

Geonames – the Database of Geographical Names of the Czech Republic

Tomáš Marek, Ondřej Závodský

Land Survey Office, Czech Republic

Abstract. The contribution outlines the toponyms administration in the Czech Republic from 1930s, when the standardization of geographical names commenced. In 1990s were geographical names digitized and Geonames – geodatabase for 1:10 000 scale – came into existence. It was enriched by toponyms of another scales and step by step evolved into geodatabase independent on map scale. Its data can be distributed in many online map services and provided for printing of different kinds of maps.

Keywords: Geographical names standardization, Geodatabase, Toponyms

1. Introduction

Map as a result of gathering topographic names was for centuries a unique source of information about toponyms. Before the standardization of geographical names and their digital organization started, the geographic location of toponyms, their nomenclature details and the cartographic representation as well could be acquired from the map script only.

2. Applied Terms

State Map Series – The State Map Series consist of map sheets showing the whole territory of the Czech Republic (CZE), processed according to common standards, and published by the state authority in public interest.

ZM 10 – ZM 10 is the Base Map (*Základní mapa*) of the CZE at the scale 1:10 000 and it is the most detailed base map of medium scale. The basic construction element of the CZE's contiguous map layout is that of the Base Map of the CZE at the scale 1:200 000 (ZM 200). Dimensions and indexing of ZM 10 map sheets are derived from the ZM 50 map sheet, divided into 25 sections. The entire CZE's territory is shown on 4533 map sheets of ZM 10.

Cadastral Unit – Cadastral unit is defined, according to the Cadastral Act¹, as a descriptively enclosed technical unit created by collective cadastral register of real estates. Every municipality is composed of one or more cadastral units.

Geonames – Geonames is the database of geographic names of the CZE at the level of detail corresponding to ZM 10 and is maintained as a seamless database for the entire territory of the CZE.

ZABAGED[®] – ZABAGED[®] (*Základní báze geografických dat České republiky*) represents the geographic base data of the CZE in a digital vector model of the CZE's territory at the level of detail corresponding to ZM 10.

3. Standardization of Geographical Names

Standardization of geographical names in the Czech Republic initiated in 1931. It concerned the most important *oronyms* and *hydronyms* primarily and has been provided by the Commission on Geographical Names, which is the expert and advisory body of the current Czech Office for Surveying, Mapping and Cadastre (ČÚZK) and of its predecessors. Secretariat of the Commission on Geographical Names is the executive authority administratively and technically maintaining the standardization.

First revision of standardized geographical names was performed twenty years after on maps at the scale 1:75 000. The Commission on Geographical Names has also standardized *exonyms*, geographical names outside the former Czechoslovakian republic (later Czechoslovakian socialistic republic) and created rules for transcription of non-Latin scripts.

3.1. Standardization Cards for 1:10 000 Maps

Standardization for 1:50 000 maps soon followed, but no systematic register of toponyms outside the map script existed until 1958, when standardization for 1:10 000 maps commenced. Every geographical name has been registered with its typology in a standardization card (see *Figure 4*, p. 7). Cards carried map sheet, cadastral unit, municipality, district and region data. The geographic location of toponyms and their cartographic representations were still given from the map script exclusively. Updating of maps resulted particularly from local surveys and legislation changes (for names of municipalities for example). New editions were created from previous

¹ No. 344/1992 Co., § 27 letter h)

editions with updates recorded in so called registration maps. Toponyms have been administered this way till 1990s.

3.2. Geonames: Geodatabase for 1:10 000 Maps

At the nearing end of the 20th century it has become obvious, that the card-index system can no longer satisfy the ČÚZK's needs for geographical names administration. Preconditions for creation of database of geographical names were being formed since 1996:

- Replace the existing registration system of standardization cards and digitize geographical names used in all 1:10 000 maps.
- Make the register of geographical names simpler.
- Let the names be found more quickly.
- Enable to perform analysis or onomastic and historical research.
- Be applicable and related to features in ZABAGED[®].
- Create a digital layer for 1:10 000 scale map script.
- Enable to search toponyms through searching Web services.

A contractor fulfilling all required criteria of the project was selected and the next year, after software and hardware was delivered, new geodatabase was put into operation. The database part of the system was Oracle-based and its graphic part was created in Delphi software.

The database of geographical names of the Czech Republic carried out by the Land Survey Office (ZÚ) was interoperable object oriented. Its records related to both space and descriptive geographic names data. Names held its own geographic location and cartographic representation in a digital form and paper map since then ceased to be their prime source. Every record of named feature was provided with number of specific information. Names carried cartographic attributes (such as *font, size, colour, typeface, span, tilt of the script* or *map script form of geographical name*), system attributes (such as *name ID, standardization date, update time, username responsible for last update*) and other attributes (such as *alternative name, external database code, name source, feature type, ZM 10 map sheet* or *cadastre unit number*).

The database was being filled with records of geographical names and its population was completed in 2005. Thenceforth a data set of geographical names independent on the map script was available and could be used without any adjustments for map printing. The spatial data were given to users in the DGN and DXF vector formats, the descriptive data in the form of ASCII files table.

Since 2006 the Geonames database is being continually updated in a three year cycle. Beside common topographic survey and public initiative new

data are being added in cooperation with local self-governments and cadastral offices as part of creation of the digital cadastral map, renewal of cadastral documentation and implemented land consolidation.

3.3. New Database

A modification of the data model and management processes of Geonames was implemented in 2009 in conjunction with preparation of a new database technology of ZÚ map production processing.

Geonames data have been migrated to a new data system. With this step Geonames simultaneously joined ZABAGED[®] in a single system. Some of the feature types in Geonames are since then related to those in ZABAGED[®] in a way of adopting their graphic representation, thus also their geographic location. Other names are being inserted in the database through simplified graphic representation, when no adequate representation in ZABAGED[®] exists or when required feature type of ZABAGED[®] is missing. Named features are categorized in 165 feature types, 100 of them correspond with ZABAGED[®] feature types. Several other technical feature types serve as instruments for geographical names maintenance.

In consideration of the inner architecture of MicroStation and LIDS, software building up the new system, not all attributes of geographical names were transferred from the replaced data system. Script coordinates were utilized for creation of graphic representations assigned to particular feature types and *map script form of geographical name* is not a constituent part of Geonames administration anymore.

Cartographic representation of toponyms is being conceived in the Information System of the State Map Series (IS SMD), which serves for State Map Series cartographic processing. Every name in the IS SMD database is being allocated an annotation considering its *feature type* and *script size proposal* acquired from Geonames. The annotation consists especially of attributes *font*, *typeface*, *size* and *colour of script* and may be varied according to a specific map product to meet its requirements. Whenever a geographical name is updated in Geonames, annotation remains, but cartographer is alerted of the update and may change the annotation as needed during the cartographic map processing.

The Geonames database maintains, excepting system attributes (*ID codes*, *standardization date*, *create date*, *update date*, *created by*, *updated by*) and already mentioned attributes *feature type* and *script size proposal*, also *standardized name*, *variant name*, *name source*, and several others. *Standardized name* is an approved form of geographical name binding for publishers of the State Map Series and recommended for other editors of

cartographic products in the Czech Republic. *Variant name* may be a used alternative name or previously standardized name currently out of use.

The database is seamless. Geonames ceased to be system for 1:10 000 map lettering and became system for management of named places and named objects. All migrated duplicate names from the replaced database were removed and new geographical names are put in the new database once only not taking their occurrence on map script into account.

Current database contains, as well as the previous one, geographical names of the Czech Republic only. We can differentiate between *official names* and *approved (standardized) names*. Official ones are brought into the database from external data providers (other state authorities mostly) – among them belong names of municipalities and their parts, railway stations, airports and protected natural areas. Approved ones are being standardized in compliance with procedures of Geonames administration. This differentiation has been caused by state legislation concerning the standardization of geographical names.

3.4. Example of Standardization and its Update

On *Figure 1* occur three names: *V Buši*, *U Trnovan*, *Ostrava*. All three names were standardized for the State Map Series in 1978. They appeared in the first edition of ZM 10 in 1980.

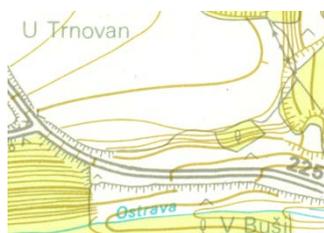


Figure 1. Cut of ZM 10 published in 1980.



Figure 2. Cut of ZM 10 published in 1998.

Name *Ostrava* was changed to *Radičevská strouha (Ostrava)* in 1994. This modification became evident in the fourth edition released in 1998 (*Figure 2*).

Another change came in 2007 – name was modified to *Radičeveská strouha*. In this case the modification appeared not earlier than on the sixth edition published in 2012 (*Figure 3*). Other two names remained unchanged all the time.



Figure 3. Cut of ZM 10 published in 2012.

Origin of the name *V Buši* can be dated at least to the first half of the 19th century, when maps of the Stable Cadastre were created. On a map of the same area figures name *Busch* [bu/], from which the contemporary name *V Buši* [v buši] evolves.

The example shows us, that an update in geodatabase may wait for its manifestation in the map, without regard to the system, even several years until a new edition is published. Fortunately, online map services exist and are in operation at the present time, where updates may occur immediately or in a relatively short time. The geographical nomenclature published on the Geoportal of the ČÚZK is being updated every month.

Geodetický ústav, n.p. Praha
 Městský archiv-geodézie a kartografie
 Sekretariát Názevové komise ČÚGK

2/3

SEZNAM GEOGRAFICKÝCH (POMĚSTNÍCH) NÁZVŮ			Kraj: <i>Středočeský</i>	Obec: <i>Žatec</i>	Katastrální území: <i>Bezděkov-Žatec</i>			
			Okres: <i>Louny</i>	Mapový list: <i>1:50 000 1:25 000 1:10 000</i>	12-11-10			
Pol. čís.	Název x)	Druhové označení	Návržený název xx)	Navrhl/ať	Odvodnění	Režimní ONS (odvodnění)	Název schválený NK ČÚGK	Poznámka
1	2	3	4	5	6	7	8	9
9.	v Na Kopci	pramenitá stud.				✓	Na kopci	
10.	U mléč. přívodny	pramenitá stud.				✓	U mléč. přívodny	
11.	U Trnovan	pramenitá stud.				✓	U Trnovan	
12.	Na hemeli	pramenitá stud. 238 m n.m.				✓	(Na hemeli)	
13.	U Ostrava	potok	Radičevská stranka (Ostrava)	ZVM 1994		✓	Radičevská stranka (Ostrava)	(Ostrava) 4.12.03-04 odvodení po měř. 1:10 000 12.11.10
14.	V Buši	pramenitá stud.				✓	V Buši	

x) 1) pozemková, 2) katastrální, 3) topografická, 4) ZM 1:50 000, 5) jiná (název a měřítko), 6) vysvětleno v terénu (u koho?)
 xx) 1) základní tvar, 2) předložkový tvar na otázku kóde 7, 3) předložkový tvar na otázku odkud?

GEODETICKÝ ÚSTAV, n.p. PRAHA
 Město Žatec
 Město Žatec
 Město Žatec

MĚSTSKÝ NÁRODNÍ VÝBOR
 V ŽATCI
 Odlis originálu v zastávce č. 8
 8.97
 102 A 47

Figure 4: Standardization card.

4. Web Services

Geographical names are for publication purposes on a web being inserted from the production geodatabase to the publication database in a simplified state. Only some of the name attributes are made public. Toponyms are displayed in the viewing Web Map Service (WMS) of the ČÚZK shaped by cartographic attributes (such as *font, typeface, colour, size and tilt*), which are being specifically and automatically assigned to geographical names according to their feature type. Graphic representations are also being simplified – every geometry collapses into a single point. Secondary points are eventually being generated for large named areas (like water reservoirs), but those serve only for name presentment in the map view service.

In the WMS are names displayed at particular map scales according to their feature type. Subtle objects, like churches or chapels are described at scales 1:10 000 and larger, municipalities at 1:50 000 and larger.

Data from publication database are provided to users, apart from the searching service in a map viewer, also through the downloading service - Web Feature Service (WFS). Geonames provides data in accordance with the INSPIRE Directive. This enables the sharing of spatial information among public sector organizations and to better facilitate public access to spatial information across Europe. The chosen model of the geographical nomenclature administration enables to utilize the same data in various ways.

5. Summary and Future Expectations

Secretariat of the Commission on Geographical Names administers the one and only continually maintained and updated collection of geographical names of the Czech Republic. Database contains toponyms suitable for maps from cadastral scale 1:1 000 up to small scales and its content is being continuously enhanced. Geonames is also an integral and irreplaceable part of Czech state information systems.

Secretariat ensures interoperability of our system with information systems of the ZÚ – IS ZABAGED, IS Geoportal, IS SMD and begins to prepare for reciprocal connection and data provision with the Information System of the Cadastre of Real Estates (ISKN). IS Geoportal provides the publication of geographical names through web services, IS SMD uses the nomenclature for creation of the State Map Series in both paper and digital fashion.

References

ČESKÝ ÚŘAD GEODETICKÝ A KARTOGRAFICKÝ, VÝZKUMNÝ ÚSTAV GEODETICKÝ, TOPOGRAFICKÝ A KARTOGRAFICKÝ V PRAZE, GEODETICKÝ ÚSTAV V PRAZE. Směrnice pro tvorbu základní mapy ČSSR 1:10 000. Praha: Český úřad geodetický a kartografický, 1970.

ČÚZK. Web sites Czech Office of Surveying, Mapping and Cadastre. [cit. 2013-03-26]. Enabled on <http://www.cuzk.cz>

DATA 10, Katalog mapových značek v Informačním systému kartografie [digital document]. Zeměměřický úřad, 5. 3. 2013.

GEODÉZIA N. P., BRATISLAVA. Instrukce pro tvorbu, obnovu a vydávání základní mapy ČSSR 1:10 000. Praha: Český úřad geodetický a kartografický, 1985, 11 p.

GEODÉZIA N. P., BRATISLAVA. Metodický návod pro obnovu a vydávání Základní mapy ČSSR 1:10 000. Praha: Český úřad geodetický a kartografický, 1985, 19 p.

INSPIRE. Infrastructure for Spatial Information in the European Community. [cit. 2013-03-26]. Enabled on <http://inspire.jrc.ec.europa.eu>

Legal act: Zákon, number: 344/1992; Official Journal: Sbírka Zákonů ČR, Publication date: 07/05/1992. Enabled on <http://portal.gov.cz/app/zakony>

Sekretariát Názvoslovné komise ČÚZK, Praha: Evidenční seznamy, okres Louny, obec Žatec, 1970-1997.

ŠÍDLO, B., KUCHAR, S. Vývoj a stav současných mapových děl. Praha: Zeměměřický úřad, 1998, 53 p.

ÚSTŘEDNÍ ARCHIV ZEMĚMĚŘICTVÍ A KATASTRU. Císařský povinný otisk – Bezděkov. 1843. UAZK/B2/A/6/0159-1. Enabled on www.archivnimapy.cuzk.cz

VÝZKUMNÝ ÚSTAV GEODETICKÝ, TOPOGRAFICKÝ A KARTOGRAFICKÝ. Technologický postup pro obnovu základní mapy ČSSR 1:10 000. Zdiby: VÚGTK, 1981, 21 p.

ZEMĚMĚŘICKÝ ÚŘAD. Základní mapa ČR 1:10 000 12-11-10. Praha: Český úřad geodetický a kartografický, 1980.

ZEMĚMĚŘICKÝ ÚŘAD. Základní mapa ČR 1:10 000 12-11-10, 4th ed. Praha: Český úřad zeměměřický a katastrální, 1998.

ZEMĚMĚŘICKÝ ÚŘAD. Základní mapa ČR 1:10 000 12-11-10, 6th ed. Praha: Český úřad zeměměřický a katastrální, 2012.