Abstracts

 # ZENTAI L., G. GERCSÁK *Budapest* **A Case Study on the Connection of Digital Humanities and Cartography: Hungarian place-names in English language maps** Challenges and increasing research topics identified in digital humanities include how to incorporate the variety of media (whether various traditional paper documents like maps) and digital content (like CD-atlases) as well as web content or social media within data analytical approaches.

The cartography of old maps can be studied from various aspects, such as their graphic execution, the reliability of locating places in the map, the purpose and originality of the map content, or the amount of authentic data or secondary information taken over from other sources without criticism. This case study traces the history of Hungarian place-names used on maps prepared by English map-makers from the 11th to the 21st century. The authors collected the English language variants of Hungarian physical-geographical features and analysed the way the names were written: first in Latin, then in Hungarian and as well as in German and English, and finally mainly in English. The results of the analysis are stored in a database and discussed not only with cartographers, but also experts of geography and arts.

Early maps mostly gave descriptive information of a land; later, an increasing number of water features and countries or provinces were labelled; the names of large physical-geographical regions of Hungary given by geographers appeared on these maps rather late. Surprisingly, the representation of main roads was missing quite until modern times.

After a short introduction to the presented maps, a selection of the shown place-names follows in alphabetical arrangement (given in the same form as on the map) completed with a map extract. Finally, the authors write about the present-day contradictions of using Hungarian place-names in English language publications sometimes setting against the concept of cartographers and arts experts.

 # DUNN S. *London* **Ancient text, modern place: the spatial footprints of Cypriot place-names** The relationship between textual references to place and space, and the places and spaces they represent, is one of the key concerns of the emerging field of literary cartography. Many applications of mapping such textual references, or "attestations", are simply illustrative, i.e. they simply represent the places referred to in the text as points on a map, which in turn relies on arbitrary frameworks such as the Mercator projection and WGS84 geodetic system.

This paper will present a project which has engaged closely with this problem, the Heritage Gazetteer of Cyprus (HGC): http://www.cyprusgazetteer.com. This project mapped a range of cartobibliographic attestations attesting the placenames of Cyprus, from the earliest periods of historical occupation until 1914. It will present the rationale of spatial abstraction used, which falls into two categories: Historical Units, which are map units representing large composite entities such as towns, with deliberately schematic polygon outlines (since we cannot know the precise dimensions of such an area at every point); and Archaeological Entities, which are map units with distinct spatial footprints, such as buildings, where we provide a geographical point as accurately as possible. However, as well as explaining the rationale of the existing project, we will also present a new close-reading analysis of HGC texts starting from this basic dichotomy, which will suggest a tentative, yet more refined, typology of ways, in which Cypriot places may be usefully abstracted into geometric spatial footprints on a WWW map.

 # CHÍAS P., T. ABAD, C. CAMARERO *Alcalá, Madrid* **Mapping the Spanish royal sites: Digital Cartography based on map-archival and written sources (16th-20th centuries)** Spanish landscapes still show many traces and remains of the preceding centuries. They should be either studied and diffused, in order to be preserved as an essential part of the memory of places. Ancient maps, historic documents, travel guides and other writings become outstanding sources that provide important information about historic landscapes, as well as about the changes and evolution of the territory. We developed a methodology based on all these graphic and written sources in order to produce a series of digital maps at 1:25,000 and larger scales, that represents all these changes. At a second phase, we are implementing a geographic information system (GIS) with the related historic datasets. According to the analysis of the various GIS outputs, we can draw the main issues, characteristics and qualities of ancient landscapes. The main target is to reconstruct the most relevant stages in the history of the territory and the landscape. Among the secondary objectives must be stressed the diffusion by means of the IULCE (Instituto Universitario "La Corte en Europa") web site (http://iulce.es), and the application of the results to future architectural, urban and landscape projects. As a case study, the Spanish Royal Sites become particularly interesting due to the large amount of original information that is still preserved in the Spanish archives, and to the interesting set of travel guides and reports by foreign and Spanish travellers from the 16th century onwards.

 # GOERZ G., K. GEUS, T. MICHALSKY, M. THIERING *Erlangen-Nurnberg, Berlin, Rome* **Spatial Cognition in Historical Geographic Texts and Maps: Towards a cognitive-semantic analysis of Flavio Biondo's "Italia Illustrata"** In the research of Bibliotheca Hertziana questions about the historical understanding of social space and its change in the Renaissance play a central role. The study of relations between historical maps and texts aims to explore the historical understanding of space and the knowledge associated with it by taking up approaches from cognitive science. Cognitive maps depict culture-specific spatial knowledge and practices.

Long-term research questions are: Which forms of knowledge represent spatial relations? How can spatial transformation processes be represented and analysed? What is the connection between culture-specific practices and cognitive representations? What is the relationship between texts and maps? Our interdisciplinary project combines cognitive-semantic parameters such as toponyms, landmarks, spatial frames of reference, geometric relations, gestalt principles and different perspectives with computational and cognitive linguistic analysis. Using new text and map mark-up and corpus-specific quantitative methods, historical texts are processed and reinterpreted. This process is supported by annotating and comparing contemporary maps.

Flavio Biondo's work Italia Illustrata (1392-1463) serves as the first case study. In this work, he draws on famous authors of Roman antiquity such as Livius, Vergil, Pliny, as well as Ptolemy, and in the Latium book a hitherto undiscovered Latin translation of Strabo. This work is not only used as a data base, but also as a structural principle: Strabo's hodological description technique is used to locate all the Latin cities relative to each other and transform them into a narrative structure on the west coast of Italy and three Roman roads. Starting with the Latium book, in contrast to previous research which is mostly dealing with textual criticism, biographical, literary and art-historical references, we focus on the identification of toponyms and the geographical vocabulary, on a linguistic-cognitive

analysis of spatial relations, on contemporary cartography and a synthetic approach to mental maps.

MASETTI C., A. GALLIA *Rome* **A Digital Cartoheritage for Tourism and Territorial Enhancement around Rome. A Case Study** The speech would be to present the first results of the Carta de' dintorni di Roma project, that aims to have several targets using Antonio Nibby and William Gell's works (XIX century) as source and tool of analysis. First of all, there was the digitalization of the opera to collect and preserve maps and books and manuscript notebooks. Then, there was the study and analysis of the documents to collect information about named places. The third phase would be to use that information to promote development actions targeted on

Roman countryside, as economic factor and as cultural heritage.

KOUSSOULAKOU A., T.M. MARKOMIHELAKI, Y.MITZIAS, C.TSAIRELI *Thessaloniki* **Cartoheritage, Literary and Map views of the city of Candia (14th – 17th cent.)** A well-established link of interest to Cartography is the one between Maps and Literature, since the existence of fiction depends on place.
The starting point for the work presented here has been a philological study: a book on the city of Candia in Crete (by the second author) and how its native writers portrayed Candia during the period between 14th to 17th centuries.
The plethora of toponyms concerning spots and monuments located in the city is not only echoed in the book's title ("A literary map of

the Venetian Candia"), but it also asks for the creation of a real map on the subject, to accompany the book. The toponyms to be mapped, on the other hand, concern a space shaped through historical time; some of them, therefore, refer to items which are not present anymore in today's geographic space. For this reason, old maps of the city, created during the historical period under study, are used in digital format, in order to provide links with the past.
With the help of digital tools and technologies, Cartographic Heritage and Literature concerning an important historical period of Candia are combined, with the purpose of creating a contemporary, comprehensive map view on the book's literary subject.

SESSION 2   **19 April 2018** 08.30-10.45

VARDAKOSTA I., S. KAPIDAKIS *Athens, Corfu* **Current use and trends of Geospatial Collection Development Policies (GCDPs) in Map/GIS Libraries** The rapid increase of publications both in print and digital form raises costs while academic libraries budgets are constantly decreasing. At the same time, academic libraries cannot ignore the continuous spread of open geographical data on the web. The construction of policies consists a major and substantial function for any library in order to develop geospatial collections and provide added value services to its users.
Based on this rationale, the purpose of the current research is to determine the availability of geospatial collection policies and identify their specific characteristics as they emerge through their published texts.
The population of these policy texts comes from the U.S.A., Canada, Australia and Europe, e.g. regions, where their libraries have developed similar collections. In order to approach the theme of geospatial collection policies, two methodologies were used: a) research on libraries' websites and b) content analysis. The sample of libraries that has been surveyed included 136 libraries with geospatial collections. In order to draw conclusions, it was necessary to determine the connection of the sample of libraries by participating in Map/GIS Libraries Associations such as ARL, MAGIRT, WAML, ANZMaps and MAGIC Group. From the sample of 136 libraries with collections and services regarding geographic information 53 (39%) policy documents were collected. The study of policy texts resulted their classification in six categories and relating to their extent they were divided into three types. After the examination of each text results were organized in tables and therefore eight major categories emerged.

The results of the research established a baseline information about the current use and trends of collection development policies in Map/GIS libraries and lead to some conclusions regarding the geospatial collection development environment.

SHAWA T. *Princeton, NJ* **Princeton at the turn of the 20th Century: Building geospatial data to tie the 12th population Census (1900) of the United States to individual addresses** I have been working on a project to develop a method to spatially tie historical population census data to individual houses based on the form filled in by the census enumerator. The United States decennial population censuses of individuals are released to the public after 72 years. This release gives researcher rich historical records about a place if the historical population census data can be spatially tied to individual houses. The scanned copies of forms filled by the census enumerator are accessible from the United States National Archives and Record Administration site, however, Ancestry Library has transcribed the forms and built spreadsheets of each form that can be downloaded by institutions subscribing to their database. In this project, I downloaded the 1900 decennial population census of Princeton, and georeferenced many maps such as the 1902 Sanborn map of Princeton, an 1898 map of Princeton, and a 1905 map of Princeton, then extracted street and house numbers and built a single house location database. From this database, I built an address locator to geocode the census data to a single house number. Once the census data are spatially joined to individual houses, a researcher can analyse and visualize sociodemographic characteristics of Princeton at the turn of the 20th century.
This presentation will explain the methods and workflows of spatially joining individual

census data to a house. I will also discuss the problems associated with using the population census data from Ancestry Library, as well as challenges and opportunities associated with building an address locator to geocode addresses.

PAVO M., E. ROJO, J. SÁNCHEZ, A. RUIZ. *Madrid* **Sharing the value of our cartographic heritage: Open data policy in the National Geographic Institute of Spain** There is no doubt that cartographic heritage has its own value itself, an objective value. But this value could be multiplied many times if this heritage were known and used by the people. In the case of a public organization, as the National Geographic Institute of Spain, it is also true that it should be almost compulsory to share this value with the society. Why? Because it has already been funded by people who pay their taxes and also because the main purpose of a public organization must be to serve to the society. Since the arrival of digital technologies, it has become relatively easy to show your information formerly in paper to the world, mainly by means of digitalization and publication on the Internet. The last part of the equation is to adopt an open data policy which allows accessing the information with minimal license restrictions. There is a lot of return of investment in doing so, in terms of public service, image, publicity, cartographic culture and even in a strict economic sense from a national or global point of view. The National Geographic Institute of Spain started its way to open data policies in 2008 and it was reinforced in 2015, when an even less restrictive policy was applied, and since then, the experience has shown us that we are in a right way.

MOHAMMED G.S. *Stanford, CA* **The David Rumsey Map Center as a model for**

advancing Cartographic Digital Heritage: Lessons from a Multi-functional Space The David Rumsey Map Center opened April 19, 2016 as a multi-functional entity that intersects between the actual physical artifact and the digital derivative in the same space. The Center's chief idea is that of collocation - where having the original physical cartographic item and studying it side by side with its digital derivative as data amounts to something much greater than the sum of its parts. The center boasts a tremendous set of collections, including the extraordinary depth and reach of the David Rumsey Map Collection as its flagship collection. The center also has several pieces of technology in place - large high-resolution screens including a touch screen, four oculus rifts and a hololens. The flexibility of the center is of equal import: We straddle between a geo-garage in the morning with mediated time, working with faculty, staff and students and a fully functioning reading room and rare maps and atlas library with significant technology to augment cartographic research in the afternoon. In the evenings and other times, we hold map related events such as the recently completed Ruderman Conference on Cartography. Last but not least, we have a state-of-the-art built-in exhibit space and install two exhibits each year along with digital showcases.

My talk will go through each of the Center's functional areas and follow them throughout the two years that we have been open. We will highlight our successes and lessons learnt and touch on how we intend to continue to be on the cutting-edge of technology as it relates to cartography and how this contributes to advancing Cartographic Digital Heritage. The talk will also briefly touch on its latest cartographic acquisition, the Urbano Monte map which has far-reaching implications in helping realize a particular author's goal of showing a map as he intended, 430 years ago.

MOUZO TRILLO J. *Madrid* **The Technical Archive and the Map Library of the Spanish National Geographical Institute (IGN): Documentation, accessibility and applications** The Technical Archive and the Map Library (Cartoteca) of the Spanish National Geographical Institute (IGN) have a large number of original documentation: including different cartography series such as the Cadastral Topography of Spain, the National Topographical Map 1:50.000, their related documentation and other maps and cartography. This paper will collect and describe all the valuable information that is preserved in the facilities of the IGN, paying attention to both accessibility for users through the website and the different applications that can be given to the documentation. In the same way, we will explain how to download the documentation from the Download Centre of the IGN website, how

to access to the documentation that is not digitized yet and, above all, we will show some examples of different problems users can face as practical cases.

BIDNEY M. *Milwaukee, WI* **Social Media Curation to Engage Cartographic Heritage Collections** Our cartographic heritage collections contain a plethora visual objects. They are able to convey information in a captivating manner and our users tend to be immediately drawn to the more colorful and artistic items we own. Many of our items are rare, have some historical significance or are simply beautiful. Cartographic heritage collections can also struggle with effective means for outreach and engagement with a wider audience or struggle with engaging a younger generation to interact with our collections. All of the library outreach and engagement literature tells us we need to go where our users are and over the years we have been following that advice by creating digital collections, engaging with schools and other groups who would have interest in our materials. Our users are also heavily using social media as a means for communication, information gathering and a little bit of fun.

In recent years, social media platforms began to emphasis visual objects, namely photos, namely selfies. Cartographic heritage collections can and should capitalize on this trend as a means for promoting their collections and engaging with an international audience. While engaging our community of users through a variety of social media platforms is an excellent way to promote use of and knowledge about our collections, it should be done in a thoughtful, curated manner, focus education and be something that is fun and creative. This paper will talk about how to create an effective social media campaign for cartographic heritage collection including examples of effective social media curation, social media policy, and effective methods for engagement.

TSORLINI A., C. BOUTOURA, A. NASTA, E. LIVIERATOS *Thessaloniki* **Searching for maps embedded in books in digital libraries environment** Historical maps consist the historical cartographic wealth and are an important part of the world's cultural heritage. They are used nowadays by many researchers from different scientific fields dealing with historical, archaeological, sociological, political, demographic, toponymic and other issues with emphasis on the area of Digital Humanities. These cartographic items in manuscript or printed form, independent or in map series, loose or embedded and bound in books, depicted in a variety of supporting materials such as parchment, paper or other writable or engravable material are located in smaller or bigger collections mainly in libraries

worldwide. Most of them, depending on the library, thanks to the development of digital technologies, are digitized, giving access to resear-chers, students as well as the general public to study and retrieve information from them.

A special case from these types of cartographic assets, is the maps which are embedded or bound in books. The maps are usually recorded within the books on comments field or they are totally ignored, having as result not to be detected during the searching procedure in the library's database system, thus to remain unknown to the academic community and the society. This becomes even worse when the digitization of these maps is not conducted in a proper way to show a correct image of them.

In this paper, we discuss problems and difficulties appearing when searching for maps which are embedded in books in digital libraries or web providers of cartographic material. We use examples coming up from different digital libraries or providers starting from the digital collections department of the Aristotle University of Thessaloniki Library and Information Centre, which is the central library of our University, to show and highlight these problems and in a second step, to overcome them proposing different solutions, in order to create a system in the AUTH Central Library to give access to more unknown maps promoting in this way, the cartographic heritage wealth stored in the library to researchers and the general public.

FLEET C. *Edinburgh* **An open-source web-mapping toolkit for libraries** This paper describes and explains a set of open-source viewers and tools which can be used to deliver maps in an online environment. It is based on the current web-mapping technologies used by the National Library of Scotland over the last six years. maps.nls.uk now makes available over 200,000 historical maps, with 11,000 user sessions and over 40,000 page views every day. Some of these tools were originally developed by Klokan Technologies, whilst others have been developed by NLS; they primarily use Javascript as a programming language, and the open-source OpenLayers and GeoServer programs.

The tools can be classified into primary functions, allowing them to be deployed independently of one another and together. The main two groupings are viewers for searching for maps using bounding boxes (http://maps.nls.uk/geo/find/), and viewers for displaying georeferenced maps (http://maps.nls.uk/geo/explore/). The search viewers use GeoServer for storing and displaying bounding boxes, and for Web Feature Service requests. The georeferenced map viewers can be divided into those presenting overlays with a transparency slider, split-screen

comparison viewers, spy viewers, and 3D viewers. More specific tools for geolocation, gazetteer search, or distance and area measurement can be deployed across any of these viewers. In addition to the NLS map

interfaces, several examples will be given of specific tailored collaborative applications that have been developed using these tools to illustrate their flexibility and modular nature. All of these viewers and tools have been made

available on Github (https://github.com/NationalLibraryOfScotland) with commented code to encourage their onward use and future collaborative development by other libraries.

SESSION 3   19 April 2018 11.00-13.00

HAVLICEK J., J. CAJTHAML, T. JANATA, P. SEEMANN, R. ZIMOVA, J. D. BLAHA, P. TOBIAS, J. KREJCI *Prague* **Web and printed Czech Historical Atlas** Czech Historical Atlas represents a project under which historical maps of the Czech lands and Central Europe arise in the coming years. There are two main project outputs planned. A web atlas dedicated to history of the Czech lands from prehistoric times to the recent past will be the first. The second important output is comprised of a printed atlas focused on Czech twentieth century history. The aim of the new atlas is to build on previous historical atlases. Within the project, the Institute of History (Czech Academy of Sciences) and the Czech Technical University in Prague are involved. Both organizations bring together collaboration of historians, geographers, cartographers and geoinformaticists from a number of other institutions.

A special database of historical atlases has been created and designed. Its structure reflects not only the thematic focus of searched atlases but also the subsequent short list of atlases which show the studied area (Central European region with emphasis on the former Czechoslovakia or contemporary Czechia, respectively), and supposed solutions for both versions of the atlas. The aim of this background research was to create a knowledge base for the conception of the atlas performed in the next step.

Historians from the Institute of History selected historical themes. In total, there are more than 160 maps. Most maps will be published in both project outputs. Unique technologies for publishing a web atlas have been tested. Map templates of different scales have been prepared. The preparation of map templates, including the boundaries of territorial units and waters (watercourses, lakes and see) are one of the most important elements. All maps of the same scale must be created in the same template. Subsequent viewing of multiple themes in one map at the same time is possible in the web map application.

ROSET R., F. NADAL *Barcelona* **3D reconstruction of an exceptional map: the lever-nivelé de la place de Barcelona 1823-1827** The ICGC (by means of a collaboration agreement with the Service Historique de la Défense of France that retains the original) has begun the tasks for the creation of a 3D model of the map of Barcelona, raised between 1823 and 1827 by the French army, to

provide accurate information on the territory surrounding Barcelona old town before the demolition of the walls in 1854.

This manuscript map at 1:1000 scale in 54 sheets displays contour lines and shows a beautiful level of detail of the plain where a few years later the Eixample, the urban expansion of the city, would be built. The use of contour lines and numerous altimetric data was still a very unknown technique and, in fact, this Barcelona map served the French military engineers to try new techniques. For the moment, the model, which is the outcome of the digitization and geo-referencing of the map, shows the Fort Pienc or Fort Pius, a bastion located on current Marina street and which was built by Philip V, the Spanish King, as part of the new defences of Barcelona after 1714.

The 3D model of this map provides a view of the layout of the Barcelona plain from 1823 to 1827 on current cartography, very useful for historians and city planners to study evolution of the urban plot of the city.

This presentation will summarize the technical process and depict what would the project be able to achieve when concluded.

FROLOV A., I. KONOVALOVA *Moscow* **Reconstruction of the Black Sea Map in the Geographical Work of Abū al-Fidā'** Abū al-Fidā's work "Survey of Countries" (Taqwīm al-buldān, 721/1321) is a descriptive world geography that does not contain any maps, but is equipped with coordinate data borrowed from the Arabic translations of Ptolemy, as well as from al-Bīrūnī and Ibn Sa'īd, which makes it possible to give cartographic reconstruction of Abū al-Fidā's picture of the world. We proceed from the fact that mental maps and geographical images underlying the geographical descriptions are no less important part of the cartographic heritage than cartographic drawings and maps themselves, and therefore study of geographical narratives can greatly contribute to a deeper understanding of the practice of mapping. Since there is no reason to believe that all the coordinates given by Abū al-Fidā' were obtained as a result of measurements using the same technique with the same accuracy, it seems reasonable to consider his data for particular region where spatial relationships of the positioned objects allowed him to at least in general control the correctness of the coordinate data. This paper investigates the information

of Abū al-Fidā' about the Black Sea. Analysis of the geographic coordinates given for the Black Sea cities leads to preliminary conclusions about geographer's sources and the specifics of his coordinate information of the Black Sea basin. The position of Azov and Kerch does not agree with the coordinate system describing the relative position of most other cities. At the same time, the value of one minute of the meridian calculated for this pair of cities fits into the general picture. The remaining pairs of cities are connected by distances based on the magnitude of the meridian close to the actual one. This confirms our initial hypothesis that the coordinates given by Abū al-Fidā' were obtained either as a result of astronomical observations, or as a result of speculative calculations.

SHCHEGLOV D. *St. Petersburg* **Georeferencing the Unidentified Places in Ptolemy's Geography: Some Methodological Pitfalls** In this paper, I would like to draw attention to several methodological pitfalls that limit the effectiveness of different approaches to locating the unidentified places from Ptolemy's Geography on the modern map. Out of the 6,000 place names listed by Ptolemy, approximately 50% still don't have recognized identifications. This makes Ptolemy's Geography a real Bonanza for researchers developing different methods to translate his coordinates into the modern ones. Most of these methods tend to share a tacit assumption that Ptolemy's Geography was an example of what David Woodward (1990) called "equipollent-coordinate space," in which "every place in the system is of equal geometric significance." This kind of space is supposed to be as continuous and homogeneous as the space of the modern maps is. My central thesis is that Ptolemy's space was closer to what Woodward has called "route-enhancing space," in which "the routes are endowed with the importance of direct observation," hiding behind the mask of the "equipollent" one. This hidden nature of Ptolemy's space is manifested in two interrelated aspects: it was discrete and hierarchically organized. On the one hand, Ptolemy tended to distribute all places evenly throughout the entire space they occupy and to round their coordinates as much as possible. On the other hand, there are reasons to suppose that the locations of most points on Ptolemy's map were originally connected not with their nea-

rest neighbours, but rather with a few distant reference points.

GUSEV D., S. STAFEYEV *West Lafayette IN, Moscow* **GIS Analysis and Digital Reconstruction of Ptolemy's India beyond the Ganges, Serike and Sinae** In this paper, we use GIS analysis to produce a new digital reconstruction of the ancient India beyond the Ganges, Serike and Sinae, three peripheral regions from Claudius Ptolemy's classical Geography, a seminal work that provides coordinates of more than 6,300 places once known to the celebrated scientist of antiquity. We discuss practical implications of Ptolemy's criticism of a contemporary round mappa mundi, along with other relevant evidence, to advance a novel hypothesis that Sinae, where Ptolemy placed "fish-eating Aethiopians", actually belonged in Africa, instead of Asia. Our new Ptolemaic maps represent an attempt to rectify the ancient error and achieve clean separation of Sinae (Guinea) from its two Asian "neighbors". Multiple new identifications of Ptolemaic places are proposed. The results presented in the paper open up new potential avenues of exploration for archaeologists and contribute to improvement of understanding of cartographic heritage, the ancients' travels, and the state of geographical knowledge of remote regions of East Asia and West Africa in the time of Claudius Ptolemy.

PORTER C., K. LILLEY, C. LLOYD, S. MCDERMOTT, R. MILLIGAN *Belfast, Liverpool* **Cartographic connections – the digital analysis and curation of sixteenth century maps of Great Britain and Ireland** Understanding the processes by which early maps were created and the interconnections of maps and map ma-kers is key to broadening our knowledge of map history and cartographic science. This paper draws on data collected across three UK research projects centred on analysing, untangling and evaluating the relationships between maps and map makers of sixteenth century Great Britain and Ireland. Using GIS, "Place" features (written in Latin, Gaelic, Welsh and English) derived from a large suite of maps were digitised and added to one centralised geo-historical gazetteer. Employing robust quantitative methods including statistical regression procedures, distortion measures and displacement modelling, the maps were analysed and compared to reveal significant insights into the cartographic connections and the map making processes of Renaissance Europe. The paper also illustrates a common goal of these projects, to "curate" early maps by enabling accessibility to cartography and associated data through online resources. The paper highlights that digital methods and curation, used in combination with more traditional forms of qualitative enquiry, provide a new instrument for deciphering and conserving histories of cartography.

BOUTOURA C., A. TSORLINI, E. LIVIERATOS *Thessaloniki* **Revisiting the French manuscript maps (1685-1687) of the Cycladic Archipelago.** The rare large dimension manuscript maps, representing a number of islands of the central Cycladic archipelago in the Aegean Sea, was found in the Tricoglou Library, a part of the Aristotle University of Thessaloniki Central Library in 2016. The maps (see Livieratos et al, 2016; Livieratos & Boutoura, 2017), collected in a volume called Recueil Raseau, made after the orders of Louis XIV of France in the period between 1685-1687 by the engineer Raseau, are considered as exceptional example of military medium-to-large scale mapping, in the context of the French naval mapmaking of the last quarter of seventeenth century. Another set of maps made at the same period by the engineer Pétré, representing the northern part of the Cycladic archipelago, are kept in the Service historique de la Défence in Vincennes, under the name Recueil Pétré, completes the mapping of the Archipelago, part of a major project for the mapping of the Dardanelles, the Aegean Sea and the East Mediterranean. The two Recueils put for the first together in a map exhibition at Thessaloniki, Greece in February and March 2018 (Livieratos, 2018) allowing the combined study of both sets. In this paper the geometric consistency of the two map sets are analysed after the relevant georeference, showing important differences in the representation of the insular coastlines.

SESSION 4   19 April 2018   14.15-15.45

SÁNCHEZ J., Á. RUIZ, S. NAVARRO, A. I. MARTÍNEZ *Madrid* **Old maps of Madrid and interactive Web applications by National Geographic Institute of Spain** The Map Library of the National Geographic Institute of Spain (IGN), which was founded in 1870, has custody of an important cartographic collection of maps from the 16th century to nowadays, such as: maps made by the National Geographic Institute (national topographic maps or topographical works), regional maps, cartographic series, thematic maps, atlases, city maps, and a valuable collection of Madrid maps. The aim of this paper is to show a part of this cartographic heritage through different Madrid maps, that are available online, and to show the use of interactive IGN web applications for exploring the maps.

Through a selection of the most significant old maps of Madrid we can appreciate the evolution of the urban development of this city: the first printed map, drawn by Marcelli in 1622, which shows a city where the king Philip II moved the court in 1561; the magnificent map of Texeira, which is the most important and detailed city map of the 17th century; the Chalmandrier´s map, 1761, that shows how the city looked like at the beginning of the Charles III´s kingdom; the Pascual Madoz and Coello´s map from 1848, or the map of Ibañez de Ibero, 1875, where is possible to appreciate the expansion district outside the wall that surrounded Madrid until 1857.

WALT R. *Zurich* **Benefits and challenges of a user-focused, academic spatial data infrastructure as exemplified by geodata4edu.ch** Despite growing demand for geodata in various scientific disciplines, Switzerland had long lacked a central academic spatial data infrastructure. Nor had there as yet been any such structures in existence outside the United States and the United Kingdom, or just at the planning stage. geodata4edu.ch fills this gap in Switzerland and provides students and researchers at Swiss Higher Education Institutions with central, user-focused access to a comprehensive range of geodata from federal agencies and cantons.

Deployment of a cross-institutional national geodata platform has enabled these institutions to pool resources and use them for innovative teaching concepts and research projects in various fields of study. Digital cartographic products like older and modern maps and geodata are also made accessible via user-focused access for fields of study with less technical orientation such as the humanities and social sciences. In doing so, such a platform contributes to the use of electronic spatial information in the context of digital humanities.

Since 2015 the ETH Library worked in collaboration with the University of Applied Sciences Rapperswil (HSR) and the Institute of Cartography and Geoinformation (IKG) of ETH Zurich on the development of a national portal, launching geodata4edu.ch in 2017. A number of Swiss universities already use the platform and are incorporating it into their teaching and research.

geodata4edu.ch provides users with a central point of entry to a catalogue of metadata in which the available geodata can easily be found. Data is accessed either via the "Downloadservice" or via "Webservices". Webservices provide experienced GIS users with the data needed for direct integration into and analysis in a GIS application. The Downloadservice visualises the data directly within the browser and enables data segments to be

downloaded. In particular, users with less experience in geodata are supported in such a way that they can easily find and download the data needed for the research matter in question.

The presentation concentrates on the benefits and challenges of a national academic spatial data infrastructure and shows the applications as exemplified by geodata4edu.ch.

BACHILLER A., C. SOTERES, J. SÁNCHEZ, A. SÁNCHEZ, P. ABAD, G. CANO, G. ANDRÉS, C. RUIZ, E. LÓPEZ *Madrid* **Ancient Web Map Services** The National Geographic Information Centre (CNIG in Spanish) carries out two projects in collaboration with the Map Library and the Department of Territorial Observation of the National Geographic Institute (ING in Spanish) working to publicize different and interesting resources of our cartographic heritage. The access to the already published

resources can be done in different ways: through the CNIG download centre, Web Map Service (WMS), Web Map Tile Service (WMTS) services or clients of the IGN, published by the CNIG. These ad-hoc tools have been created based on the use and needs that have been reported by users.

The monitoring of these pages and services has shown that, despite not being in any INSPIRE topic, the old cartography has great acceptance among different types of users (individuals, companies, State Administration...). With this motivation, we have been working on the incorporation of new layers in the services of visualization of cartography and ancient orthophotos during the last months. This communication presents the update carried out in the services and their implementation in the IGN viewers, to bring this heritage to users.

SÁENZ-LÓPEZ PÉREZ S. *Madrid* **Old maps in digital era** This paper centres the attention on the resources available on Internet which provide access to old maps. It will explore from databases that allow visualizing or downloading digital reproductions of maps - namely those of institutions which hold important cartographic heritage - to blogs, online exhibitions or websites which offer information related to events on the history of cartography. This paper is not intended to be a complete list of Internet resources but a careful selection compiled after years of researching and teaching on old maps, which hopefully will be useful for researchers, professionals of maps and mapmaking, and anyone interested in the field. Special emphasis will be placed on contributions of Spanish institutions and scholars with the aim of spreading worldwide both the cartographic heritage hold in this country and projects developed in Spain.

TRACHET J. *Ghent* **Painting/Mapping the medieval Landscape. A Landscape-archaeological analysis of the medieval landscape around Bruges as depicted by Pieter Pourbus** During the Middle Ages, the metropolis of Bruges thrived through its oversea trade. A large tidal inlet - called Zwin - provided a navigable passage from the North Sea, through the wetlands, to the heart of the city. In the middle of the 16th century, the Eighty Years War (1568-1648) transformed the Zwin area from an axis of trade into a frontline of war. Of course, this had a profound impact on the environment. At the start of this sudden landscape transformation, painter-cartographer Pieter Pourbus portrayed the countryside of Bruges with a unique level of detail, accuracy and scale. Although this painted map is often used as an illustration, it has so far remained incomprehensibly understudied. Moreover, recent research has shown that the current landscape-historical narratives depicted in this part of the North Sea area are severely outdated. In order to fill these gaps and study this unique landscape through this unique painting, we will merge newly developed digital techniques from art history and geography (e.g. Digital Thematic Deconstruction) and complement this with a renewed archaeological and historical survey of the region. By unlocking the details of the painted map, we will make an invisible landscape reappear, and unveil the historical, archaeological and environmental records of this remarkable manmade landscape.

ANOYATIS PELE D., M. KAMONACHOU, A. AIDONIDIS, I. ATHANASOPOULOU *Corfu*, **The registries of the feuds or "anagraphies": source of surveying the rural area of Corfu**

during the 18th and 19th centuries The purpose of this announcement is to depict the rural area of Corfu in the 18th and 19th centuries through the inscriptions of the feuds of Corfu, as well as the disintegration of the rural property. During the Venetian rule, as well as in later periods (until the abolition of the feudal regime on the island of Corfu in the second half of the 19th/early 20th century), agricultural records were often carried out, accompanied by cartographic and topographic surveys. This is a surveying project of the settlement area of Corfu, which is part of the course of Historical Geography of the Department of History of Ionian University.

NOVOTNÁ E. *Prague* **1518: Mikulas Klaudyan´s first map of the Kingdom of Bohemia** The contribution will focus on an important culture heritage of Central Europe, the first printed map of Bohemia and its derivatives, in particular, in the collections of the Map Collection of the Faculty of Science, Charles University in Prague. It will briefly present the personality and the first map of the physician and printer from Mladá Boleslav. There will follow variants in Münster´s works, presented by the priest F.J.J. Kreibich and finally its copy in the edition of old maps Monumenta Bohemia Cartographica. The maps will be described and analysed. Its digital copies will be also presented.

JANATA T., J. CAJTHAML *Prague* **Vltava - transformation of historical landscape along with cultural and socio-economic activities in the river neighbourhood** The paper introduces a newly ongoing project focusing mainly to considered processing of large volumes of archival materials (historic

documents, maps, plans, photographs, iconographic sources) and their combination and digitization creating a comprehensive information system of the longest and most popular Czech river Vltava. It serves both 2D and 3D environments and, specifically, concerns to the upper three quarters of the river - from its source to its confluence with the Berounka river near to Prague. This system will allow maintaining and documenting a wealth of information about the history of the Vltava river, including immovable and movable cultural heritage using new technologies (e.g. extinct settlements, important buildings, sociocultural activities, historical floods and, above all, construction of a dam cascade).

Riverine landscape along the Vltava river is one of the examples of territories in the Central Europe which underwent an intensive transformation associated with the disappearance of the local settlement, whether due to increase of the anthropogenic pressure on the landscape or its reduction. A number of cultural and social activities is also associated with the Vltava river. As a favourite recreational site, the Vltava valley was used before as well as after the construction of the cascade. However, there have been significant changes in the types and forms of tourism that have been and are being carried out on the river and in its immediate surroundings. The transformation of the social and cultural significance of the area together with the associated infrastructure (from inns through docks, tramping settlements, hamlets to mass recreation facilities), the appearance and use of river banks, the structure of their users, etc. was crucial in many places.

The mission of the project is, in particular, to document information on the changes of the Vltava riverine landscape in the modern period in the context of various events and, subsequently, to make it available to the general public. Thus, the project would act as a transfer of historical science into education through modern cartographic methods.

LAVINS I. *Riga* **Sea ice conditions in the Baltic after Carta Marina by Olaus Magnus (1539)** For the purposes of studying global climate change and warming, it would be of interest to see what the ice conditions of the Baltic Sea were in the past, and how they have changed over a long period of time. The oldest available information comes from travel narratives and chronicles, but unfortunately these sources are not of a systematic nature and are fragmentary. It was only at the end of the 19th century that ice services were established in several countries around the North Sea and the Baltic Sea to gather and analyse information about the sea ice conditions.

Valuable information can be obtained from the Carta Marina of Olaus Magnus (1490-1557), published in 1539. This woodcut map consists of nine sheets, which when assembled together make a large map that measures 125 x 170 cm. The author of this paper compares the extent of ice in the Baltic Sea depicted on the Carta Marina with the situation recorded in this area during the past thirty years by several national ice extent observation services located in the countries surrounding the Baltic. Based on this data, it was possible to draw approximate conclusions about the change of ice extent in the Baltic Sea during the last 500 years. This research represents a unique use of a Renaissance map in climate studies.

YU C.D., H. LU, R. RANZI, A. TSORLINI, E. LIVIERATOS *Holy See, Brescia, Thessaloniki* **A new digital comparison of the Chinese World Maps of Giulio Aleni and Matteo Ricci** The cartographic contents of two world map sheets of father Giulio Aleni S.J., archived in the Biblioteca Apostolica Vaticana in Rome, are digitally analysed. The maps, printed in at least two editions starting in the year 1623, were inspired and influenced by the more famous Matteo Ricci's world map, printed in different versions, after the end of the XVI century. Although it is a later cartography, the Aleni's world map is a unique masterpiece worldwide, as it is very likely the first map of the world known at that time, written in Chinese and having a size enabling an easy use of the map itself. It is a map that merges the Western and Chinese geographical knowledge and is a relatively accurate representation, with some exceptions, of the actual outlines of continents which are depicted, as in the large Matteo Ricci's world map, from a non-Eurocentric point of view. Giulio Aleni was born in Brescia in 1582, and his education in the Jesuits colleges in Brescia, continued then in Novellara and Parma, and studied in Bologna the books of the geographer Antonio Magini, which were later the main source of his geographic publications. In December 1607, Aleni went to Rome and at Collegio Romano he was also a student of the famous mathematician and astronomer Cristopher Clavius.

Arriving at Macao in the Jesuits' mission in 1610 Aleni taught mathematics at the college there, while learning the Chinese language. By 1613 he travelled in mainland China up to Beijing where he met Xu Guangqi, former secretary of the emperor, scientist, friend and collaborator of Matteo Ricci. At the Mings court, he was asked to write a geographical book describing countries depicted in the Matteo Ricci's world map (RWM). Annexed to the book, named 職方外紀 (Zhifang waiji, Geography of countries non-tributary to China) printed in 1623, he edited the two world maps with Chinese characters, definitely inspired by that of his famous predecessor, but with some significant differences. The two maps sheets (one 630 x 552 mm and the second 1230 x 642 mm in size) are analysed and the cartographic content of the Aleni's planisphere (AWM), is compared with that of RWM. Differences in continents' borders, as those for North America, Korea, Java, are assessed, together with some discrepancies between geographical terms which pose the question of the sources Giulio Aleni investigated. Some conjectures about the correct dating of the edition of the map, to be set between 1623 and 1649, are also discussed. A facsimile high-quality copy of the maps was printed by the University of Brescia to better disseminate this important cartographic heritage.

OLÁH K., M. GEDE *Budapest* **Presentation of changes in the legend of celestial globes using virtual 3D models** Studying star charts and celestial globes is not a simple project. Few of published maps and globes survived, and these are scattered throughout the world. For this reason, their comparative analysis is almost unimaginable without their reproduction with digital technology.

The representation of the star maps and celestial globes has a very complex and dual nature. On one hand, we can speak about depicting the stars and then the deep-sky objects, on the other hand, the representation of the constellation they have formed, or rather the constellation that includes them.

In this research, we are trying to conclude about the changes in legend, based on the celestial globes of the Virtual Globes Museum. We selected and as required digitized the spheres in the preparation phase of the project. With an annotation-editing interface, each constellation of each globes had been isolated. That made possible to simultaneously examine each constellation on all globes, while keeping the possibility of examining the entire globe with relatively small effort.

We wanted to answer questions about how the representation mode depends on the size of the globes, the time of preparation, or even the development of technology. We present the practice of generalization of celestial globe contents. We look at the technological background from many aspects, as it is not enough to take into account the development of manufacturing technology, one must also think about the development of technology that provides the scientific basis for the content of the globes. We show that the time of fabrication - and the creator - determines the scientific background of the certain age, and the effect of related human disciplines.

SESSION 6　　　　　　　　　　　　　　　　　　　　**20 April 2018** 10.45-12.45

IRÁS C., Z. UNGVÁRI *Budapest* **Wheels of Geography – Interactive Renewal of Antique Educational Instruments** Following the tradition of digital reconstruction and interactive exhibition of globes, Department of Cartography and Geoinformatics of ELTE has started a new renewal project focused on antique educational instruments preserved in the library of the Department.

The term 'wheels of Geography' in the title refers to three instruments: a country guide, a sun pointer, and a comparative time dial. From a detailed analysis of their geographic content, we know they were prepared between the end of the 19th century and the mid 1930's. Their purpose was to help understanding complex issues and related phenomena of geography at primary, secondary and university levels in education.

Interactive forms of these wheels are collected to a web page named szertar.elte.hu where users can easily understand their methodology and content. This web page provides access to the applications, shows scanned images of the original objects and gives short descriptions on the content and usage. Web applications of these instruments are written in JavaScript, attributes of the databases are maintained with PHP and graphic visualization is based on SVG. Some details had to be

slightly modified and geographic data needed to be updated.

Today, web-based reconstructions of such objects are able to bring pupils and students closer to geographic topics. On the other hand, with digitalization, we are able to protect these objects from falling out of memory and to present them to the new generations. Breaking out from the library drawers, szertar.elte.hu ensures their way back to the students.

HEITZLER M., C. GKONOS, A. TSORLINI, L. HURNI *Zurich, Thessaloniki* **A modular process to improve the georeferencing of the Siegfried map** The topographic atlas of Switzerland, short "Siegfried map", is a historical map series covering the whole of Switzerland for the time period between 1870 and 1949. Georeferencing each single map sheet in a high quality is critical to minimize error propagation when subsequent tasks are to be performed, such as feature extraction or sheet comparison.

We present a modular process consisting of six steps that facilitate georeferencing scanned Siegfried map sheets by making use of tailored algorithms: The first step consists of pre-processing the scanned map sheet using common image processing approaches, to remove non-relevant colour regions and to enhance the contrast and the sharpness of the map sheet. The second step performs image segmentation by detecting the corners of the map frame using a simple pattern matching approach to determine the actual map content. The third step involves the extraction of the coordinate grid based on the Hough transform and subsequently the computation of the grid intersection points. In the fourth step, the coordinate information is extracted and translated into machine readable form. In the fifth step, the user can examine these automatically generated results and may manually correct them. Finally, in the sixth step, the map sheet is automatically georeferenced using quadrilateral interpolation. This technique georeferences each coordinate grid cell separately and aligns the results rather than georeferencing the whole map sheet at once. This way, distortions resulting from aging and scanning can be minimized.

The modularization of the process allows to replace single components when better algorithms have been developed. It is aimed to use this process to gradually georeference all Siegfried map sheets and to make them accessible in the geodata4edu.ch geoportal.

GATTA G., G. BITELLI *Bologna* **Dissemination of cartographic heritage and rediscovery of the past using digital geomatic tools: some experiences in Bologna (Italy)** Digital regeneration of historical cartography is an interesting way to allow preservation of its

fundamental historic and geographic information, utilization for a wide range of studies and researches and finally diffusion towards a wide public of experts or ordinary citizens. The latter aspect is only apparently of little importance: in fact, if the huge cartographic he-ritage remains closed within institutions and is not made known to the general public, it will be destined to lose its importance. From this point of view, digital tools and techniques coming from Geomatics can help to re-generate historical cartography in a metric way and to expand the possibilities of knowing and using this heritage, alone or integrated and compared with current data. GIS technology proves to be a suitable tool not only for experts and specialists for research and data management, but also for the wide public to know ancient maps and interact with them, rediscovering the past in an unusual way and increasing the awareness about the geographical and historical context.

In the last few years, some experiences of dissemination of research concerning the metric digital regeneration of historical cartography were conducted in Bologna by the authors. They were dedicated partly to high school students and partly to citizens and tourists. The paper presents some results from these experiences.

PANECKI T. *Warsaw* **How to publish an old map? A case study on maps' editing methods** Old maps in their original form are not easily available. Sometimes they can be found only in archives, libraries or private collections. Such maps can be used for various types of research: based on the map itself as a document, the studies on development of the geographical horizon, and - in case of newer maps - also as a source of spatial data in the GIS. For these reasons, old maps are being published and their editions are being developed, both in the form of reprints (analogue editions) and in the digital form (digital editions). The multitude of editorial procedures used in this context is enormous, also in the context of potential end user. The questions are: what constitutes old maps' publishing and editing procedure? What are the editions look like? What should the so-called "model edition" look like?

Various editions types are to be considered for the analysis:
• analogue – issued in paper version, usually as reprints (facsimile);
• digital – issued in digital environment, mostly as WebGIS geoportals;
• popular – simple reprints or scans of old maps without or with little commentary and description;
• scientific – editions provided with an exhaustive commentary, with an index of placenames, sometimes supplied by vector layers.
A dozen or so editions are to be discussed

including most important works in this field. They are evaluated in terms of several criteria selected on the basis of their general review:
• Possibility of viewing the map along with a download option;
• Description of the map, as well as its publishing methodology;
• Georeferencing: its accuracy and methods;
• Index of placenames;
• Vectorization of selected layers as a spatial database;
• Additional elements and functionality.
Based on this evaluation, it is possible to indicate the features of "model edition", which should include be the basis for the development of others.

SŁOMSKA K. *Warsaw* **To doubt or not to doubt? That is the question. - basemap in historical cartography** Historical geoportals are widely accessible, what induces heterogeneity of its' users - from experts to people who are not proficient in the history nor in the history of cartography. Web-services enable application of various basemaps: contemporary digital map, digitized or georeferenced old maps.

The aim of the paper will be to present advantages and pitfalls of each solution. All mentioned types of basemaps will be considered in the scope of graphical and landscape continuity with the reconstructed historical data obtained from other sources. Furthermore, accessibility and technical issues will be presented on several examples.

What is more, attention will be paid to possibilities of displaying uncertainty of data in the context of the basemap, as it may constitute the ground for further inference. It is possible to suggest ambiguity with use of the methods of cartographic presentation and graphic variables. Implementation of cartographic solutions based on them may prevent misinterpretations and enable more explicit transmission of information.

Old maps may give an impression of uncertainty of presented data, what could be profitable for the less experienced users. However, digitized old map may seem to be the most adequate in terms of every mentioned aspect, because of the graphical and landscape continuity with the historical data and wide possibility of applying cartographic means of expression.

Presented solutions may be applied in the elaboration of paper maps or in the expanding field of historical geoportals.

GEDE M. *Budapest* **Online annotation editor for virtual globes** Annotations on virtual globes are descriptive texts linked to specific area of the globe. Annotations can be used to draw the observers' attention to certain features of the globe map or to create thematised description of an old

globe. This paper introduces an online annotation editor which is connected to the Virtual Globes Museum. Registered users can create, modify and publish annotation sets to any globes present in the museum. The website is based on the open source WebGL virtual globe engine Cesium.

JANÁK D. *Unterägeri* **Historical interactive web maps with vector tiles** What if Google Maps would have a time slider and you could travel back in time and explore history the same way as we explore the space around us today?

We work on an open-source cutting-edge vector tile technology for displaying detailed world maps using historical gazetteer data, combined with WikiData and OpenStreetMap. The first use case is the Roman Empire vector map created as a cooperative project of Klokan Technologies GmbH, Lund University and Pelagios project.

See how to turn your scanned paper maps into web maps, where people can dynamically change the language, select the time period on a slider and see relevant historical place names and roads. Creating data for such maps is straightforward with online tools for georeferencing and collaborative vector feature extraction directly in a web browser.

SESSION 7   20 April 2018 13.45-15.30

STAMNAS A., M. TASSOPOULOU, O. GEORGOULA, P. PATIAS *Thessaloniki* **Cartographic study of Thessaloniki's "shared sacred sites"** For centuries, many Christians, Jews and Muslims prayed and exercised their religious beliefs and practices in sanctuaries belonging to another religion. The presence of "shared sacred sites" is a well-established phenomenon in the Mediterranean, revealing the permeability of the frontiers between various religious communities. Thessaloniki (Greece) is a prominent example of a historic city to narrate the story of these "shared sacred sites", as the three monotheistic religions have traditionally flourished within its walls. The documentation of these sacred sites starts at the beginning of the 20th century. Terrestrial and aerial photographs, urban planning maps, sketches, drawings, post-cards and gravures are important forms and means of recording through time of these noteworthy landmarks that are still present or have been destroyed completely or in some cases partially. In reality, all of the above consist of the essential technical tools in order to study, analyse and visualize the ever-changing religious landscape of the city. In this context, this project is meant, among other things, to complete a thorough research on the evolution of Thessaloniki's "shared sacred sites" using the tools and the know-how that are now at our disposal and create the necessary geographic background for a detailed and accurate documentation of its cultural and religious identity, highlighting at the same time the historical value and cultural significance of these places to the public.

SVENNINGSEN S. R., M. L. PERNER *Copenhagen* **Using GIS and historical digitized aerial imagery and maps to analyse information on Cold War Soviet military maps of Denmark** During the Cold War, the General Staff of the Soviet Union secretly mapped foreign countries for military purposes. Being a military secret until the fall of the Soviet Union, research into the cartographic heritage of this global mapping enterprise has only emerged in recent years. The geographical information in these Soviet maps was based on a wide range of sources, among them remote sensing, field survey, other topographical maps and even information collected by spies (Davies and Kent 2017). However, Davies and Kent mainly focus on maps from United States and United Kingdom. Following the research agenda set by Davies and Kent, this paper focus on analysing the Soviet military mapping of Denmark, based on the collection of Soviet maps at held the Royal Danish Library. The analysis focuses both on identifying the source of information for the production of these maps as well as their cartographic quality.

We propose a GIS-based approach to investigate the origin of the topographical information on Soviet military maps, utilizing the extensive collection of more than one million geo-located historical aerial photographs as well as a collection of digitized topographical maps covering Denmark. The proposed method is based on the following steps; (1) Scanning and geo-referencing of the Soviet military maps, (2) selection of areas/map sheets to be included in the analysis, (3) comparison of geometry and places names/labels with contemporary Danish maps, (4) comparison of geometry with historical aerial imagery in order to date the geographical information contained in Soviet maps, (5) assessment of the quality of information through comparison with contemporary Danish maps and declassified information about places of military importance.

(Reference: Davies, John, and Alexander Kent. 2017. The Red Atlas: How the Soviet Union Secretly Mapped the World. Chicago; London: University of Chicago Press.)

TASSOPOULOU M., A. STAMNAS, O. GEORGOULA, P. PATIAS *Thessaloniki* **Use of Greek Lighthouse Network to identify deformations in historical maps** Lighthouses comprise a unique example of world cultural heritage, closely connected both with the evolution of navigation techniques, as well as with the social and economic development of their surrounding areas. The way the lighthouse network is organized in nodal sites along the coastlines, highlights the uniqueness of these structures with defined and unalterable position, regardless of the changes that may have occurred in the wider area.

The purpose of this study is to develop a methodology for identifying and controlling distortions in historical maps, using the position of lighthouses as control points. In particular, the proposed methodology combines the location of the lighthouses and historical maps in which the lighthouse network can be identified. Regarding the information about the lighthouse network, all the available data (location of the lighthouse, tower height, luminous or nominal range, etc.) are organized in a geodatabase using Geographical Information System (GIS) tools. Moreover, several cartographic sources were studied so as to collect historical maps concerning both National level (e.g. General Maps of Greece) and more specific areas. Thus, the proposed methodology applied both to the National Lighthouse Network and to the corresponding lighthouse network in specific regions. For the georeferencing of the aforementioned maps, various combinations of control and check points were applied in order to evaluate the results of the polynomial transformations. Furthermore, the combination of the georeferenced maps with the existing geodatabase via GIS analysis tools provided useful information about the content accuracy of each historical map. The results are depicted on corresponding maps.

Finally, another objective of the study is to check the functionality of the lighthouses in the past. This objective is examined combining historical maps, a Digital Terrain Model (DTM) of an area of interest and information about the structure of the lighthouses (i.e. height of the light, luminous range).

ZAMORA MERCHÁN M. *Madrid* **Landscape change and historical maps: ancient paths around the archaeological site of Polvoranca (Leganés, Madrid)** It has been widely demonstrated that historical maps are an important source of information for landscape reconstruction studies. This paper deals with landscape transformations related to paths networks around the ancient village of Polvoranca (Leganés, Madrid), focusing on the

wide topic of historical heritage preservation. The urbanistic development during the XX-XXI centuries around the study area has changed the appearance of the landscape in many ways. In particular, the structure of path network available during the XIX century has experimented a huge change since the village of Polvoranca remained uninhabited. Today, the site conforms a visible group of ruins, where several parts of the church of San Pedro still stand (although deeply damaged).

The final aim of this work will be to preserve the knowledge of ancient landscape. The historical maps are overlapped to current cartography into a GIS, in order to analyse changes on the path network through time. Main sections of ancient paths still in use have been digitalized.

To carry out this task, several historical maps have been analysed (available from (or made by) the National Cartographic Institute of Spain, IGN):

• Provincial Map of Madrid, 1853, by Francisco Coello;
• Previous works made for the creation of the National Topographic Map of Spain, (planimetric works of 1875 and 1925, and altimetric data from 1925);
• as well as the 1st Editions of the National Topographic Map at 1:25.000 (MTN25) and at 1:50.000 (MTN50) scale, among other maps.

In order to get the comparison to the current situation, orthophotos from the National Air Orthophotography Programme (PNOA, IGN), as well as other official cartographic data have been considered.

The work will include some recent pictures showing the present situation of several sections of ancient paths in the study area.

DE SOTO P. *Lisbon* **The evolution of the**

Iberian historical transportation networks through very detailed digitised models The Mercator-e Project is attempting to reconstruct the historical transport conditions of the Iberian Peninsula by analysing the morphology of the transport networks and by modelling travel costs and times with the help of GIS and Network Analysis applications. The results of such applications provide us with new information to understand the distribution of commodities, product competition and problems of stagnation in historical economies. At the same time, this project will show the evolution (changes and continuities) of the territorial configuration of the Iberian Peninsula and how the transportation networks influenced and/or were influenced by political, social, religious or economical motivations.

The base of this project is the digitised transportation networks from 4 different historical periods: Roman times, Medieval Ages, Modern times and the XIXth Century. This process has taken an important amount of the project's time. To accomplish such phase, a huge amount of published information has been taken into account, for each territory of the Iberian Peninsula and for each time period. At the same time, some researchers have freely offered their information in order to fulfil the historical networks. Obviously, not all the territories and time periods has been equally studied by specialists, for that reason this project will remain open to new information and contributions.

In this talk, it is planned to show the actual state of the project, with all the digitised historical networks. At the same time, some of the first analysis will be showed mostly focused in the use of Network Analysis to evaluate the connectivity of each of the historical transportation networks.

DARÁNYI N., M. GEDE, M. BIRÓ *Budapest* **Using historical maps in order to detect habitat change on the Great Plain (Hungary), between the 19th and 21th century**
Exploring historical maps might help understanding the past landscape and habitat change which is an important question for biologists. Expanding our knowledge on long term changes over the landscapes is a crucial part of conservation biology. Habitat restoration and sustainable management plans for remaining natural habitats needs proper information about the natural, small scale habitat type on the given patch which is often difficult to identify in a highly modified landscape.

The valued and widely used Habsburg Military Maps provide an excellent source of past land cover, yet the validation and enrichment of the ecological information rarely happens. Large number of digitalized historical maps allow us to see the fine vegetation pattern and gather additional information about the ecology of the landscape.

I surveyed and classified digitalized maps from the Great Plain made between 18-19. century by using the website of hungaricana.hu. I chose 364 historical maps which all displayed some information regarding to the ecology or vegetation of the area. The maps were arranged into a database by the following features: date of map, location, local names, graphic details, land use type, the number and list of written information referring to vegetation type.

Aim of the research is to highlight the importance of historical maps and motivate conservationists to consider using map sources more often.