

SERBIA - REPORT FOR PERIOD DECEMBER 2019 – APRIL 2020

19 scientists have become a member of EUROPLANET society.

The second meeting of Serbian EUROPLANET Group (SEG) is organized at the Institute of Physics Belgrade on 10 February, 2020.

PUBLISHED PAPERS IN JOURNALS

1. Variation in natural short-period ionospheric noise, and acoustic and gravity waves revealed by the amplitude analysis of a VLF radio signal on the occasion of the Kraljevo earthquake (Mw = 5.4)

A. Nina, S. Pulnits, P. F. Biagi, G. Nico, S. T. Mitrović, M. Radovanović, L. Č. Popović, (2020) *Sci. Total Environ.* 710, 136406

2. Electron swarm parameters in C₂H₂, C₂H₄ and C₂H₆: measurement and kinetic calculations

N R Pinhão, D Loffhagen, M Vass, P Hartmann, I Korolov, S Dujko, D Bošnjaković and Z Donkó, (2020) *Plasma Sources Sci. Technol.* 29, 045009

3. Evidence of extensive lunar crust formation in impact melt sheets 4,330 Myr ago

White, L.F., Černok, A., Darling, J.R., Whitehouse, M.J., Joy, K.H., Cayron, C., Dunlop, J., Tait, K.T. and Anand, M.,

Nat Astron (2020), doi: 10.1038/s41550-020-1092-5

4. Variations in Ionospheric D-Region Recombination Properties during Increase of its X-ray heating induced by solar X-ray flare

Nina, A.M., Čadež, V.M., Lakićević, M.D., Radovanović, M.M., Kolarski, A.B. and Popović, L.Č., (2019) *Therm. Sci.* 23(6B), 4043-4055

5. Databases for collisional and radiative processes in small molecules needed for spectroscopy use in astrophysics

Jevremović, D., Srećković, V. A., Marinković, B. P., & Vujčić, V., (2020) *CoSka*, 50(1), 44-54.

6. The influence of collisional-ionization and recombination processes on spectral line shapes in stellar atmospheres and in the hydrogen clouds in broad-line region of AGNs

Srećković, V. A., Dimitrijević, M. S. and Ignjatović, L. M., (2020) *Contrib. Astron. Obs. Skalnaté Pleso*, 50, 171-178.

7. Photoionization of the alkali molecular ions in geo-cosmical plasmas

Ignjatović, L. M., Srećković, V. A. and Dimitrijević, M. S., (2020) *CoSka*, 50(1), 187-192.

8. Influence of the (n-n')-mixing processes on the optical properties of the hydrogen clouds in the broad-line region of AGNs

Dimitrijević, M. S., Srećković, V. A. and Ignjatović, L. M., (2020) *Contrib. Astron. Obs. Skalnaté Pleso*, 50, 179-186.

9. The collisional atomic processes in geo-cosmical plasmas: data needed for spectroscopy

Srećković, V. A., Ignjatović, L. M., Dimitrijević, M. S., Bezuglov, N. N., & Klyucharev, A. N., (2020) *Contrib. Astron. Obs. Skalnaté Pleso*, 50, 55-65.

10. Radon variability due to floor level in two typical residential buildings in Serbia,

Udovičić, V., Veselinović, N., Maletić, D., Banjanac, R., Dragić, A., Joković, D., Savić, M., Knežević, D. and Eremić Savković, M., (2020) *Nukleonika* 65(2), 121-125.

PUBLISHED PROCEEDINGS AND ABSTRACTS

1. The specific property of motion of resonant asteroids with very slow Yarkovsky drift speeds, Milić Žitnik, I., I-CELMECH Training School, Department of Mathematics of the University of Milan (Italy), February 3-7, 2020.

2. Izložba "Asteroidi, mali kameni svetovi" njen povod, sadržaj i posledice, Todorović, N., Milić Žitnik, I., 2019, Zbornik radova konferencije "Razvoj astronomije kod Srba X", Publications of the Astronomical Society "Ruđer Bošković, urednik M. S. Dimitrijević, 275-289, 22.4.2019.-26.4.2019. u Beogradu.

3. Streamer discharges in the atmosphere of Primordial Earth, M. B. Enghof, N. Segkos, S. Dujko, O. Chanrion, and C. Köhn, has been selected as "Highlight" by the session conveners at the EGU General Assembly 2020, Session Geodynamics: Early Earth: Dynamics, Geology, Chemistry and Life in the Archean Earth, On-line 4-8 May 2020.

4. Variations revealed by INFREP Radio Network in correspondence of six earthquakes with MW greater than 5.0 occurred in the Balkan Peninsula and Adriatic Sea on 26 and 27 November, 2019, Biagi, P.F., Nina, A., Ermini, A. and Nico, G., EGU General Assembly 2020, On-line 4-8 May 2020, EGU2020-9200.

5. On the characterization of VLF radio signal propagation in atmosphere in quite solar conditions, Nico, G., Nina, A., Ermini, A. and Biagi, P.F., EGU General Assembly 2020, EGU2020-9197.

SUBMITTED MANUSCRIPTS:

1. The relationship between the 'limiting' Yarkovsky drift speed and asteroid families' Yarkovsky V-shapes

Ivana Milić Žitnik, Serbian Astronomical Journal.

2. The functional relation between mean motion resonances and Yarkovsky force on higher eccentricities

Ivana Milić Žitnik, MNRAS.

3. Ionospheric D-region influence on SAR signal propagation

J. Radović, A. Nina and G. Nico, Proceedings, 30 Summer School and International Symposium on the Physics of Ionized Gases SPIG, 24-28 August–, 2020, Šabac, Serbia

4. Reduction of lower ionosphere plasma fluctuation – new earthquake precursor?

A. Nina, S. Pulinets, P.F. Biagi, G. Nico, S. T. Mitrović, M. Radovanović and L. Č. Popović, Proceedings, 30 Summer School and International Symposium on the Physics of Ionized Gases SPIG, 24-28 August, 2020, Šabac, Serbia

5. Propagation of electromagnetic waves in perturbed lower ionospheric plasma

A. Nina, Abstract, 30 Summer School and International Symposium on the Physics of Ionized Gases SPIG, 24-28 August, 2020, Šabac, Serbia

ACCEPTED PROJECTS

1. Bilateral project SERBIAN ACADEMY OF SCIENCES AND ARTS Department of International Relations and Bulgarian SERBIAN ACADEMY OF SCIENCES AND ARTS 2020-2022 “ANALYSIS OF BIG DATA IN ASTROPHYSICS, EARTH OBSERVATIONS AND APPLICATIONS”, Ognyan Kounchev and Vladimir Srećković

APPLICATIONS

1. EUROPLANET call: proposal for co-financing the organization of the 12th Serbian-Bulgarian Astronomical Conference has been sent through the Southeast European Hub.
2. Ivana Milić Žitnik applied for the project "Agora" Horizon 2020 with 6 months of research in March 2020.
3. In collaboration with Dr Christoph Köhn and Dr Christiane Helling, Saša Dujko has submitted the proposal entitled “The effect of lightning induced energetic gamma-rays and antimatter on the production of prebiotic molecules” to the Independent Research Fund Denmark.

CURRENT RESEARCH

1. Ivana Milić Žitnik works on Celestial Mechanics.
2. The manuscript entitled “Streamer discharges in the atmosphere of Primordial Earth” is in preparation. Likewise, the manuscript entitled “Electron transport parameters in CO₂: A comparison of two experimental systems and measured data” is also in preparation (Saša Dujko).

3. Aleksandra Nina leads studies related to modelling of the lower ionospheric parameters under quiet conditions, analysis of influences of the disturbed lower ionosphere on satellite signal propagation, and research of the lower ionospheric disturbances in period of earthquake occurrences. Several EUROPLANET members are included in these studies as well as scientist from Italy and Russia.

4. A group of international scientists at the Royal Ontario Museum, Toronto, including a Serbian scientist Dr. Ana Černok, has discovered that the formation of ancient crust of the Moon may be directly linked to large-scale meteorite impacts. They studied a sample 76535 collected by Apollo 17 mission to conclude that the temperatures at which this rock solidified can only be achieved in large-scale impacts. [https://phys.org/news/2020-05-evidence-giant-meteorite-impacts-moon.html?](https://phys.org/news/2020-05-evidence-giant-meteorite-impacts-moon.html?fbclid=IwAR26KoFYMK3PsS1PGw1fl3O5Ommhmnt4idSwu0eQhoLPWX4gPM3az4TIX0)

[fbclid=IwAR26KoFYMK3PsS1PGw1fl3O5Ommhmnt4idSwu0eQhoLPWX4gPM3az4TIX0](https://phys.org/news/2020-05-evidence-giant-meteorite-impacts-moon.html?fbclid=IwAR26KoFYMK3PsS1PGw1fl3O5Ommhmnt4idSwu0eQhoLPWX4gPM3az4TIX0)

5. Saša Dujko prepared the popular science article (in Serbian) about the possible lightning discharges in the atmosphere of Titan for the website of the Institute of Physics Belgrade in section Our stories.

6. Last six months Nikola Veselinović have been working on cosmic rays data, specifically on correlation between CR flux and atmospheric and solar wind parameters. This cross-correlation analysis can help in better understanding of Earth-affecting CMEs and space weather as well as temperature in higher regions in atmosphere. During COVID-19 pandemic lock-down he was in constant correspondence with colleagues from GSU, Atlanta, USA regarding development of small, highly affordable, muon detector that can be useful in various research. His group were making plans to use these detectors to form a worldwide network. Unfortunately, all these plans must wait for normalization of the situation. In near future one paper about CR correlation will be submitted but also this topic will be addressed in progress report at the 30th Summer School and International Symposium on the Physics of Ionized Gases (SPIG 2020).

7. Vladimir Srećković Aleksandra Nina and Milan Radovanović are guests editors for Special issue “Natural Disasters and Extreme Solar Energy” in MDPI journal Sustainability.

https://www.mdpi.com/journal/sustainability/special_issues/Natural_Disasters_Extreme_Solar_Energy

8. Special issue “Atomic and Ionic Collisions with Formation of Quasimolecules“ MDPI časopisa Atoms (citescore=1.2) edited by Vladimir A. Srećković, Milan S. Dimitrijević and Nikolai N. Bezuglov.

https://www.mdpi.com/journal/atoms/special_issues/Atomic_ionic_collisions_formation_quasi_molecules

9. Ivana Milić Žitnik started to participate in April 2020 at "I-CELMECH Seminars", a series of online seminars on Celestial Mechanics and Dynamical Systems (once per week), organised within the Italian MIUR National project PRIN: "I-CELMECH New frontiers of Celestial Mechanics: Theory and Applications". This activity is made in collaboration with the Departments of Mathematics of the Universities of Milano, Padova, Pisa and Roma Tor Vergata (Excellence Department project MATH@TOV).

PLANS:

ORGANIZATIONS:

1. 30 Summer School and International Symposium on the Physics of Ionized Gases SPIG, 24-28 August, 2020, Šabac, Serbia (<http://spig2020.ipb.ac.rs/>). EUROPLANET members participate in organization of this event: Luka Popović is chair of the Scientific Organizing Committee and Vladimir Srećković is chair of the Local Organizing Committee. Several EUROPLANET members from Serbia will participate with lectures and poster presentations, and the President of EUROPLANET Nigel Mason (also member of the Scientific Organizing Committee) will have presentation as well as Spacial Section.

2. Meeting of COST Action CA15211 “Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems”, Belgrade, 9-11 September 2020 (<https://www.atmospheric-electricity-net.eu/index.php/node/152>). Organizers are EUROPLANET members Aleksandra Nina and Milan Radovanović, and Gorica Stanojević, Jelena Radović, Vladimir Srećković and Dejan Doljak are members of the Local Organizing Committee.

3. 12th Serbian-Bulgarian astronomical conference (12SBAC, see <http://poincare.matf.bg.ac.rs/~andjelka/12sbak/index.html>) is a conference from the series of meetings of Serbian and Bulgarian scientists as well as scientists from region and other European countries working in astronomy and space science, also covering physics, informatics and history of science (see http://poincare.matf.bg.ac.rs/~andjelka/12sbak/past_confs.html). The aim of this series of conferences is to contribute to the developing of collaboration and friendship of Serbian and Bulgarian scientists, but also scientists from the south Europe region, first of all astronomers but also from close scientific fields (informatics, physics, philosophy and history of natural sciences, etc.) in order to stimulate the exchange of experiences, joint projects and common research. The 12th SBAC will be held in Sokobanja (Serbia) at the end of this year. We have several registered participants which are EUROPLANET members, mostly from Bulgaria and Serbia, but also from other countries (see <http://poincare.matf.bg.ac.rs/~andjelka/12sbak/participants.html>). Luka Popović and Vladimir Srećković are chairs of the Scientific Organizing Committee and Local Organizing Committee, Andjelka Kovačević je Secretary of the Local Organizing Committee, and Milan Radovanović is member of the Scientific Organizing Committee.

4. On October 13-17 2020, the 19th Serbian astronomical conference (19 SAC, <http://astro.math.rs/kas19/>) will be held in Serbian Academy of Art and Sciences, Belgrade. The Serbian astronomical conferences have a longtime tradition started almost 30 years ago. The 19 SAC is aimed at bringing together scientists in astronomy and related fields from Serbia and abroad. One of the session is dedicated to the planetary sciences. Expected speakers at the planetary session include Research Scientist Matija Ćuk at the SETI Institute USA, Katarina Miljković ARC DECRA Fellow at Curtin University Australia, Stefan Cikota University of Zagreb Croatia, Bojan Novaković PI of the STARDUST-Reloaded at Department of Astronomy University of Belgrade, founded by the Horizon 2020 Programme of the European Union, Nataša Todorović and Ivana Milić Žitnik members of EUROPLANET Serbia Hub from Astronomical Observatory Belgrade. COSPAR Associate, UK

and NoR CEL International Committee member dr Sohan Jheeta is expected to give lecture on astrochemistry view of synthesis of the basic 'building blocks' of life on our planet. Vice-chair of Serbian EUROPLANET Hub Aleksandra Nina will also give lecture. A member of EUROPLANET Serbia Hub Andjelka Kovačević from Department of Astronomy, University Belgrade is a cochair of the Scientific Organizing Committee of the 19th Serbian astronomical conference.

PARTICIPATION IN MEETINGS

1. Ivana Milić Žitnik registered as a participant at "The Global Virtual Workshop I" in Piza (Italy), organized by the University of Pisa and the University of Belgrade, September 7-10, 2020, with the presentation "The relationship between the 'limiting' Yarkovsky drift speed and asteroid families' Yarkovsky V-shapes".
2. Aleksandra Nina is registered as participant at 1st SCOSTEP/PRESTO on line seminar (26 May, 2020).
3. Several EUROPLANET members plan to participate in the 30 Summer School and International Symposium on the Physics of Ionized Gases SPIG, 24-28 August, 2020, Šabac, Serbia.
4. Several EUROPLANET members plan to participate in the Conference of Serbian and Bulgarian Astronomers
5. Several EUROPLANET members plan to participate in the 19th Serbian astronomical conference (13-17 October, 2020).

APPLICATIONS

Several project applications are planed for call of the Ministry of Education, Science and Technological Development of the Republic of Serbia IDEJA.

OTHER

1. Master thesis: Jelena Radović, Faculty of Physics, University of Belgrade.
2. Special Issue in MDPI journal Atmosphere is in preparation. Aleksandra Nina, Giovanni Nico (Italy) and Vladimir Srećković should be guest editors.