APPLICATION – MIHAI N DUCEA

1. Candidate: Mihai N Ducea

Last Name: Ducea

First Names: Mihai Nicolae

Previous names: N/A

PhD since: 1998 Caltech (copy attached as Annex 1 at end of document)

Current position: Professor

Current employment: University of Bucharest

Mobile phone:

Email address:

2. Competition: "Gala Cercetarii Romanesti" year 2024

3. Award seeking: Premiul G. Cobalcescu, Stiintele Pamantului, Mediului si Schimbari Climatice

4. Team leader – no, this is an individual application

5. Team membership- not applicable

6. THE MOST IMPORTANT SCIENTIFIC ACCOMPLISHMENTS, FOCUS ON PAST 5 YEARS (4 PAGES MAX)

This section will refer to the major accomplishments of scientific nature over the course of 2019-2023, and very little for the time prior to that – that prior work is reflected in my attached CV. This new dawn includes a shift in teaching, the move to Bucharest and related building of a next gen lab of isotope geochemistry, as well as some scientific discoveries that are illustrated in some of the highlight publications of this period. They are listed below in no particular order, and they are all crucial to my career development and the education and success of my students and postdocs. While the lab in Bucharest is too new to warrant an application as "research group" (that may be an option in 3-5 years), all my work is centered around students and a huge network of collaborators that I was fortunate to find over the course of my career.

1. Discovery and publication of several papers in the field of chemical Mohometry. With my group we pioneered a new method of determining the thickness of the continental crust and paleotopography in mountain ranges of the past. This effort started in 2015 (Profeta et al., 2015; Chapman et al., 2015) but really took off over the past 5 years with over 25 papers that we published on the topic in high profile journals. We applied this to numerous mountain ranges on Earth (see papers by Hu et al., Sundell et al., Moghadam et al., and Carrapa et al., over the past 5 years in mu CV). This technique which has far reaching implications for understanding continental evolution and the distribution of mineral resources has been used and cited in over 2000 publications. The latest iteration of it uses 41 chemical sensors to average paleo-elevation and paleo-crustal thickness and was published in a high profile journal (Reviews of Geophysics, Luffi and Ducea, 2022). We are now using this tool to generate maps of mountain ranges in the geologic past integrating geochemical data with paleogeographic maps. This will lead to a transformative understanding of how fast and how high mountains grow and erode away on the continents, which is in many ways a holy grail of continental tectonics.

2. Discovery of arclogite and their significance in continental evolution and potentially in mineral resources. Arclogite is a rock type that is only rarely found at the surface of the earth. It is the residual complement from extracting granitic magmas in thick crustal environments at subduction margins. My name is directly related to the finding of this elusive rock type and its origin, ever since my PhD thesis. In a number of high profile publications over the past few years (Ducea et al., 2021a and 2021b, Bowman et al 2022) we provide the ultimate in

understanding arclogite origin, their distribution and significance to forming granitic continents. This is a major step forward in understanding processes such as crustal delamination (foundering) and other intracontinental mechanisms responsible for generating the modern day continents. In addition, we propose that melting of arclogites are responsible for making one of the most elusive type of magmas on Earth, alkaline massifs that are found in select areas of the continents. We speculate that melting arclogite is the mechanism responsible for the concentration of so many rare metals that are found in alkaline massifs (REE, Nb, Ta, others). This is a major hypothesis that puts the focus on links between magmatic arcs formed at subduction and later assembly of alkaline massifs and is a major scientific contribution for me for the past 5 years.

3. The evolution and origin of the central Andes. The American signature project TANGO (2020-2024) has allowed me and my collaborators to sort out the evolution of the central Andes in particular the rise of the great Altiplano Plateau. Some papers are already published (Bowman and Ducea, 2023), others are in the making. The basic discovery is that in order for a plateau to develop, enough shortening needs to take place such as the mid crust goes into partial melting mode for long periods of time (tens of millions of years). This conclusion draws from an earlier paper (Ducea et al., 2020, Tectonics) on the paleo plateau of the western US and establishes feedback links between the need for extensive melting (see also Ward et al., 2019) under plateaus and the internal drainage inherent for these features. We have further documented that the thermal structure of sub plateau environments is steady state stable for millions to tens of millions of years and melting resides at 20 km or shallower beneath the surface even if little or nothing is extracted to the surface (volcanoes). Moreover, the in situ melting of sub plateau crust require that metasedimentary assemblages found at least in the Altiplano and Tibet form leucogranites that are commonly thought of being scavengers of light elements such as Li, B or Be. We further speculate in a paper now in press (Ducea et al., 2024) that the presence of the largest deposits of Li in plateau environments is a direct result of this process. This in turn highlights the need to better understand how can be better identify plateaus in the geologic past (where obviously the flat lying feature is no longer in place), which is what my colleagues and I proposed in this research.

4. Mass budget of carbon over time and recycling at subduction margins. We discovered that when large amounts of carbonates get subducted, they will detach from the downgoing slab, diapirically rise into the mantle, mix with the mantle and retard melting at subduction zones

(Ducea et al., 2022). Nobody has ever previously attempted to model what takes place at E-W oriented closing oceans (like the Tethys) that have large amounts of carbonates associated in the trenches (a situation that does not happen in today's plate organization). This has huge implications on why many Alpine convergent margins do not have a magmatic arc (and thus associated mineral deposits). This modeling effort which was a new departure for me and my students and collaborators from Bucharest (who are co-authoring the paper) and we have put the boundary conditions on what can and cannot happen at such margins. Further experimental work and field based studies will cement these conclusions or tell us otherwise, but so far this paper has gathered a lot of steam, and it is not so much because of implications for magmatism as it is for the fact that we are predicting that a large carbonate-rich reservoir can be found inside the earth's continental upper mantle. This in turn has important implications in understanding the long term budget of CO_2 and the fact that large amounts of this critical component to climate change may be in fact hidden in the subcontinental lithosphere.

5. Petro-chronology of zircons, titanite and apatite. The field of petrochronology is a relatively new one and it requires that one simultaneously measure ages and chemistry on minerals that are prone to such analysis (zircons, apatite, titanite). I was at the forefront of this field in measuring zircons (Balica et al., 2020), titanite (Barla et al., 2023) and apatite (Jepson et al., 2021). In particular, the paper by Balica et al., has illuminated the possibility of using sedimentary material that averages lots of eroded terrain to interrogate zircons for the evolution of continental masses at large scales. That paper investigated rocks from the earliest moments of the planet (4.4 Ga, Jack Hill zircons) to modern zircons. Subsequently, we modified the analytical protocol (Triantafyllou et al., 2023) in order to better address these questions. The question for us here is: were magmatic processes and temperatures and other parameters different in the past from what we can measure today in the continents? There is virtually no other method that can average out such huge swaths of terrain and time, except the technique proposed in Balica et al. Moreover, we are now turning our attention to zircon mohometry, an extension of the technique we pioneered and was explained above. This is decidedly an analytical effort that is carried out at UB in the Petrochronology lab (see below) between myself, Peter Luffi, postdoc Vlad Ene and PhD student Maria Parlea. We are testing different analytical protocols to improve the simultaneous measure of isotopes of U and Pb as well as the trace elements needed in our analysis. The laser ablation system at U Bucharest is suited for this approach. The efforts made over the past 5 years in this exciting new direction of "in situ" measurements put me and my group at the very front of this cutting edge sub discipline.

6. Move to UB and setting up a new isotopic laboratory. I set up a new isotope laboratory called the UB Petrochronology laboratory in 2023, which now has a team of 5 experts running it (https://sites.google.com/ducea.com/ubpetrochronlab/home). We are beyond testing with isotopic analyses for U-Pb geochronology for zircon, titanite, monazite and other U-bearing phases. We do elemental mapping and major and trace elemental analyses in situ by laser ablation down to scales of just a few microns. This laboratory is now the center of excellence for research in geochemistry and isotope geochemistry and has users from as far away as Argentina, Chile, the United States or Norway. The laboratory will be growing in 2024 with the addition of several new instruments and is the" gathering place" for several Master and PhD theses data acquisition. We have also began collaborating with external funding from industry (oil and gas) and have the goal of making this laboratory the best of its kind in central Europe and beyond. This next generation laboratory is the center of my research and many other people's in the department.

9. Editorial responsibilities. I was the senior editor of GSA Today between 2018-2022 and was then asked to lead the signature journal of the Geological Society of America (the largest professional geologic society in the world), GSA Bulletin. Since 2022 I serve that position of chief editor and have handled over 800 manuscripts (not reviewed – just administered), have reset the Associate Editor line up (and included some outstanding Romanians from Romanian institutions in there, among others. The journal was and continues to be a Q1 top ranked journal and has increased most of its parameters (like impact factor, etc.) since 2022. This takes a much larger fraction of my time than planned. Our challenges were addressed in these past 2 years and we don't publish a hard copy anymore for the journal (all electronic), which previously clogged the waiting time from acceptance to publications. As a member of the GSA Publication Committee (which I also chaired in 2020), together with my support team in Boulder, Colorado, we are continuously facing challenges including the arrival of AI-generated "fake" papers, especially from Asia. I also serve as vice-Editor to the journal International Geology Review since 2017. This is a Taylor and Francis corporate journal that I was attached to since graduate school. It is now (since 2021) a Q1 journal in the AIS classification of UEFISCDI (as well as WOS classification). I was also an associate editor for the Q1 journal Tectonics, the leading journal in this field between 2018-2021, so that technically covers the past 5 years.

7. DESCRIPTIVE (NARRATIVE) CV- MIHAI N. DUCEA

This section is centered around three topics: first (A) is to outline why the application is eligible for the competition, as required by the call documentation (Annex 2). Second (B), the impact on the five qualitative elements required in Annex 3 (C1 to C5) is presented in a narrative fashion. Third (C), the remainder is dedicated to providing a semi narrative career-long CV with highlights for the past 5 years and complements section B.

A. GENERAL ELIGIBILITY CRITERIA

I am a PhD (doctor in geology) since 1998 and have an institutional affiliation at University of Bucharest, where I serve as professor. I published over the past 5 years (30 January 2019- 30 December 2023) at least 6 papers classified as ***articles*** with Romanian affiliations listed in those papers as principal author in Q1 or Q2 journals following the most recent AIS classification (UEFISCDI, 2023): The list of these papers (first author or corresponding author) is given below for ease of establishing eligibility:

1. Balica,C., M.N. Ducea G.E. Gehrels, J. Kirk, R.D. Roban, P. Luffi J.B. Chapman, A. Triantafyllou, J. Guo, A.M. Stoica, J. Ruiz, I. Balintoni, L. Profeta, D. Hoffman, L. Petrescu, 2020, A zircon petrochronologic view on granitoids and continental evolution, Earth and Planetary Science Letters, 531, paper 11605 10.1016/j.epsl.2019.116005. AIS 2.246 Q1. Corresponding author
2. Ducea, M.N., Stoica, A., Barla, A., Panaiotu, C, Petrescu, L., 2020, Temporal Evolution of the Persani Volcanic Field, Eastern Transylvanian Basin (Romania); Implications for Convective removal /Slab Rollback of Lithosphere Beneath the SE Carpathians, Tectonics, 39, doi.org/10.1029/2019TC005802. AIS 1.612. Q1 First author
3. Ducea, M. N., A. Triantafyllou, and J. Krcmaric, 2020, New timing and depth constraints for the Catalina Metamorphic Core complex, Southeast Arizona, Tectonics, 39(8), e2020TC006383. AIS 1.612. Q1 First author
4. Sheldrick, T. C., G. Hahn, M. N. Ducea, A. M. Stoica, K. Constenius, and M. Heizler 2020, Peridotite versus pyroxenite input in Mongolian Mesozoic-Cenozoic lavas, and dykes, Lithos, 376, 105747. AIS 1.165 Q1 Corresponding author
5. Ducea, M. N., A. D. Chapman, E. Bowman, and C. Balica, 2021, Arclogites and their role in continental evolution; part 2: Relationship to batholiths and volcanoes, density and foundering, remelting and long-term storage in the mantle, Earth-Science Reviews, 214C, 103476. AIS 3.954 Q1 First author

6. Ducea, M. N., A. D. Chapman, E. Bowman, and A. Tryantafyllou, 2021, Arclogites and their role in continental evolution; part 1: Background, locations, petrography, geochemistry, chronology and thermobarometry, Earth-Science Reviews, 214C, 103375. AIS 3.954 Q1 first author but appears as REVIEW in WOS thus may not be eligible.
7. Ducea, M. N., Currie, C. A., Balica, C., Lazar, I., Mallik, A., Petrescu, L., and Vlasceanu, M., 2022, Diapirism of carbonate platforms subducted into the upper mantle: Geology, v50, 929-933. AIS – 2.227 Q1. First author
8. Luffi, P., and Ducea, M. N., 2022, Chemical Mohometry: Assessing Crustal Thickness of Ancient Orogens Using Geochemical and Isotopic Data: Reviews of Geophysics, v. 63, no. e2021RG000753, p. 1-42. AIS 11.042 Q1. Corresponding author . Shows in WOS as REVIEW, thus may not be eligible.

There are either 6 if the 2 "reviews" are not taken into account or 8 papers if the 2 reviews are counted. Regardless, the application satisfies the minimum 6 eligibility rule.

A SUMMARY OF RESEARCH HIGHLIGHTS FOR THE PAST 5 YEARS FOLLOWING THE MAIN QUALITATIVE CRITERIA LISTED IN ANNEX 1 OF THE COMPETITION.

1. Principal author or co author in Q1 publications listed as *articles* according to AIS (UEFISCDI list), minimum 7 – YES. The accompanying CV lists the number of Q 1 papers listed as articles between Jan 2019 and Dec 2023. There are 43 publications in that category out of which 6 (or 8 as described) that satisfy the principal author eligibility criterion.
2. Top 1% Highly Cited Researcher NO. I do not satisfy that. I am a top 2% global scientist in the Stanford list but not the HCR in Clarivate.
3. National and international projects won as project director (or Principal Investigator as it is known in the US) -YES.

I won a Romanian PNNR 1.05 million Euros project PACE as Project Director in 2023 (link: https://www.mcid.gov.ro/wp-content/uploads/2023/12/Rezultate-finale-PSE.pdf). Project PACE is at the top of the funded list.

I also won a 4 year 2.2 Million US dollars, US National Science Foundation project TANGO in the US in 2020 (to be executed between 2020 and 2024)

(https://www.nsf.gov/awardsearch/showAward?AWD_ID=2020935&HistoricalAwards=false). The NSF project has 5 principal investigators (directors), one of whom is the candidate. Both these projects have numerous participating members (>6 each).

4. Researcher or affiliated faculty in a prestigious international Institution (YES). I have been since 2001 and continue to be until the end of 2025 affiliated with the University of Arizona (listed as prestigious university at position 525 in Romanian Government classification of prestigious international institutions). My name is listed in the UArizona directory at https://www.geo.arizona.edu/content/geoscience-directory

Or in more details at: https://www.geo.arizona.edu/ducea

5. Chief editor of a top journal indexed in the Journal Citation reports YES. I am the chief science editor (2022-2025) of Q1 journal Geological Society of America Bulletin, as well as chief associate editor (vice editor) of International Geology Review (Q2) since 2018.

Geological Society of America Bulletin editorial board identifying chief and associate editors: https://www.geosociety.org/GSA/gsa/pubs/bulletin/edBoard_Bulletin.aspx

International Geology review board: https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=tigr20

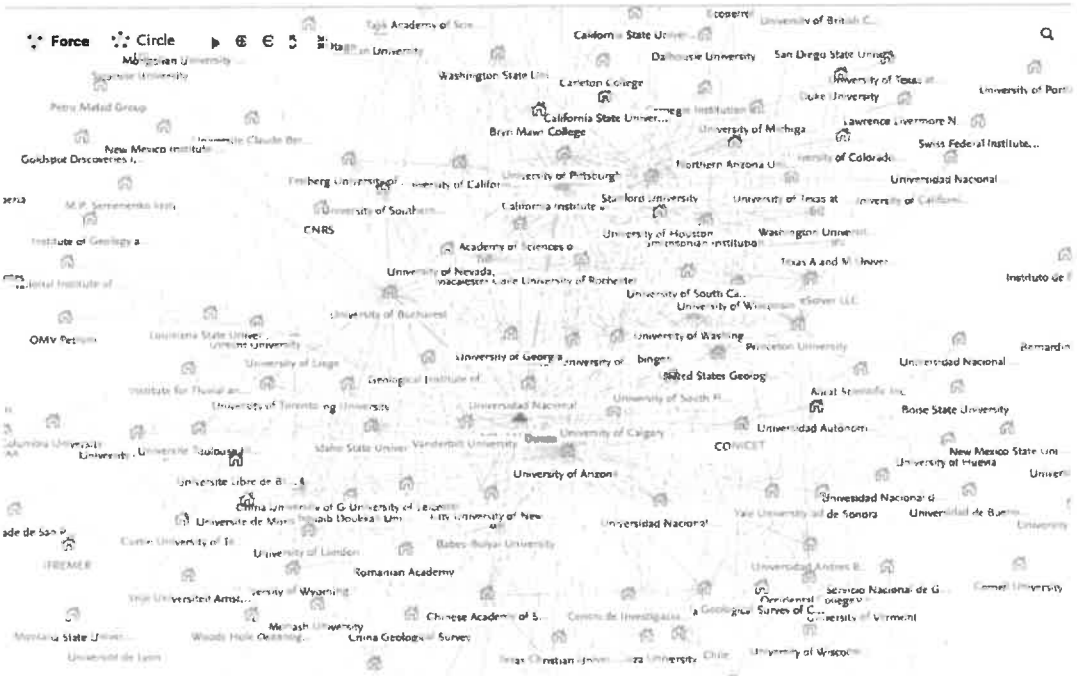
6. Cumulative AIS of more than 5 according to the definition provided in the competition documentation YES. I have a cumulative AIS of 17.11* for the past 5 years. This calculation is based on numbers presented in the list of publications in my CV where web of Science listed papers for the past 5 years are shown as Q1 or Q2 and the total AIS was divided by the number of authors (and shown in the CV) for each qualifying paper.

*- Given that there are 43 qualifying articles with numerous co authors and different classifications in WOS as well as my limited time to perform the task before application deadline– this number may be slightly in error, plus minus 0.2 of the total 17.1 calculated. The review paper of Luffi and Ducea (2022) has not been counted here since that paper is listed as

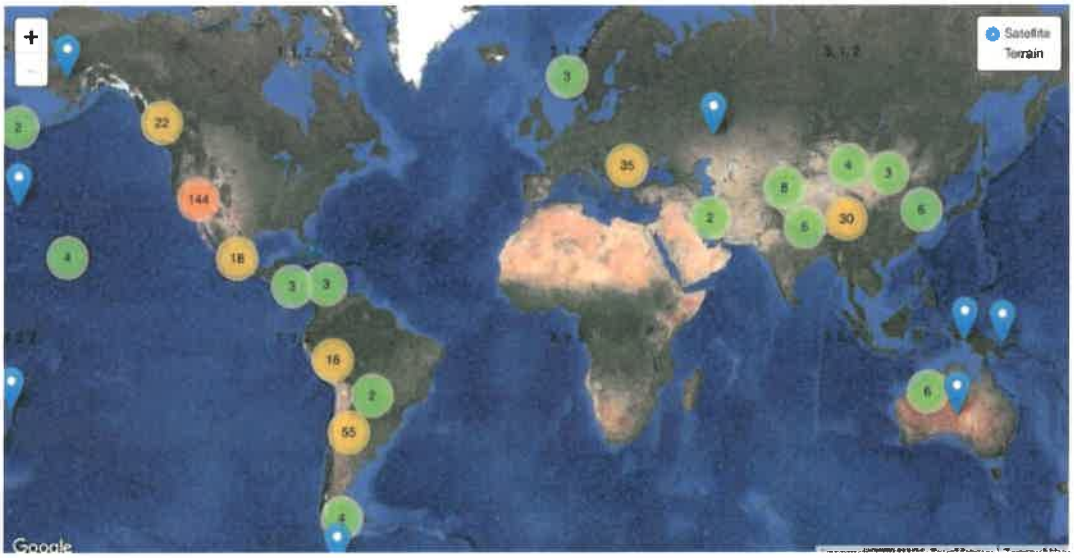
"review" in WOS, otherwise the number would have been over 22. In conclusion, I satisfy 5 out of 6 criteria, all except criterion number 2.

B. THE IMPACT ON THE FIVE QUALITATIVE ELEMENTS C1 TO C5

C1. Research activity through the lens of number and impact of publications. Mos of my over 200 peer reviewed publications are in Q1 journals as listed in the Web of Science, about 90% of them. The remainder is dominated by Q2 journals (6%) and only 4% appeared in lower than Q2 journals or journals that are not listed in WOS. About 20% of them are first authored papers, for another 20% I am corresponding author. The overall citation impact provided by WOS shows my papers on average have a 81% percentile among geoscience papers. I published papers with over 700 authors from 32 countries and worked on many research topics covering much of the globe. I wrote or co-edited several books on regional geology published by the Geological Society of America and Wiley. If we add my papers AIS per career (1998-present) I have a total AIS of over 400. For the past five years, the total is about 180 and the number divided by the number of authors is over 17 (5 is the bar requested for this competition). The figure below is a Force diagram from scopus showing the institutions of co-authors of my papers over the past 5 years.



The second figure shows the geographic areas covered in my published research over the course of my career (source: Web of Science, downloaded in Oct 2023) and the number of papers published for each region. Blue points represent ONE paper.



C2. Research activity impact via citation. Web of Science total citations in All databases 12229 (11237 without self-citations), h-61, 4-highly cited papers. About 11000 total citations in Core Collection database almost 10000 without self-citations and a h-57. Scopus total citations 12000, h - 60, Google scholar total citations 154600, h -68, i10-178. I am listed in Stanford's list of top 2% most cited scientist and top 0.5% most cited in Earth Sciences for both career wise as well as last year. I rank among the highest 30 most cited petrologists and 65 most cited tectonicists of all time in Google Scholar. I make virtually every classification that ranks top scientists in my field as of 2024. My research output doubled over the past 4 and ½ years in almost all categories except H index (which increases at 5 units per year); consequently, slightly more than half of that quality input viewed through citations was acquired over the past 5 years.

C3 Research funding ability as well as international presence in various universities and invited speaker status. One of the annex below details the grants and other funds I obtained over the course of my career- they total over 25 million US dollars, which averages to about 1 million USD a year post my PhD and postdoctoral tenure. Two large grants are current, one in the US which studies the origin of the Andes (winding down toward the middle of 2024) and one in Romania on a new technique on zircon petrochronology (just started). While the greatest majority of funding is from fundamental funding agencies in US and Romania, some are

industry funds secured competitively (Chevron, Exxon, Mars Corp, others) whereas others yet are from private organizations, such as the PRF grants from the American Chemical Society. Most of my career was carried out internationally at one of the highest ranked geology departments in the US and globally -University of Arizona. Over this time, I enjoyed visiting professor status from Caltech, USA, China University of Geoscinces in Wuhan and UBB Cluj. I also benefited from a Fulbright Scholarship in 2017.

C4. Prestige based on international recognition. I am an elected Fellow of the main and largest professional societies in my field. I received several awards and serve on numerous international boards, have been asked to provide letters for countless tenure cases at some of the largest institutions in Europe and North America. I have given over 80 talks at major departments of geology in the world – from Harvard, Stanford, Yale, Caltech, Lyon, Oxford, to emerging countries such as China, Argentina, Chile etc. I organized special sessions at major global meetings, have been on the organizing committee of several major such meetings in my younger days. I served and continue to serve on panels on funding agencies on three continents and enjoy top 2% status for several years now. I have been elected as a junior member ("membru correspondent") into the Romanian National Academy of Science in 2021.

C5. Ability to create laboratories and research groups as well as to train young disciples. I trained many Ms and PhD students in my career, as well as postdocs (see section C below). I also advised undergads at Arizona and more recently at Bucharest. Some of these studens went on to become some of the brightest minds in American Academia, such as Mary Robinson Cecil (Prof at Cal State) Jay Chapman (Prof at UTEP), Dave Pearson (Prof at Idaho State), Antoine Triantafyllou (Prof at Ecole Normale Lyon), Fangyang Hu (Prof at Univ Beijng) Pablo Rossel (Prof at U Concepcion) Jungliang Guo (Prof at CUG Wuhan) and most recently my graduating student Emilie Bowman got a professorship at Cambridge UK. There are others who succeeded at lower level institutions or industry which I don't focus on here. Anca Barla, a current PhD student in the USA (my last PhD Student there) and Maria Parlea (U Bucharest) are some of the brightest current students that I ever had and we are targeting them, as well as my postdoc Dr. Vlad Ene (Bucharest) to form the core of new excellence at the University of Bucharest. Our goal is to bring UB Geosciences (currently ranked a respectable 330 or so in the world, much better than most Romanian universities as a whole) to be a top 100 department over the next decade. In summary, my work is centered around students and postdocs of excellence – this is perhaps the most important aspect of our work.

I created the University of Arizona TIMS isotopic lab earlier in 2003-2004 with a major update in 2008 after a flood destroyed the laboratory. The TIMS lab which includes a state of the art clean lab, had hundreds of people running geochronologic work and various isotopic analyses. Of course, my students worked in the laboratory. Today the lab is still functional but the deadline for its passage to a younger professor or dismantling is 2025. There are no improvement just routine work and maintenance. The lab had some years (2010-2014) with operational costs of over 2 million dollars per year; those days are over.

Today we created a brand new laboratory in Bucharest, a next generation laser ablation mass spectrometry laboratory that greatly surpasses my old Tucson Laboratory. Our lab (opened in September 2023) is centered around students and postdocs and generates data for countless of MS or PhD students. We do external service work for various industry in Romania. We are growing now and buying new instruments and intend to become a regional European leader in just a few years. I sincerely think we are better than most of our European competitors, excepting perhaps 2 state funded labs in UK. Link to the new University of Bucharest lab:

https://sites.google.com/ducea.com/ubpetrochronlab/home

To summarize, I am not interested in administrative duties in Romania for the rest of my career. Instead, I want to build a world class Geology Department at Bucharest and that means laboratories, training students and carefully selecting the next crop of talent there.

C. PRIMARY CV ELEMENTS IN SEMI NARRATIVE FORMAT

Education

California Institute of Technology, Ph.D. (Geology), 1998
Advisor: Prof. Jason Saleeby

Caltech, MS, (Geology) 1995
Advisors: Prof. Jason Saleeby and Prof. Peter Wyllie

University of Bucharest, Romania, Diploma of Geology Engineer, 1991

Professional Positions

Professor University of Bucharest -2021- present

Professor, Department of Geosciences, University of Arizona (09/09-scaled down to 50% and set to retire from Arizona completely in 2025)
Associate Professor, Department of Geosciences, University of Arizona (04/04-09/09)
Assistant Professor, Department of Geosciences, University of Arizona (1/01-04/04)
Postdoctoral Scholar, Caltech and Florida International University (12/98-12/00)
Graduate Student, California Institute of Technology (4/94-12/98)
Graduate Student, Department of Geology, Duke University (6/92-3/94)

Research

Summary: My research so far was centered on ten major topics in petrology, geochemistry and field geology; I think I made important contributions to these – see papers listed below:

1. Crust mantle exchange at subduction systems. I study exposed arc lower crustal sections at various locations in order to quantify the exchange between crust and mantle via magmatism and foundering. My PhD thesis has the first to document igneous cumulate and residues as eclogite facies rocks under arcs (known today as *arclogites*) and the hypothesis of arc root foundering under thick continental arcs.
2. Fluxes and tempos of arc magmatism. We use granitoid geochronology and field constraints to quantify regional and global fluxes of magmas in arcs and find causes for the non-steady state behavior of arcs.
3. Regional geology. I contribute to regional geology studies (most recently in the Carpathians) via geologic mapping and geochronology and thermochronology with a particular focus on basement terrains.
4. Sm-Nd, Rb-Sr and other geochronology applied to igneous and metamorphic rocks. I oversee a TIMS and ICP-MS laboratory where we push the envelope of various geochronologic techniques, with a focus on metamorphic geochronology.
5. Ultra shallow subduction. We study the field evidence for underplating mechanisms and their consequences for convergent margin evolution. The focus so far was on Western North America and Mexico.
6. Crustal and mantle xenoliths. I have a long-term interest in using xenoliths as tectonic tracers of lithospheric composition and evolution.
7. Mineral evolution. We study the linkages between tectonic processes in a Wilson cycle and the distribution of mineral species on continental regions.

8. Geophysics and petrology of deep arcs. I am invested in collaboration with geophysics groups (seismologists and other geophysicists) to decipher the composition and extent of magma bodies under subduction systems.
9. Basalt petrology. We use the geochemistry of basalts from various regions to test for magnitude of extension, provide tests of delamination and other tectonic processes in various continental regions.
10. Geochemistry and crustal thickness over time. We use intermediate rock trace elemental geochemistry and that of derivative trace minerals (zircon, apatite) to quantify crustal thickness evolution over time in orogenic regions.

Teaching/advising

Summary: My teaching duties and interests span the undergraduate and graduate curriculum and also include shorter topical seminars for the most advanced scholar. Most of my teaching activities were performed at University of Arizona for over 2 decades, and more recently I have begun teaching at the University of Bucharest. I also did and do teach shorter modules and more advanced course at other Universities (China University of Geosciences, University of Concepcion and UBB Cluj. I have a series of short courses on geochronology, geochemistry and other novel developments of use to the oil and gas industries. They have been presented in short modules at Chevron, OMV, Ecopetrol and other large corporations.

*Courses taught at Arizona (all listed) and more recently at Bucharest (asterisk *):*
- Petrology (undergraduate)
- Field Camp *(undergraduate)
- Physical Geology (undergraduate)
- Structural Geology (undergraduate)
- Geochronology/thermochronology (undergad/grad)
- Tectonic Petrology* (graduate course)
- Regional Tectonics* (graduate course)
- Chemical evolution of the Earth (new graduate course for 2021)
- Hot Spots (graduate course or seminar)
- Alpine and Carpathian geology (grad seminar)*

Outstanding students and postdocs (U Arizona and U Bucharest): Undergraduates: Thereza Kayzar, Guleed Ali, Jordan Krcmaric, Derek Hoffman, Pamela Doig, Florentina Enea, Adriana

Stoica, Maria Parlea. Graduate students: Steven Kidder, Christian Manthei, David Pearson, Mary Robinson Cecil, Jay Chapman, Kendra Murray, Lucia Profeta, Fangyang Hu, Emilie Bowman, Anca Barla, Mihai Vlasceanu, Maria Parlea. Postdocs: Alexander Robinson, Alan Chapman, Paul Wetmore, Antoine Triantafyllou, Constantin Balica, Lyung Zhang, Fuhao Xiong, Yunchuan Zeng, Jingliang Guo, Vlad Ene.

Honors & Awards

Koons Graduate Fellowship, 1998

GSA fellow, 2016; AGU Fellow 2021 (these are the biggest professional societies in my field)

1001 Takents in Science and Dida Fellowship, China University of Geosciences, Wuhan, 2016-2019

Fulbright Scholar, 2017-2018

Member of the Romanian Academy of Sciences since 2021

Scholarly Presentations (past 5 years)

Oregon State University, Istanbul Technical University, Stanford University, China University of Geosciences Wuhan, China University of Geosciences Beijing, University of Oslo, Babes Bolyai University of Cluj Napoca, University of Bucharest, University of Liege, University of Brussels, University of Leicester, Lyon Ecole Normal Superior, University of Porto, University of Lisbon, Keynote talk GSA Phoenix 2019

Service/Outreach

Summary: I have served on numerous departmental committees at Arizona, as well as for the GSA and AGU. I serve on departmental committees at U Arizona and at U Bucharest. I am providing countless reviews for journals and funding agencies throughout the world (USA, China, Hong Kong, Poland, Ukraine, Chile, Argentina, Romania – these only for the past year, 2020). Major community service efforts are currently focused on giving talk on the nature and significance of Earth Sciences to high-schools in Romania.

Highlights (top 10) of my service/synergistic activities (past 5 years):

Serving on numerous departmental committees (Performance Evaluation, Graduate Policy, Various Hiring Committees, Promotion and Tenure, Field Camp);

Contributions to development of NSF Earthscope's GEOFRAME initiative;

Organizing and chairing several GSA, AGU and Goldschmidt topical sessions to highlight new avenues in Petrology and Tectonics research;

Serving on publication committee at GSA (2019-2022);

International Committee Member at Large, Geological Society of America, 2022- present;

Co-Edited volume on "Tethysides in Central and Eastern Europe", with Celal Sengor, Hans Thybo and Ogus Goguz, in press, 2021, Tectonics;

Coordinator of the Earth and Life Science Division of the Research Institute of the University of Bucharest; iCUB, 2020-present;

National Science Foundation Panelist (GEOPRISMS, Petrology, Tectonics);
Member of Earth Science Panel of the Romanian Education Ministry, CNACDTU 2019-present;

Finalist of NSF Idea Machine competition for developing new programs at NSF (With collaborators Barbara Carrapa and Mihai Surdeanu, U Arizona), with an Artificial Intelligence in Geoscience project, 2019.

Current Editorial Services
GSA Bulletin, Chief Science Editor (2022-2025)
International Geology Review, Associate Editor (2017 – present),

Numbers of Manuscripts and Proposals Reviewed
488 manuscripts reviewed between 2000-2024 (e.g. Nature, Tectonics, J Petrology, Geology, JGR, GSA Bull, Contributions to Mineralogy and Petrology, etc.);
224 proposals reviewed between 2000-2024 (for NSF, PRF, and other national and international organizations).

Publications (listed separately below under 8.) Highlight: 205 web of Science articles, over 230 peer reviewed publications, top 2% scientist in the Stanford list, over 10000 citations in web of Science

Grants (listed separately below under 9.) Highlights – over 25 million USD funding about 1 million USD per year average.

8. PUBLICATION LIST – MIHAI N DUCEA

SCIENTOMETRIC SUMMARY AND HIGHLIGHTS (Jan 2024)

Web of Science total citations All databases 12229 (11237 without self citations), h-61, 4-highly cited papers; cca. 11000 total citations in Core database almost 10000 without self citations, h-57.

Scopus total citations 12000, h - 60,

Google scholar total citations 154600, h -68, i10-178

Stanford list of top 2% most cited scientist and top 0.5% most cited in Earth Sciences

Peer reviewed papers published with over 700 co-authors from 32 countries.

Ranks among the highest 30 most cited petrologists and 65 most cited tectonicists of all time in Google Scholar.

The lists below are for peer reviewed papers (articles and reviews) followed by books/chapters. The past 5 year publication record (2019-2023) is accompanied by the AIS of the journal, the quartile (Q1 or Q2) and the AIS divided by the number of authors – a number that was used for eligibility purposes. Other papers that although peer reviewed, are not visible in WOS, do not contain those numbers and obviously were not used in the calculations Some papers are highlighted in blue – they constitute the basis of eligibility (first or corresponding author).

PEER REVIEWED PUBLICATIONS (oldest to newest)

These papers (not up to date) are also listed on my web page: https://www.mihaiducea.com

1. Park, S.K., Clayton, R.W., Ducea, M.N., Wernicke, B., Jones, C.H., Ruppert, S.D., 1995. Project combines seismic and magnetotelluric surveying to address the Sierran root question. Eos, Transactions American Geophysical Union 76, 297-298.

2. Wernicke, B., Clayton, R., Ducea, M., Jones, C.H., Park, S., Ruppert, S., Saleeby, J., Snow, J.K., Squires, L., Fliedner, M., 1996. Origin of high mountains in the continents: The southern Sierra Nevada. Science 271, 190-193.

3. Ducea, M.N., Saleeby, J.B., 1996. Buoyancy sources for a large, unrooted mountain range, the Sierra Nevada, California: Evidence from xenolith thermobarometry. Journal of Geophysical Research: Solid Earth 101, 8229-8244.

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5. Ducea, M., Saleeby, J., 1998. A case for delamination of the deep batholithic crust beneath the Sierra Nevada, California. International Geology Review 40, 78-93.

6. Ducea, M., Saleeby, J., 1998. Crustal recycling beneath continental arcs: silica-rich glass inclusions in ultramafic xenoliths from the Sierra Nevada, California. Earth and Planetary Science Letters 156, 101-116.

7. Gao, S.., Ducea, M.N., Zhenmin, J., Saleeby, J., 1998. Lower crustal delamination and evolution of continental crust. Geological Journal of China Universities 4, 241-249.

8. Ducea, M.N., McInnes, B.I.A., Wyllie, P.J., 1999. Experimental determination of compositional dependence of hydrous silicate melts on sulfate solubility. European Journal of Mineralogy-Ohne Beihefte 11, 33-44.

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10. Ducea, M.N., Park, S.K., 2000. Enhanced mantle conductivity from sulfide minerals, southern Sierra Nevada, California. Geophysical Research Letters 27, 2405-2408.

11. Ducea, M., 2001. The California arc: Thick granitic batholiths, eclogitic residues, lithospheric-scale thrusting, and magmatic flare-ups. GSA today 11, 4-10.

12. Ducea, M., Sen, G., Eiler, J., Fimbres, J., 2002. Melt depletion and subsequent metasomatism in the shallow mantle beneath Koolau volcano, Oahu (Hawaii). Geochemistry, Geophysics, Geosystems 3, doi:10.1029/2001GC000184.

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14. Ducea, M., House, M.A., Kidder, S., 2003. Late Cenozoic denudation and uplift rates in the Santa Lucia Mountains, California. Geology 31, 139-142.

15. Ducea, M.N., Kidder, S., Zandt, G., 2003. Arc composition at mid-crustal depths: Insights from the Coast Ridge Belt, Santa Lucia Mountains, California. Geophysical Research Letters 30, doi:10.1029/2002GL016297.

16. Ducea, M.N., Ganguly, J., Rosenberg, E.J., Patchett, P.J., Cheng, W., Isachsen, C., 2003. Sm–Nd dating of spatially controlled domains of garnet single crystals: a new method of high-temperature thermochronology. Earth and Planetary Science Letters 213, 31-42.

17. Ducea, M.N., Lutkov, V., Minaev, V.T., Hacker, B., Ratschbacher, L., Luffi, P., Schwab, M., Gehrels, G.E., McWilliams, M., Vervoort, J., 2003. Building the Pamirs: The view from the underside. Geology 31, 849-852.

18. Kidder, S., Ducea, M., Gehrels, G., Patchett, P.J., Vervoort, J., 2003. Tectonic and magmatic development of the Salinian Coast Ridge belt, California. Tectonics 22, doi:10.1029/2002TC001409.

19. Medaris Jr, G., Ducea, M., Ghent, E., Iancu, V., 2003. Conditions and timing of high-pressure Variscan metamorphism in the South Carpathians, Romania. Lithos 70, 141-161.

20. Park, S.K., Ducea, M.N., 2003. Can in situ measurements of mantle electrical conductivity be used to infer properties of partial melts? Journal of Geophysical Research: Solid Earth 108, doi:10.1029/2002JB001899.

21. Saleeby, J., Ducea, M., Clemens-Knott, D., 2003. Production and loss of high-density batholithic root, southern Sierra Nevada, California. Tectonics 22, doi:10.1029/2002TC001374.

22. Sen, G., Yang, H.-J., Ducea, M., 2003. Anomalous isotopes and trace element zoning in plagioclase peridotite xenoliths of Oahu (Hawaii): implications for the Hawaiian plume. Earth and Planetary Science Letters 207, 23-38.

23. Ducea, M.N., Gehrels, G.E., Shoemaker, S., Ruiz, J., Valencia, V.A., 2004. Geologic evolution of the Xolapa Complex, southern Mexico: Evidence from U-Pb zircon geochronology. Geological Society of America Bulletin 116, 1016-1025.

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25. Zandt, G., Gilbert, H., Owens, T.J., Ducea, M., Saleeby, J., Jones, C.H., 2004. Active foundering of a continental arc root beneath the southern Sierra Nevada in California. Nature 431, 41-46.

26. Barbeau Jr, D.L., Ducea, M.N., Gehrels, G.E., Kidder, S., Wetmore, P.H., Saleeby, J.B., 2005. U-Pb detrital-zircon geochronology of northern Salinian basement and cover rocks. Geological Society of America Bulletin 117, 466-481.

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29. Root, D.B., Hacker, B.R., Gans, P.B., Ducea, M.N., Eide, E.A., Mosenfelder, J.L., 2005. Discrete ultrahigh-pressure domains in the Western Gneiss Region, Norway: implications for formation and exhumation. Journal of Metamorphic Geology 23, 45-61.

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36. Wagner, L.S., Beck, S., Zandt, G., Ducea, M.N., 2006. Depleted lithosphere, cold, trapped asthenosphere, and frozen melt puddles above the flat slab in central Chile and Argentina. Earth and Planetary Science Letters 245, 289-301.

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41. McQuarrie, N., Robinson, D., Long, S., Tobgay, T., Grujic, D., Gehrels, G., Ducea, M., 2008. Preliminary stratigraphic and structural architecture of Bhutan: Implications for the along strike architecture of the Himalayan system. Earth and Planetary Science Letters 272, 105-117.

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43. Balintoni, I., Balica, C., Ducea, M.N., Chen, F., Hann, H.P., Şabliovschi, V., 2009. Late Cambrian–Early Ordovician Gondwanan terranes in the Romanian Carpathians: a zircon U–Pb provenance study. Gondwana Research 16, 119-133.

44. DeCelles, P.G., Ducea, M.N., Kapp, P., Zandt, G., 2009. Cyclicity in Cordilleran orogenic systems. Nature Geoscience 2, 251-257.

45. Drew, S.T., Ducea, M.N., Schoenbohm, L.M., 2009. Mafic volcanism on the Puna Plateau, NW Argentina: Implications for lithospheric composition and evolution with an emphasis on lithospheric foundering. Lithosphere 1, 305-318.

46. Ducea, M.N., Kidder, S., Chesley, J.T., Saleeby, J.B., 2009. Tectonic underplating of trench sediments beneath magmatic arcs: The central California example. International Geology Review 51, 1-26.

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48. Luffi, P., Saleeby, J.B., Lee, C.T.A., Ducea, M.N., 2009. Lithospheric mantle duplex beneath the central Mojave Desert revealed by xenoliths from Dish Hill, California. Journal of Geophysical Research: Solid Earth 114, doi:10.1029/2008JB005906.

49. Otamendi, J.E., Ducea, M.N., Tibaldi, A.M., Bergantz, G.W., de la Rosa, J.D., Vujovich, G.I., 2009. Generation of tonalitic and dioritic magmas by coupled partial melting of gabbroic and metasedimentary rocks within the deep crust of the Famatinian magmatic arc, Argentina. Journal of Petrology 50, 841-873.

50. Valencia, V.A., Ducea, M., Talavera-Mendoza, O., Gehrels, G., Ruiz, J., Shoemaker, S., 2009. Geocronología U-Pb de granitoides del límite noroeste del terreno Xolapa. Revista Mexicana de ciencias geológicas 26, 189-200.

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52. Balintoni, I., Balica, C., Ducea, M.N., Zaharia, L., Chen, F., Cliveţi, M., Hann, H.P., Li, L.-Q., Ghergari, L., 2010. Late Cambrian–Ordovician northeastern Gondwanan terranes in the basement of the Apuseni Mountains, Romania. Journal of the Geological Society 167, 1131-1145.

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9. RESEACRH PROJECTS AWARDED TO MIHAI N DUCEA

In my 23 years as a professor at University Arizona and more recently at the University of Bucharest, I have successfully secured research grants and industry competitive contracts as a principal investigator and co-principal investigator (project director or co director). A complete list of grants, contracts and service contracts (laboratory work for third party contractors) is available on request. Below, I provide a list of some of the most important grants in my career development in the United States and in Romania. Those marked with asterisk (*) are either current or were executed over the past 5 years. NSF= United State National Science Foundation. The total amount of money raised over the course of my career (25 years since PhD) is around 25 million USD – about a million USD per year on average.

US Federal and Private competitive funding:

Federal

- *Collaborative Research: TransANdean Great Orogeny (TANGO), NSF multiple sources, 2,200,000, 08/20-07/2024

- *Rare earth elements tracing crustal evolution through time: a detrital zircon study - NSF-Tectonics; $ 230,991, 07/01/17-6/30/21.

- Constraints on Plateau Architecture and Assembly From Deep Crustal Xenoliths, Northern Altiplano (Southern Peru), Program: NSF Petrology-Geochemistry, $ 254, 000, 07/01/15-6/30/17.

- Crustal Overturn in Continental Margin Arcs During Magmatic Surges NSF Tectonics, $ 297, 752, 06/01/2011-5/31/2014)

- Collaborative Research: The suturing process: Insight from the India-Asia collision zone NSF Continental Dynamics, University of Arizona, $1,958,673, 04/01/11 – 03/30/15

- In Pursuit of missing Andean Lithosphere: constraining Late Cenozoic crust-mantle process in the Puna Plateau, central Andes NSF Tectonics, $468,796, 9/1/09 – 8/31/12

- Collaborative Research: CAUGHT: Central Andean Uplift and the Geodynamics of High ' Topography NSF Continental Dynamics, $1,935,391, 6/1/09 – 5/31/13

- Collaborative Research: Lithospheric removal: The Sierra Nevada as the prototype of a fundamental process in mountain building NSF Continental Dynamics, $394,999, 6/1/06 –5/31/10

- Facility Support: Completing the Western North American Volcanic and Intrusive Rock Database (NAVDAT) NSF Instrumentation-Facilities, Facilities support, $ 998,261. 9/1/06-8/31/08

- Collaborative Research: BATHOLITHS: Generation and evolution of crust in continental magmatic arcs National Science Foundation (Continental Dynamics Program), $3,803,072, 1/04- 1/09

- Igniting Continental Arcs; A Petrologic Study Of Peridotites And Mafic Rocks From The Coast
Ridge Belt, Santa Lucia Mountains (California), National Science Foundation (Petrology-Geochemistry Program), $221,700, 01/2003-12/2005

- Acquisition of micromill and the development of a micro-sampling facility National Science Foundation (Instrumentation and Facilities Program), $525,000, 01/2002-12/ 2002

- Testing the degree of correspondence between surface tectonic features and upper mantle structure and composition by study of volcanic-hosted xenoliths in the southwestern Cordillera National Science Foundation (Tectonics Program), $325,000, 01/ 2001-12/2002

- Sm-Nd thermochronology of garnets in metamorphic rocks: A new method and tectonic application National Science Foundation (Petrology Program), $1,159,717, 01/2001-12/2002

- Collaborative Research: Laboratory and field studies linking electrical anisotropy and deformation in the mantle National Science Foundation (Geophysics Program), $226,145, 9,/2000-8/2001

- A thermobarometric study of deep-crustal rocks from southwest Mexico University of Arizona, $244,950, 12/ 2000-12/ 2001

Private

- K-Ca Geochronology; New Analytical Developments Using Multicollector ICP-MS And Geologic Applications, American Chemical Society, Petroleum Research Fund, $135,000, 9/2006- 8/2009

- In-Situ U-Pb Age Determinations Using Multiple-Collector ICP Mass Spectrometry: Further Technique Developments And A Tectonic Application, American Chemical Society, Petroleum Research Fund, $135,000, 9/2002-8/2004

- Evolution of the Andes, EXXON-MOBIL Center for Orogenic System Analyses (COSA) grant, Phase 1 $1,290,197, 9/2007–8/2010

- Evolution of the Andes, EXXON-MOBIL, Center for Orogenic System Analyses (COSA) grant Phase 2, $1,440,000, 8/2010-7/2013

- Isotopic techniques constrain the evolution of oil genesis in carbonate reservoirs, Chevron Energy Technology, ongoing grant, ~$466,400 (2010-2018)

- Mars Chocolate Company 550,000 (2015-2019)

In Romania, Federal Funding:

- *PACE – Paleotopography and Crustal Evolution, PNNR i8 projects, 6,000,000 RON (aprox 1.25 million USD) – January 2024-June 2026

-*CUTE New Methods for Tracking Regional and Global Crustal Changes Using the Geochemical Record of Magmatic Rocks and Their Derivative Sediments , UEFISCDI, PCCF, 8,500,000 RON (aprox 2, 000,000 USD), 11/18-11/22.

- DRIPS - Geochemical Tests Of Lithospheric Delamination With Applications To Convergent Margin Tectonics, UEFISCDI, Proiect PCE, 850,000 RON (aprox 200,000 USD), 6/17-12/19.

10. Patents if applicable – NOT APPLICABLE

ANNEXES- MIHAI DUCEA

Annex 1 – copy of PhD diploma obtained in 1998 from the California Institute of Technology
Annex 2 – (in Romanian) declarație de consimțământ privind prelucrarea datelor cu caracter personal; this corresponds to Annex 5 in the information package.

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