

Digital technologies in the toponymy study

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Abstract. The article considers the possibilities of using electronic maps Google Maps, Apple Maps, and Yandex as key sources for searching and identifying geographical objects. In the era of digitalization, GIS technologies have become the most important tool for the study of toponyms. The purpose of the work is to identify and study the toponymy of Almaty by using a new approach, which is a popular and practical 2GIS electronic map. There are given the main results of the toponomination study which are characterizing their semantics and cultural components. The types of toponyms in Almaty were identified as oronyms, hydronyms, drimonims, urbanonyms, and symbolization, which is one of the ways to enrich the toponymic stock, is presented in detail. Toponymy-symbols serve as a substitution of names based on associations and references with stylized and figurative expressions. Among them, name-landmarks, name-classifiers, name-phytonyms, name-zoonyms, name-ideologemes, name-culturogemes, and others have been selected.

1 Introduction

Toponymy has been of interest since ancient times. Geographical names, their origin and history have long attracted the attention of both ordinary people and professional researchers. To date, toponyms are studied by linguists, geographers, historians, ethnographers, etc. The main sources for studying toponyms have been toponymic dictionaries, maps, popular science literature, reference, encyclopedic and educational literature, and materials from periodicals and the media.

But now, in the age of digital technology, there are new ways to collect and process toponyms. In recent years, toponymic research has been based on geographic information systems (GIS) data. This is due to the widespread digitization of geospatial data, and accordingly, interest in the study of toponyms is growing. “In the context of globalization and informatization, the development of Internet technologies (IT) and prompt access to reliable spatially distributed information are of paramount importance” [1].

Geographic information system (GIS) is a system for collecting, storing, analyzing and graphical visualization of spatial (geographical) data and related information about the necessary objects. GIS contains data about spatial objects in the form of their digital representations. GIS is assisted by software, hardware, information, regulatory personnel and organizational support [2]. The main functions of GIS are visualization, organization and management of information, analysis and data processing.

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According to Martynenko I.A., “until recently, the use of geographic information systems (GIS) in the study of geographical names could not be called large-scale. Toponymical research has acquired a new character with the development of modern information technologies which are characterized by the latest approaches to the collection and processing of geodata”[3]. He considers modern electronic means as a tool for toponymical research. The data collected in this way can serve as material for further research.

The use of digital technologies in toponymical research was already discussed in the 80s of XX century. So, the Soviet linguist G.M. Kert in his writings touched upon the use of computer technology in the study of toponyms. He was involved in the development of the toponymical database of the northwest Russia TORIS (Toponymical Research Information System) [4]. E. Schochenmaier emphasized the importance of social networks for onomastic research [5]. To date, electronic dictionaries of toponyms and electronic databases have already been created. In this sense, the development of the GeoName Geographic Database [6] is significant.

In Kazakhstan, the study of toponymy using GIS technologies is under development. At the moment, there are already some regional electronic databases of toponyms [7]. Handbooks, encyclopedias and separate works on systematization, semantization, etymology and spelling of Kazakh place names are devoted to the direct study of Kazakh toponymy [8-15]. As regards specifically the toponymy of Almaty, the existing research is fragmentary and uneven. We believe that in order to solve many unsolved tasks and problems of toponymy, including a full-fledged study of the toponymy of Almaty city, the use of digital technologies will be relevant.

2 Methods

Modern scientific research on toponymy is carried out by using GPS navigation systems and online maps. A new approach to the study of geographical names is explained by the general digitalization, mass computerization, the development of high-speed Internet, and the use of available Internet applications. The following main research methods were used in the work: descriptive, cartographic, and semantic. An analysis of variants geographical objects names (official and unofficial) was also used. The study of toponyms in Almaty was carried out on the basis of the 2GIS electronic system.

The 2GIS program has the following useful features:

- work in offline mode after a single download of the city map;
- a detailed map of the city and the ability to find out the exact location of the nearest establishments;
- a detailed directory of organizations with all the necessary information;
- search for travel with the ability to take into account the best routes by car;
- additional information: advertising, the cost of business lunches, WiFi hotspots and much more.

3 Results

2GIS is equipped with a convenient and understandable interface that makes it easy to navigate in a virtual city, microdistrict, building, etc. On the 2GIS map, next to the urbanonym, there are icons that make it intuitively clear what the organization located on the map does. For example, the mail is shown in the form of an envelope, a pharmacy is marked with a red cross, cafes and restaurants are marked with a spoon and fork, and a coffee house is indicated with a cup of coffee, etc. Graphic information in the form of signs to convey information about the organization, conventional signs have a certain shape, composition,

color, for example, residential multi-story buildings and quarters are indicated in beige, administrative in beige-grey, the private sector in dark beige, new buildings in light orange, kindergartens in pink, schools in blue, industrial zones in grey, forests and parks in green, summer cottage areas in light green.

In addition, the GPS navigation component can be not only the official names of objects and places but also unofficial (“folk”) ones like ‘Arbat’, ‘Golden Square’, ‘Ekran (Screen)’, ‘Plotina (Dam)’, ‘Tower’.

After considering the toponyms of Almaty on the maps, we have identified the following types of toponyms.

Oronyms are toponymy names of landforms (objects of orography), i.e. names of mountains, peaks, plains, cavities, caves, ravines, etc.: peaks ‘Kumbel’, ‘Three brothers’, ‘Kusmurn Hill’, ‘Shymbulak’, ‘Pioneer’, peaks ‘Bukreev’, ‘Furmanov’, ‘Komsomol’, ‘Kaskabas’, ‘Titova’, ‘Pamyat’, ‘Talgat’, ‘Sovietov’, ‘Big Almaty Peak’, ravines ‘Kok Zhailau’, ‘Prokhodnoi ravine’, ‘Alma-Arasan’, ‘Ayusay’, ‘Aksai Ravine’, ‘Butakovka’, ‘Kimasar’, ‘Gorelnik’.

Hydronyms are toponymy names of water bodies like rivers, streams, warm reservoirs, wells, ponds, etc.: waterfalls ‘Devich`i slesy’, ‘High Butakov Falls”, ‘Bataraika’, rivers ‘Esentai’, ‘Small Almatinka’, ‘Big Almatinka’, ‘Ili’, ‘Zharbulak’, ‘Big Almaty Canal’, lakes ‘Parkhach’, ‘Sairan’, ‘Big Almaty Lake’, ‘Kolsai’, ponds ‘Small Almaty’, ‘Pervomayskii Ponds’, warm reservoir ‘Chundzha’ and etc.

Drymonims are toponymy names of forests, groves, parks and their parts: the park of the ‘First President’, ‘Park named after 28 Panfilov guards’, ‘M.K. Gandhi park’, ‘S. Seifullin park’, ‘T. Ryskulov park’, ‘Park named after R.I. Ognev’, ‘Central park of culture and leisure’, parks ‘Karagaily’, ‘Dostyq’, ‘Kok-tobe’, ‘Southern’, ‘Esentai’, ‘Oak Grove’, ‘Qalyq’, ‘Zheltoksan’, ‘Sayaly’, ‘Gulder’, Victory Park, ‘Children's park’, ‘Charyn State National Natural Park’, ‘Altyn-Emel’ National Park, ‘Fantasy World Almaty’, ‘Family-park’, ‘Hide-park’, squares named after. A. Baitursynov, square named after Shukhov, S. Seifullin square, Mukanov square, square ‘Shugyla’, ‘Victory’ square, ‘Afghans’ square, ‘Journalists’ square, ‘Jas qanat’, ‘Biokombinat’, ‘Mayak’, grove named after Bauma, Birch Grove, Almaty Botanical Garden, ‘Sosnovy Bor’ Eco-Park, etc.

Urbanonyms are toponymy names of any intracity objects, which are streets, alleys, squares, avenues, names of housing complexes, buildings, roars, signs, names of organizations, etc. Here are some names of urbanonyms:

- streets, avenues, squares as Raiymbek batyr, Ryskulov avenue, Aiteki bi, Tole bi, Kazybek bi, Bogenbay batyr, Karasai batyr, Kabanbay batyr, Zhambyl, Shevchenko, Kurmangazy, Abai, Bukhar Zhyrau, Satpayev, Zhandosov, Timiryazev, Basenov, Utepov , al-Farabi, Nauryzbai Batyr, Seifullin, Zheltoksan, Abylai Khan, Nazarbayev, Konaev, Kaldayakov, Manas, Sain, Baitursynov, Herold Belger, Pushkin, Panfilov, Tulebaev, Valikhanov and others.

- banks, ATMs as Otbasyn Bank, Bank Center Credit, Kaspi bank, Eurasian Bank, Alfa Bank, Halyk Bank of Kazakhstan, Islamic Bank, Zaman Bank, Sberbank, NurBank, RBK Bank, ForteBank, Jusan bank.

- Petrol stations like Almagaz, QAZAQ OIL, Poyal Petrol, Helios, Petrol Asia, Nomad gaz, Sinooil, GAZENERGY, ELF, Gazprom Neft, Compass, KazMunayGaz, Asia Petroleum.

- car services, car washes: Formula7, Real Service, Hyundai Suyunbay, Fartovyy, Body Repair Center, 8th MILE, RESTART, Blue Star Mercedes-AMG, TechArt-Service, MASTERSHINA, Auto electrician, 12 VOLTS, SVOY SERVICE, STR, Car service station, Underground Group, RV SERVICE, Car service on Zhambyl, Honest Service, SCT Service, Service Auto, NAVIGATOR, Forsage, Car Vision, PROAUTO, De-Leon, DosCar, Auto Spa Astana Motors, Arsenal, TIM Group Car Wash & Detailing

- restaurants, bars, karaoke, cafes: Sandyq, Bastau, SHAFRAN, ATA DONER, Basilik, Paradise, Chaihana, Navat, Janym Soul, Friday, Tekemet, Marakanda, TAVERN ON ZHAROKOVA, Tarym, April, Schast'ye, Myata Vyshka, Vakhtanguri, Madeniet, ShashlykoFF , URBO coffee, Max Plov Center, Korean Street food, Mc Donald's, KFC, Vilka, Akazany, Fort Vernyi, Chechil Pub, Tmin, Pinta, Veselidze, Myata Lounge, Beijing Xoro, Paulaner Brauhous Almaty, Granat, Nasledniki, Nedelka , Qulpynai Bakery, Zhan plov lagman.
- Theaters and cinemas: Kazakh State Academic Theater of Children and Youth named after G. Musreпов, Kazakh State Academic Drama Theater named after M. Auezov, Kazakh National Academic Opera and Ballet Theatre named after Abay, National Academic Russian Drama Theatre named after M. Lermontov, the State Puppet Theatre, the State Republican Korean Theater of Musical Comedy, the State Republican Uighur Theater of Musical Comedy named after K. Kuzhamyarova, ARTiSHOCK, Art Refuge 'BUNKER', 'Zazerkal'e', State Academic Russian Theater for Children and Youth named after N. Sats, Arman 3D Asia Park, KINOPARK, Chaplin Cinemas, Kinoplexx, Lumiera Cinema, Caesar, VIP Cinema, Almaty Cinema, NOMAD cinema, Movie House Almaty, AvtokinoteatrAlmaty, Gold Cinema, Cinema hall.
- hotels: Almaty, Alatau, Uyut, Aiser, SAPAR DE LUXE, Gold Boutique Hotel, MONTANA HOTEL, Julduz, Rosa, City Rooms, Hotel Mountain View, Gulder, Golden Palace, Renion Park Hotel, Margarita Oscar, Salem, Ajour, Turkestan. Arman, Azhar, Kazakhstan, Tau-Dastarkhan, Sarbaz, Three stars, Kok-tobe, Kezdesu, EURASIA, The Ritz-Carlton Almaty, Grand Opera, Rixos.
- shopping and entertainment centers: ESENTAI MALL, TSUM, GUM, Mega Park, Ush Sunkar, FLOWER AVENUE, AeroVoksal, MEREY, Eurasia, Turksib, Alatau, Adem, Baisat, Yalyan, Olzha, Altyn Taraz, Mart, Mart Village, Megatau, Nurly Tau, Resei, Koktem, Dukat, Voskhod, Stolichnyy, Central, Baiterek, Ak-Bota, Gulanda, Kaiser Plaza, Forum, Mayak, Merkur, Dana, Gallery, Asyl, Baby City, Avatariya, Aspan Park, Legorod, etc.
- supermarkets and shops: Magnum, Toimart, Small, Dobrotsen, City Market, DOSTYK MARKET, Family market, INTERFOOD, Euromarket, Patisson, My mart, Dani, Nido, Sebet, Ai-Mart, Apple Town, Care Food, Qutty Mart, Tomiris, Alma market, Daria, Optovka, Svetofor, Magnet, D-MARKET, Bahyt.
- medical centers, pharmacies: EMIRMED, Sunkar, HAK, Author's medicine, Venera, Talent-K, Medical Park, Center for Israeli Medicine, Dostar Med, Helmir Hospital, ZAMZAM, Private Clinic Almaty, Almaty Central Family Clinic, SAF Medical, SUNAR, emhana, Republican Family Medical Center, Republican Family Medical Center GS Hospital, Orhun Medical, Shifa, Medical Center named after Nuradin Doszhanov, National Scientific Center of Surgery named after A.N. Syzganov, Dr. Li Medical Center, So sklada, Sadykhan, Pulse, Rauza-ADE, Europharma, Pharmacy sklad, Pharmacy House, Melissa, Dobraya, APTEKAPLUS, Biosphere, Ak Zhol Pharm, Pharmacy № 84, etc.

4 Discussion

One of the important problems of toponymic research is the classification of geographical names. There are many classifications of toponyms, focusing both on their linguistic and geographical properties. Toponymy as a science develops at the intersection of linguistics, history and geography. But in our opinion, toponymy has a much greater resource and can be studied from the standpoint of a cultural and semiotic approach, the foundations of which were laid by the famous Russian scientist M. Sembi [16].

One of the ways to enrich the toponymic stock is symbolization. Toponymy-symbols attract attention with stylized and figurative expressions. In this case, there is a substitution of names based on arbitrary ideal associations and links. A significant part of the toponyms

of Almaty is symbolic. So, in the toponymy of Almaty city, the names reflecting the Soviet reality were preserved and carried a significant ideological semantics. For example, 'Pioneer' Peak, 'Furmanov' Peak, 'Komsomol' Peak, 'Sovetov' Peak, 'Victory' Park, etc.

Spatial name-symbols (name-landmarks) indicate the real properties of the denotation. Such names can serve as spatial reference points, which are pointing to the location of the object: a tavern on Zharokov, a square on Mukanov, a car service on Zhambyl, Kok-tobe park (area of Mount Kok-tobe), Charyn State National Natural Park (Sharyn river valley), trading house Koktem (according to the corresponding microtoponym), Hyundai Suyunbay (car dealership on Suyunbay street), etc.

Name-classifiers indicate the range of products sold at the enterprise or the nature of the services provided, and focus on certain consumer interests: Lombard, Dairy products, Watch repair, Phone repair, Dry cleaning, Mobile accessories, Household appliances, Household chemicals, etc.

Name-classifiers are given by taking into account professional and leisure, material and spiritual needs, age, gender and other differences, for example: auto parts stores, Lavash, Gifts, Bird, Seeds, Souvenirs, Crockery, Flower shop; cafe Blinnaya, Shashlychnaya, Pizza, Shawarma, Doner, Lagman, Hinkalnaya, House of sewing machines, etc. The names symbolize genus-species relationships or subject-thematic connections: Kozha KZ is eco-leather and automotive fabric store; Audi Center Almaty, Porsche Center Almaty are car dealerships; Bashmachok, Saposhki-botnochki are women's shoes stores, Altyn, Magic of Gold are jewelry stores, etc. In addition, such names may indicate the addressee of the consumer, for example: bathhouse 'Dlya Svoih'; shops 'Vse dlya rybalki', 'Vse dlya salona', '1000 melo4ei dlya doma', 'Mamin Mir', 'Rukodelnitsa', 'Sewing Accessories Store', 'Hosayushka'; car service 'Master'; cafe 'Gourmet', 'Lakomka', 'Karapuzy'.

Recent formations include names that fix the name of the owner of the enterprise in different forms: shops Kulikovskiy, Alisa, Ainur, Kamilla, Yerlan, Rustem, etc.

Most toponym-symbols of Almaty reflect the realities of nature. They can be classified by:

- plant names, i.e. phytonyms: studio 'Tulip'; hotel 'Astra', 'Rose', kindergarten 'Romashka (chamomile)', 'Berezka (Birch)', 'Kolosok (Spike)', 'Aq Qain (white birch), beauty salon 'Iris', 'Persik (Peach)', 'Magnolia', 'Golden Lemon', a boutique of women's clothing 'Vyshnya (Cherry)', a store 'Landysh (Lily of the valley)', 'Orchid', a restaurant 'Alma' (apple), street 'Baisheshek' (snowdrop), a network of institutions 'Basilik', 'Myata (Mint)', a karaoke bar 'Ris' (rice).

- names of animals and birds: shopping center 'Colibri', studio 'Belka (Squirrel)', supermarket 'Chaika', kindergarten 'Medvezhonok (Bear cub)', street 'Zholbarys' (tiger), security company 'Kaskyr Security' (wolf), bathhouse 'Albatross', '33 Penguin's' ice cream parlor chain, 'Medved' (Bear) tavern, CAO Zhavoronok (skylark), 'Aist (stork)' family restaurant, restaurant 'Beliy slon (White Elephant)', 'Dove' store, 'Fish of my dreams', 'Alatau Kys' (bird), draft beer store 'Lame blue cat', street 'Bulbul' (nightingale).

- names of natural phenomena: 'Zarya Vostok' store, 'Zima I leto' (Winter and Summer), 'Breeze' household chemicals store, 'Rainbow' photo studio, 'Veterok' cafe, 'Samal', 'Luna', restaurant 'Vesna', kindergarten 'Raduga (Rainbow)', street 'Tan' (morning), restaurant 'April'.

- names with national and cultural symbols: cafes 'Boursak', 'Tarym', a network of canteens 'Tagam', lagmanhana 'Iftar', ethno-café 'Zhailau', complex 'Tekemet', teahouse 'Tubeteika', canteen 'Naryn', hotel complex 'Nauryz', hotel 'Sarbaz', cafeteria 'Five O'clock', restaurant 'China Town', street 'Dombyra'.

- names of natural landscape forms: 'Oasis' store, 'Call of the Steppe' fishing store, 'Ocean' draft beer store, 'Golden Valley' cafe, 'Ocean Basket' seafood restaurant chain, 'Peshera' cafe, 'Hotel Mountain' hotel, recreation area 'Maral-Sai' (ravine).

- space names: hotel 'Mercury', 'Three Stars', lounge bar 'Aspan' (sky), medical center 'Venus', cafe 'Moon', 'Asteroid B612', residential complex 'Mountain Sun', microdistrict 'Zhuldyz' (star), hotel and restaurant complex 'Aurora', etc.

- names related to the art theme, for example, music: 'Microphone' karaoke bar, 'Do Re Mi', 'Muzkafe' cafe, 'Accord Capital' organization, 'Arfa' music school, 'Sonata' boutique; Literature: 'Poetry' restaurant, 'the Dickens' resto-bar, 'Lolita' bar, the 'Assol' optics, 'Duimovochka' (Thumbelina) flower shop, 'Pinocchio' trading company; shop of bee products 'Winnie the Pooh', beauty salon 'Zolushka (Cinderella)'; cinema: the restaurant 'Love and Doves', 'Leon', 'Mimino', the lounge bar 'Ezhik v Tumane' (Hedgehog in the Fog), the retro bar 'Celentano', the chain of sushi bars 'Aliye Parusa' (Scarlet Sails).

The names addressed to the theme of folklore (fairy tales, myths, legends) acquire aesthetic significance: 'Kurochka Ryaba' stores, 'Legend' residential complex, 'Skazka' cafe, 'Alyonushka', the wonderful confectionery 'Alisa'; theater 'Zazerkal'ye' (Through the Looking Glass), beauty salon 'Rai', restaurant 'Princess', 'Khoja Nasreddin', hairdressers and beauty salons 'Aphrodite', 'Eva', travel company 'Sphinx', car wash 'Phaeton', service station 'Hermes'.

Symbols-ideologemes: the park of the First President, the Park named after 28 Panfilov Guardsmen, Victory Square, Victory Park.

Symbols denoting the high quality of a service or product include the words "gold", "grant", "alтын" in their names: trading company 'Grant Gold', 'Gold Product', shopping and entertainment complex 'Grand Park', restaurant 'GRANT ZINA', 'Baqyt Grant hall', workshop 'Gold', 'Altyn Adam', 'Altyn el', complex 'Grant Osteria', hotel Grant Opera, service station 'Gold', etc.

Symbols of dedication: park named after M.K. Gandhi, S. Seifullin Park, park named after T. Ryskulov, park named after R.I. Ognev, square named after A. Baitursynov, Shukhov park, S. Seifullin square, Afghans square, Journalists square, Baum grove.

Symbols-splinters of advertising texts: school 'Mosaic', residential complex 'Fantasy', 'Prestige', bath 'Lux', atelier 'Chic', 'Style', shop 'Queen of temptation', 'Chance', restaurant 'Fortune' and others

Conditional symbols-stereotypes that reproduce quotes, idioms, winged words, etc. in the mind most often have an unusual, colorful, exotic sound form. Such names are used to advertise a product or object and attract customers to the establishment, i.e. impress the communicant as much as possible: 'Veselidze' cafe, 'Zhan plov lagman', 'Lariss Ivanna Khachu', 'Syto Piano', 'Dry Law' bar, 'Love and Doves' and 'Bambarbia Kergudu' restaurants.

A large layer in the names of toponyms in Almaty is borrowed names, which can be explained by the passion for imported material and spiritual values. These names can be presented both in Russian script and in the script of the source language. Among them there are names that emphasize belonging to a foreign culture: Shashlykoff, Pivovarov. Sometimes the names are found not in the form of borrowings, inclusions, but in a transliterated form, for example: Resei shopping center, TechArt-Service car service, Chaihana Navat, Sandyq cafe, Bastau, Vilka, Fort Vernyi, Granat, Nasledniki, Nedelka.

Toponyms-migrants are already existing twin names: Gazprom Neft, KFS, Mc Donald's, etc.

5 Conclusion

Toponymical research is reaching a new level with the advent of electronic systems as Google Maps, 2GIS, and Yandex Maps and others. We have tried to demonstrate how electronic maps can be used for toponymical research. We can confidently speak about the expediency of attracting technical means to toponymical research in general. GIS technologies will assist

in solving the problems of studying geographical names. Electronic maps can be used for a comprehensive study and systematization of toponyms. There is a need to create digital maps in the Kazakh language. The analysis of toponyms in Almaty will make a certain contribution to the creation of online toponymic dictionaries in this region.

References

1. E.V. Kedrova, O.A. Zarubin, *International scientific news-2017*, 495 (2017)
2. Yu.S. Ananiev, GIS, 3 (2003)
3. I.A. Martynenko, TSPU Bulletin, **5 (211)** (2020)
4. G.M. Kert, V.T., Vdovitsyn, A.L. Veretin, *Toris* (1998)
5. E. Shohenmaier, *Onomastica Uralica*, **14** (2019)
6. The GeoNames geographical database. <http://www.geonames.org>
7. Directory of geographical names of Kazakhstan. <https://www.zin.ru/animalia/coleoptera/rus/kazgeonm.htm>
8. Toponymy of Kazakhstan. Encyclopedic reference (2010)
9. E.D. Suleimenova, U.E. Mussabekova, N.Zh. Shaimerdenova, *Onomastics of Kazakhstan* (2015)
10. E.A. Khasenov, *Sociolinguistic problems of urbanization* (2002)
11. Zh.S. Chvuderbaev, *Semantics of urbanonyms (on the example of Almaty)* (2007)
12. U.U. Anarbekov, *City onomasticon*, 22 (2015)
13. G.B. Madiev, *Onomastics of Kazakhstan: an analytical review (approaches to the study of onyms)* (2018)
14. I. Malyar *Alma-Ata: city, districts, streets* (1989)
15. A. Pozdeev-Bashta, *Mountain trails of Almaty* (1998)
16. M. Sembi, Proceedings of Kazakh Research Institute of Culture. **I** (2013).