnetometer with underwater sensor (MPP-78) was successfully used by Sorin's team in the Danube Delta and the Razim – Sinoie Lagoon Complex, as well as along the Danube River, where – for the first time – magnetic profiles were recorded. A methodology for petromagnetic investigation of bottom sediments and cores was developed, based on the use of a high sensitivity device (Kappabridge KLY-1), usually designed to determine anisotropy of magnetic susceptibility of rocks. A new technique of “underwater magneto-susceptibilimetry” was tested

in the Danube Delta in 1980, based on an adaptation of a GM 250 susceptibilimeter to record profiles in the lacustrine areas. In this way, a substantial archive of magneto-susceptibilimetric and magnetic data, useful for sedimentological and structural interpretations has been accumulated. The end results permitted the detection of the fossil sand ridges from the lakes and canals bedrock, the identification of the sediment supplies impact on the lacustrine sedimentation, or the deciphering of the geological structure under the recent sediment cover. The first outcomes have been presented at the XIIth Congress of Carpathian-Balkan Geological Association, held in 1981 in Bucharest-Romania (Rădan, in Mihăilescu *et al.*, 1983).



Underwater magnetometry recording in the Danube Delta
(the end of the years 80s – „pioneering” times)

Between 1987-1989, the underwater magnetic investigations were extended in the fluvial domain, achieving a very long (about 130 km) magnetic profile from the Iron Gates up to Baziaș the entrance point of the Danube River in Romania. At that time, the recordings were made with difficulty, the magnetometry team led by Sorin working in a little boat towed with a rope of about 40-50 m by the tugboat “Stuful”, turned into a research vessel; the underwater sensor was towed, in turn, from the small boat, with a 50-60 m cable, so that it could be kept as far as possible from the metal body of the tugboat. Pioneering times! The data obtained have, how-

ever, brought useful magnetic information, able to improve the knowledge of the “deep structure” in the water-covered area, especially given the crossing of the western end of the Southern Carpathians in the mentioned area, characterized by a complex geological structure.

After 1990, the activity focused exclusively on the study of the variations of the magnetic susceptibility (MS) values in the bottom sediments and in the cores, the measurements being later (1992) included in the monitoring program devoted to assess the Danube and Danube Delta environment quality. This program started in the Geological Institute of Romania, then taken over by GeoEcoMar (1994). Between 1995 and 2013, MS measurements of the bottom sediments in the northwestern Black Sea took place in the framework of several international expeditions (EROS 2000/1995, EROS 21/1997) and national expeditions (2010, 2013). The cooperation of the two institutes in this field has officially continued until 2008, thanks to two consecutive projects, led by Sorin (CERES Program – 2002-2004), and myself, respectively CEEX Program – 2005-2008), which have greatly contributed to the development of the field of environmental magnetism. After Sorin’s retirement, our collaboration in the magneto-susceptibility testing has been maintained, due to the mutual scientific interest, until 2012 for the Danube, and 2015, respectively, for the Danube Delta. This partnership, carried out over four decades, has led to the accumulation of a consistent database of several thousand of MS measurements, the writing over 90 articles and presentations at different scientific events, and the initiation of original research methodologies for the lacustrine environments in wetlands. Thus, a strong correlation between sediment granulometry and magnetic susceptibility was proved, and, for sediments showing similar grain size, a clear link between MS and the degree of heavy metal contamination of sediments could be made.



In the Danube Delta (September, 2013)

The introduction of a new method of lithological classification for the Danube Delta sediments, based on the participation of three major components - organic matter (TOM), carbonates (CAR) and minerogenic material (usually detrital, predominantly siliciclastic) (SIL), revealed a very strong posi-

tive correlation (usually $r > 0.90$) between the magnetic susceptibility (MS) and the siliciclastic material content (SIL). That makes MS a particularly valuable *proxy* parameter as *environmental and minerogenic fingerprinting tool*, given that the MS measurement is a faster and cheaper analysis. Based on the huge amount of data gathered, a first scale of magnetic susceptibility, applicable to lake sediments could be conceived (Rădan & Rădan, 2007 a). Dozens of diagrams, core profiles and distribution maps of the three lithological parameters and MS were drawn, showing the similarity of the models obtained for the lakes of the Danube Delta, the main and the marginal lakes of the Razim-Sinoie Lagoon Complex, as well as for the North-western area of the Black Sea. By the results obtained so far, the use of the magnetic susceptibility (MS) record as a *proxy* signature for the lithological composition of lake sediments remains one of the most interesting research tools developed by Sorin.

A confirmation of these results came from the **AGU Fall Meeting**, held in San Francisco-USA (December, 2007). Sorin proposed a session entitled *"Enviromagnetic Fingerprints Recovered From Modern Sediments"*, which was accepted and included in the Programme of the Section **"Geomagnetism and Paleomagnetism"**. He became the convenor and chairperson of this session, in which 5 invited lectures, 3 oral and 15 poster contributions were accepted, including his presentation on *"Modern Sediments as Enviromagnetic Archives. A Case Study: Danube Delta and Northwestern Black Sea"*. It was a difficult endeavour to organize such an event, but his passionate work and determination brought him success.

Sorin was involved in several international projects (SEQS/INQUA, KAPG, Intergeotecnica, IGCP, CoMCoM, Perithys, EROS-2000, EROS-21, BSRC-IOC/UNESCO, SCOPE 2002-2003), with contributions of rock-magnetism, palaeomagnetism, environmental magnetism, magnetic survey. Among other things, he had also successfully participated in several international meetings and expeditions for field works, in the framework of the "Commission of the Academies of Sciences (of the former Socialist states) for Planetary Geophysics", carried out in various countries (Czechoslovakia, Poland, USSR/Russia, USSR/Uzbekistan, German Democratic Republic, Romania).

Another aspect worth remembering is his participation as a co-author in the elaboration of the Reports of the Romanian Section of the International Association of Geomagnetism and Aeronomy (IAGA)/Working Groups I.3 ("Palaeomagnetism") and I.4 ("Rock Magnetism"), included in seven "National Reports" sent to the General Assemblies of the International Union of Geodesy and Geophysics (Germany, 1983; Canada, 1987; Austria, 1991; Great Britain, 1999; Japan, 2003; Italy, 2007; Australia, 2011).

Sorin was actively involved in many scientific meetings. Some series of conferences have been very close to him through the themes approached, and he managed to become almost a regular participant. Such a cycle is the so-

called „Castle Meetings” with the theme “New Trends in Geomagnetism - Palaeo, Rock and Environmental Magnetism”, organized since 1988 every two years, traditionally in various castles from the old Czechoslovakia; in the last years, the tradition was extended to other countries (Portugal-2016, Poland-2018). As a sign of appreciation for his activity, his attendance to some of these meetings was sponsored by the organisers and, in 2006, he was also conferred the Medal “10 Castle Meetings - New Trends in Geomagnetism”, by the Geophysical Institute of the Academy of Sciences of the Czech Republic from Prague and the Geophysical Institute of the Slovak Academy of Sciences from Bratislava, at Valtice Castle (Czech Republic).

The second series of conferences, that he attended almost every year, were the annual International Symposia organized by the Danube Delta National Institute dedicated to „Deltas and Wetlands” (26 editions so far). Many papers on the Danube Delta sediments have been presented here for the first time. In the last 8 years, he usually participated on his own, although sometimes the organizers offered him sponsorship and even assigned him a „*Diploma for the most active participation*” (May, 2017).

Speaking about other diplomas received on anniversary occasions, we might mention the Jubilee Diploma “70 years of Romanian Geophysical Prospecting”, awarded by the Romanian Academy – the Romanian National Committee of Geodesy and Geophysics and the Romanian Society of Geophysics, in 1995 and the Jubilee Medal “The 50th Anniversary of the Surlari Geophysical Observatory”, awarded by the Geological Institute of Romania, in 1993.

A particular area of his activity was devoted to the young generation. He offered help for younger colleagues in their work, and he also liked to share his experience with geological and geophysical students in numerous university conferences. After 2000, he had a first series of invited lectures at several Seminars of Applied Geophysics organized for the PhD students in the framework of the Department of Geophysics, University of Bucharest, then later, between 2012-2018, he was an invited lecturer at the Faculty of Geology and Geophysics (University of Bucharest), for short (intensive) courses on Rock Magnetism, Palaeomagnetism and Environmental Magnetism (within the current course of Magnetic Prospecting and Magnetism). Moreover, he offered scientific consulting related to rock magnetism, palaeomagnetism, enviromagnetism, magnetic survey, for Romanian or foreign students or PhD students, who were carrying out licence works or PhD or postdoctoral theses.

He was a member of the Editorial Board of the “Technical and Scientific Information and Documentation Newsletter”, published by the Institute of Geology and Geophysics (1982-1987), and, from 2009, a very active and deeply involved member of the Editorial Board of the GeoEcoMarina journal, edited by GeoEcoMar. In 2013-2015 he was one of the Guest

Editors of a Special Issue of *Quaternary International* journal (vol. 357/2015, 344 p.)

During his long research activity, Sorin was a member of several professional associations: Romanian Society of Geophysics, Geological Society of Romania, European Geosciences Union, American Geophysical Union, Society of Exploration Geophysicists and Romanian Committee for the International Association of Geomagnetism and Aeronomy.

Among other skills, Sorin showed much talent for photography and special artistic abilities, some of which were manifested in carrying out, in a personal manner, quite complex (but suggestive) diagrams, charts and graphs, full of colour, which are enclosed in his scientific reports, papers, PPT presentations and posters.

At the end of his life, Sorin-Corneliu Rădan presents himself as the author and co-author of more than 250 papers, notes, reviews, contributions to books, special volumes, monographs, field guidebooks, atlases, geophysical and geological maps, and other type of presentations at scientific conferences or workshops.

Many people are happy when retiring, some even want to take an early retirement. To him, this was a troubling perspective. A beautiful life means doing the things one likes. Or, for a

loner as him, what may be more beautiful to do than dealing with the things that have always given him satisfaction, analyzing and deciphering the Earth's messages transmitted by all kinds of measurable signals and parameters.

Sorin was a special man, usually selective in dealing with people, but very devoted to family values and true friends. He was particularly fair and honest with everyone, persevering, tenacious, with the mind open to new, hard-working, devoted and loyal to the causes he embraced. He was an analytical, meticulous, even perfectionist worker; he had a very fine sense of detail and a special aesthetic sense.

Sorin was a passionate researcher who has generously given all his energy to his work. He had a young spirit and was an idealist to the end of his life, ready to fight for the ideas he believed in. I do not know if he ever thought about what he would leave behind, and I think we still have a long way to discover all his legacy.

Sorin was equally dedicated to the family he was deeply attached to. Even if he did not have children of his own, he was a loving uncle to a niece who misses him. We all miss him, beyond words.

May God rest his soul in peace !

Silviu RĂDAN

National Institute of Marine Geology and Geo-Ecology (GeoEcoMar), 23-25 Dimitrie Onciul St., 024053 Bucharest, Romania

SELECTED PUBLICATIONS

Papers, extended abstracts, notes and reviews

Contributions to books, Geophysical – Geological field Guidebooks

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