Name and surname:	**Krzysztof Sośnica**
Academic Degree	prof. dr hab. inż. (Prof.)
Institute/Department	Institute of Geodesy and Geoinformatics
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UPWr Base of Knowledge - link	https://bazawiedzy.upwr.edu.pl/info.seam?id=UPWrbd14633e36ae4108a4aefde1c1e25350&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)):	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 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 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 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 Innovative Methods of the Troposphere Delay Modeling for Satellite Laser Ranging Observations PI: prof. dr hab. inż. Krzysztof Sośnica Number (MSHE code): National Science Center, UMO-2015/17/B/ST10/03108 Duration: 15.02.2016 - 14.02.2020
PhD topic:	**Time-variable Earth's gravity field derived using SLR, GNSS, and GRACE data**
Research discipline in Doctoral School	Civil Engineering and Transport
Short description of the research problem to be solved in the PhD (minimum 1000 characters):	Observations of the time-variable Earth's gravity field describe the redistribution of environmental masses in the Earth system, including changes in land hydrology, ice, ocean, and atmosphere. These observations provide essential insights into the global water cycle, changes in ocean surface currents, mountain, and polar ice mass loss, large-scale underground droughts, sea-level rise, surface load displacements, as well as many other environmental processes. The variations of the Earth's gravity field directly influence the Earth's rotation, in particular, pole coordinates and length of the day variations from intra-annual to decadal and secular scales. Two satellite missions, GRACE and GRACE FollowOn, have revolutionized the observations of mass transport within the system Earth. However, GRACE was launch in 2002; thus, there is very little information about temporal Earth's gravity field changes before this date. Moreover, GRACE was initially designed for five years, and after 2010, substantial problems related to the power supply occurred, resulting in missing data. GRACE FollowOn entered the science phase in January 2019, which is 16 months after decommissioning its predecessor; therefore, the observations of the Earth's gravity field are discontinuous, with many gaps between 2010 and 2019. Fortunately, GRACE and GRACE FollowOn are not the only missions that can be used to recover the Earth's gravity field variations. For the recovery of the mass redistribution processes in the large scales, we may employ precise Satellite Laser Ranging (SLR) observations to past, present, and future geodetic satellites, such as LAser GEOdynamics Satellites (LAGEOS-1/2), LAser RElativistic Satellites (LARES-1/2), Ball Lens In The Space (BLITS), as well as Ajisai, Starlette, and Stella. Since the 1980s, Starlette, Ajisai, and LAGEOS have been observed on a regular basis by the globally distributed network of laser stations providing range measurements with the accuracy of several millimeters. Since the beginning of the 1990s, many active low Earth orbiters (LEO) have been equipped with precise Global Navigation Satellite System (GNSS) receivers, allowing for precise orbit determination and thus for the gravity field recovery. The primary goal of this study is to derive long-term models of the longest wavelengths of the Earth's gravity field changes using integrated observations from SLR observations to geodetic satellites, inverse methods based on GNSS station coordinates, LEO satellites equipped with GNSS receivers, and geophysical models. We will focus on the long-term evolution of the Earth's oblateness term, low-degree gravity field changes, geocenter motion, with geophysical interpretations and implications.
Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):	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, Proficiency in programming in a selected language (e.g. C ++, Perl, Fortran, Python), Experience in advanced data analysis or numerical modeling (confirmed by scientific articles or thesis), Scientific achievements, including publications or speeches at scientific conferences, will be an additional advantage, Fluency in English (spoken and written), Ability to work independently in a defined time regime, to present complex results in international forms in a concise and accessible way.
Details of the project to support PhD research:	
Project title:	Sonata BIS "EArth's Gravity fieLd Evolution (EAGLE)"
Agreement number:	UMO-2021/42/E/ST10/00020
Number of months in the project to support PhD (in months; starting from 1st of October 2022):	40
Project website:	