EDITORIAL FOR SPECIAL ISSUE: "GEOMATICS APPLICATION FOR GEOGRAPHY (GAG)" in GEOGRAPHIA TECHNICA

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1. INTRODUCTION

Geomatics or Geography, that is the question!

This is how the authors' idea of merging Geomatics and Geography in this special issue begins, paraphrasing a Shakespearean citation. The common principle that unites these two scientific disciplines, which attempt to describe the territory in the most straightforward way possible. On the other hand, Geomatics and Geography derived from "gèo- "[greek γεω-], as first element of composed words in learned and scientific terminology, meaning "earth", "globe", "land surface".

Geography is the basis of all disciplines that study the territory, its characteristics and its changes over time. It includes the analysis of the forms of territorial and landscape organisation in their physical-environmental, economic and historical-cultural components and extends to skills related to the study of economic phenomena and political-administrative structures, population and settlement structures. The research has theoretical and applicative values that are functional to planning and programming, in an interdisciplinary dimension with regard to the study of resources, the use of space, the location of activities, innovation processes, as well as the repercussions on the urban and regional system with reference to the different territorial scales and the plurality of political and geopolitical scenarios. Of fundamental analytical support remains cartography, in particular thematic cartography, integrated with the construction of geographic information systems and multimedia imaging techniques. The fields of study include the various modes of human-environment interaction in terms of the territorial and landscape effects of general and site specific policies, geographical regionalisation, the distribution of settlements, the geography of productive sectors and financial flows, the network of intangible relations concerning production, the distribution of goods and resources, the spatial diffusion of innovation, territorial marketing techniques, reflection on the epistemological nature of the models used.

Geomatic is a new neo-logism based on a disciplinary scientific content that concern the acquisition, restitution, analysis and management of data of metric or thematic nature relating to the Earth's surface, or portions of it, including the urban environment, infrastructures and architectural heritage, identified by their spatial position and qualified by the accuracy of the survey. The disciplines covered with Geomatic are geodesy (physical, geometric and spatial), survey, photogrammetry (aerial and terrestrial), cartography, remote sensing (spatial, aerial and terrestrial), navigation (spatial, aerial, maritime and terrestrial) and spatial information systems.

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The fields of application are, in particular, the study of global and local reference systems, instruments and methods for surveying, controlling, monitoring the territory, structures and cultural heritage, processing of measurement data, production and updating of cartography, topographic DBs, tracking of works and infrastructures, mobile surveying systems, numerical models of terrain and surfaces, management and sharing of multidimensional and multi-temporal geographical information.

Hence, this special issue of the journal Geographia Technica (https://technicalgeography.org/), "GEOMATICS APPLICATIONS FOR GEOGRAPHY" was successfully planned, and we here publish many papers detailing novel contributions that are of relevance to these topics.

Since 2006 Geographia Technica is a journal devoted to the publication of all papers on all aspects of the use of technical and quantitative methods in geographical research. It aims at presenting its readers with the latest developments in GIS technology, mathematical methods applicable to any field of geography, territorial micro-scalar and laboratory experiments, and the latest developments induced by the measurement techniques to the geographical research. Geographia Technica is dedicated to all those who understand that nowadays every field of geography can only be described by specific numerical values, variables both of time and space which require the sort of numerical analysis only possible with the aid of technical and quantitative methods offered by powerful computers and dedicated software.

Geographia Technica is Indexed by CLARIVATE ANALYTICS, SCOPUS, GEOBASE, EBSCO, SJR, CABELL, Web of Sciences and is SCIMAGO.

In conclusion Geomatics for Geography, this is the solution!

2. GEOMATICS APPLICATIONS FOR GEOGRAPHY

In total, 19 papers were submitted to this special issue, 15 of which were accepted and published (constituting a 79% acceptance rate), 2 manuscripts were rejected before being submitted for review due to very poor quality and 2 manuscripts were rejected after review. The geographical distribution of works is essentially linked to two continents, Asia (53%), Europe (40%); Africa is present only at 7% (**Fig. 1 a**).

The presence of paper within individual countries, on the other hand, is absolutely well balanced between Indonesia (40%) and Italy (40%), while they are present equally among Kyrgyzstan (6.7%), Morocco (6.7%), Thailand (6.7%), as you see at (**Fig. 1 b**).

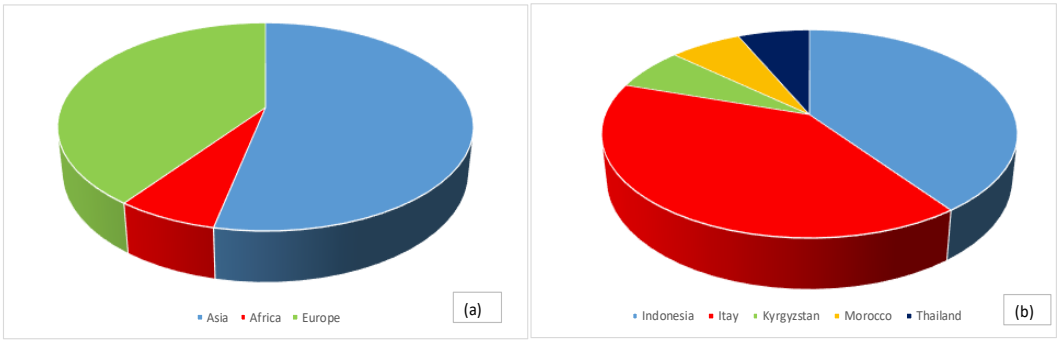

Fig. 1. Spatial distribuition of accepted paper.

The papers in this special issue cover various areas related to Geomatics Applications for Geography as cartography, GIS, remote sensing, photogrammetry and GNSS, which are typical tools used by geoinformation researchers.

A very interesting first case study has been developed by Pepe et al. in wich was identified an appropriate survey technique and numerical method for the calculation of volumes extracted in a quarry; also, the impact of the TIN (Triangulated Irregular Network) and GRID method was evaluated firstly, by the use of UAV (Unmanned Aerial Vehicle) photogrammetry and in latter the ease and speed in performing the 3D model by UAV photogrammetry was shown in the manuscript (Pepe et al. 2021).

GNSS application was used in two papers: in the work of Innac et al. was evaluate the performance assessment of a Single Point Positioning algorithm (SPP), with a Kalman filter (KF) estimator, adapted for maritime applications, in wich the algorithm is developed in Matlab environment and tested using multi-GNSS single-frequency raw data, collected by a smartphone located on board a ship (Innac et al. 2021). Dardanelli and Pipitone, on the other hand, showed the availability of Continuosly Operating Reference Station (CORS) to understand the effects of a GNSS CORS network geometry and differential corrections on the solutions. The analysis is carried out using ten different network configurations, with different inter-distances between the stations within GNSMART Geo++ software. Different surveys have been performed, including four separate session tests, with acquisitions of one hour each. The analysis has been carried out using the traditional network solutions, such as the Virtual Reference Station (VRS), the Flächen Korrektur Parameter (FKP), the nearest (Near) and the farest (Far) stations. Results confirmed the great reliability of the GNSS network, with centimetre precision in terms of coordinates (North, East and Ellipsoidal Height), whether changing the geometric configuration of the network or the corrections (Dardanelli and Pipitone, 2021).

Three papers on GIS were also presented in the Special Issue, and particularly remarkable is the one of Pesaresi et al. in wich after a contextualization about the measures used to contain the COVID-19 diffusion and the need to promote geotechnological proposals, data sharing and homogenous centralised systems for data collection and analysis. Successively, was presented the "Dynamic Space-Time Diffusion Simulator in a GIS Environment to Tackle the COVID-19 Emergency" that was elaborated on the basis of the data provided by the UOC Hygiene and Public Health Service – Local Health Unit Rome 1 (Pesaresi et al. 2021). Also Baiocchi et al. tested on a real case (the May 1999 pyroclastic flows in Campania, southern Italy) the actual possibility of implementing a model for forecasting such events using only open-source software and open data by usign GIS and Web GIS. It has been demonstrated that the entire process can be carried out using only open-source resources and it has been verified that the predictions of the hazard and risk model obtained with only input data prior to the event, give an output prediction that is significantly coincident with the events that actually occurred as documented by the authorities (Baiocchi et al. 2021). Aghad et al. showed to identify optimal sites for Rainwater harvesting (RWH) using GIS based Fuzzy Analytical Hierarchy Process (FAHP) method in the Kenitra province, NW Morocco. For preparing thematic layers, several data sources were used including remote sensing data (RS), digital elevation model (DEM), the soil and precipitation data were used to create the necessary database using ArcGIS software (Aghad et al. 2021).

Certainly, the special issue hosted numerous papers on the considerable potential offered by satellite sensors such as remote sensing, such as those related to Landsat 8, Terramodis, Sentinel-1 and 2, Spot 6/7, or Ikonos. Auntarin et al. aimed to use a split-window algorithm to retrieve the land surface temperature via Landsat-8 OLI/ TIRS data in the Roi Et province area. The research methodology included 1) separating the Landsat-8 OLI data into four types of land use, i.e. the agricultural, forest, urban and water areas and 2) the data for Landsat-8 OLI bands 4 and 5 and Landsat-8 TIRS (bands 10, 11) being analysed to retrieve the land surface temperature using a split-window algorithm (Autarin et al. 2021).

Septiangga and Mutaqin aims to analyze the spatio-temporal evolution of the Wulan Delta, in Indonesia including the shoreline and its dynamics, as well as the geomorphological processes that affect it. The shoreline change was extracted digitally from Landsat satellite images and divided into four periods, i.e., 1995-2000, 2000-2011, 2011-2015, and 2015-2020. It was used the histogram thresholding method to separate the land from the sea and produce the shoreline as the interface. This research employed field check and focus group discussion for identifying the cause and impact of shoreline dynamics in the research area (Septiangga and Mutaqin, 2021).

Considerable is the paper of Dewi et al. in wich starting for a case study located in a small island nearby Morotai Island, Indonesia, four SDB models were compared. The implementation of the SDB model was carried out by combining echo-sounding measurements and the reflectance of blue, green, red, and near infrared bands of three satellite images (World View 2, Sentinel 2A and Landsat 8). Our findings reveal that all three satellite images performed well in assessing SDB at various spatial and spectral resolution, however, the use of high-resolution imagery did not always improve accuracy, for example when using SVM (Support Vector Machine, Dewi et al. 2021). Jomsrekrayom et al. instead used Terra/Modis satellite to analyze vegetation drought variability from a vegetation phenology perspective using the vegetation condition index (VCI), in the middle of the northeast region of Thailand (Jomsrekrayom et al. 2021); it found that July, August, and September showed a coefficient of determination (r2) equal to 0.835, 0.834, and 0 .849, respectively. The r2 value showed that this method was reliable.

Sentinel data was used in two papers: in the work of Zholdoshbekov et al. evaluated the synthetic aperture radar (SAR) remote sensing-based approach has been used for identifying the ELA of glaciers in the Ala-Archa River catchment of Kyrgyzstan from 2015 – 2019 (Zholdoshbekov et al. 2021). Initially, the glacier radar zones were mapped using the Sentinel-1 SAR datasets of each year under consideration. It was found that mainly the middle percolation, lower percolation, and bare-ice zones along with debris cover-ice are present in the glaciers. In the second paper, Haris et al. explored the accuracy of the gray level of co-occurrence model (GCLM) textures of multitemporal Sentinel-1 data for aquaculture pond mapping in Brebes Regency, Central Java Province, Indonesia. In addition, single-date Sentinel-2 optical imagery was used to compare the results from Sentinel-1 data (Haris et al. 2021).

Still in Indonesia Rosyid et al. examined the ground surface deformation and displacement in each landslide location in terms of spatial and temporal and identifies the different types and characteristics of landslides in the Sukabumi area of West Java, Indonesia. The Small Baseline Subset Interferometric Synthetic Aperture Radar (SBAS-InSAR) methodology was used in this study, and the DinSAR method was applied. The ground surface displacement at each landslide location ranged from -10 mm/year to +34 mm/year, with most of the landslides occurring on moderate to steep slopes. These results are suitable to use for support regional development planning in reducing losses and casualties (Rosyid et al. 2021). On the other hand, regarding other satellite remote sensing, Zylshal et al. presented our results for topographic correction performed using three different DEMs on orthorectified SPOT-6/7 multispectral data. These DEMs are Shuttle Radar Topography Mission (SRTM) and ALOS World 3D 30 meters (AW3D30), as well as DEMNAS. The study was conducted on two test sites located in the mountainous region over South Sulawesi Province, Indonesia (Zylshal et al. 2021).

Last but not least, Alcaras et al. compared the results obtained from the application of eight different pan-sharpening methods, which are totally carried out by using the raster calculator in QGIS: Multiplicative, Simple Mean, Brovey Transformation, Brovey Transformation Fast, Intensity Hue Saturation (IHS), IHS Fast, Gram-Schmidt, and Gram-Schmidt Fast, with Ikonos imagery (Alcaras et al. 2021).

Finally, we hope this Special Issue will help readers to integrate Geomatics Aplication for Geography and bring us new probabilities and opportunities to our life.

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