

## HOVER WP3 D3.5c: Thermal and Natural Mineral Waters in Europe – A webservice concerning special groundwater in Europe

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### Introduction

This service provides information about thermal and natural mineral waters in Europe. It shows selected results from HOVER WP3 deliverable D3.1 “Harmonization of terminology, inventory of available information on mineral, thermal and highly mineralized groundwater” lead by GBA (Daniel Elster). The report for HOVER WP3 D3-1 can be accessed here: [https://repository.europa-geology.eu/egdidocs/hover/hover\\_d3-1\\_report\\_v2.pdf](https://repository.europa.eu/geology.eu/egdidocs/hover/hover_d3-1_report_v2.pdf)

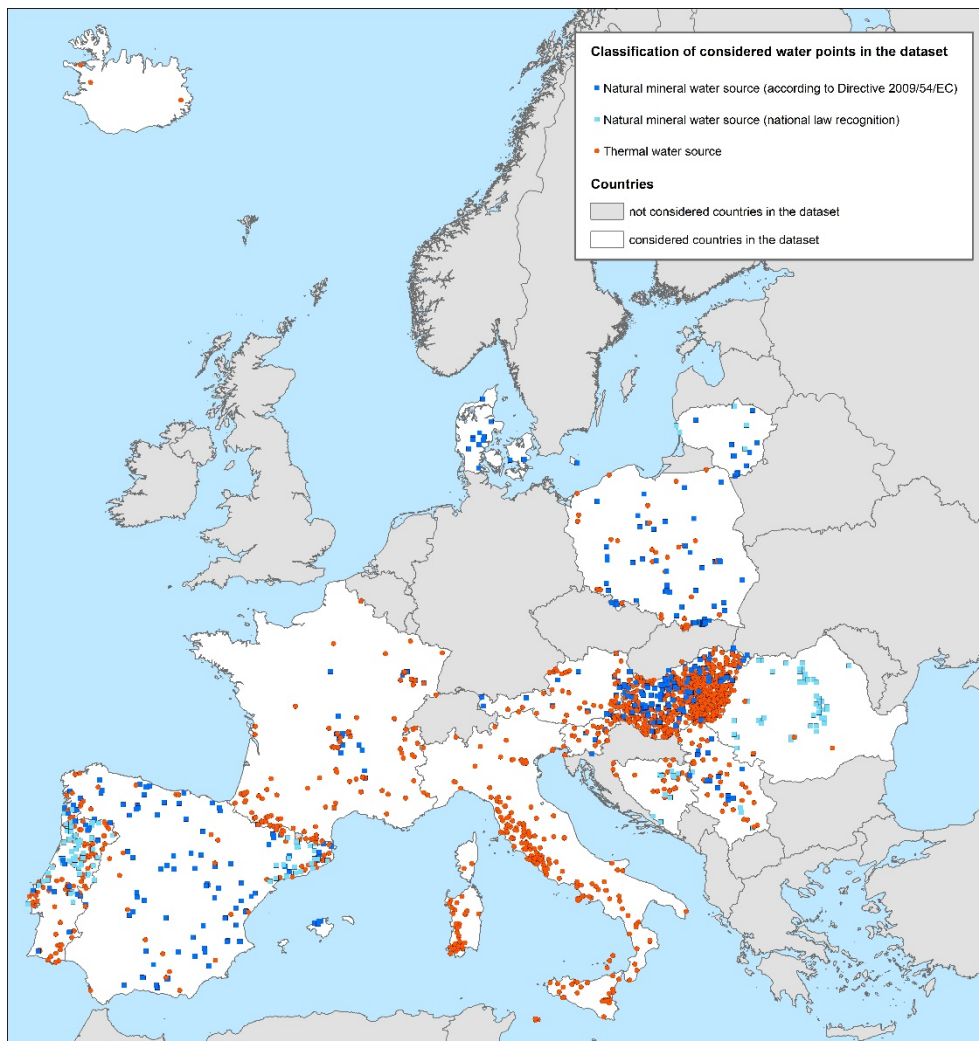


Figure: Overview of considered sources of thermal waters and natural mineral waters in Europe.

## Contents of the web map service:

The web map service comprises 3 layer groups:

- Classification of sources (thermal and natural mineral waters)**  
 Natural Mineral Waters: The Directive 2009/54/EC regulates the marketing and exploitation of natural mineral waters in Europe. Therefore, the focus is given to listed recognized natural mineral waters. The majority of participating countries/regions in HOVER WP3 are found in the list of natural mineral waters recognised by EU member states. Sources in non-listed countries that have national definitions for natural mineral waters are included, if the criteria for recognition are very similar.  
 Thermal waters: National definitions for thermal waters are inconsistent on a European level. Therefore, we considered recognized sources on national levels.
- Temperatures at the outlet of thermal water sources**  
 The focus is given to thermal water sources used for balneology, heating and/or electricity production. Due to the mentioned inconsistency of national definitions for thermal waters, we differentiate between the following outlet water temperature classes: <15°C, 15-20°C; 20-30°C, 30-40°C, 40-50°C, 50-60°C, 70-80°C, 90-100°C, >100°C.
- Customized layers**  
 The contents of 3 layers can be individually created by the use of combined filters. Field links lead to INSPIRE vocabulary and developed HOVER WP3 project vocabulary.

## Constitution of the dataset

The dataset was delivered as geopackage and comprises 3.272 thermal and natural mineral waters found in Austria, Bosnia and Herzegovina, Denmark, France, Hungary, Iceland, Italy, Lithuania, Poland, Portugal, Romania, Serbia, Slovenia and Spain. In detail, 2.390 thermal water sources and 678 natural mineral waters are considered. Data is not available for Belgium, Ireland, Malta, Sweden and Ukraine.

Table 1: Overview of classified sources in the dataset. Natural mineral waters trade descriptions of recognised by member states derived from 2013/C95/0232 (updated April 9<sup>th</sup> 2021).

Sources in countries	Classification of sources			Data availability in the provided dataset			Natural mineral waters trade descriptions recognised by member states
	Natural mineral water (Directive 2009/54/EC)	Natural mineral water (national law recognition)	Thermal water	Natural mineral water (Directive 2009/54/EC)	Natural mineral water (national law recognition)	Thermal water	
Austria	40		62	All		Yes	32
Bosnia and Herzegovina		10	28		Yes	Yes	None
Denmark	17			All		No thermal waters in Denmark	14
France	33		240	part		Yes	101
Hungary	224		1432	All		Yes	173
Iceland			3			Yes	1
Italy			241	none		Yes	305
Lithuania	21	19		All	Yes		22
Poland	126		46	All		Yes	89
Portugal	17	61	121	part	Yes	Yes	22
Romania		85	14	none	Yes	Yes	79
Serbia	30	8	82	all?	Yes	Yes	none
Slovenia	9		33	X		Yes	9
Spain	161	21	88	all	Yes	Yes	160
<b>Total</b>	<b>678</b>	<b>204</b>	<b>2390</b>				<b>1007</b>

Instead of providing exact coordinates, locations of sources are allocated to country specific EEA reference grid cells based on 1 km<sup>2</sup> (see <https://www.eea.europa.eu/data-and-maps/data/eea-reference-grids-2>). Additionally, that 10 km<sup>2</sup> cells were used in Romania. INSPIRE code lists (see <http://inspire.ec.europa.eu/codelist>) and Geoscience Vocabularies for Linked Data (see <http://resource.geosciml.org/>) are used to describe aquifer information. Hydrochemical information of sources is described by single representative hydrochemical analysis, assuming stable hydrochemical conditions in general.

Table 2: Constitution of the dataset

field abbreviation in geopackage	unit	Explanation of field
name		name of source
of_name		official name of natural mineral water
country		Name of country
classification		Classification
x, y		No exact coordinates of sources are provided, but information from 1km grid cells <a href="https://www.eea.europa.eu/data-and-maps/data/eea-reference-grids-2">https://www.eea.europa.eu/data-and-maps/data/eea-reference-grids-2</a>
type		type of water source
use1		intended use 1
use2		intended use 2, if multiple uses are present
use3		intended use 3, if multiple uses are present
yieldclass	l/s	yield class, extraction allowed by law regulation
depth	m	If borehole: true vertical depth
screen_from	m	If borehole: screen or open hole: FROM (true vertical depth)
screen_to	m	If borehole: screen or open hole: TO (true vertical depth)
media		Aquifer media type according to INSPIRE
media_uri		<a href="http://inspire.ec.europa.eu/codelist/AquiferMediaTypeValue">http://inspire.ec.europa.eu/codelist/AquiferMediaTypeValue</a>
type1		Aquifer type according to INSPIRE
type_uri		<a href="http://inspire.ec.europa.eu/codelist/AquiferTypeValue">http://inspire.ec.europa.eu/codelist/AquiferTypeValue</a>
Lith1		Lithology of the aquifer 1
Lith1_uri		<a href="http://inspire.ec.europa.eu/codelist/LithologyValue">http://inspire.ec.europa.eu/codelist/LithologyValue</a>
prop1		Proportion, lithology of the aquifer 1
prop1_uri		<a href="http://resource.geosciml.org/classifier/cgi/proportionterm">http://resource.geosciml.org/classifier/cgi/proportionterm</a>
Lith2		Lithology of the aquifer 2
Lith2_uri		<a href="http://inspire.ec.europa.eu/codelist/LithologyValue">http://inspire.ec.europa.eu/codelist/LithologyValue</a>
prop2		Proportion, lithology of the aquifer 2
prop2_uri		<a href="http://resource.geosciml.org/classifier/cgi/proportionterm">http://resource.geosciml.org/classifier/cgi/proportionterm</a>
Lith3		Lithology of the aquifer 3
Lith3_uri		<a href="http://inspire.ec.europa.eu/codelist/LithologyValue">http://inspire.ec.europa.eu/codelist/LithologyValue</a>
prop3		Proportion, lithology of the aquifer 3
prop3_uri		<a href="http://resource.geosciml.org/classifier/cgi/proportionterm">http://resource.geosciml.org/classifier/cgi/proportionterm</a>
age1		Aquifer, younger age <a href="http://inspire.ec.europa.eu/codelist/GeochronologicEraValue/">http://inspire.ec.europa.eu/codelist/GeochronologicEraValue/</a>
age1_uri		
age2		Aquifer, older age <a href="http://inspire.ec.europa.eu/codelist/GeochronologicEraValue/">http://inspire.ec.europa.eu/codelist/GeochronologicEraValue/</a>
age2_uri		
gw_age		groundwater age
temp	°C	Temperature class, water temperature at the outlet
TDS	g/l	Total dissolved solid class, derived from representative hydrochemical analysis
ec	µS/cm; 25°C	Specific conductivity, derived from representative hydrochemical analysis
ph		pH, derived from representative hydrochemical analysis
eh	mV	Redox potential (Eh), derived from representative hydrochemical analysis
O2	mg/l	Oxygen (O2), value from representative hydrochemical analysis
na	mg/l	Sodium (Na), value from representative hydrochemical analysis
k	mg/l	Potassium (K), value from representative hydrochemical analysis
ca	mg/l	Calcium (Ca), value from representative hydrochemical analysis
mg	mg/l	Magnesium (Mg), value from representative hydrochemical analysis
sr	mg/l	Strontium (Sr), value from representative hydrochemical analysis
ba	mg/l	Barium (Ba), value from representative hydrochemical analysis

field abbreviation in geopackage	unit	Explanation of field
fe	mg/l	Iron (Fe total), value from representative hydrochemical analysis
mn	mg/l	Manganese (Mn total), value from representative hydrochemical analysis
nh4	mg/l	Ammonium (NH <sub>4</sub> ), value from representative hydrochemical analysis
Hco3	mg/l	Bicarbonate (HCO <sub>3</sub> ), value from representative hydrochemical analysis
Co3	mg/l	Carbonat (CO <sub>3</sub> ), value from representative hydrochemical analysis
F	mg/l	Fluoride (F), value from representative hydrochemical analysis
Cl	mg/l	Chloride (Cl), value from representative hydrochemical analysis
Br	mg/l	Bromide (Br), value from representative hydrochemical analysis
i	mg/l	Iodide (I), value from representative hydrochemical analysis
So4	mg/l	Sulfate (SO <sub>4</sub> ), value from representative hydrochemical analysis
No3	mg/l	Nitrate (NO <sub>3</sub> ), value from representative hydrochemical analysis
hs	mg/l	Hydrogen Sulfide (HS), value from representative hydrochemical analysis
al	mg/l	Aluminium (Al), value from representative hydrochemical analysis
sb	mg/l	Antimony (Sb), value from representative hydrochemical analysis
as	mg/l	Arsenic (As), value from representative hydrochemical analysis
be	mg/l	Beryllium (Be), value from representative hydrochemical analysis
pb	mg/l	Lead (Pb), value from representative hydrochemical analysis
cd	mg/l	Cadmium (Cd), value from representative hydrochemical analysis
cs	mg/l	Cesium (Cs), value from representative hydrochemical analysis
cr	mg/l	Chrome (Cr), value from representative hydrochemical analysis
co	mg/l	Cobalt (Co), value from representative hydrochemical analysis
cu	mg/l	Copper (Cu), value from representative hydrochemical analysis
li	mg/l	Lithium (Li), value from representative hydrochemical analysis
mo	mg/l	Molybdenum (Mo), value from representative hydrochemical analysis
ni	mg/l	Nickel (Ni), value from representative hydrochemical analysis
hg	mg/l	Mercury (Hg), value from representative hydrochemical analysis
rb	mg/l	Rubidium (Rb), value from representative hydrochemical analysis
se	mg/l	Selenium (Se), value from representative hydrochemical analysis
u	mg/l	Uranium (U), value from representative hydrochemical analysis
v	mg/l	Vanadium (V), value from representative hydrochemical analysis
zn	mg/l	Zinc (Zn), value from representative hydrochemical analysis
sn	mg/l	Tin (Sn), value from representative hydrochemical analysis
H2sio3	mg/l	m-Silic acid (H <sub>2</sub> SiO <sub>3</sub> ), value from representative hydrochemical analysis
H3bo3	mg/l	o-Boric acid (H <sub>3</sub> BO <sub>3</sub> ), value from representative hydrochemical analysis
Gasdom		gas phase dominance
comment		free comment