

Name and surname:	Krzysztof Sośnica
Academic Degree:	prof. dr hab. inż. (Prof.)
Institute/Department:	Institute of Geodesy and Geoinformatics
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ORCID:	0000-0001-6181-1307
UPWr Base of Knowledge - link:	https://bazawiedzy.upwr.edu.pl/info_seam?id=UPWrbd14633e36ae4108a4ae41c1e25350&affil=&lang=pl
Researchgate:	https://www.researchgate.net/profile/Krzysztof-Sosnica
Personal website / Working group website:	http://www.igig.up.wroc.pl/igg/
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	<p>Earth's Gravity field Evolution (EAGLE) PI: prof. dr hab. inż. Krzysztof Sośnica Number (MSHE code): UMO-2021/42/E/ST10/00020 Duration: 1.07.2022 - 30.06.2027</p> <p>Multi-GNSS Precise Point Positioning with stochastic clock modeling PI: prof. dr hab. inż. Krzysztof Sośnica Number (MSHE code): UMO-2021/43/O/ST10/00096 Duration: 1.10.2022 - 30.09.2027</p> <p>Fundamental techniques, models and algorithms for a Lunar Radio Navigation system PI: prof. dr hab. inż. Krzysztof Sośnica (UPWr) Number (MSHE code): European Space Agency, ESA AO/1-10712/21/NL/CRS Duration: 7.10.2021 - 7.04.2023</p> <p>Integrated terrestrial reference frames based on SLR measurements to geodetic, active LEO, and GNSS satellites PI: prof. dr hab. inż. Krzysztof Sośnica Number (MSHE code): National Science Center, UMO-2019/35/B/ST10/00515 Duration: 18.06.2020 - 17.06.2024</p> <p>Determination of Global Geodetic Parameters using the Galileo Satellite System PI: prof. dr hab. inż. Krzysztof Sośnica Number (MSHE code): National Science Center, UMO-2018/29/B/ST10/00382 Duration: 2.01.2019 - 1.01.2022</p> <p>General Relativistic Effects in the orbits of Galileo Satellites PI: dr hab. inż. Krzysztof Sośnica, prof. uczelni Number (MSHE code): European Space Agency, ESA Contract No. 4000130481/20/ES/CM Duration: 1.04.2020 - 1.03.2021</p> <p>Innovative Methods of the Troposphere Delay Modeling for Satellite Laser Ranging Observations</p>
Do you plan to engage support of second supervisor or auxiliary supervisor?	YES
	Auxiliary supervisor
Name and surname:	Radosław Zajdel
Academic Degree:	dr inż. (Dr. Eng.)
Faculty, Institute/Department:	Institute of Geodesy and Geoinformatics
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ORCID:	0000-0002-1634-388X
UPWr Base of Knowledge - link or most important publications from last 3 year (JCR) / patents from last 3 years (maximum 5):	https://bazawiedzy.upwr.edu.pl/info/author/UPWrda0b0cf17b3944ba9ab531afe696fdafa/
Researchgate:	https://www.researchgate.net/profile/Radoslaw-Zajdel-2
Personal website / Working group website:	http://www.igig.up.wroc.pl/igg/
Projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	<p>Determination of Global Geodetic Parameters using the Galileo Satellite System Role: PI Number (MSHE code): National Science Center, UMO-2020/36/T/ST10/00097 Duration: 01.10.2020 – 30.09.2021</p> <p>Fundamental techniques, models and algorithms for a Lunar Radio Navigation system Role: RF Number (MSHE code): European Space Agency, ESA AO/1-10712/21/NL/CRS Duration: 7.10.2021 - 7.04.2023</p> <p>Integrated terrestrial reference frames based on SLR measurements to geodetic, active LEO, and GNSS satellites Role: RF Number (MSHE code): National Science Center, UMO-2019/35/B/ST10/00515 Duration: 18.06.2020 - 17.06.2024</p> <p>Determination of Global Geodetic Parameters using the Galileo Satellite System Role: RF Number (MSHE code): National Science Center, UMO-2018/29/B/ST10/00382 Duration: 2.01.2019 - 1.01.2022</p> <p>General Relativistic Effects in the orbits of Galileo Satellites Role: RF Number (MSHE code): European Space Agency, ESA Contract No. 4000130481/20/ES/CM Duration: 1.04.2020 - 1.03.2021</p> <p>Innovative Methods of the Troposphere Delay Modeling for Satellite Laser Ranging Observations Role: RF Number (MSHE code): National Science Center, UMO-2015/17/B/ST10/03108 Duration: 15.02.2016 - 14.02.2020</p>
PhD topic:	EXPLOITING BENEFITS OF USING INTEGRATED GLOBAL NAVIGATION SATELLITE SYSTEMS FOR GEODESY, GEOPHYSICS, AND GEODYNAMICS
Research discipline in Doctoral School:	Civil Engineering, Geodesy and Transport

<p>Short description of the research problem to be solved in the PhD (minimum 1000 characters):</p>	<p>One of the big societal challenges is global climate change. For a better understanding of these anthropogenic changes, the Earth's system and the interaction between the components have to be studied in detail. A basis is precise measurements, e.g., of sea level changes, hydrological cycles, and deglaciation. The fundamental basis of such measurements is a highly accurate and long-term stable global reference frame. The realization of such a frame and the investigation of the orientation of the frame in space and points on the Earth's surface with respect to the frame is a core task of geodesy. A fundamental contribution to this task comes from GNSS. However, the quality of GNSS-based observations is limited when using the legacy systems, i.e., American Global Positioning System (GPS) and Russian Global Navigation Satellite System (GLONASS).</p> <p>In the principle of the GNSS technique itself, GPS, GLONASS, Galileo, BDS, or any other GNSS should provide the same geodetic parameters – within the respective system accuracy – when used standalone. However, there are some limiting factors, which make the system-specific geodetic parameters unique, e.g., the resonant forces acting on GPS satellites due to the Earth's nonuniform gravitational field and orbital resonance in a ratio of 2:1 between the GPS orbital period and Earth rotation, or significant orbit modeling issues for GLONASS. Since 2019, the Galileo and BeiDou constellations became mature enough to support GPS on hypothetically equal terms, however, several scientific issues need to be solved beforehand to ensure the synergy of GPS+GLONASS+Galileo+BDS solutions and full interoperability.</p> <p>The objective of the project is to conduct a series of scientific activities aimed at the successful integration of GNSS observations provided by American GPS, Russian GLONASS, European Galileo, and Chinese Beidou (BDS) to increase the quality of fundamental geodetic parameters, such as Earth rotation parameters (ERPs), coordinates of Earth's center of mass (geocenter), low-degree gravity field coefficients, station coordinates, parameters describing Earth's atmosphere, as well as the scale of the terrestrial reference frame (TRF), compared to those delivered so far using GPS+GLONASS+Galileo observations.</p> <p>The Ph.D. student will be responsible for processing GNSS observations and determination of global geodetic parameters using GPS, GLONASS, Galileo, and BDS-3 constellations. The Ph.D. student will investigate the differences between the geodetic parameters derived from different systems and develop the best strategy for multi-GNSS solutions to bring out the strengths of individual systems and reduce the impact of orbit modeling errors. On the way to that goal, the Ph.D. student will perform a bunch of analyses to find out the impact of different aspects of the processing scheme on the global geodetic parameters, e.g., selection of observables, observation weighting, orbit modeling, network effects, and impact of background models.</p>
<p>Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):</p>	<p>Completed master's studies in the field of engineering and technical sciences or exact and natural sciences, e.g. geodesy, computer science, physics, mathematics, astronomy, space and satellite engineering, or a related discipline.</p> <p>Experience in programming in Python, R, or Matlab and advanced data analysis (confirmed by scientific articles or thesis).</p> <p>Scientific achievements, including publications or speeches at scientific conferences, will be an additional advantage.</p> <p>Proficiency in English (spoken and written).</p> <p>Capability to work independently and timely, enjoying participating actively in meetings of international teams and to present complex research matter concisely and appealingly (oral and written).</p>
<p>a) Project title:</p>	<p>N/A</p>
<p>b) Agreement number:</p>	<p>N/A</p>
<p>c) Number of months in the project to support PhD (in months; starting from 1st of October 2022):</p>	<p>0</p>
<p>Project website:</p>	<p></p>