Name and surname:	**Tomasz Hadaś**
Academic Degree:	dr hab. inż. (DSc.)
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UPWr Base of Knowledge - link:	https://bazawiedzy.upwr.edu.pl/info.seam?ps=20&id=UPWr44e97b393be1466bb641f4ff5cb82520&lang=en&pn=1&cid=200882
Researchgate:	
Personal website / Working group website:	
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	2019 - 2021, PI: Real-Time GNSS for European Troposphere Delay Model, H2020 Marie Sklodowska-Curie Action, Individual Fellowship 2021 - 2023, RF: EPOS - European Plate Observing System (EPOS-PL+), EU Smart Growth 2022 - 2025, PI: Simultaneous Troposphere Estimation with Precise Point Positioning (STEPPP), National Science Centre Poland (NCN, OPUS-LAP) 2023 - 2026, PI: Precise positioning using GNSS in real time - online service (NCBR, LIDER)
Do you plan to engage support of second supervisor or auxiliary supervisor?	YES
	Second supervisor (from other discipline, Polish or international research unit)
Name and surname:	Manuel Hernández-Pajares
Academic Degree:	Prof.
Faculty, Institute/Department:	Department of Mathematics, Universitat Politècnica de Catalunya
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ORCID:	https://orcid.org/0000-0002-9687-5850
UPWr Base of Knowledge - link or most important publications from last 3 year (JCR) / patents from last 3 years (maximum 5):	1. M. Hernández-Pajares et al. (2023) Topside Ionospheric Tomography Exclusively Based on LEO POD GPS Carrier Phases: Application to Autonomous LEO DCB Estimation. Remote Sensing. DOI: 10.3390/rs15020390 2. E. Monte-Moreno; M. Hernandez-Pajares et al. (2022) Estimation of Polar Depletion Regions by VTEC Contrast and Watershed Enhancing. IEEE Transactions on Geoscience and Remote Sensing. DOI: 10.1109/TGRS.2021.3060107 3. E. Monte-Moreno; M. Hernandez-Pajares et al. (2022) Method for Forecasting Ionospheric Electron Content Fluctuations Based on the Optical Flow Algorithm. IEEE Transactions on Geoscience and Remote Sensing. DOI: 10.1109/TGRS.2021.3126888 4. H. Yang; M. Hernandez-Pajares (2022) Systematic Detection of Anomalous Ionospheric Perturbations Above LEOs From GNSS POD Data Including Possible Tsunami Signatures. IEEE Transactions on Geoscience and Remote Sensing. DOI: 10.1109/TGRS.2022.3182885 5. M. Hernández-Pajares et al. (2022) Wide-Area GNSS Corrections for Precise Positioning and Navigation in Agriculture. Remote Sensing. DOI: 10.3390/rs14163845
Researchgate:	
Personal website / Working group website:	https://futur.upc.edu/ManuelHernandezPajares
Participation projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	2021-2025 PI: PLASMAPHERE IONOSPHERE THERMOSPHERE INTEGRATED RESEARCH ENVIRONMENT AND ACCESS SERVICES:A NETWORK OF RESEARCH FACILITIES 2017-2021 PI: Determinació Ionosfèrica i navegació per SAtèl·lit i sistemes Terrestres 2016-2017 PI: Galileo Reference Center - Development, Operations support and Hosting services 2016-2018 RF: Advanced Multi-Collection EGNSS Augmentation and Monitoring Network and its Application in Precision Agriculture
PhD topic:	Ionosphere constraints in real-time Precise Point Positioning
Research discipline in Doctoral School:	Civil Engineering, Geodesy and Transport
Short description of the research problem to be solved in the PhD (minimum 1000 characters):	Ionosphere remains the major error source in precise GNSS positioning. In the Precise Point Positioning (PPP) technique the application of Global Ionosphere Maps (GIMs) is critical to reducing the convergence time as well as it supports the ambiguity resolution. This is feasible because 1) the accuracy and precision of GIMs are better than 5 TECU, and 2) the spatial resolution is high, i.e. 1 deg. Although the ionosphere delays estimated with undifferenced uncombined PPP are contaminated by receiver biases, the latter can be reduced by forming single differenced ionosphere delays between any two satellites of the same constellation. In real-time, GIMs are not available and the real-time ionosphere maps are of limited spatial resolution and accuracy. Therefore, one cannot apply such strict constraints on ionosphere estimates, as they lead to significantly degraded positioning results. On the other hand, looser constraining does not reduce the convergence time. Post-fit residuals for the ionosphere delays vary significantly and depend, among others, on the distance between the pair of satellites used to form the single differenced ionosphere delays. Similar to ambiguity resolution (AR) techniques and GNSS network solution, it seems that a strategy to form single differenced ionosphere delays, combined with a reliable stochastic model of the ionosphere constraints, plays a crucial role in a rapid convergence of the real-time PPP. Therefore the Ph.D. will evaluate the accuracy of various real-time ionosphere maps, and define the model describing the accuracy of the map as a function of satellite positions and/or local time. He/she will investigate how to apply various strategies of pairing GNSS satellites and their impact on the positioning performance, which will finally lead to a superior stochastic model of the ionosphere-constrained real-time PPP.
Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):	- master in geodesy, aerospace engineering or similar; - good knowledge of Global Navigation Satellite Systems and positioning techniques; - good knowledge (or keen to learn) of least-squares adjustment, Kalman Filter, dynamic processes and dynamic system estimation - basic (at least) programming skills, preferably in Matlab, C++; - at least B2-level English (writing, reading, speaking); - keen to analyze large datasets and prepare original plots; - ready for an international collaboration and networking
a) Project title:	
b) Agreement number:	
c) Number of months in the project to support PhD (in months; starting from 1st of October 2022):	
Project website:	