THE OFFICIAL NEWSLETTER OF THE ISPRS STUDENT CONSORTIUM

SPECTRUM

Vol. No. 17 ISSUE No. 3 December 2024: Released in May 2025

MOBILE MAPPING FOR AUTOMATED DRIVING

ISPRS STUDENT CONSORTIUM

isprs information from imagery

CONTENTS

ENGAGE *WITH OUR GLOBAL NETWORK OF EXPERTS AND* **BE EMPOWERED**

Join the ISPRS Student Consortium today!

Follow us on:

groups/isprssc
@ISPRS_SC
@ISPRSSC

JOIN THE SPECTRUM TEAM

We are constantly in search for passionate volunteers to be part of the ISPRS-SC Newsletter team. If you are a student or a young professional (between 20-35 years old), willing to lend your time and skills with the passion to tell stories, share knowledge and experiences, then join us as a CONTRIBUTOR to the Spectrum.

Have a passion for design, layout, and infographic? Be one of the volunteers of our CREATIVE DESIGN TEAM and help us in telling stories through pictures and images.

Take the opportunity to work with the international array of experts at ISPRS SC to bring the latest stories and developments in the field of Remote Sensing, Geomatics, and Photogrammetry.

If you are interested, please email us at **sc.isprs@gmail.com.** We look forward to hearing from you.

Sileola Charles **ASUNBIARO**
Daryl Ann **CABUYADAO**
DESIGN TEAM

Miguel Luis R. **LAGAHIT**
CO-LEAD

Nicolas **PUCINO**
PROOFREADERS

We are thankful to Dr Sunni K.P. **KUSHWAHA**, former Editor-in-Chief for collecting articles for IFOV and Spotlight. Laxmi **THAPA** took over the tasks to complete the Newsletter afterwards.

EDITOR-IN-CHIEF

Dear Readers,

Normally, the member of the ISPRS SC board of directors (BODs) who helped the editorial team to publish the related issue takes some space here to brief this page. This time, I am also taking some space before them to inform you all that we have some exciting changes in our team. We are happy to have Saicharan Vasala as the website administrator and Efthymios Georgiou as the new newsletter editor-in-chief. While this volume has been launched in transition, we will have Efthymios taking over full responsibilities for the newsletter in the upcoming volumes. I would like to apologise on behalf of all the BODs for the delays in publishing our newsletter. However, I would like to assure you all that we are committed to publishing more volumes more frequently in the foreseeable future.

A big thank you to our contributors who have been instrumental in making this publication possible. Likewise, we are publishing it because you all are reading it. So, we are equally thankful to each one of you for reading it and motivating us to publish new volumes. And, remember that we are just an email away for any contributions, suggestions or feedback you have for us!
Best wishes,
Laxmi Thapa
President
ISPRS Student Consortium

Dear Students and Young Professionals,

As a board member of the ISPRS Student Consortium (SC), I'm pleased to welcome you to this issue of our Newsletter, where we explore the role of Mobile Mapping in the fast-changing world of intelligent transportation.

While autonomous vehicles (AVs) often capture the public's attention with futuristic driverless mobility, much of their capability to safely navigate roadways hinges on information provided by mobile mapping systems. These systems collect geospatial data from moving vehicular platforms, typically equipped with combinations of GPS, LiDAR, cameras, and inertial measurement units. Together, they generate highly accurate 3D maps, known as high-definition (HD) maps, capturing geometric and semantic information of the surrounding environment. Avs rely not only on real-time sensor input but also on HD maps to localize themselves accurately, anticipate road conditions, and make safe driving decisions. Unlike traditional navigation maps, HD maps created through mobile mapping provide centimeter-level accuracy, providing critical data that supports the safety, reliability, and performance of Avs. But mobile mapping also goes beyond autonomous driving. It's reshaping how we plan smarter cities, respond to emergencies, and improve accessibility for all. Whether your interest lies in geoinformatics, AI, urban planning, or environmental sustainability, we hope this issue inspires you to explore and imagine possibilities. Because the future of mobile mapping in intelligent transportation isn't just being developed in industrial labs or tested on roads, it's being mapped by students and young professionals like you.
Warm regards,

Miguel Luis R. Lagahit
Board Member
ISPRS Student Consortium

ISPRS SC Representation at ISPRS TC IV Mid-term Symposium

Event Date and Location: 22-25 October 2024 – Fremantle, Perth, Australia

ISPRS SC Representation: Mr. Miguel Luis R. Lagahit

ISPRS SC Booth

We are incredibly grateful to the organizers for generously providing us with a booth for the entire symposium. This space allowed us to interact with participants, share our mission, and actively engage with the community. Before the symposium, we had the idea to involve our members more directly by calling for volunteers to help us represent us at the booth. This not only encouraged engagement but also allowed us to foster a deeper connection with our members. We were thrilled to welcome four dedicated volunteers who responded to this call (from top to bottom): My-Thu and Eva from San Diego University, Ishtiaq from IIT Roorkee, and Yang from University of Western Australia.

Thanks to the enthusiasm and commitment of these volunteers, we were able to achieve several meaningful goals. They helped us reach out to symposium attendees, promote the Student Consortium's activities, and spread awareness about our membership benefits. Through their efforts, we provided guidance on how interested individuals could establish a student chapter at their own institutions, which is key to expanding our network of young professionals and researchers in photogrammetry, remote sensing, and spatial information sciences.

Beyond outreach, the presence of these volunteers brought valuable insights and fresh perspectives to our team. We had the opportunity to discuss their views on the Student Consortium, gather ideas for future events, and explore potential collaborations with local organizations they are currently affiliated with. Their feedback will play a crucial role in shaping future initiatives, helping us align more closely with the needs and interests of our global membership.

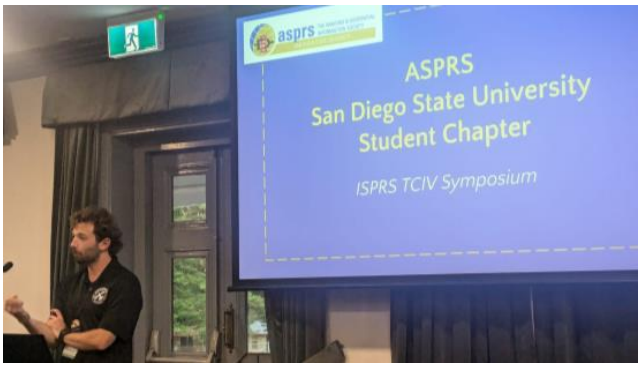
ISPRS SC Networking Hour

On the second day of the symposium, we hosted a successful networking hour aimed at providing a welcoming platform for students, young professionals, and ISPRS Student Consortium (ISPRS SC) board members to connect, share experiences, and build relationships. This event served as an interactive space for attendees to learn about the various student organizations, showcase ongoing activities, and explore opportunities for involvement within these organizations.

We were also delighted to host speakers from an ASPRS student chapter and the Western Australian Spatial Science Student Association (WASSA). Their insights and experiences enriched the event, inspiring participants to consider membership and explore collaborative opportunities with us. These interactions allowed us to initiate several inter-organizational partnerships and draft plans for upcoming events and projects that we hope to realize in the near future.

Our sincere thanks to the ISPRS Council for their participation, which highlights their unwavering support for the Consortium's initiatives. Their presence underscored the importance of fostering a collaborative network within our field. Their involvement added significance to the event and underscored the importance of creating a collaborative and supportive network within the broader ISPRS community. The council's support reinforces the Consortium's efforts to empower the next generation of leaders in our field.

Overall, this networking hour was a meaningful step toward building stronger connections and shared goals within our community. We are excited about the future collaborations and events that emerged from this networking hour and look forward to further developing these partnerships to create even greater opportunities for our members and the broader ISPRS community.



Lastly, on behalf of the ISPRS SC Board of Directors, I would like to extend our heartfelt gratitude to the ISPRS Foundation, Inc. (TIF) for making our in-person participation in this midterm symposium possible. Being physically present at ISPRS events is invaluable to our mission of connecting students, young researchers and professionals who share interest in photogrammetry, remote sensing and spatial information sciences

ISPRS SC Representation at ISPRS TC III Mid-Term Symposium

Event Date and Location: 4-7 November 2024 – Belem, Brazil
ISPRS SC Representation: Ms. Laxmi Thapa and Mr. Yogender Yadav

Laxmi Thapa, President and Yogender Yadav, the then website administrator (July 2022 – January 2025) of the ISPRS SC attended the TC III Mid-Term Symposium in Belem, Brazil from the 4th to 7th November, 2024. Both of them actively participated in many events and interacted with symposium's participants through various activities while showcasing different initiatives of ISPRS SC. ISPRS SC had a dedicated booth set up at the 'VILLAGE' exhibition area during the symposium. The booth served as a hub for students, young professionals, and other attendees to learn about various activities and opportunities offered by the ISPRS SC. The focus during the interaction with visitors was on promoting career growth and engagement in photogrammetry, remote sensing, and spatial information sciences. Laxmi and Yogender also explained to the visitors about different ways of getting involved with ISPRS SC, their upcoming events, freely available educational resources through ISPRS SC and possibilities of collaborative projects.

On the third day of the symposium, Yogender delivered a presentation on the activities of ISPRS SC during the industrial session, based on the ISPRS SC accepted paper for this symposium. Additionally, during the plenary session, Laxmi presented a talk titled “From Knowledge to Network: The Impact of ISPRS SC” on students and early-stage researchers. On the fourth day, ISPRS SC organized a hybrid networking session attended by members of the ISPRS Council and interested symposium participants. The event aimed to provide a platform for students and young professionals to connect with peers, learn about the activities of ISPRS SC, and share their

Figure: ISPRS Council (top-left) and SELPER Team (top-right) and various participants at our booth (bottom left and right)

experiences in the field. Prof. Lena Halounová, President of ISPRS, gave opening remarks, followed by Dr. Derek Lichti, who spoke about ISPRS Congress 2026 activities designed for students and young researchers. Laxmi then presented various ways to engage with ISPRS SC and highlighted the benefits of involvement. She also explained the concept of ISPRS SC student chapters, detailing the requirements for establishing chapters and the advantages they bring within the ISPRS community.

The event included the official announcement of the first list of ISPRS SC student chapters; Prof. Halounová announced the name of these chapters established by the students from four different universities, namely University of Tehran (ISPRS SC Iran - University of Tehran Student Chapter) Tribhuvan University-Pashchimanchal Campus (ISPRS SC Nepal- GESAN Student Chapter), Wuhan University (ISPRS SC China - Wuhan Student Chapter), and Beijing University of Civil Engineering and Architecture (ISPRS SC China - BUCEA Student Chapter). Representatives from these chapters introduced their groups and outlined their planned activities for the next one to

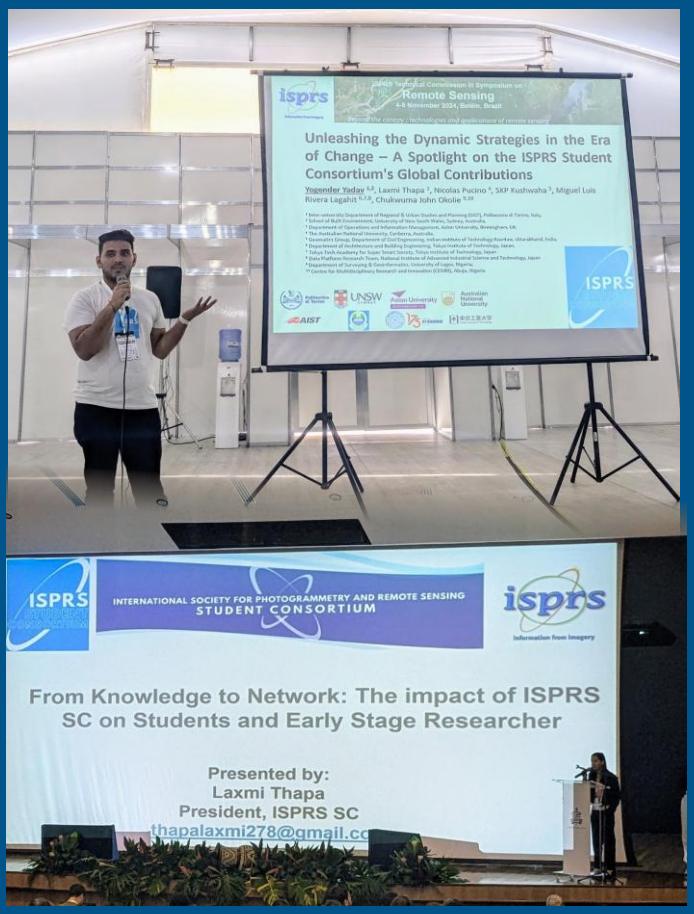


Figure: Yogender (top) and Laxmi (below) presenting during the industrial and plenary sessions respectively.

Figure: Attendees of the ISPRS SC Networking Session (below row) and ISPRS President Prof. Lena Halounová and ISPRS SC president Ms. Laxmi Thapa at the launch of the first list of ISPRS SC student Chapters (top row) during the ' ISPRS SC Networking Hour' in Belem, Brazil.

two years. The session was well-attended and fostered an environment of knowledge exchange and collaboration. Participants had the opportunity to ask questions, discuss research interests, and gain insights into contributing to the ISPRS community.

In the afternoon, Leticia Rosim Porto, a PhD student from São Paulo State University (Unesp, Brazil), volunteered at the ISPRS SC booth. Her support in disseminating information about ISPRS SC to a broader audience was greatly appreciated. Likewise, Laxmi represented ISPRS SC during the Joint Council and TC Meeting, where she presented about the activities that the consortium had completed for the year 2024.

The symposium provided an excellent opportunity to showcase ISPRS SC's activities, including workshops, summer schools, newsletters, webinars, and other collaborative outreach programs. These initiatives are aimed at building a global community of young researchers, and they were effectively communicated to a wider audience through various presentation platforms offered at the symposium. We are grateful to Dr. Laurent

Polidori, President of ISPRS TC III, and the local organizers for waiving Laxmi's registration fee and giving ISPRS SC significant visibility through these activities.

We would like to mention here that the students' group and professors we interacted with during the event were interested to collaborate with us for different activities. In fact, Santa Catarina State University (UDESC) has established ISPRS SC Brazil - UDESC Student Chapter in February 2025 and has been actively participating in our virtual event organised especially for the members of the student chapters. Likewise, we got the opportunity to interact in-person with many professors and scholars that we collaborated virtually to organise different events such as webinars and summer schools.

Figure: Leticia Rosim Porto, our volunteer (left), Laxmi Thapa (center) and Yogender Yadav (right).

Gratitude for Financial Support from The ISPRS Foundation (TIF)

The ISPRS Student Consortium (ISPRS SC) extends its heartfelt gratitude to The ISPRS Foundation (TIF) for generously funding the travel of all board members to attend these important symposiums. This financial support has been instrumental in enabling ISPRS SC to actively participate in and contribute to these events, furthering its mission to empower students and young researchers within the ISPRS community.

The presence of the ISPRS SC board at these symposiums provided several critical benefits:

Enhanced Visibility: The board members' participation strengthened the visibility of ISPRS SC's initiatives, such as workshops, summer schools, webinars, and student chapters, among a global audience of researchers and professionals.

Networking Opportunities: Face-to-face interactions with symposium attendees, including students, early-stage researchers, and professionals, fostered meaningful connections and collaboration opportunities.

Strengthening Collaboration with ISPRS Leadership: The direct interaction with the ISPRS Council, who generously dedicated their time to attending ISPRS SC events, visiting our booths, and engaging in discussions, reinforced the collaborative relationship between ISPRS SC and the ISPRS leadership.

Promotion of ISPRS SC Activities: The symposiums served as a platform to showcase the Consortium's ongoing and upcoming initiatives, attracting interest and participation from the global community.

Knowledge Exchange: Board members actively participated in technical sessions and networking events, gaining valuable insights into the latest developments in photogrammetry, remote sensing, and spatial information sciences. This knowledge will enhance ISPRS SC's future activities.

The financial support also underscores the commitment of TIF and ISPRS to fostering professional development and capacity building for young researchers. Such investments in student-led initiatives significantly contribute to the growth and sustainability of the ISPRS community.

We also express our sincere appreciation to the ISPRS Council for their unwavering support, active participation in ISPRS SC events, and continued interaction with our team throughout the symposiums.

Beyond the Canopy
Technologies and Applications of Remote Sensing

Experience Sharing from The ISPRS TC III Mid-Term Symposium

João Victor Schimalski

In a world where climate change and sustainability are at the center of global debate, remote sensing technologies have become essential tools for understanding and tackling the challenges of the present and the future. It was in this context that the "ISPRS Technical Commission III: Remote Sensing Midterm Symposium", co-organized with SELPER (Association of Latin American Remote Sensing Specialists), took place between November 4 and 8 in Belém, Brazil. The event, which also promoted the XXI SELPER International Symposium, addressed the theme "Beyond the Canopy - Remote Sensing Technologies and Applications", bringing together specialists on the campus of the Federal University of Pará (UFPA) for a week of intense knowledge exchange and networking. The event took center stage at the Benedito Nunes Events Center for the opening and closing ceremonies, as well as various presentations that took place simultaneously at different locations on campus. The structure of the event included the space called the Village, which housed the sponsors' stands, food areas and the stage for poster exhibitions that were grouped and divided according to the established program. The oral presentations were distributed in specific rooms throughout the campus, organized by theme, with plenary sessions at the end of each day, where big names in Remote Sensing took part in debates and shared valuable insights into innovations and opportunities in the field. The event's lectures followed the previous commented organization in a wide range of themes, reflecting the diversity and interdisciplinarity in the scope of Remote Sensing. Among the topics covered were planetary studies, which explored the use of remotely located data to investigate the surface and atmosphere. Innovations in the area of digital image processing were also presented, with an emphasis on new techniques and algorithms that make it possible to extract precise information from large volumes of geospatial data. 3D models and the cryosphere were other topics of great interest, with talks detailing the use of three-dimensional modeling to study landscapes, infrastructure and glacial environments, offering technological solutions to monitor changes in polar and mountainous regions. Artificial intelligence (AI) was widely discussed, with an emphasis on its application in improving image analysis and automating processes for classifying and detecting patterns in remote data. Forest monitoring received special attention, with presentations highlighting innovative applications in the mapping and monitoring of tropical and temperate forests, including studies focused on biodiversity and the management of natural resources. Topics related to the dangers of forest fires were also discussed, with lectures presenting detection and warning systems based on remote sensors, which are fundamental for risk management in vulnerable areas.

In short, the event provided discussions on new sensors for acquiring images with high precision, as well as data processing models that use AI, with an emphasis on Deep Learning. The use of Radar and Lidar was also discussed, with applications covering not only forestry, but also construction, urbanization and maritime studies. The plenary sessions featured big names from the scientific community, such as Thelma Krug, a Brazilian mathematician and Chair of the WMO GCOS (World Meteorological Organization - Global Climate Observing System). Krug, who holds a PhD in spatial statistics from the University of Sheffield in the UK, is widely recognized for her contribution to INPE (National Institute for Space Research) and for developing systems such as PRODES and DETER, which monitor deforestation in the Amazon. Another highlight was Dr. Catherine Nakalembe, Assistant Professor in the Department of Geographical Sciences at the University of Maryland and Director of the Africa Program under NASA Harvest, as well as Theme Leader for Agriculture and Food Security at NASA SERVIR.

In addition to the technical content, the event brought together global professionals, promoting a valuable scientific exchange. With a program that integrated academics and representatives of private companies, the Symposium was attended by renowned companies such as AirBus, DataTerra

and ISPRS Student Consortium, as well as authorities in the field. Personally, I would like to highlight the presence of Laxmi Thapa, president of the ISPRS Student Consortium, whose leadership and inspiring initiative opened up new opportunities for collaboration. I also mention Charles Toth, globally recognized as one of the foremost authorities in Remote Sensing and Geodetic Sciences, who showed great receptiveness to new partnerships. Another highlight was Professor Xinlian Liang, from Wuhan University, who coordinates a laboratory that uses Remote Sensing to extract important attributes from forest systems, with an emphasis on Forest Inventory, an application that caught my attention for its contribution to the sector.

Participating in the "ISPRS Technical Commission: III Remote Sensing Mid-term Symposium" was not only a technical learning opportunity, but also a transformative experience that broadened my perspective on the potential of Remote Sensing to tackle global challenges. The event reinforced the importance of international collaboration and technological innovation to advance natural resource management, environmental monitoring and climate change adaptation.

I would especially like to thank Professor Marcos Benedito Schimalski for his dedication and inspiration, which made this experience possible, as well as Professors Veraldo Lisenberg and Leonardo Josoe Biffi for their company and enriching discussions during the event. I also acknowledge the support of Laxmi Thapa, whose leadership of the ISPRS Student Consortium opened doors to new possibilities for collaboration.

This experience has shown me the relevance of Remote Sensing as an essential tool for tackling technical and environmental challenges. The knowledge acquired in Belém, combined with the connections established, represents an important milestone in my academic and professional training, contributing to the development of partnerships and an entrepreneurial vision for creating technological solutions with a positive impact on society and the environment.

Geospatial Practices for Sustainable Development in East and North-East Asia 2024: A Compendium

The “Geospatial Practices for Sustainable Development in East and North-East Asia 2024: A Compendium” showcases the transformative role of space applications, featuring 100 examples that demonstrate how geospatial data, space technology, and digital innovations are advancing the Sustainable Development Goals (SDGs).

It explores opportunities to make geospatial data more available, accessible, affordable, and actionable in an era of rapid digital transformation. The Compendium also highlights governance frameworks for space applications, aiming to strengthen the impact of geospatial practices on sustainable development, policies, and knowledge. Additionally, it recommends regional accelerators to ensure that all countries can benefit from the rapidly expanding role of geospatial information in development.

Read the full web publication:

https://unescap.org/kp/2024/geospatial-practices-sustainable-development-east-and-north-east-asia-2024-compendium

How Do HD Maps Assist Autonomous Vehicles ?

Meng-Lun Tsai, Kai-Wei Chiang, Yi-Feng Chang, Chih-Yun Hsieh

(Article collected in November, 2024)

In response to the development of autonomous vehicles and the requirement of High-Definition Maps (HD Maps), the automotive industries in advanced countries such as The United States of America, Europe, Japan, and others have invested in the research for self-driving maps. Due to HD Maps providing rich lane-level road information, such as lane lines, stop lines, traffic signs, traffic lights, and other facilities, HD Maps can aid lane-level navigation for autonomous vehicles. In other words, HD Maps are the key element for enabling fully autonomous driving technology.

With the support of Taiwan's Ministry of the Interior (MOI), HD Maps in Taiwan are being developed from 2019. Figure 1 shows the complete scenario of HD Maps and autonomous vehicle applications. HD Maps in Taiwan include four parts which are (i) map layer (as static base map), (ii) reference layer (as transient static map), (iii) area layer (as dynamic map), and (iv) fusion layer (as highly dynamic map). There are referenced Local Dynamic Map (LDM) concepts too. There are two main methods to acquire the data. The first one involves professional mobile mapping systems, which are used for collecting static base map layers. The second one involves using certified third-party contractors for sourcing the other three kinds of layers. After making and verifying the items and accuracy of HD Maps, these certified vector maps are converted to the accepted autonomous vehicle format. Then, these HD Maps are published and uploaded to the cloud. According to different data requirements, the frequency of upload will differ. For example, the static map may be updated every three months, while the traffic information may be updated every minute. Finally, end users can download and use these maps for their autonomous vehicles applications.

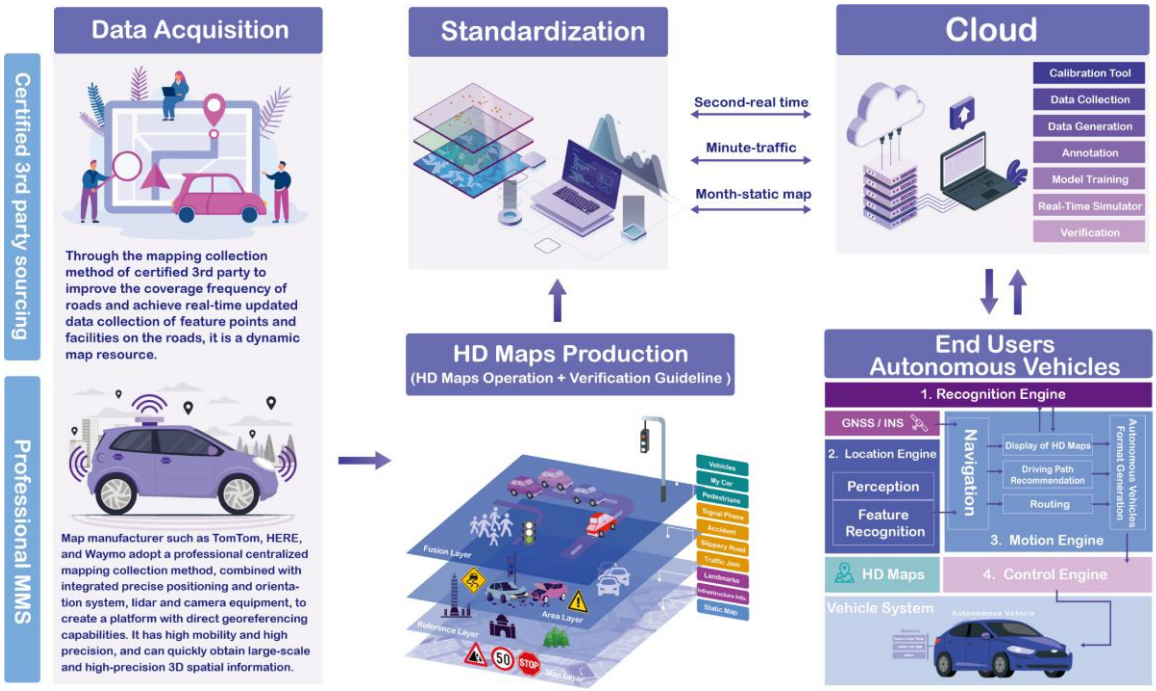


Figure 1. Complete scenario of HD Maps and autonomous vehicle applications

Figure 2 shows the recommended steps for HD Maps production in Taiwan. The map manufacturers have to specify the operation, verification and validation guidelines for HD Maps, and HD Maps data contents and formats standard which is published in TAICS (Taiwan Association of Information and Communication Standards). The operation guidelines detail the mobile mapping system process including task planning, field reconnaissance, system test, system alignment, trusted sources, data post-processing, accuracy check, and map production and report writing. The verification and validation guidelines present the checklist including operation planning, control survey, operation results, point cloud data, and vector layer. The data contents and formats standard guidlines clearly specify the content and encoding formats for the data of HD Maps in Taiwan. These HD Maps guidelines and standards also define data formats which include point clouds (.las format), vector maps (.shp, shape file format), and OpenDRIVE, and illustrate 2D and 3D absolute accuracy of HD Maps which shall be less than 20 and 30 cm, respectively. Figure 3 shows the whole HD Maps demonstration area.

In order to verify that HD Maps can assist autonomous vehicle systems, this study discusses the positioning performance with direct and indirect evaluation methods. The process of direct evaluation is to collect reference data and test the system at the same time. Then, the accuracy can be evaluated by comparing the trajectory of both systems. The procedure of indirect evaluation is to gather data in the area with reference point clouds. Then, the performance can be assessed by comparing with the coordinates of the corresponding check points in this area. The reference system includes navigation-grade IMU, surveying-level GNSS, and commercial software. The validation experiment selects national highways and normal roads. The preliminary results show that 2D and 3D RMSE of the direct evaluation method in national highways are 0.340 and 0.348 m. The RESE in normal roads are 0.119 and 0.185 m. 2D and 3D RMSE of the indirect evaluation method in national highways are 0.128 and 0.134 m. The RMSE in normal roads are 0.166 and 0.223 m. The accuracy in national highways and normal roads both achieve “where in lane” level (less than 0.500 m). This demonstrates the feasibility of utilizing HD Maps assistance capability for testing the autonomous vehicle system.

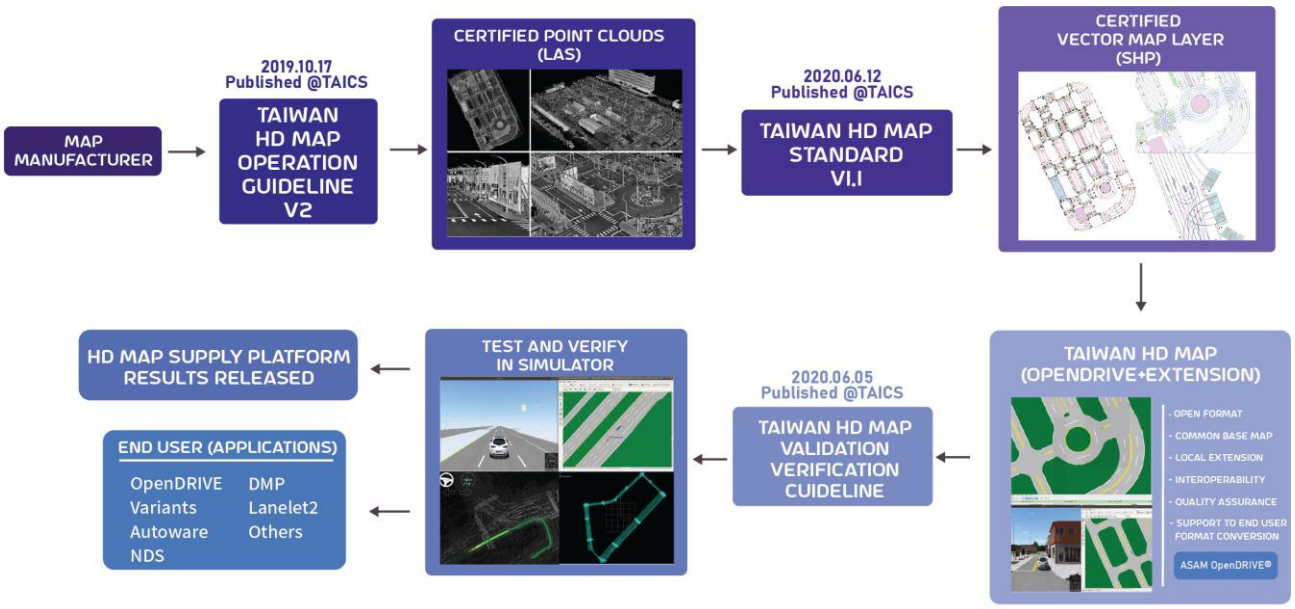


Figure 2. Recommended steps for HD Maps production

Figure 3. MOI Taiwan HD Maps demonstration area

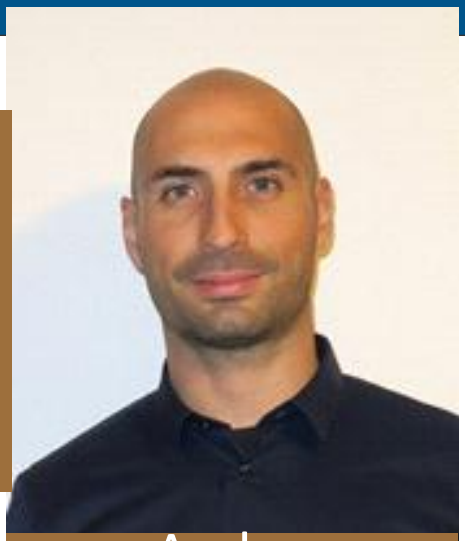
Meng-Lun Tsai
taurusbryant@geomatics.ncku.edu.tw
Associate Researcher
Department of Geomatics, National Cheng Kung University
No.1, University Road, Tainan City 70101, Taiwan (R.O.C.)
Meng-Lun Tsai received his Ph.D. degree from the Department of Geomatics, National Cheng Kung University, Taiwan. He is interested in the development of next generation's multi-sensor fusion such as GNSS modernization, inertial navigation system, lidar, digital photogrammetry, and mobile multi-sensor mapping systems. He is also focusing on the operation, verification, validation, data contents, and formats standard of High Definition Maps

Kai-Wei Chiang
kwchiang@geomatics.ncku.edu.tw
Professor
Department of Geomatics, National Cheng Kung University
No.1, University Road, Tainan City 70101, Taiwan (R.O.C.)

Yi-Feng Chang
F64066185@gs.ncku.edu.tw
Project Manager
Department of Geomatics, National Cheng Kung University

Chih-Yun Hsieh
11202078@gs.ncku.edu.tw
Project Manager
Department of Geomatics, National Cheng Kung University

I MPORTANT
F OCUSED
O UTSTANDING
V ALUABLE



Andrea MASIERO

Interview Questions for SpeCtrum
(Important – Focused – Outstanding – Valuable)

Full Name: Andrea Masiero
Current Position: Associate Professor

Affiliation:
Interdepartmental Research Center of Geomatics (CIRGEO), University of Padova, Italy

Research Interests and Expertise:
(Interview conducted in November, 2024)

Mobile mapping, sensor integration and information fusion, positioning, photogrammetry, LiDAR data processing, visual and LiDAR odometry, remote sensing, statistical and mathematical modelling, machine and deep learning.

Short bio:

Andrea is Associate Professor of Geomatics at the Research Center of Geomatics of the University of Padova, while from 2020 to 2023 he was at the Department of Civil and Environmental Engineering of the University of Florence. He received his MSc Degree in Computer Engineering and his PhD degree in Automatic Control from the University of Padova. He is chair of the ISPRS WG I/2 Mobile Mapping Technology and chair of the IAG WG Wireless positioning with terrestrial instruments.

1. Can you briefly tell us about your research interests?

My research interests mainly focus on mobile mapping, positioning and navigation. I initially worked on sensor integration and data fusion, mainly for positioning and mapping, including the implementation of some simultaneous localization and mapping (SLAM) algorithms, while, more recently, I focused on machine perception, on the study of techniques for geospatial data automatic understanding, typically involving the use of computer vision, machine and deep learning techniques, with applications for instance related to autonomous driving and cultural heritage, e.g. semantic segmentation of point clouds.

2. Who or what inspired you to become a scientist in this research field?

My first thought about becoming a researcher came from one of my best friends, when I was a child. I was originally fascinated by the idea of becoming a physicist, however, during my PhD I became enthusiastic about working on positioning, tracking and processing multi-dimensional data. Then, after my PhD I met Professor Antonio Vettore, the head of the Research Center of Geomatics of the University of Padova, who had a crucial influence on my decision for what concerns the choice of my research field. In particular, after meeting him I started working on mobile mapping systems, and,

more in general, on topics related to geomatics and geospatial data processing.

3. Among the research projects you have conducted, can you share with us a specific project that you liked the most? (Please briefly share with us the project's overall goal, its significance, the remote sensing concepts applied in the research, the outcome, and the reason why you enjoyed working on this project. You can also provide us with links to your papers)

I particularly enjoyed the first project that I worked on just after my PhD. It was within the ELT Design Study, the European programme for the realization of the Extremely Large Telescope (ELT), the largest telescope ever realized, with a primary mirror of 39 m, aiming at pushing further our ability to explore the Universe. My work was on the adaptive optics for the ELT, and, in particular, my goal was properly characterizing the atmospheric turbulence characteristics on the observations of the ELT and developing effective compensation methods. The project was challenging, in particular because I wasn't an expert on telescopes, however, I found very stimulating working on such an interesting topic, dealing with spatio-temporal statistical models of atmospheric turbulence, and using tools such as optimal control and Kalman filtering for formulating a proper approach for the turbulence compensation.

More recently, I have also enjoyed working on collaborative positioning and mapping with an international team, headed by Professor Charles Toth of the Ohio State University and Professor Allison Kealy of the Swinburne University of Technology. The goal of this project is related to formulating a proper strategy for enabling an effective positioning and mapping solution even in conditions critical for GNSS, integrating information provided by different interconnected vehicles and sensors, including cameras and LiDARs.

4. What is the importance of Mobile Mapping for Automated Driving?

Mobile mapping and autonomous driving systems are similar in terms of sensors, actually, we may say that the realization of autonomous driving systems has been highly influenced by the already realized mobile mapping solutions. Indeed, they share the use of positioning and mapping sensors, even if the purpose is slightly different. Such sensors are principally related to two tasks, navigation and sensing the environment: technologies for mobile mapping systems are useful to support the development and use of autonomous driving vehicles in both these tasks. First, the basic technology beyond sensing the environment in autonomous driving vehicles is similar to direct georeferencing in mapping in mobile mapping systems, despite being performed in real-time and typically with cheaper sensors. Even the techniques implemented in autonomous driving for object detection and recognition, crucial for scene understanding and decision-making, are similar to those used for point cloud analysis in mobile mapping. Regarding positioning, the required accuracy in autonomous vehicles is at the decimeter level, ubiquitously and without using high-end navigation sensors, which are instead typically used in mobile mapping systems. Integration of information from different sensors is commonly accepted as the optimal solution for reaching the required positioning accuracy and ubiquity. More specifically, to achieve such kind of performance and to enable autonomous navigation, autonomous driving vehicles typically exploit HD maps, which have usually been previously generated with the support of mobile mapping systems. Also, the use of vision-based techniques, such as simultaneous localization and mapping, which can support autonomous navigation, is used in several mobile mapping systems as well.

5. How have the technologies developed and helped in faster and reliable data acquisition?

There has been a tremendous technological improvement during the last decades, in particular for what concerns the development of electronic devices for gathering geospatial information: new devices are much smaller, able to acquire dramatically more data and cheaper than a few years ago. Typical examples are digital cameras and LiDAR sensors, which represent the most used mapping sensors in mobile mapping systems. The current generation of digital cameras and LiDARs is easily able to acquire ten or more times the amount of data of those used fifteen years ago, while costing an order of magnitude less. Similar considerations hold for navigation systems, including GNSS receivers, and, partially, for inertial measurement units. Such improvements are leading to a democratization of the use of mobile mapping systems: the development of quite affordable solutions is making them more and more popular in many applications.

6. What do you consider your greatest achievement? Can you tell us a challenge that you faced in your career, how you overcame it and what you learnt from the experience?

As a multi-disciplinary researcher, I do believe that the main challenge that I faced was that of being able to deal with research works and projects on very different topics: being able to learn notions from different disciplines and being quickly productive in different fields is quite challenging, but also very stimulating. I do believe that the main reason why I have chosen to be a researcher is my passion for learning and investigating new things, hence, despite the challenges, it has been a pleasure for me to deal with different topics.
In terms of value of my works, I like some of them more than others, for instance, the first low-cost mobile mapping system that I have realized, or the indoor positioning solution that I developed based on smartphone sensors, but I usually find more motivating thinking about the potential results of future researches than about the previous ones.

7. What can you say about the current trends in scientific research related to the efficient use of Mobile Mapping for Automated Driving?

On the one hand, a lot of efforts are being made to improve multi-sensor-based positioning, to ensure good performance even in critical conditions: this requires an effective sensor fusion strategy, properly exploiting also recently developed techniques based on vision and LiDAR-IMU odometry, and effectively employing the use of maps information, provided by HD-maps. On the other hand, certain artificial intelligence (AI) tools, such as machine and deep learning techniques, have already become the state-of-the-art in certain multi-dimensional data processing tasks: the potential of such techniques is not already fully exploited, and, consequently, the development of proper data processing strategies based on such tools is a very hot topic nowadays.

8. What do you think are the possible contributions of international organizations like the ISPRS Student Consortium in knowledge dissemination in Mobile Mapping for Automated Driving?

ISPRS Student Consortium can play a fundamental role in disseminating knowledge among young researchers and encouraging interaction between the industrial world, professionals, students and young academics. Initiatives such as webinar series and summer schools can be important to foster knowledge among the students, whereas the organization of ad hoc activities and facilitating the participation of students in regular scientific events has remarkable importance for allowing them to establish their professional network. These initiatives can help form a new generation of highly skilled professionals and young scientists characterized by strong expertise in mapping, positioning and navigation, and geospatial data processing, which are fundamental for the realization of the new mobile mapping and autonomous driving systems.

9. What is your advice to the youth and how can one be motivated to pursue research in Mobile Mapping for Automated Driving.

Mobile mapping solutions can provide fundamental support to the development of several geospatial data-based applications, and, in particular, to autonomous driving. The development of the latter can be seen as crucial for reducing the number of car incidents, improving mobility solutions and reducing emissions as well. PhD students and young researchers represent the future of science: they are already playing a fundamental role in developing new solutions in several fields, and their contribution is fundamental for mobile mapping and autonomous driving as well. In particular, I do think that the recent introduction of AI-based tools established a new paradigm in geospatial data analysis, and young researchers can play a crucial role in the development of these tools, which are supposed to be at the basis of machine perception and, hence, of any kind of decision-making in autonomous driving. My advice is to follow their passion for innovation and research, learn as much as possible about the existing tools, and try to provide their contribution by pushing a step forward with new technologies.

International Summer School on Smart Cities

July 3 to July 12, 2025

https://english.bucea.edu.cn/Admission/SummerSchool

Organizers

- Beijing University of Civil Engineering and Architecture (BUCEA)
- International Society for Photogrammetry and Remote Sensing
- International Society for Photogrammetry and Remote Sensing (ISPRS) Student Consortium (ISPRS SC)
- Belt and Road Architectural University International Consortium (BRAUIC)

Supporters

- China's University-Enterprise Alliance for Excellent Engineer Education in Civil Engineering in Construction Field
- GNSS & LBS Association of China

Overview

The international summer school aims to provide an academic and cultural exchange platform for students and young scholars from different countries and regions. The summer school will invite high-level lectures from ISPRS as well as domestic and foreign experts and scholars on topics of the construction and management of smart cities, sustainable development of sponge cities, etc., introducing innovative methods, practical technologies, and successful cases of building smart cities.

In addition, the summer school will also arrange a variety of practical or cultural experience activities related to architecture and environment. While Chinese and foreign students attend classes together, internships in architecture and civil engineering courses will be arranged for them to experience traditional Chinese ancient architectural culture, as well as architecture and landscape of modern Beijing. The courses provide an opportunity to experience the charm of Chinese architecture that blends East and West and spanning ancient and modern times.

BUCEA and BRAUIC have successfully organized 8 editions of the international summer school with well-designed courses given by international experts from famous universities and institutions, having attracted more than 1400 students from over 100 universities around the world.

Themes

The lectures will involve a broad range of topics, focusing on practical and methodological skills for better management and sustainable development of our cities, including:

- Architecture and Urban Planning
- GIS & Remote Sensing
- Civil Engineering
- Environmental Science and Engineering
- Construction Management
- Robotics Engineering and Artificial Intelligence

Application

Full time students are welcome to apply by submitting an application form (See Appendix). All applications will be reviewed before being accepted. Accepted participants need to register for the Summer School and pay the registration fee. The application should be sent to the email (buceaiss@hotmail.com) before June 1st, 2025.

Registration fee

- 6,000 RMB/ person, including attendance to all lectures and activities, learning material, accommodation, and meals from July 3 to July 12. International travel expenses are not included.
- For BRAUIC and I6356 members and BUCEA partners sending a delegation with more than 5 students, a discounted price of 4,000 RMB / person will be offered.
- The fee should be paid in RMB cash or by card upon arrival.
- Accommodation: University apartment or hotel (2-3 persons / room)
- Dining: University cafeteria (3 meals / day)

The University,
ISPRS and ISPRS SC

Beijing University of Civil Engineering and Architecture (BUCEA)

https://english.bucea.edu.cn/

BUCEA is located in the Capital City of China and was established in 1907. It has distinctive architectural and civil engineering characteristics. Jointly supported by the Beijing Municipality and the Ministry of Housing and Urban Rural Development of China, the university now has 10 colleges offering undergraduate and graduate degree programs and more than 11,000 full-time students studying in 2 campuses. The Summer School will take place in the Daxing campus, which covers 640,000 square meters, and is blessed with very good facilities and beautiful environment.

BUCEA proposed to establish the BRAUIC in 2017, and has served as the Chairman's Unit ever since. It now works in partnership with more than 91 universities and enterprises across 30 countries and regions.

International Society for Photogrammetry and Remote Sensing (ISPRS)

https://www.isprs.org

ISPRS was founded in Vienna, Austria in 1910 as 'Internationale Gesellscha- ft für Photogrammetrie'. It is a non-governmental international organization, devoted to the development of international cooperation for the advancement of knowledge, research, development, education and training in photogramm- etry, remote sensing and spatial information sciences, their integration and applications, to contribute to the well-being of humanity and the sustainability of the environment

ISPRS Student Consortium (ISPRS SC)

https://sc.isprs.org

ISPRS SC is the official representation of the youth to ISPRS, linking students, young researchers and professionals worldwide, interested in photogrammetry, remote sensing and spatial information science and promoting their scientific and professional developments. ISPRS SC advocates imaging and geospatial science for informed, scientifically valid, and technologically sound observations of Earth conditions and trends that lead to improved and effective decision-making.

Contact information

Contacts persons: Mr. HUANG Xing / Ms. LIN Qing / Ms. LI Yang
Email: buceaiss@hotmail.com
Tel: 0086-10-68361635 / 0086-10-61209251
Address: No.1 Zhanlan Road, Xicheng District, Beijing, P.R.China, 100044

UPCOMING EVENTS

Upcoming Event Name	Dates	Venue	Website
EUROCOW – European Workshop on Calibration and Orientation Remote Sensing	16-18 Jun 2025	Warsaw Poland	https://www.eurocow.org/
46th Canadian Symposium on Remote Sensing (CSRS): From Mountains to Kitchens; Remote Sensing Innovations for Water, Food & Security.	16-19 Jun 2025	Lethbridge Alberta Canada	https://crss-sct.ca/events/csrs2025lethbridge/
International Capacity Building Training Program: Geospatial Technology for Urban Development and Management (GT4UDM)	16-20 Jun 2025	Ahmedabad India	Anjana Vyas & Mr. Harpal Dave +91 9825522844 profanjanavyas@gmail.com & harpaldave@gmail.com
ISPRS SC & ISPRS WG V/2 - 2025 Summer School on Smart Cities	03-12 Jul 2025	Beijing, China	https://english.bucea.edu.cn/Admission/SummerSchool/a571aff62a9d40108af94fab71516dac.htm
3D underwater mapping from above and below	08-11 Jul 2025	Vienna Austria	https://www.tuwien.at/en/mg/geo/photo/events/3d-underwater
2025 Workshop and Tutorial in GeoAI Advancements and Applications	14-15 Jul 2025	The Hong Kong Polytechnic University	https://rcaig.com/2025-workshop-and-tutorial-in-geoai-advancements-and-applications/
Academic Track of FOSS4G (Free and Open Source Software for Geospatial) Europe 2025	14-20 Jul 2025	Mostar Bosnia-Herzegovina	https://2025.europe.foss4g.org/
CIPA 2025 Symposium: 30th CIPA Symposium Heritage Conservation from Bits:From Digital Documentation to Data-driven Preservation for Cultural Heritage	25-29 Aug 2025	Seoul South Korea	http://cipa2025seoul.org/
Summer School on Earth Sensing	07-13 Sep	San Vito di	https://www.cirgeo.unipd.i

SCHOLARSHIPS *AND* OPPORTUNITIES

PhDs

PhD: Exploring the Value of Community-Led Research & Innovation in the Isles of Scilly
The University of Exeter, UK
Deadline: 25 June 2025
Link: https://www.exeter.ac.uk/study/funding/award/?id=5543

PhD position in Earth Observation Remote Sensing
ETH Zürich, Switzerland
Deadline: summer/autumn 2025
Link: PhD position in Earth Observation Remote Sensing

PhD Scholarship for The Impact of Future Human Values and Practices on Australia's Net Zero and Digital Transitions
Monash University, Australia
Deadline: 16 June 2025
Link: https://careers.pageuppeople.com/513/cw/en/job/679372/phd-scholarship-for-the-impact-of-future-human-values-and-practices-on-australias-net-zero-and-digital-transitions

PhD Scholarship for The Impact of Future Human Values and Practices on Australia's Net Zero and Digital Transitions
Monash University, Australia
Deadline: 16 June 2025
Link: https://careers.pageuppeople.com/513/cw/en/job/679372/phd-scholarship-for-the-impact-of-future-human-values-and-practices-on-australias-net-zero-and-digital-transitions

PostDocs

Postdoctoral Research Associate
School of Earth and Environmental Sciences
Cardiff University, United Kingdom
Deadline: 12 June 2025
Link: Research Associate | Cardiff University

Marie Sklodowska-Curie Actions: Postdoctoral Fellowships
European Universities
Deadline: 10 September 2025
Link: https://marie-sklodowska-curie-actions.ec.europa.eu/actions/postdoctoral-fellowships

Postdoctoral Position on Computer vision for sustainable forest management
Norwegian Institute of Bioeconomy Research, Norway
Deadline: 8th June 2025
Link: https://www.jobbnorge.no/en/available-jobs/job/274872/postdoc-computer-vision-for-sustainable-forest-management

NASA Postdoctoral Program for NASA Foundation Models for Earth Science (Ecosystems, Biodiversity, Environmental Variable Downscaling)
USA
Deadline: 1 November 2025
Link: Zintellect - National Aeronautics and Space Administration (NASA) - NASA Foundation Models for Earth Science (Ecosystems, Biodiversity, Environmental Variable Downscaling) - 0146-NPP-NOV25-ARC-EarthSci

Please visit our ISPRS SC web page

sc.isprs.org

where you will find more information about Student Consortium, our previous Newsletter issues, SC activities, photo galleries from previous Summer Schools, interesting links etc.

Are you a student or a young professional below the age of 35?
Fancy Being a Member of ISPRS SC!!
It's Completely Free!!
You just have to fill up the registration form at https://sc.isprs.org/members/register/
We will get back to you with the membership certificate within 7-15 days.

ACKNOWLEDGEMENT

On behalf of the **ISPRS SC Board of Directors**, the Newsletter team would like to thank all the contributors of the featured articles in this issue who shared their knowledge and research experiences with us. We would like to acknowledge design and proofread team in accomplishing this Newsletter issue. We are so proud of you!

SPECTRUM