

Report on the International Scientific Conference

“Towards a State Plane Coordinate System: Scientific Approaches and Practical Challenges”

Skopje, October 31, 2025 (hybrid format)

Summary

The international scientific conference "Towards a State Plane Coordinate System: Scientific Approaches and Practical Challenges", held on October 31, 2025, at Mother Teresa University in Skopje, brought together participants from leading regional cartographic associations and international experts to address the critical establishment of a cutting-edge State Plane Coordinate Reference System (SPCRS) for North Macedonia. Organized by the South-East European Research Institute on Geo Sciences (Geo-SEE Institute), the conference focused on crucial themes such as existing CRS practices, legal frameworks, and implementation challenges. Key outcomes underscored the urgent need for a legally compliant CRS that aligns with European standards (ETRS89/GRS80), robust stakeholder engagement, and a clear transition from research to actionable implementation. The conference not only facilitated vital knowledge exchange but also laid a strong foundation for ongoing collaboration to enhance national geospatial systems, with effective dissemination strategies set to amplify its impactful findings through publications and digital platforms.

1. INTRODUCTION

On October 31 2025, within the framework of the national project "State Plane Coordinate Reference System of the Republic of North Macedonia (SCRS)", the South-East European Research Institute on Geo Sciences (Geo-SEE Institute) in collaboration with 8 esteemed international organizations and companies, held an international scientific conference titled "*Towards a State Plane Coordinate System: Scientific Approaches and Practical Challenges*". The event took place at Mother Teresa University in Skopje, with both in-person attendance and online participation available via the following link: <https://www.scrsproject.mk/p/international-conference.html>.

The Geo-SEE Institute, as the main organizer and under the umbrella of the International Federation of Surveyors (FIG), was strongly supported by the Bulgarian Cartographic Association, the Croatian Cartographic Society, the Kosovo Association of Surveyors, the European Group of Surveyors, and the Macedonian Chamber of Trade Surveying Companies as co-organizers. The event was sponsored by the Alb Matrix Group (Geo Sensors) from Albania and the company FARO Europe.

The primary objective of the conference was to present the key results of the national project, engage international experts, share experiences, discuss methodologies and findings, and explore

the future implementation of the proposed coordinate reference system (CRS) for North Macedonia (<https://www.scrsproject.mk>).

The theme of the conference was focused on the central questions:

- What lessons from existing state plane coordinate reference systems (CRSs) can inform North Macedonia's CRS?
- What legal and institutional frameworks are needed for a new national CRS?
- What technical options ensure accuracy and compatibility with European standards?
- What practical challenges exist in implementing the new CRS?

2. PARTICIPANTS AND FORMAT

The hybrid format enabled participation from local and international stakeholders, including researchers, geospatial professionals, institutional representatives, and policymakers. The project team provided a platform for exchanging knowledge on coordinate reference systems (CRSs) and for dialogue about engineering, legal-institutional, and implementation aspects.

Distinguished presenters from **North Macedonia, Albania, Bulgaria, Croatia, Germany, Greece, Kosovo, the Netherlands, and Türkiye** shared their scientific findings and practical experiences related to state plane coordinate reference systems. The hybrid event attracted a diverse range of participants, including experts, researchers, and institutions working towards harmonizing national geospatial systems with European standards. **In total, 67 participants attended the conference in person and 91 joined online**, demonstrating strong regional and international engagement in this important field.

3. CONFERENCE PROGRAM AND KEY THEMES

The conference covered several themes related to the development of a national state-plane CRS:

- Comparative review of existing state-plane CRS in other countries to identify best practices and their lessons for North Macedonia.
- Legal and institutional issues in establishing a new national CRS to define necessary standards, legislation, and responsibilities.
- Technical/methodological options for the future CRS, including accuracy, compatibility with European/international systems, and ease of use.

- Practical implementation challenges: stakeholder consultations, migration from existing systems, interoperability, EPSG coding, and GIS applications.

These themes align with the work packages of the project (<https://www.scrsproject.mk>), such as WP3 (Legal Issues) and WP4 (CRS in other countries).

4. KEY OUTCOMES AND MESSAGES

Some of the major outcomes of the conference were:

- A shared recognition of the importance of a modern, accurate, legally-conforming CRS for North Macedonia that aligns with European standards and supports GIS, surveying, mapping, and National Spatial Data Infrastructure (NSDI).
- Good practice examples from other countries were discussed, which will help inform the design of the new system. Insights from other countries highlight the importance of strong institutional frameworks.
- Institutional stakeholders emphasized the need for clear legal mandates, coordination among relevant bodies (surveying, mapping, and geospatial agencies), and training for practitioners. A successful rollout requires careful planning, thorough stakeholder consultation, and effective capacity building.
- Technical options were analyzed: balancing high accuracy and compatibility with usability for national applications.
- Implementation steps were outlined, including stakeholder consultation, migration planning from current systems, pilot tests, capacity building, and dissemination of the project results.
- The project team reaffirmed that the next phase will transition from research to action, focusing on preparing for the adoption of the new CRS, supporting institutions, and ensuring the sustainable use of the system.

5. PUBLICATIONS AND DISSEMINATION

The conference serves as a milestone for disseminating the project's findings and engaging the geospatial community. The project website announced the event and related content. The conference announcement was posted on the GeoSEE website on September 15, 2025, and information about the successfully held conference was published on November 1, 2025.

Following the conference, the GeoSEE Institute will implement a plan to publish a book of abstracts with a DOI index and inclusion in the DOAJ. Additionally, presentations will be published on the conference website, ensuring that the conference outputs achieve visibility in international databases.

6. RELEVANCE OF THE CONFERENCE TOPIC

For those working in surveying, large-scale mapping, cadaster, geodesy, engineering geodesy, urban planning, GIS, environmental monitoring, etc., the establishment of a new national state-plane CRS based on ETRS89 datum with GRS80 Earth ellipsoid, and ground to grid map projection, is highly relevant:

- It will provide improved spatial accuracy and consistency across survey, cartography, civil engineering, GIS, and monitoring datasets.
- Aligning national spatial data with a modern reference system and the well-established OGC and ISO geospatial standards enhances interoperability with EU datasets, making cross-border environmental studies more robust.
- Discussions on the institutional and legal framework help contextualize the challenges that may arise in data harmonization, metadata standards, and regulatory compliance.
- Technical insights from the conference can help define the methodology for integrating spatial data from multiple sources (geodetic survey, remote sensing, GIS) and establishing baseline reference systems.

7. RECOMMENDATIONS AND NEXT STEPS

Based on the conference abstracts, presentations, and panel discussions, the following recommendations emerge:

1. **Engage with the project outcomes:** Review the technical options and legal frameworks presented and assess how they align with spatial datasets and GIS workflows.
2. **Prepare for migration:** If the monitoring database currently uses older coordinate systems or local datums, plan for transformation to the future state-plane CRS to ensure consistency.
3. **Capacity building:** To ensure that the team has the appropriate competencies and is familiar with geodetic transformations, datum shifts, projection changes, and metadata documentation - topics that were highlighted at the conference.

4. **Collaboration and feedback:** To actively participate in stakeholder consultation phases, sharing the specific needs of organizations, institutions, or private companies, so that the design of the national system meets these use cases.
5. **Leverage interdisciplinary integration:** The conference demonstrated the value of bringing together surveying/geodesy, cartography/mapping, GIS, legal/institutional, and practical application domains. For the SCRS project, maintaining awareness and seeking feedback on all these dimensions (legal, institutional, technical) is crucial when designing new CRSs.

8. CLOSING REMARKS

The international scientific conference on the state-plane coordinate system marked a key step in advancing the theory of state-plane coordinate systems and map projections for large-scale mapping. By bringing together science, practice, and policy, the event strengthened the foundation for a modern national CRS that will benefit geospatial applications, environmental monitoring, surveying, topographic mapping, cadastre, civil engineering, GIS, and all national-level activities related to geospatial data and information. For practitioners and researchers, this development offers a timely opportunity to align projects and data infrastructures with evolving national standards, enhance data interoperability, and strengthen the scientific quality of analyses.

Prepared by

Bashkim Idrizi, Chair, North Macedonia, and
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Scientific committee

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#SCRS #Geodesy #MapProjections #Cartography #StateCoordinateSystem #GIS #SpatialData
#NorthMacedonia #GeospatialScience #ETRS89

Acknowledgements

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Annex 1: Conference program LINK4DOWNLOAD

8:30-9:30	Registration	<i>Conference classroom B102 – LOCATION in Google Map</i>
9:30-11:00	Opening of conference & first session Moderators: Bashkim Idrizi, <i>North Macedonia</i> Chryssy Potsiou, <i>Greece</i> Nikola Ribaroski, <i>North Macedonia</i>	Official opening of conference (9.30-9.40) - Bekim Fetaji, Rector of the “Mother Teresa” University – Skopje Welcome speeches (9.40-10): - Diane Dumashie, President of the <i>International Federation of Surveyors - FIG</i> - Georg Gartner, President of the <i>International Cartographic Association - ICA</i> - Nikos Zacharias, President of the <i>European Group of Surveyors</i> - Subija Izeiroski, President of the <i>Geo-SEE Institute</i> - Nikola Ribaroski, President of the <i>Chamber of Surveyors</i> - Lyubka Pashova, <i>Vice chair of the conference</i> Presentation of General sponsor (10-10.15): - Geo Sensors, <i>Celestina Roshniku</i> - FARO, <i>Michaela Ragossnig</i> Scientific/professional presentations (10.15-11): 1. Standard parallels choice for Lambert conformal conic projection for Bulgaria - BGS2005 <i>Temenoujka Bandrova</i> 2. State Map Projection in Croatia <i>Miljenko Lapaine</i> 3. Coordinate Systems and Map Projections Used in Mapping and GIS Activities in Turkey <i>İbrahim Öztuğ Bildirici</i>
11:00-11.30	Coffee break	
11.30-13:00	Second session Moderators: Hrvoje Matijevic, <i>Croatia</i> Teuta Jusufi Zenku, <i>North Macedonia</i> Jochem Lesparre, <i>Netherlands</i>	1. Some key facts for the realization of a modern National Geodetic Reference System/Frame: The Hellenic case <i>Dimitrios Ampatzidis, Alexandros Konstantinidis, Konstantinos Papatheodorou</i> 2. Challenges and Harmonization of Local Datum Transformations within the Coordinate Reference Systems of North Macedonia <i>Zoran Cvetkovski, Nikola Ribaroski</i> 3. UAV LiDAR and GNSS Surveys for High-Accuracy Spatial Data Acquisition Case Studies from Croatia and Bosnia and Herzegovina <i>Nikola Kranjčić, Vlado Cetl, Hrvoje Matijević, Danko Markovinović</i> 4. The role of coordinates in Border Diplomacy: The case of Albania <i>Anduel Cauli, Pal Nikolli, Oltion Pupi</i>

		5. Geodetic Reference Systems and Map Projections in Bulgaria: Historical Context and Modern Applications <i>Lyubka Pashova</i>
13:00-13.45	Lunch break	
13.45-15:00	Third session Moderators: Celestina Roshniku, Albania Subija Izeiroski, North Macedonia Lyubka Pashova, Bulgaria	1. From EPSG 2462 to EPSG 6870: The evolution of coordinate systems in Albania <i>Pal Nikolli, Sonila Sinjari, Xhulia Bygjymi, Denisa Kukajc</i> 2. Making a new CRS inside Europe: practical considerations <i>Javier Jimenez Shaw</i> 3. Assessment of the Kosova National Coordinate System (KOSOVAREF01) and Evaluation of Alternative Options <i>Fitore Bajrami Lubishtani, Milot Lubishtani, Pal Nikolli, Bashkim Idrizi</i> 4. Modernised transformation between the Dutch century-old national CRS and ETRS89 <i>Jochem Lesparre, Lennard Huisman</i> 5. State plane coordinate systems of North Macedonia <i>Bashkim Idrizi</i>
15:00-15.30	Closing session Moderators: Nikos Zacharias, Greece Vlado Cetl, Croatia Murat Hoxha, Kosovo	Panel discussion: Temenoujka Bandrova, <i>President of the Bulgarian Cartographic Association</i> Javier Jimenez Shaw, <i>Member of the Project Steering Committee of PROJ</i> İbrahim Öztuğ Bildirici, <i>Expert on map projections</i> Bashkim Idrizi, <i>Head of project SPCRS-RNM and TSPCS conference chair</i>