graffiti archaeology
along the Donaukanal



Geert Verhoeven | *project coordinator*
projectindigo.eu

The INDIGO graffiti project was funded by the Heritage Science Austria programme of the Austrian Academy of Sciences (ÖAW)



graffiti are

unique

complex

short-lived

socially relevant

cultural heritage

indigo

Inventory and

disseminate

graffiti along the

d**o**naukanal

Inventory and

disseminate

graffiti along the

d**o**naukanal

WHAT

Inventory and

disseminate

graffiti along the

d**o**naukanal

WHAT

WHERE

INventory and

DIsseminate

Graffiti along the

d**O**naukanal

WHAT

WHERE

WHY

digitally preserve

and

analyse

INventory and

DIsseminate

9raffiti along the

DOnaukanal

WHAT

WHY

digitally preserve

and

analyse

WHERE

ÖAW

TU WIEN GEO

GiFLE

vr vis

Stadt Wien

SPRAY CITY.AT

LUDWIG BOLTZMANN INSTITUTE
Archaeological Prospection and Virtual Archaeology

WHO

INventory and

DIsseminate

Graffiti along the

d**O**naukanal

WHAT

digitally preserve

and

analyse

WHY

WHERE

WHO

Heritage Science Austria programme | **€ 580 k** | **2** years

WHY

Inventory and digitally preserve and disseminate WHAT analyse

Graffiti along the Donaukanal WHERE

? HOW ?

WHO

Heritage Science Austria programme | € 580 k | 2 years

INDIGO approach

5 research pillars

INDIGO approach

5 research pillars

creation



INDIGO approach

5 research pillars

creation



acquisition



INDIGO approach

5 research pillars

creation



acquisition



processing



INDIGO approach

5 research pillars

creation



acquisition



processing

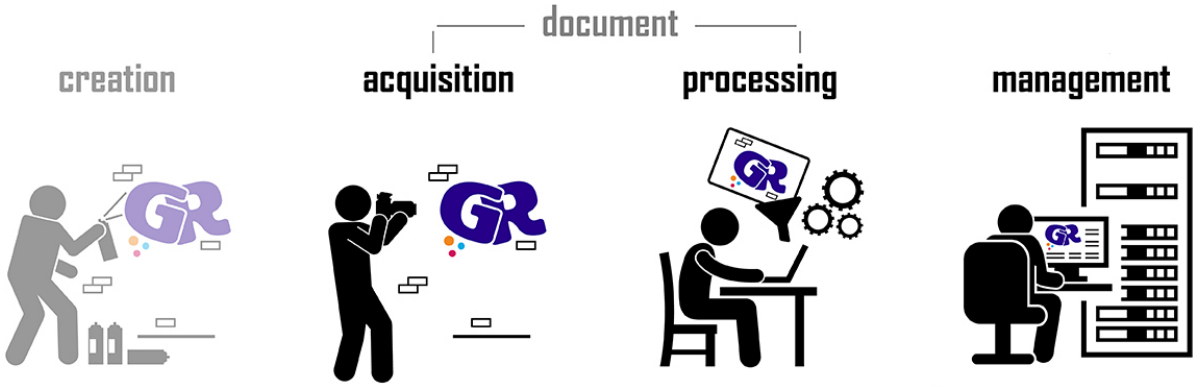


management



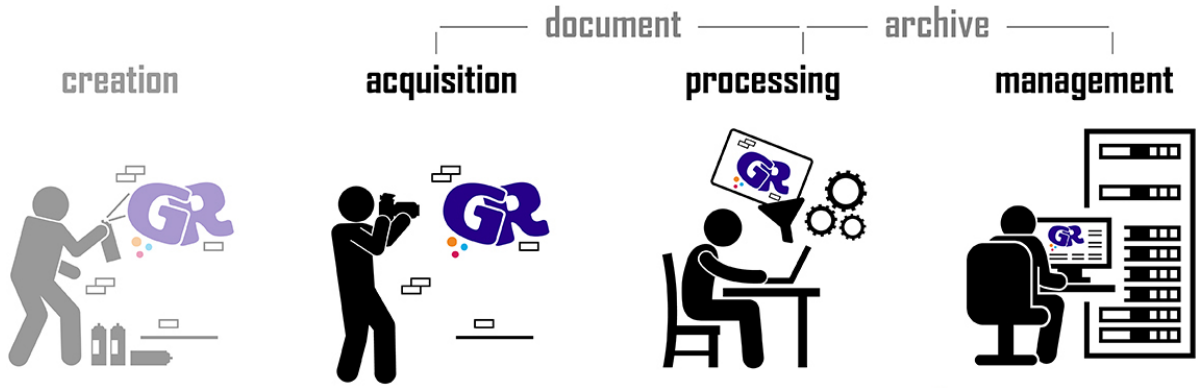
INDIGO approach

5 research pillars



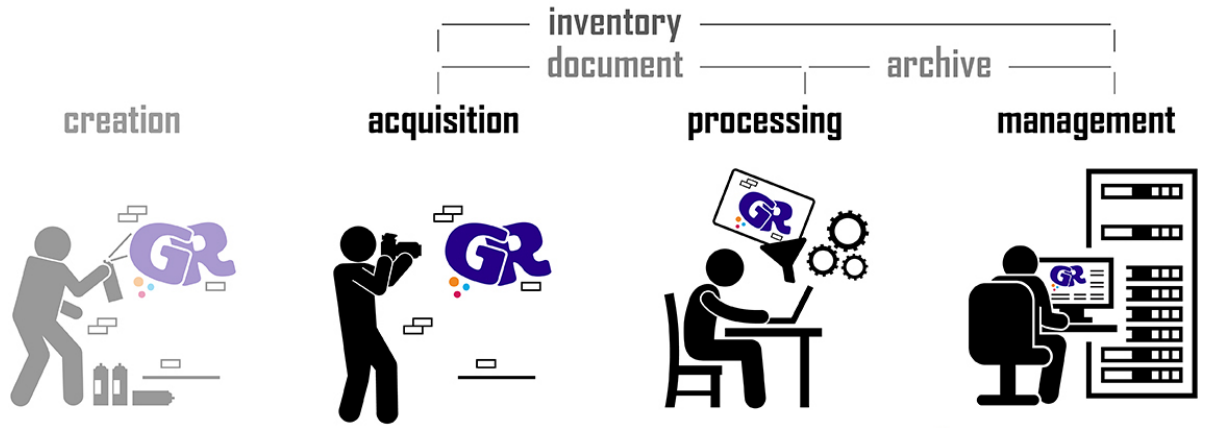
INDIGO approach

5 research pillars



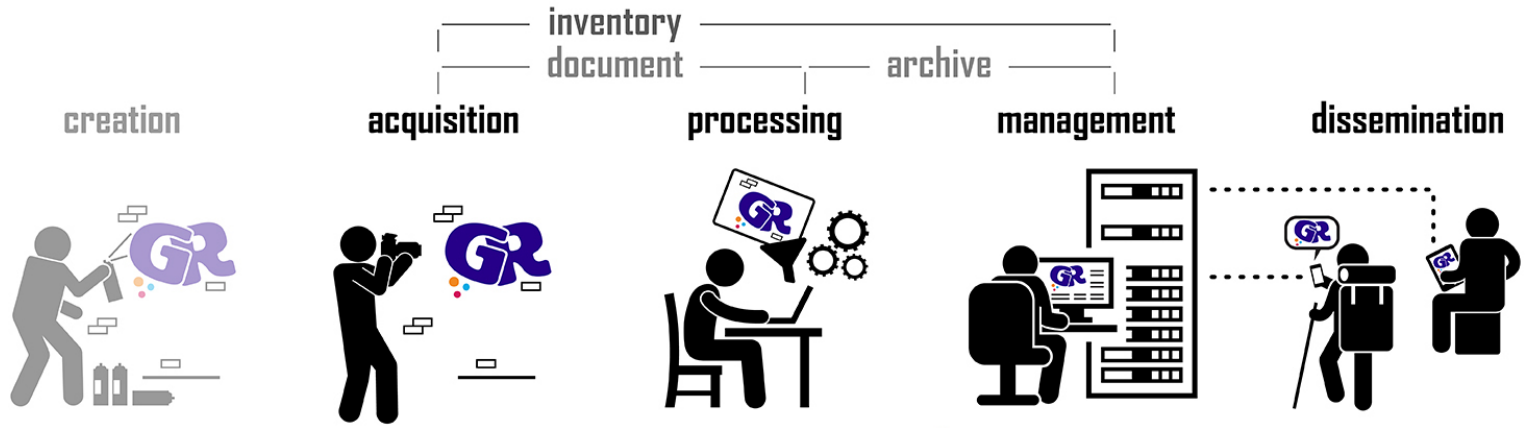
INDIGO approach

5 research pillars



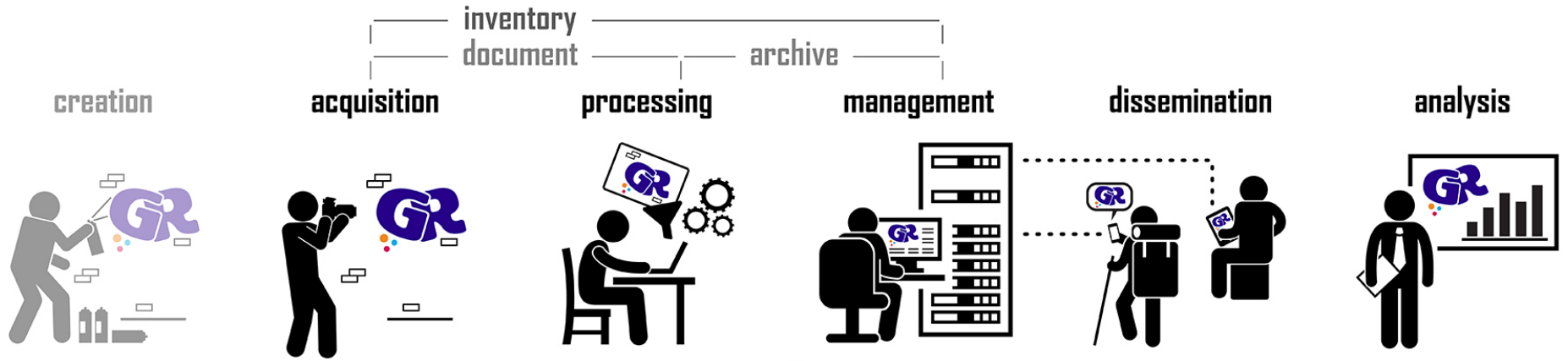
INDIGO approach

5 research pillars



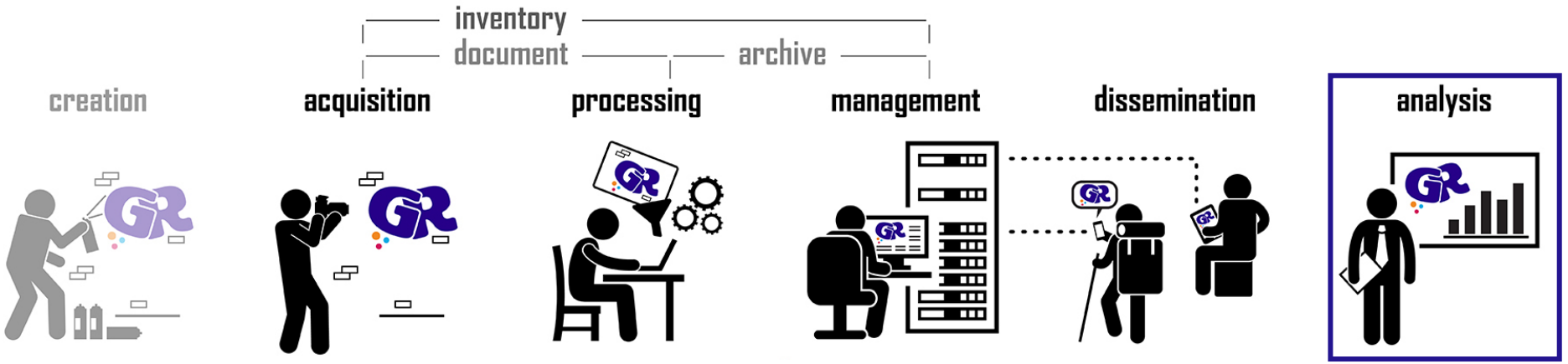
INDIGO approach

5 research pillars



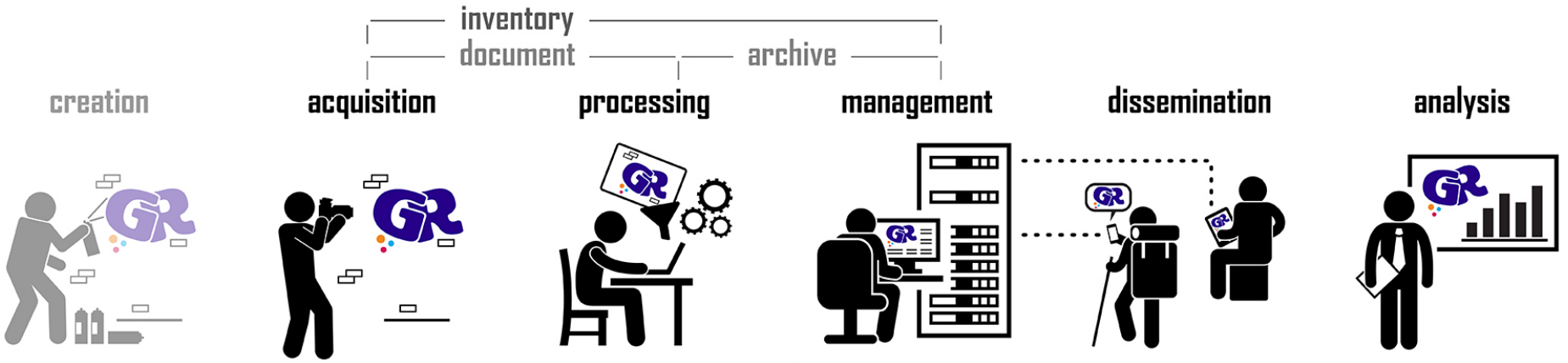
POTENTIAL questions

5 research pillars



POTENTIAL questions

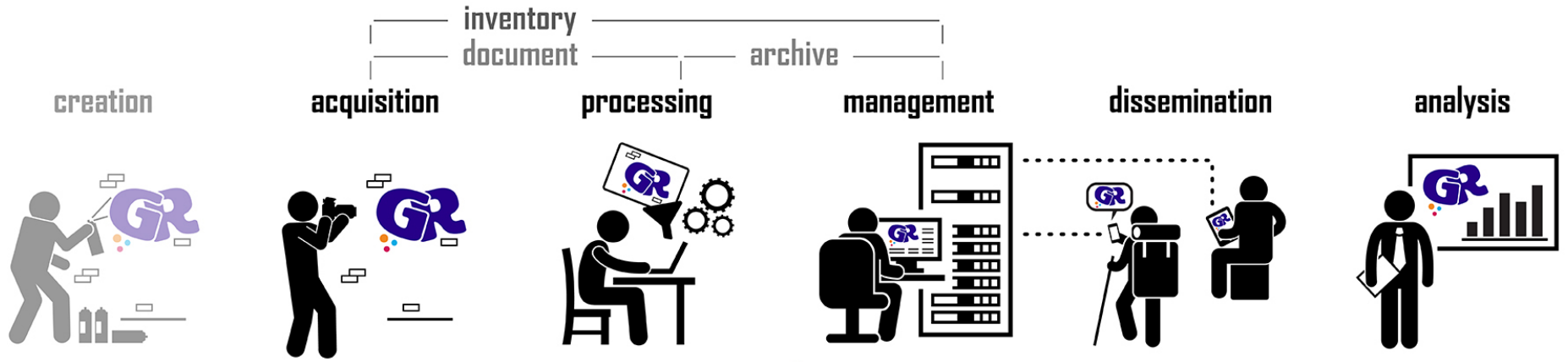
5 research pillars



When and where do political graffiti typically appear ?

POTENTIAL questions

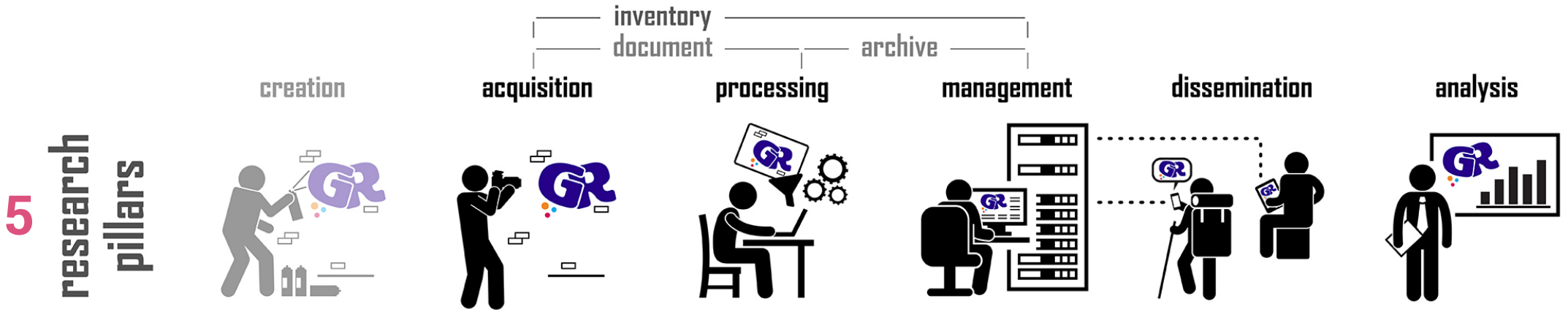
5 research pillars



When and where do political graffiti typically appear ?

What are the main styles and colours of those graffiti, and how long do they – on average – stay visible before they are (partly or entirely) covered ?

POTENTIAL questions



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What type of graffito commonly covers political messages ?

POTENTIAL questions

GRAFFITI *LOCATION*

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GRAFFITI *TEMPORALITY*

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GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

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GRAFFITI *TEMPORALITY*
GRAFFITI *TERMINOLOGY*
GRAFFITI *CHARACTERISATION*

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GRAFFITI archaeology

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GRAFFITI *TEMPORALITY*
GRAFFITI *TERMINOLOGY*
GRAFFITI *CHARACTERISATION*

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GRAFFITI archaeology

ARTEFACT

LOCATION
TEMPORALITY
TERMINOLOGY
CHARACTERISATION

When and where do political graffiti typically appear ?

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SOME results

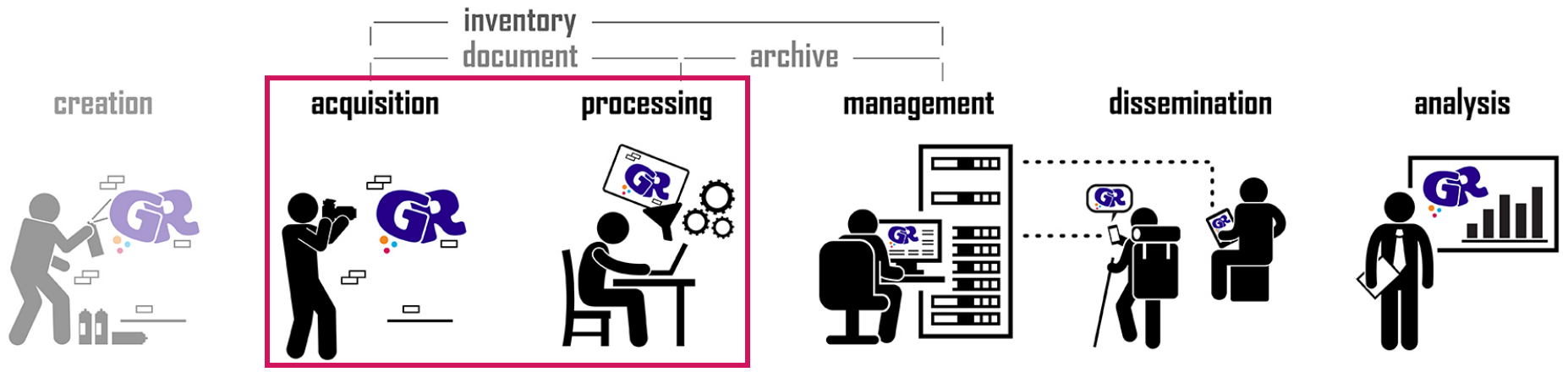
GRAFFITI *LOCATION*

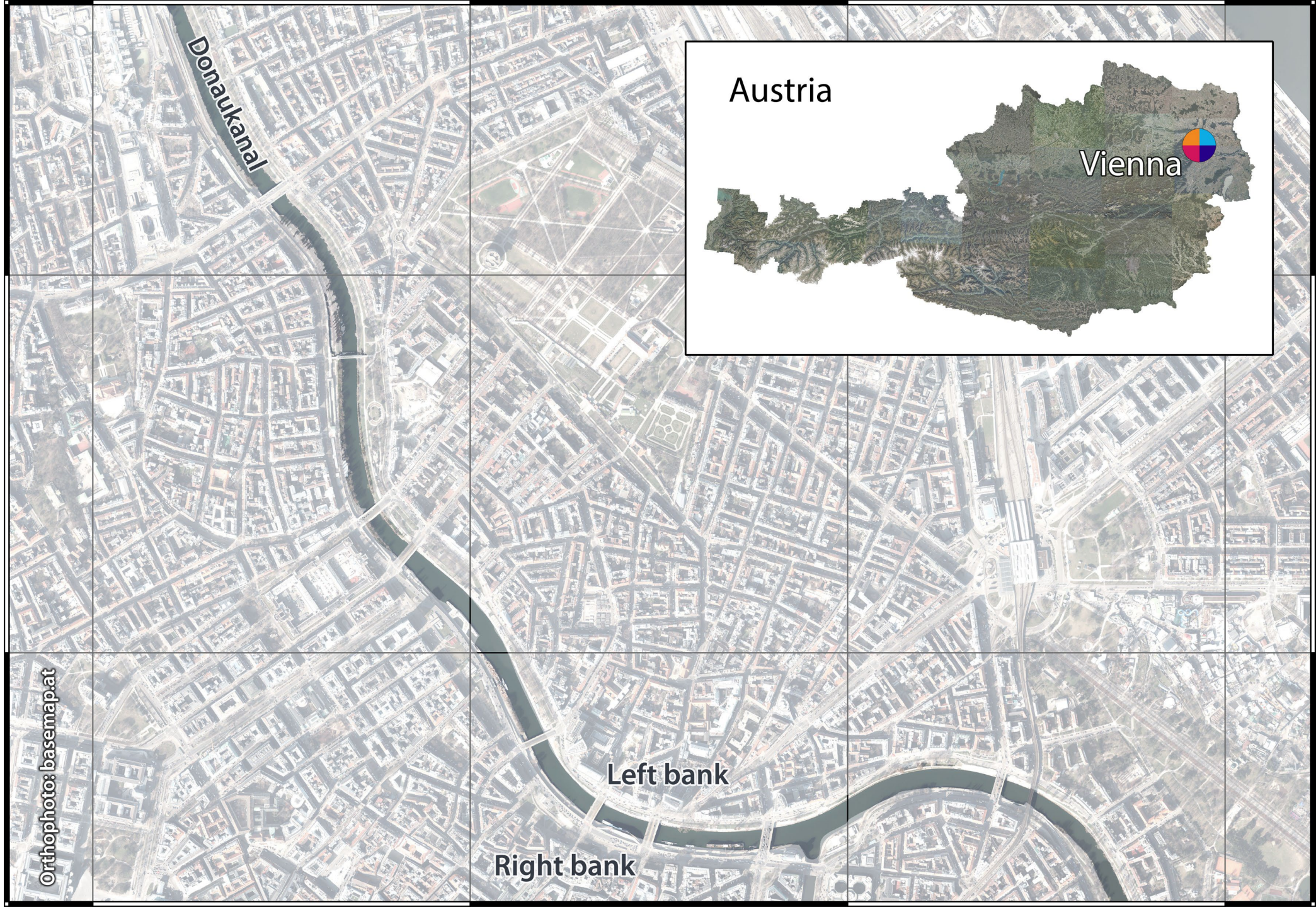
GRAFFITI *TEMPORALITY*

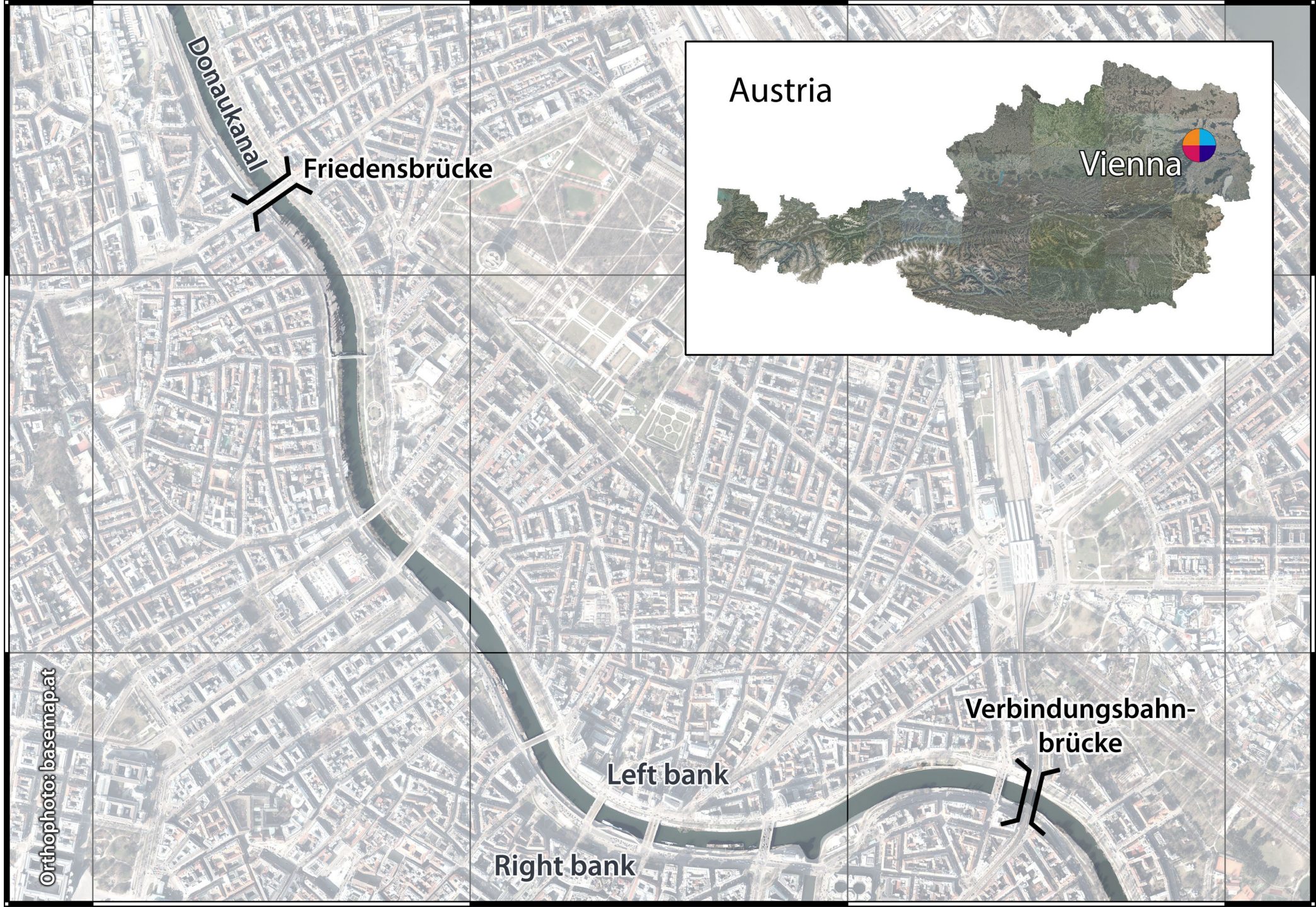
GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5 research pillars

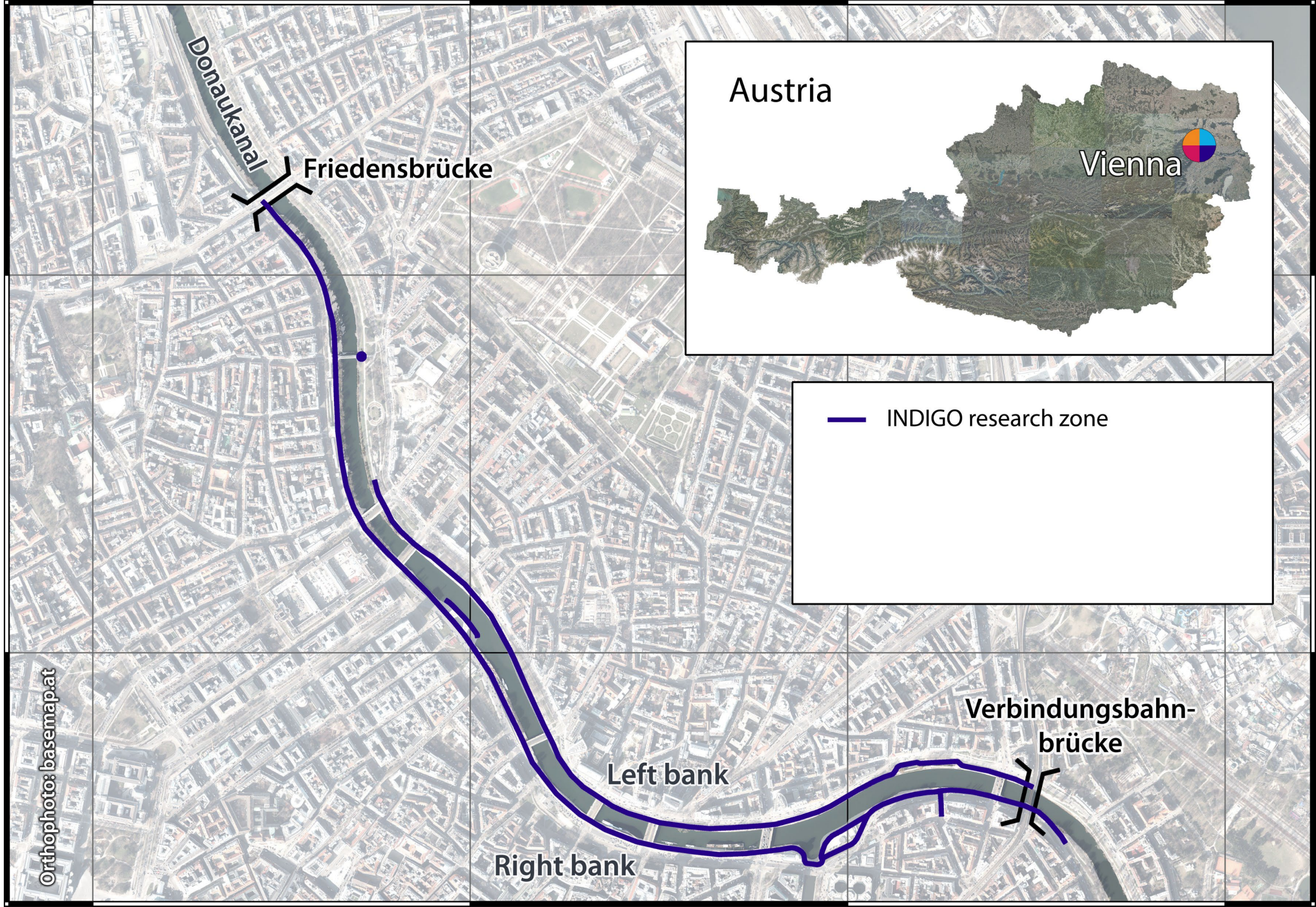



Donaukanal
Austria
Vienna
Left bank
Right bank
Orthophoto: basemap.at


Donaukanal
Friedensbrücke
Austria
Vienna
Orthophoto: basemap.at
Left bank
Right bank
Verbindungsbahn-
brücke

STRETCH

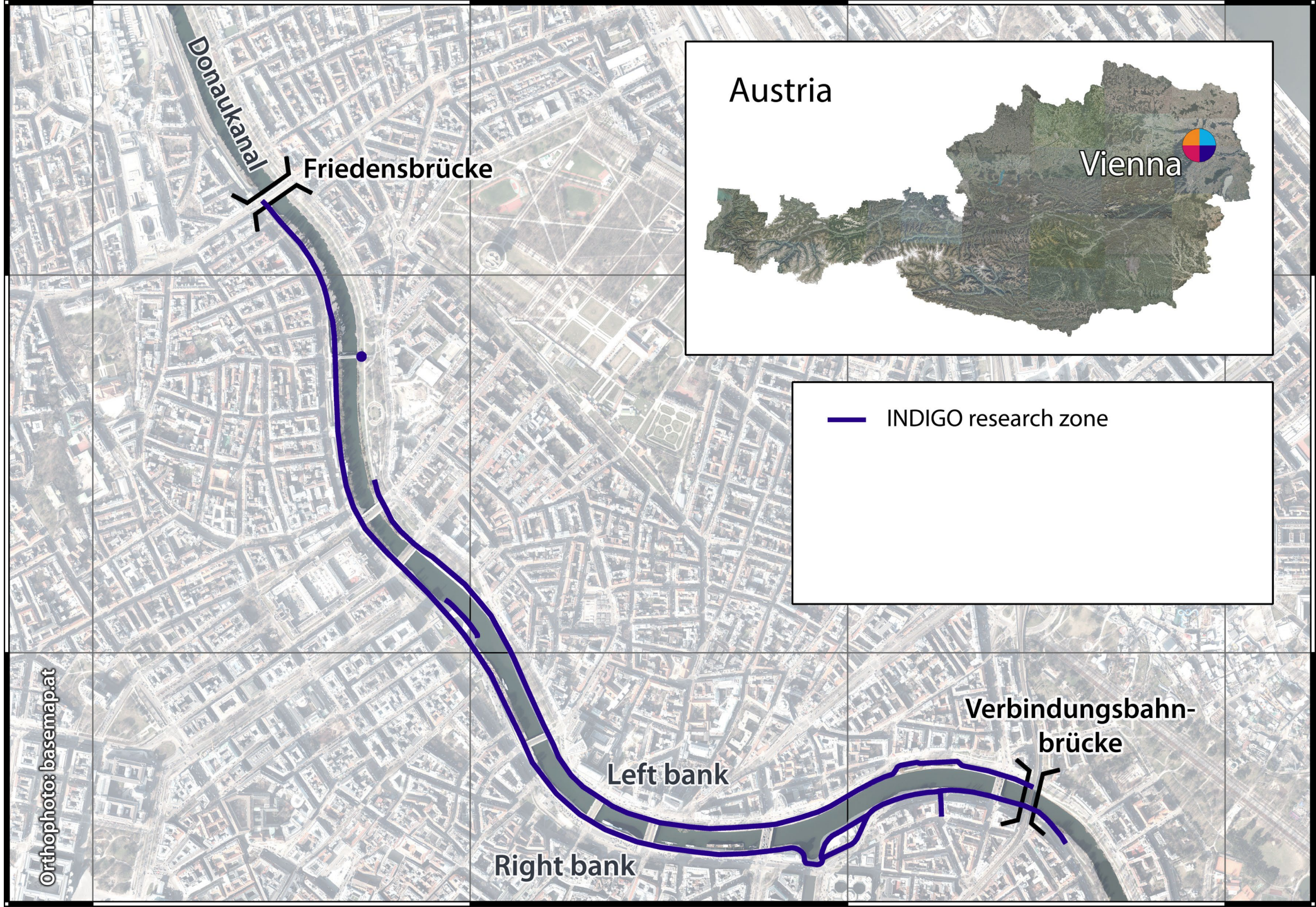
3.3 km



STRETCH

3.3 km

LEFT **RIGHT**



STRETCH

3.3 km

LEFT **RIGHT**



STRETCH

3.3 km

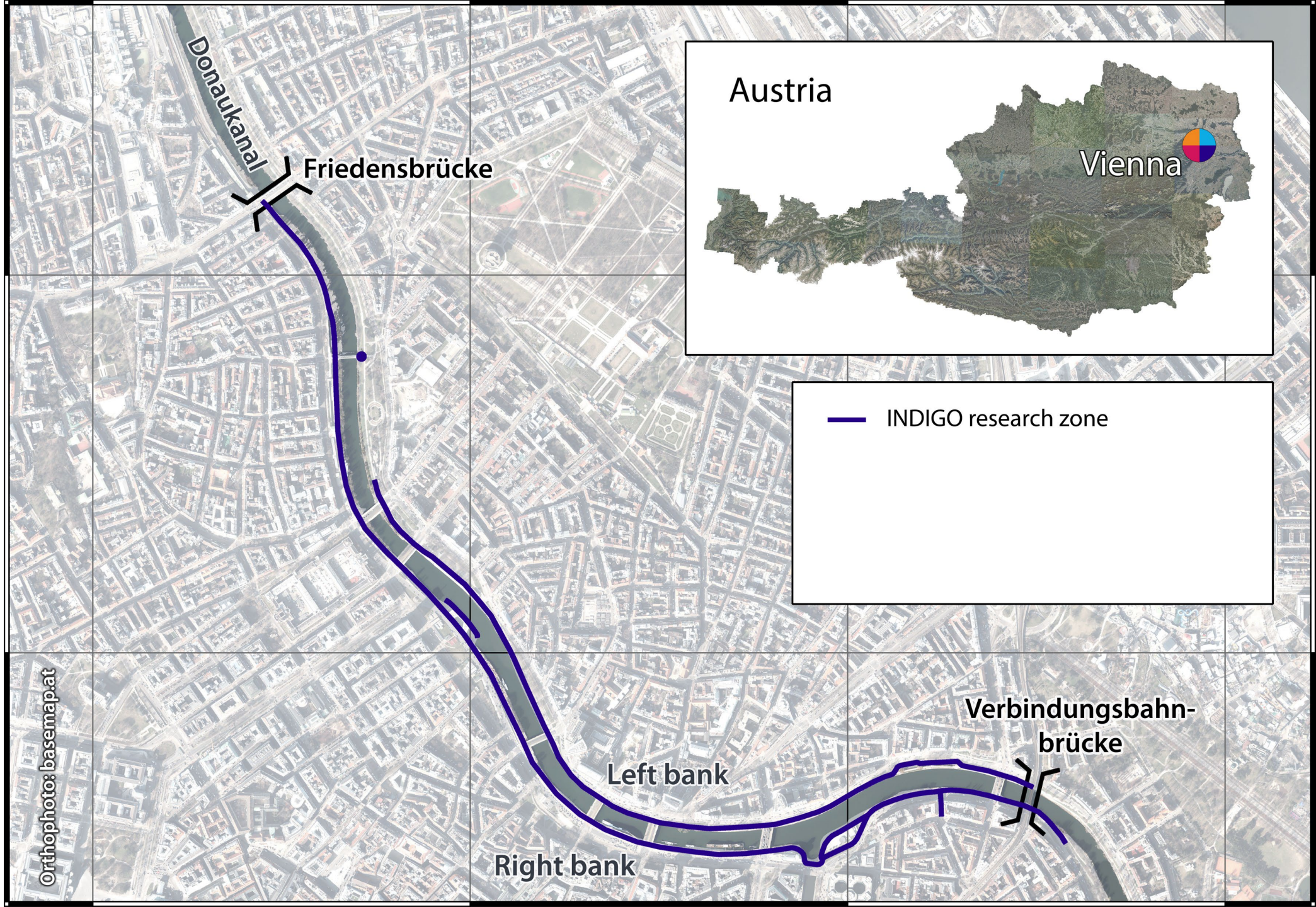
LEFT	RIGHT
UP	UP
DOWN	DOWN



STRETCH

3.3 km

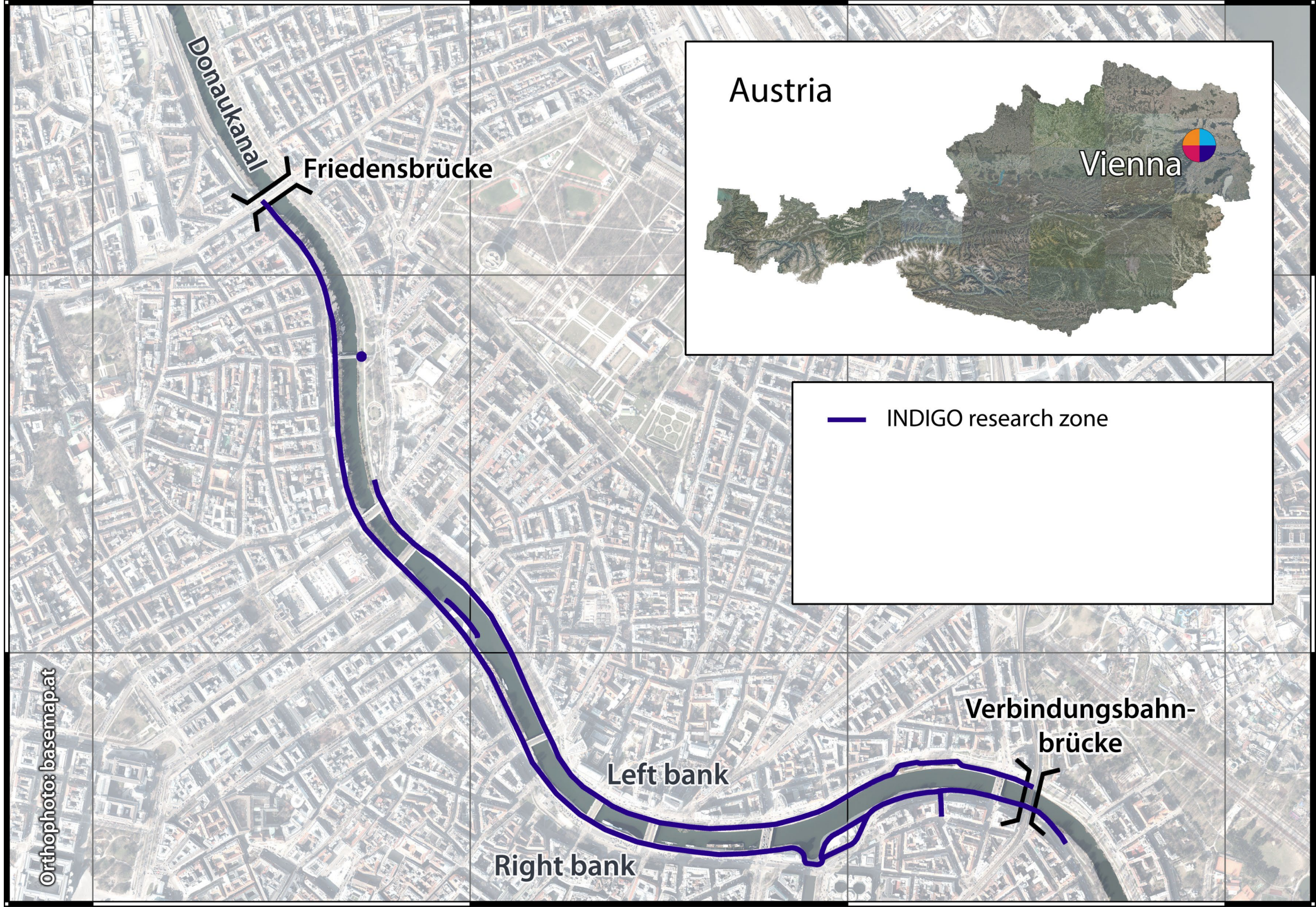
LEFT	RIGHT
UP	UP
3.2 km	5.3 km
DOWN	DOWN



STRETCH

3.3 km

LEFT	RIGHT
UP	UP
3.2 km	5.3 km
DOWN	DOWN
2.1 km	2.3 km



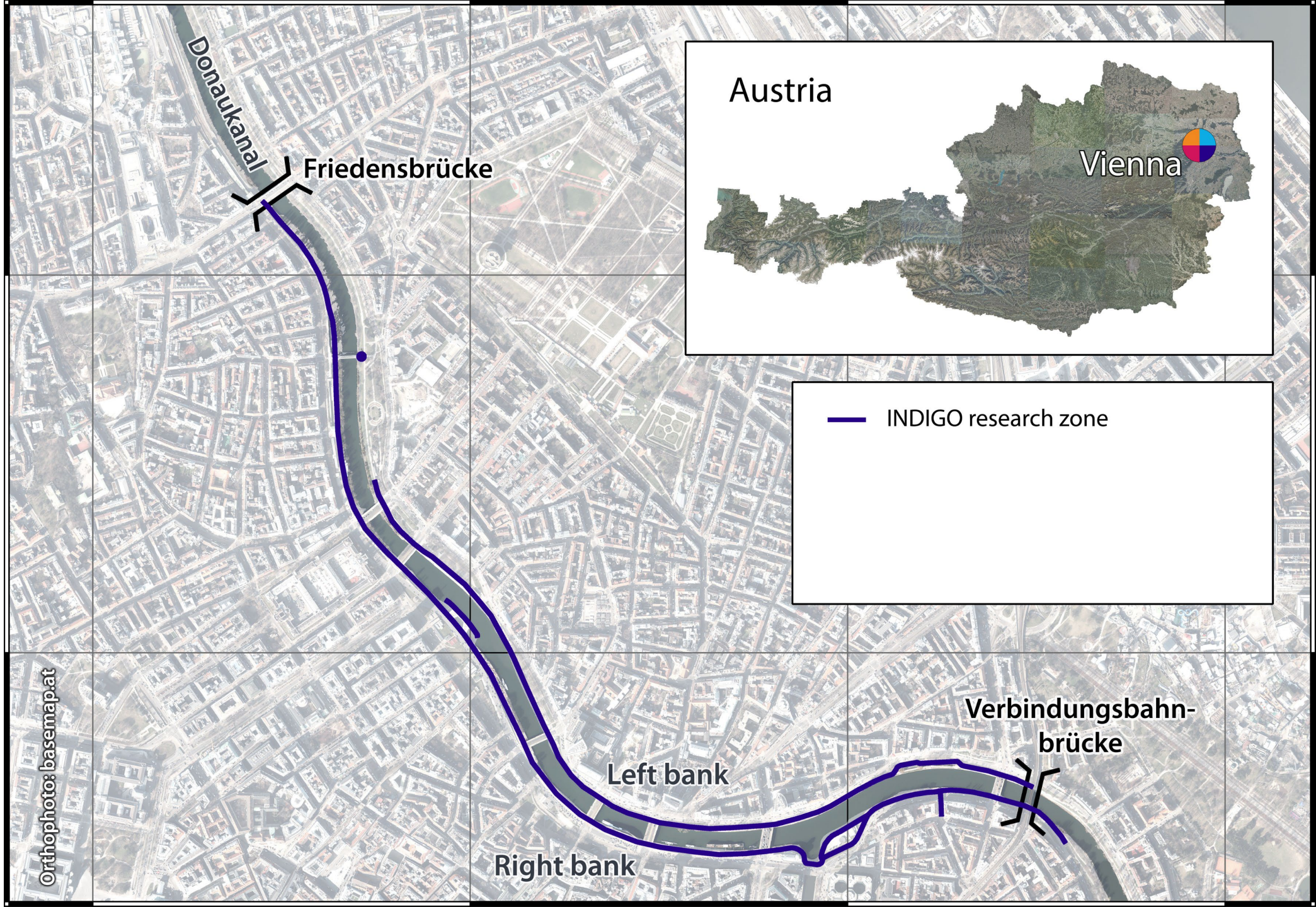
STRETCH

3.3 km

LEFT	RIGHT
UP	UP
3.2 km	5.3 km
DOWN	DOWN
2.1 km	2.3 km

MONITORED SURFACES

12.9 km

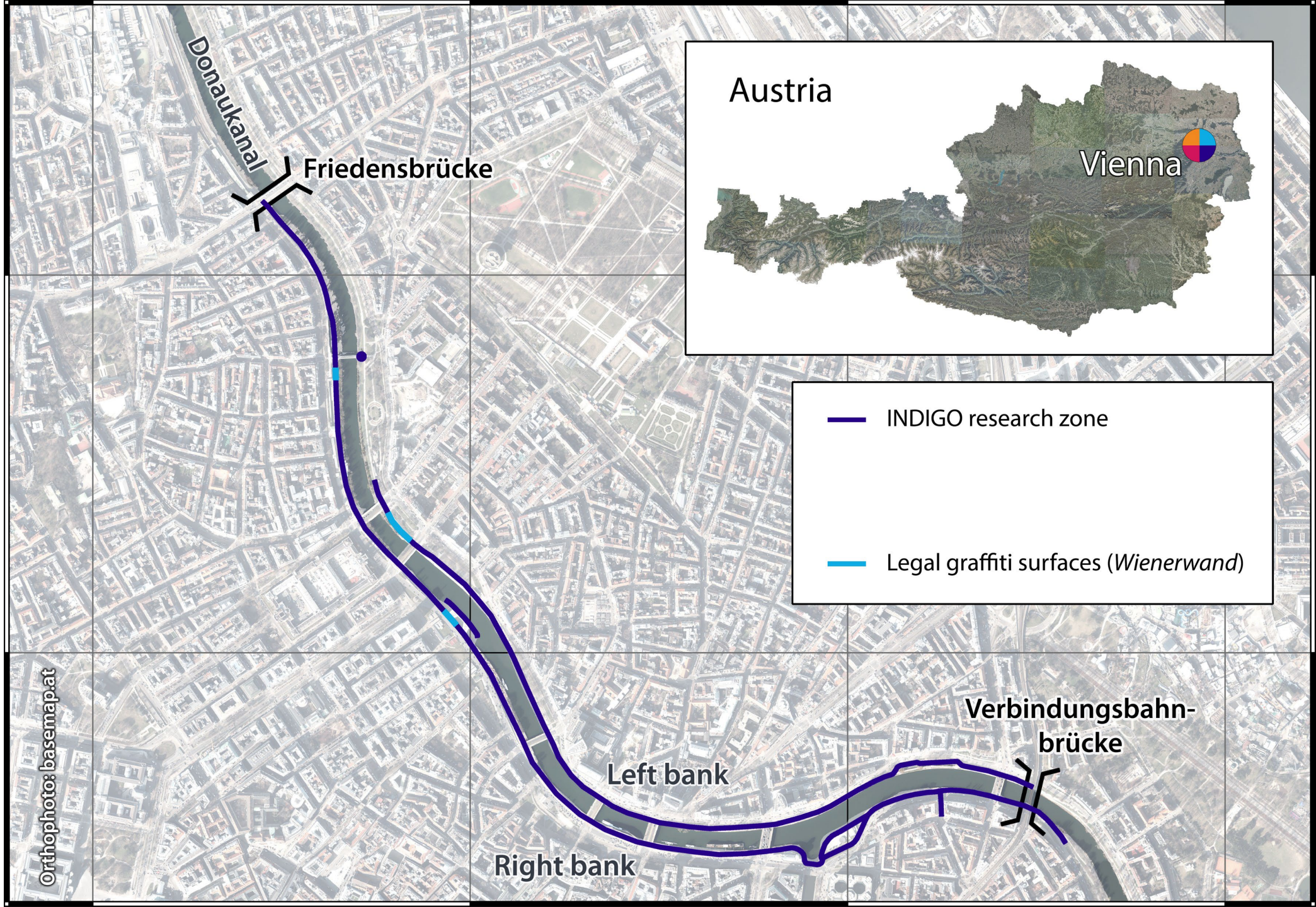


LEGAL SURFACES

0.3 km

MONITORED SURFACES

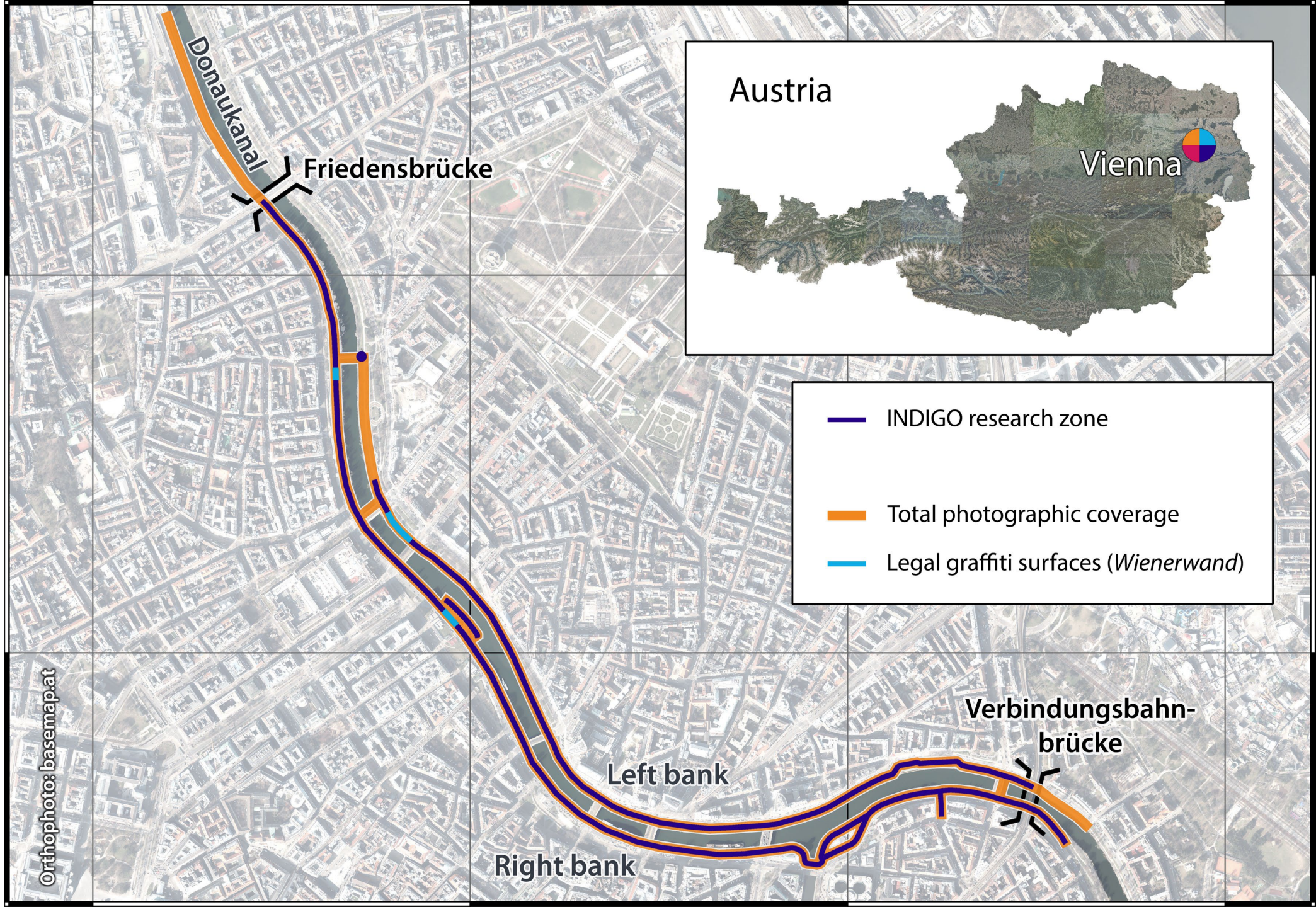
12.9 km



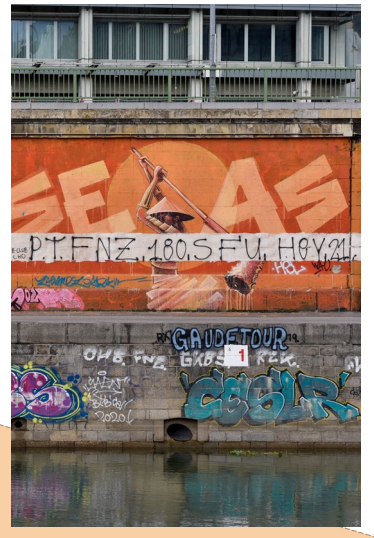
TOTAL COVERAGE
14.0 km

LEGAL SURFACES
0.3 km

MONITORED SURFACES
12.9 km



TOTAL coverage



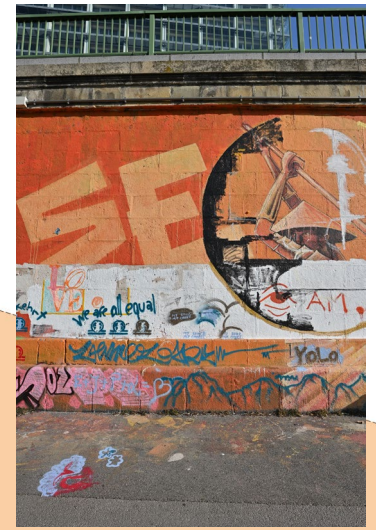
Date	Camera	Lens	Mean GSD	Acquisition time	Image count
30/09/2021	Nikon D750 (24.2 MP p = 5.95 µm)	Nikon AF-S NIKKOR 85mm 1:1.8 G @ f/5.6	3.6 mm	3 h 45 min	2065
01/10/2021				3 h 20 min	2544

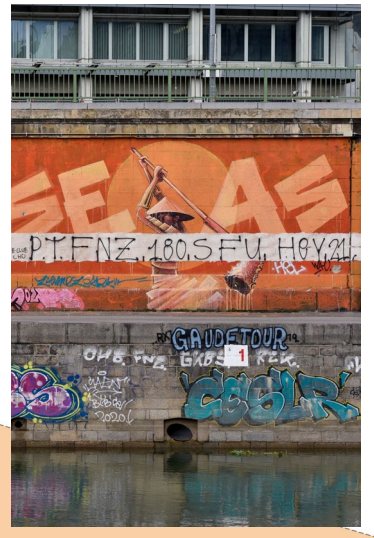
TOTAL coverage



Date	Camera	Lens	Mean GSD	Acquisition time	Image count
26/10/2021	Nikon Z 7II (45.4 MP p = 4.33 µm)	Nikon NIKKOR Z 20mm f/1.8 S @ f/5.6	0.9 mm	7 h	6042
27/10/2021				7 h 45 min	6591
28/10/2021				3 h 40 min	2856
29/10/2021				7 h	6608

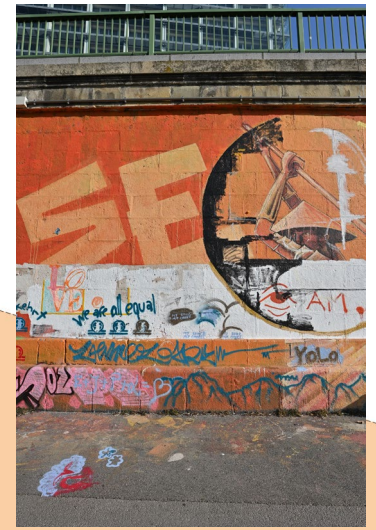
TOTAL coverage

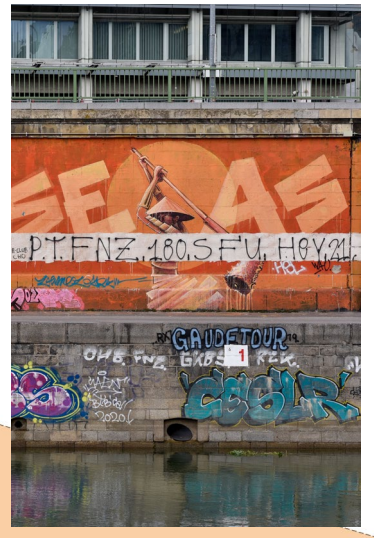




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TOTAL coverage





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processing

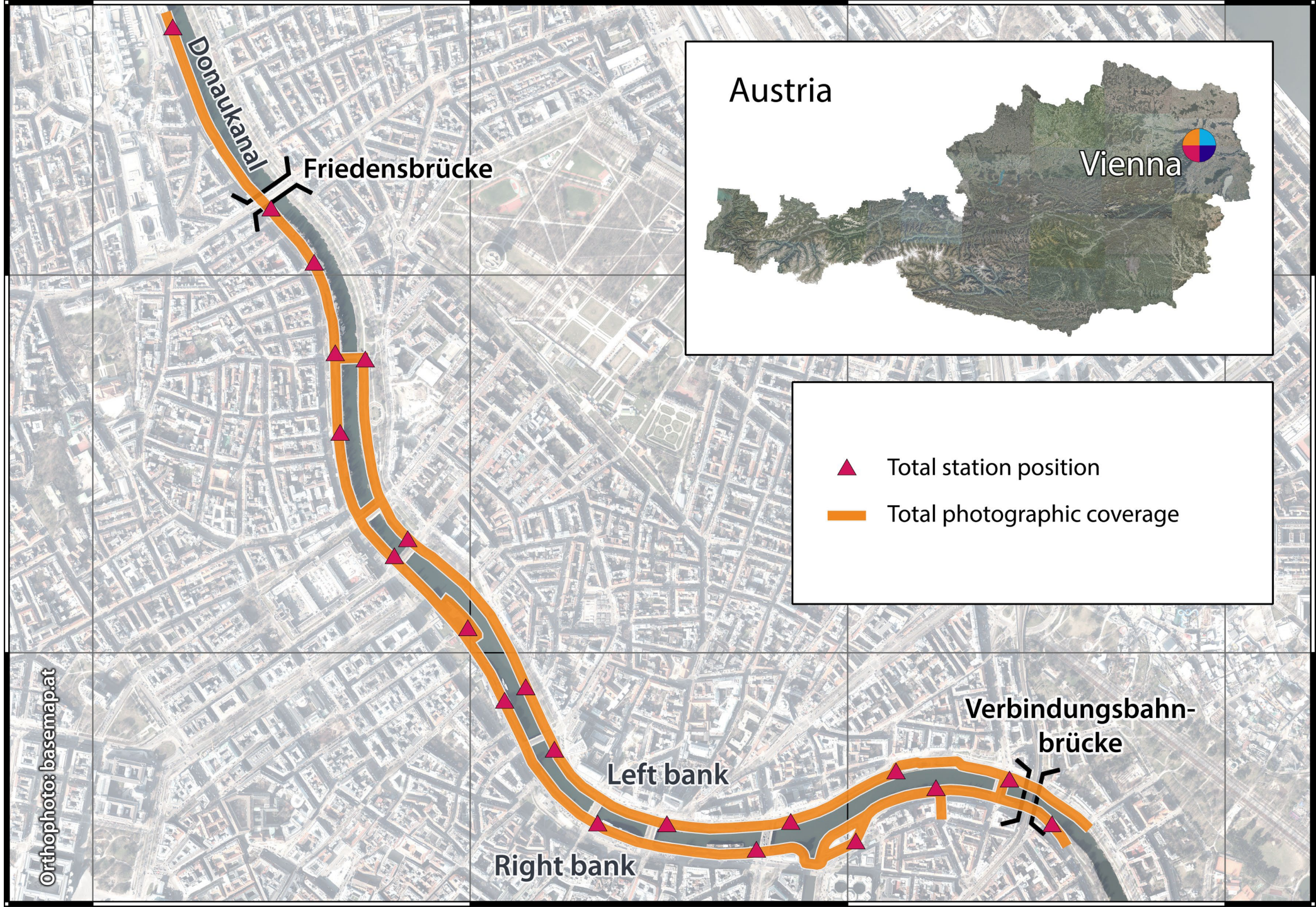


TOTAL COVERAGE

14.0 km

TOTAL STATION POSITIONS

21



TOTAL COVERAGE

14.0 km

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21



TOTAL COVERAGE

14.0 km

TOTAL STATION POSITIONS

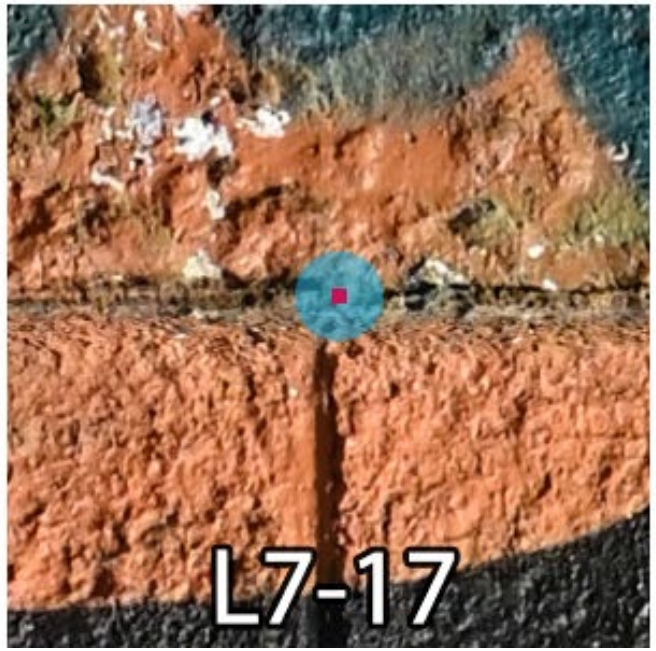
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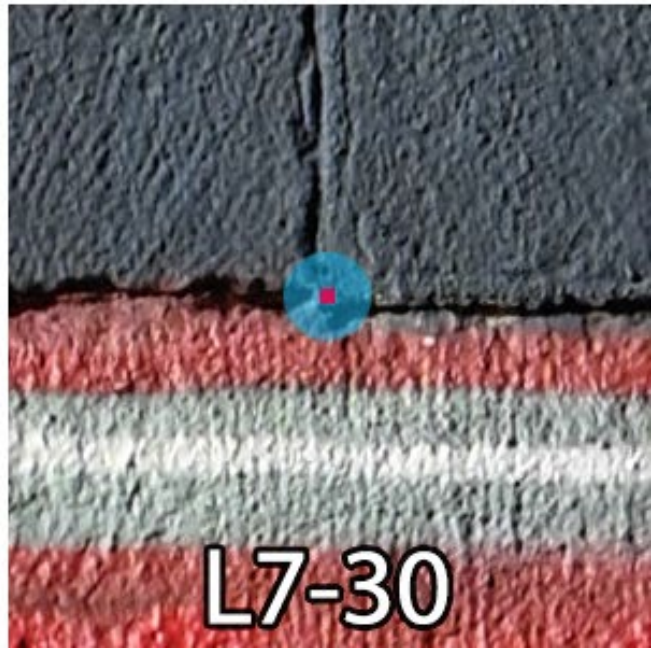
GRAFFITI-SCAPE POINTS

624



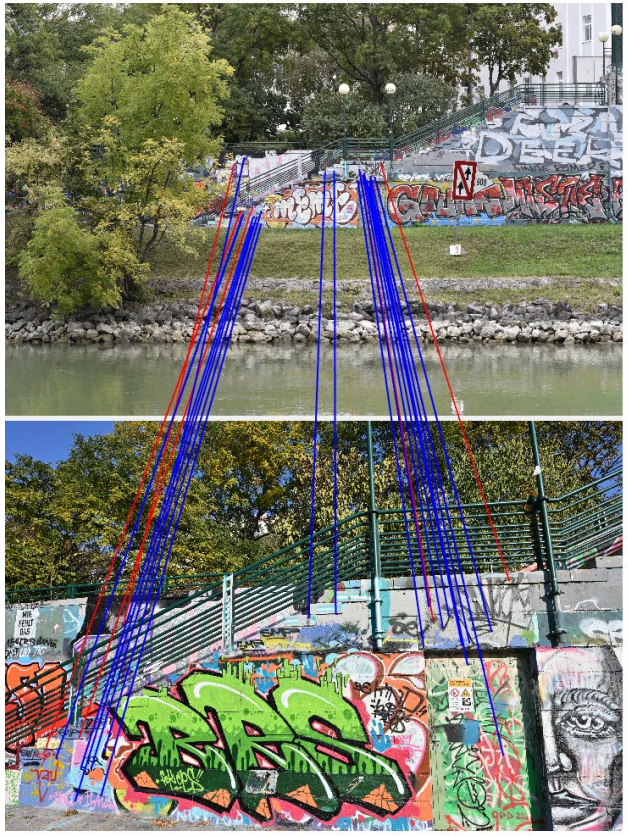




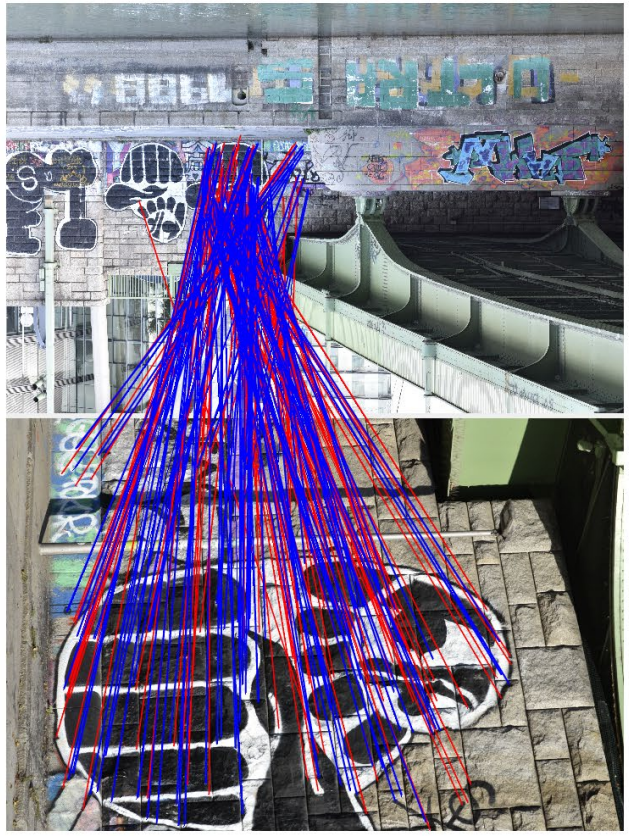


POSITION all images

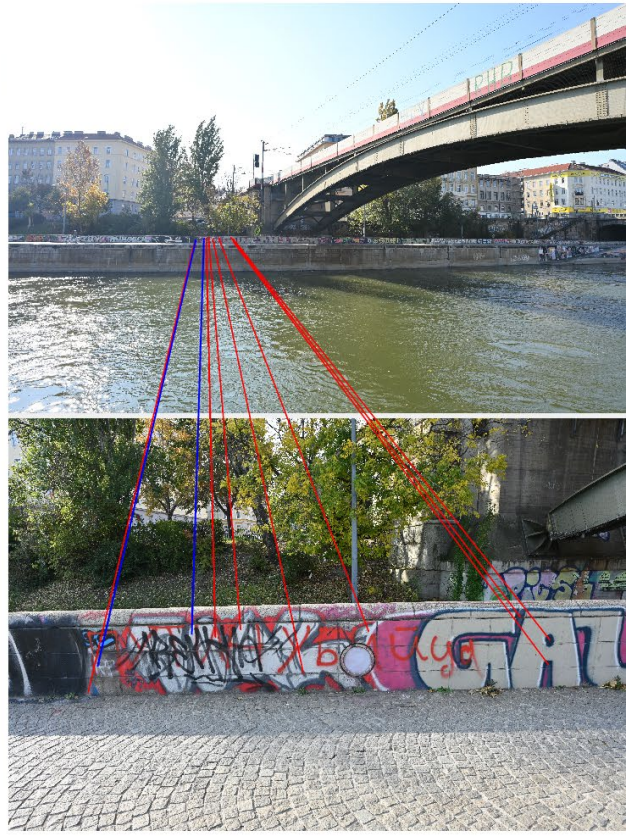
Nikon D750 + 85 mm
30-09-2021



Nikon D750 + 85 mm
30-09-2021



Nikon Z7 II + 20 mm
28-10-2021

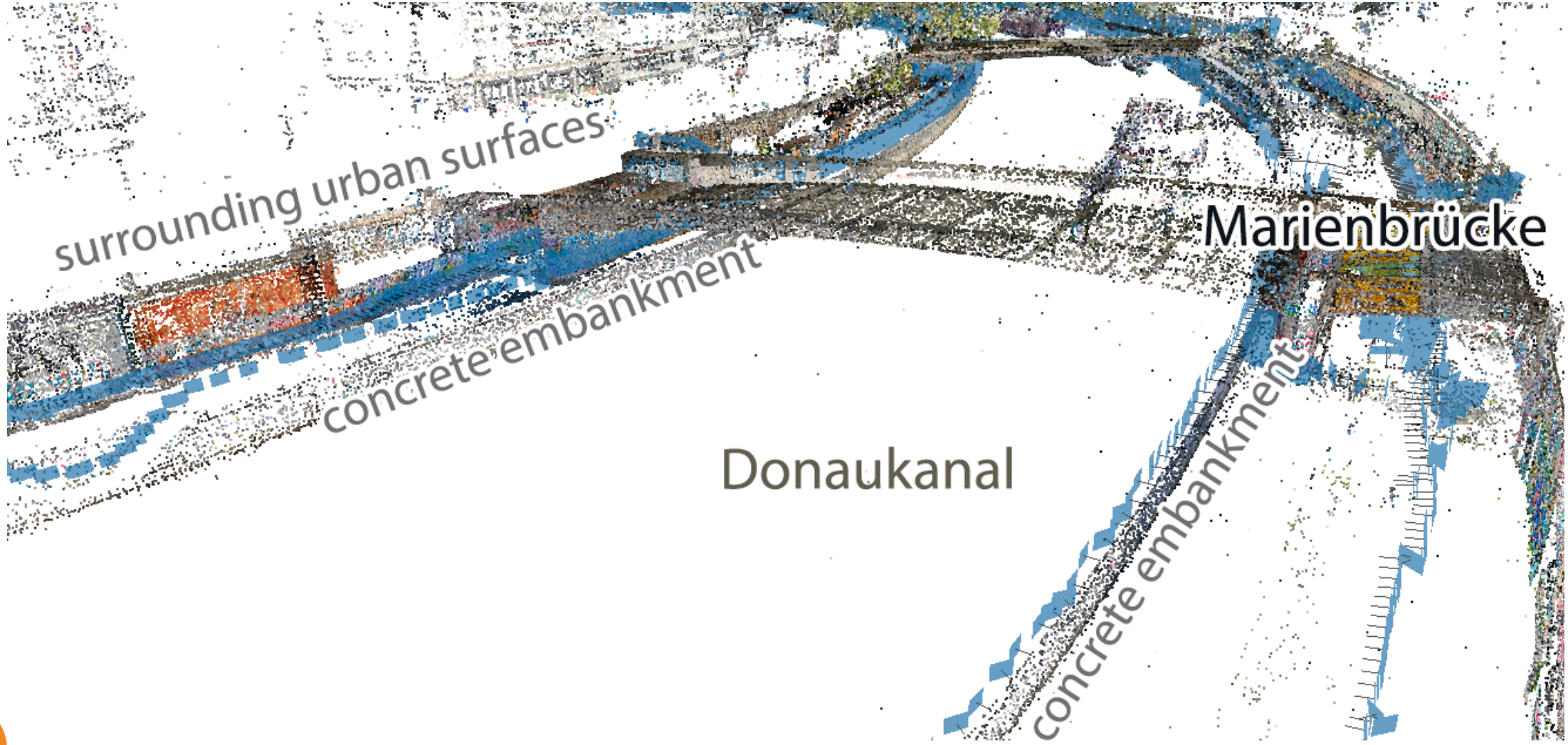


Nikon Z7 II + 20 mm
29-10-2021

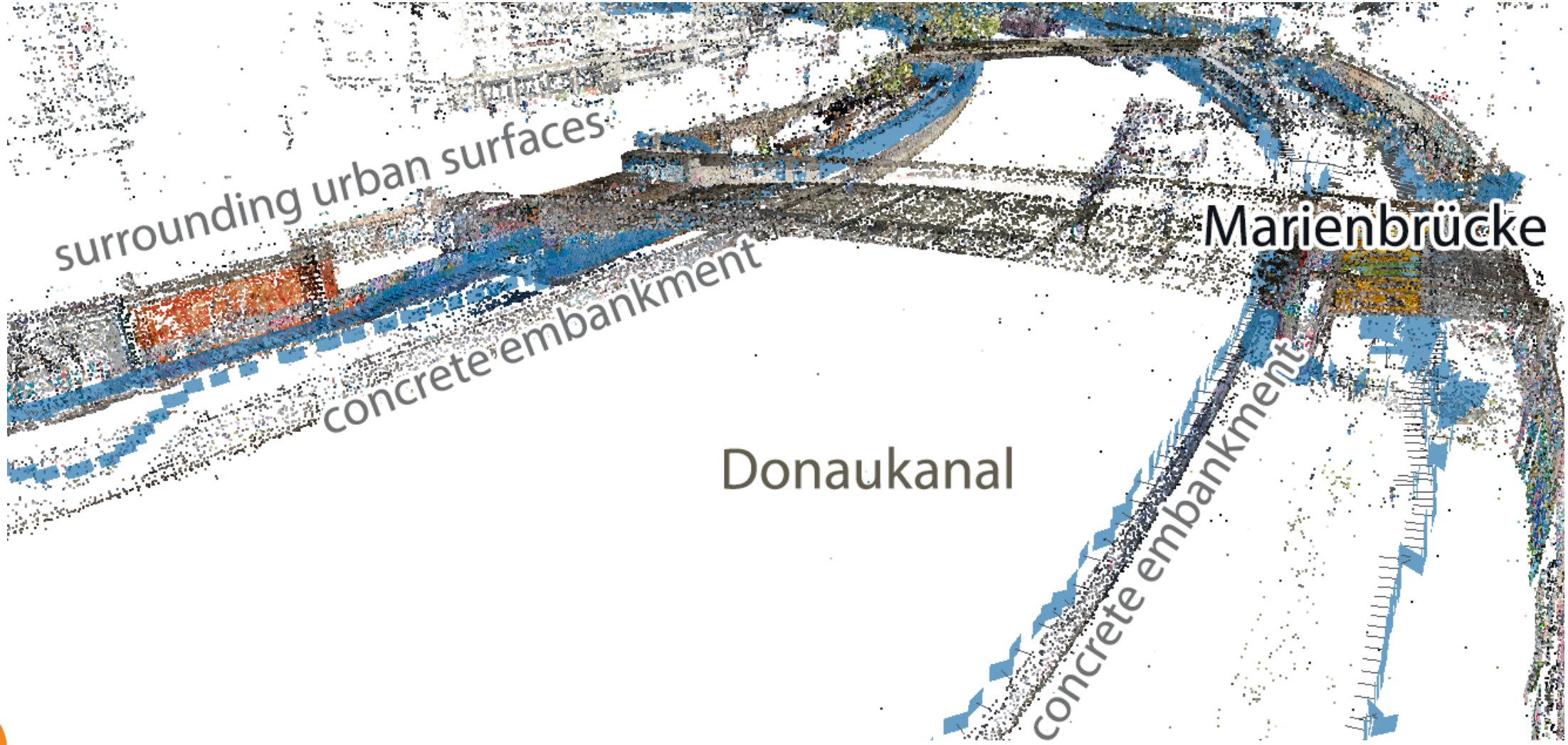
Nikon D750 + 85 mm
01-10-2021

Nikon Z7 II + 20 mm
26-10-2021

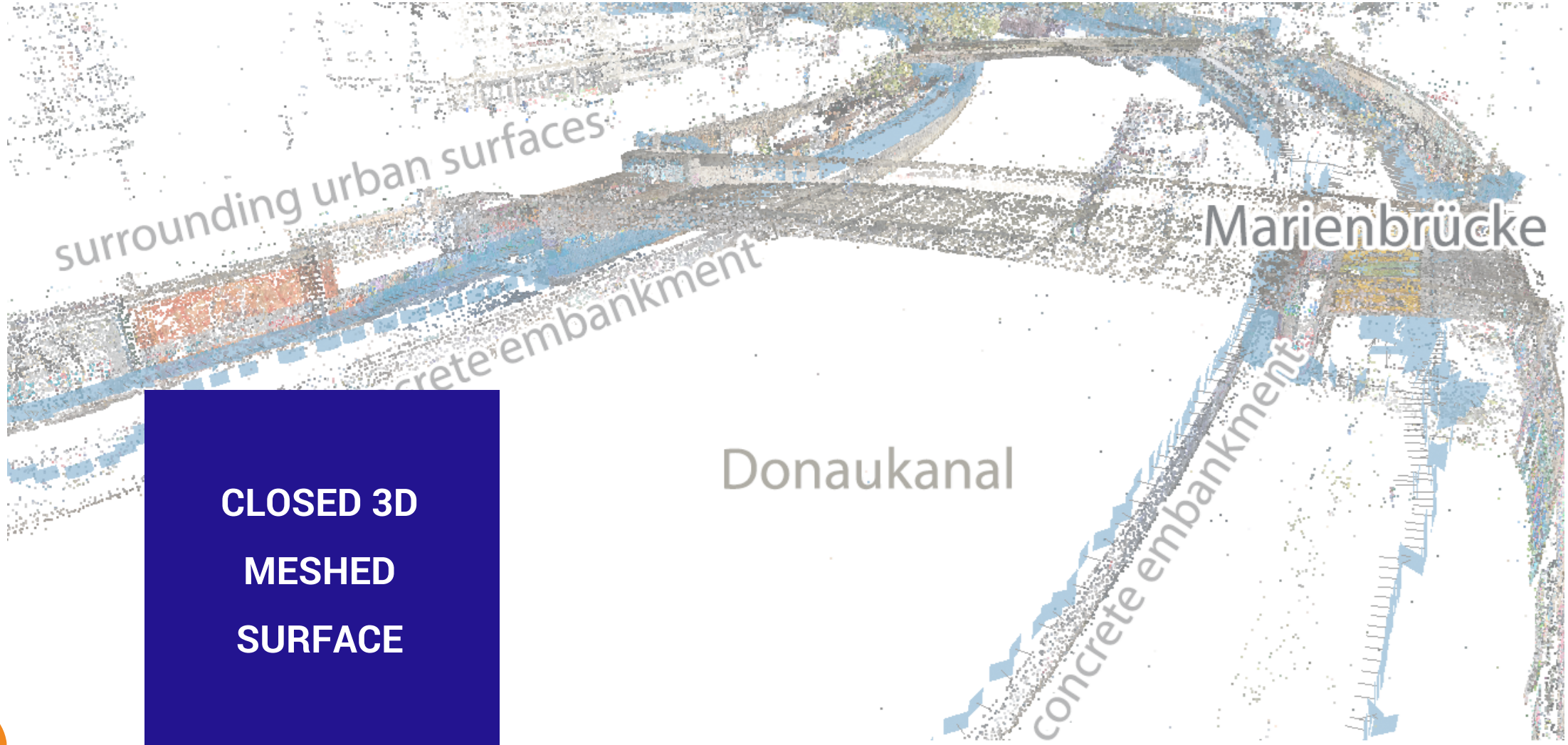
POSITION all images



THREE purposes

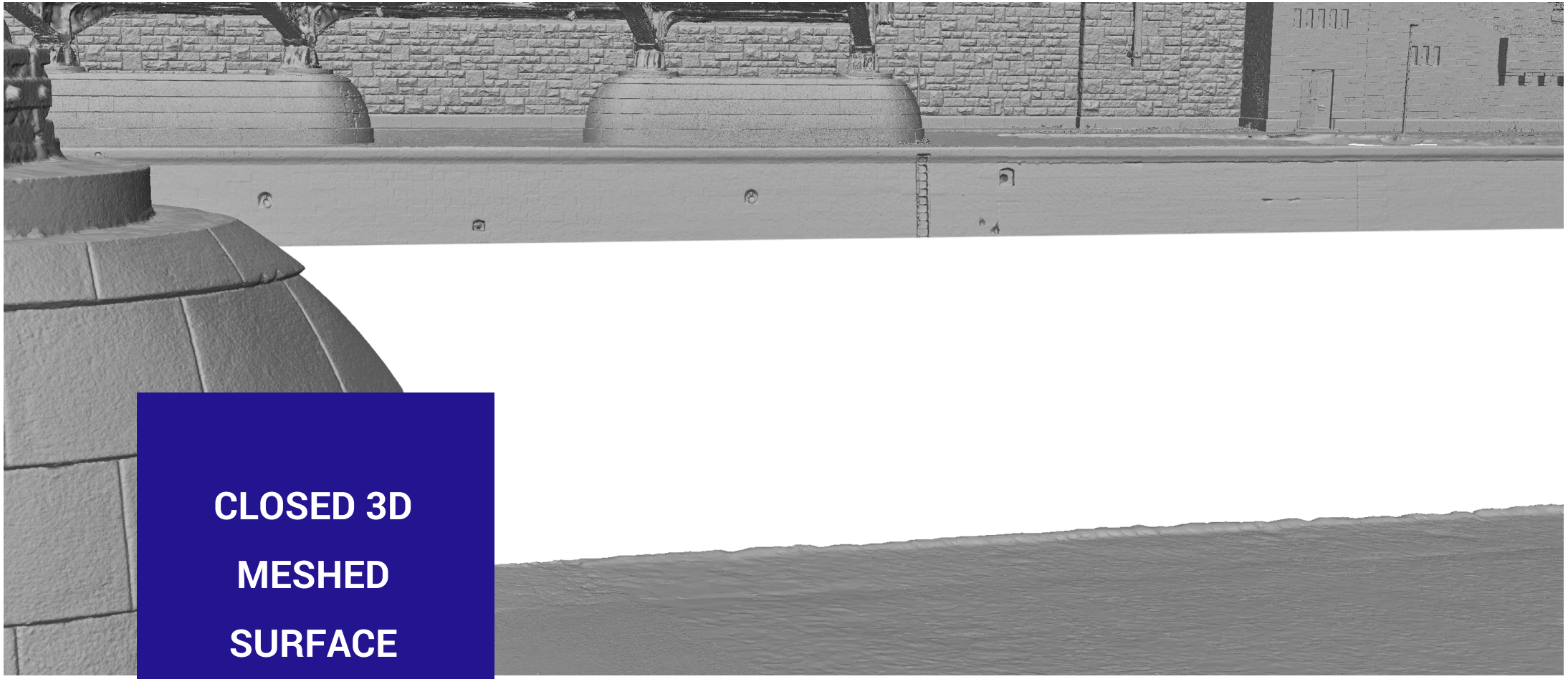


THREE purposes



CLOSED 3D MESHED SURFACE

THREE purposes

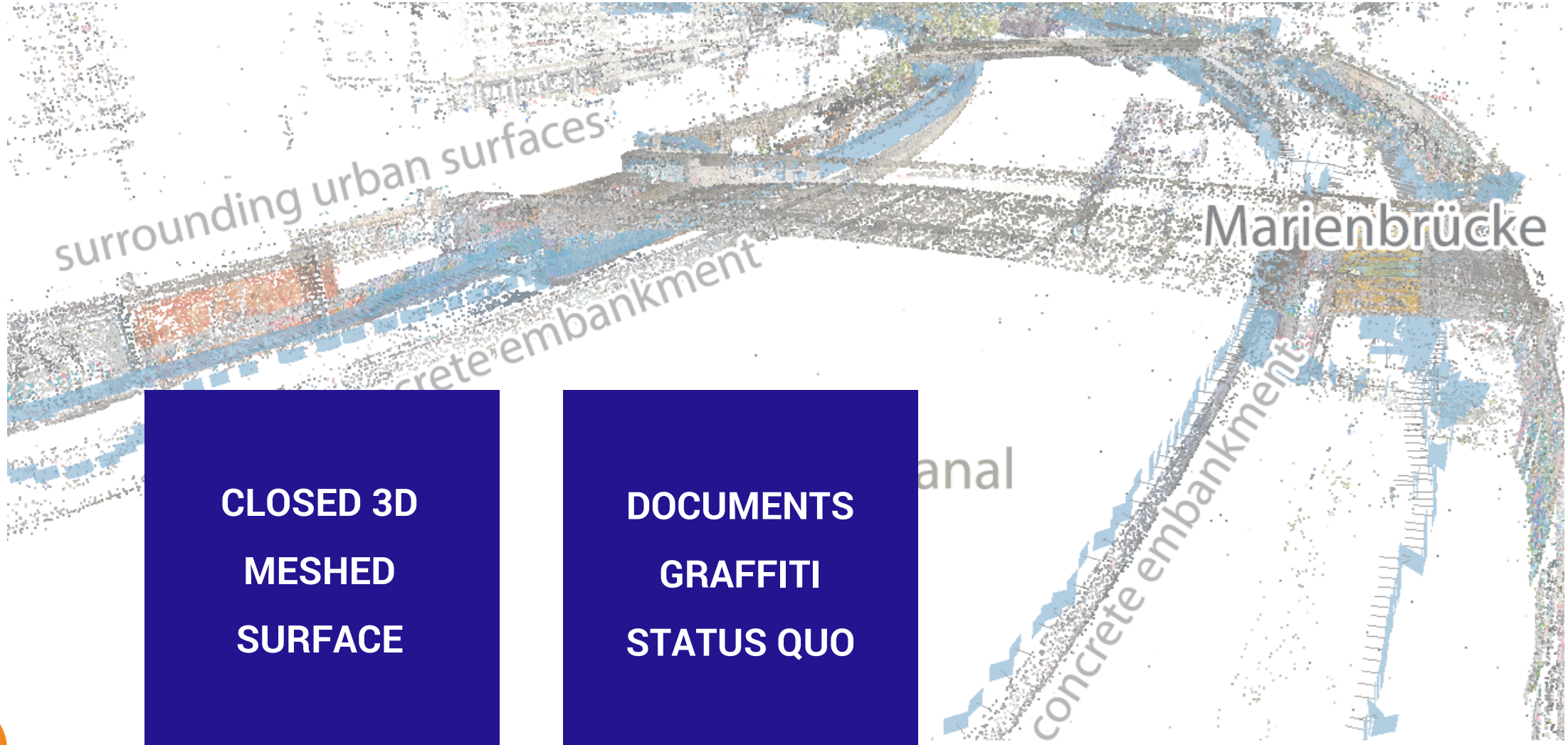


CLOSED 3D

MESHED

SURFACE

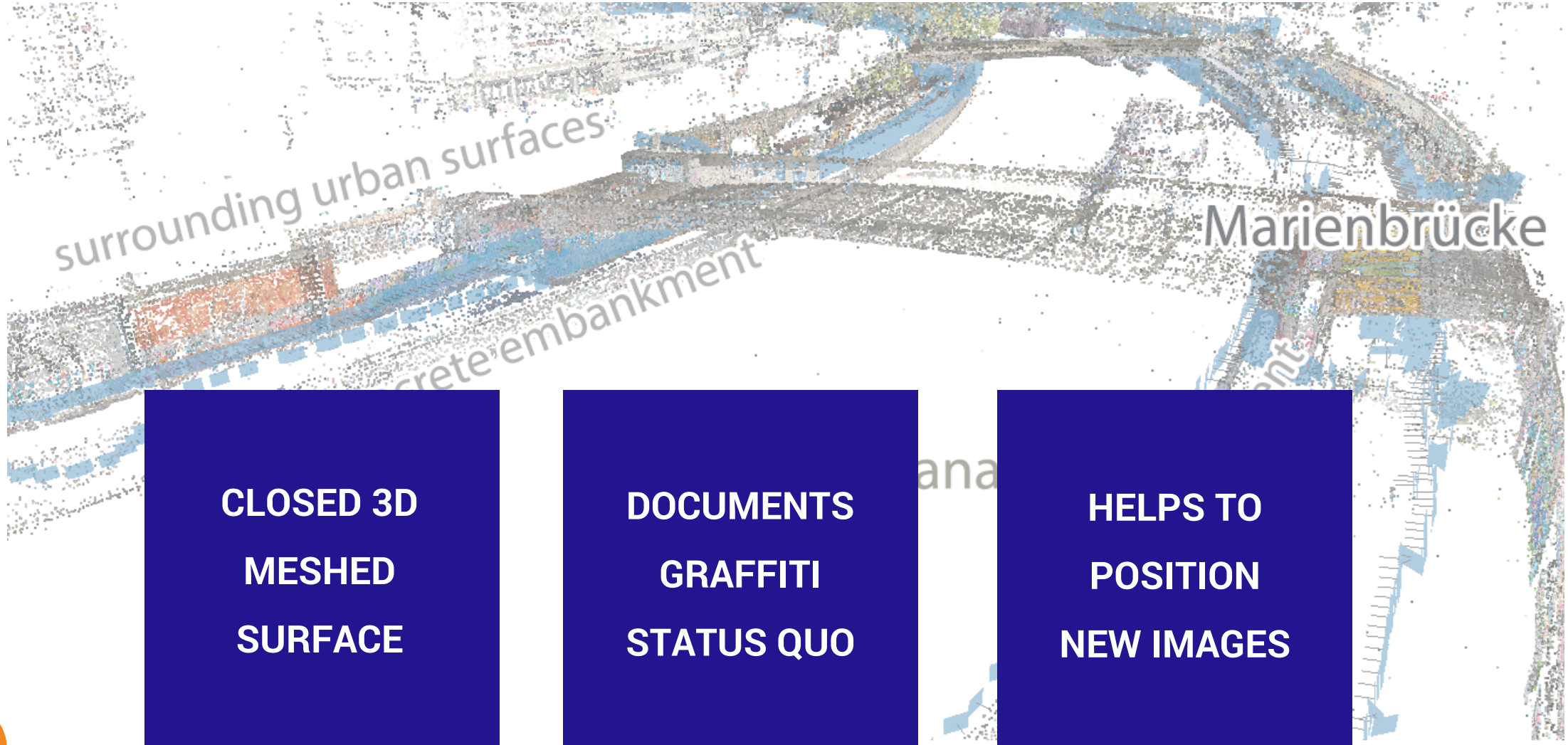
THREE purposes



CLOSED 3D MESHED SURFACE

DOCUMENTS GRAFFITI STATUS QUO

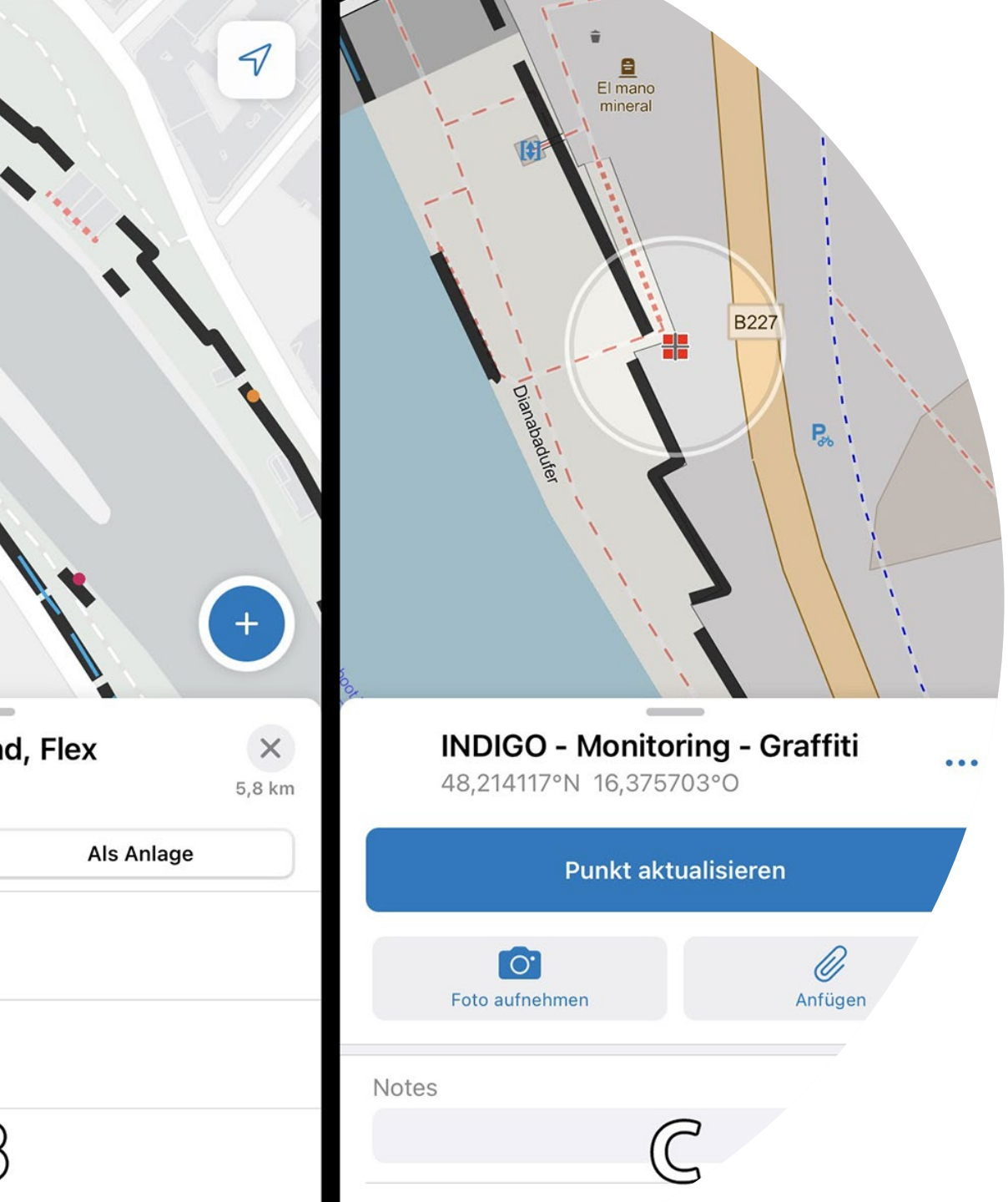
THREE purposes



CLOSED 3D MESHED SURFACE

DOCUMENTS GRAFFITI STATUS QUO

HELPS TO POSITION NEW IMAGES



FOLLOW-UP
photography

Instagram + monitoring app



FOLLOW-UP
photography

Instagram + monitoring app

2 photographers



FOLLOW-UP
photography

Instagram + monitoring app

2 photographers

2 cameras + 2 spectrometers + 2 tablets

identically programmed



FOLLOW-UP
photography

Instagram + monitoring app

2 photographers

2 cameras + 2 spectrometers + 2 tablets

identically programmed

fixed acquisition procedure

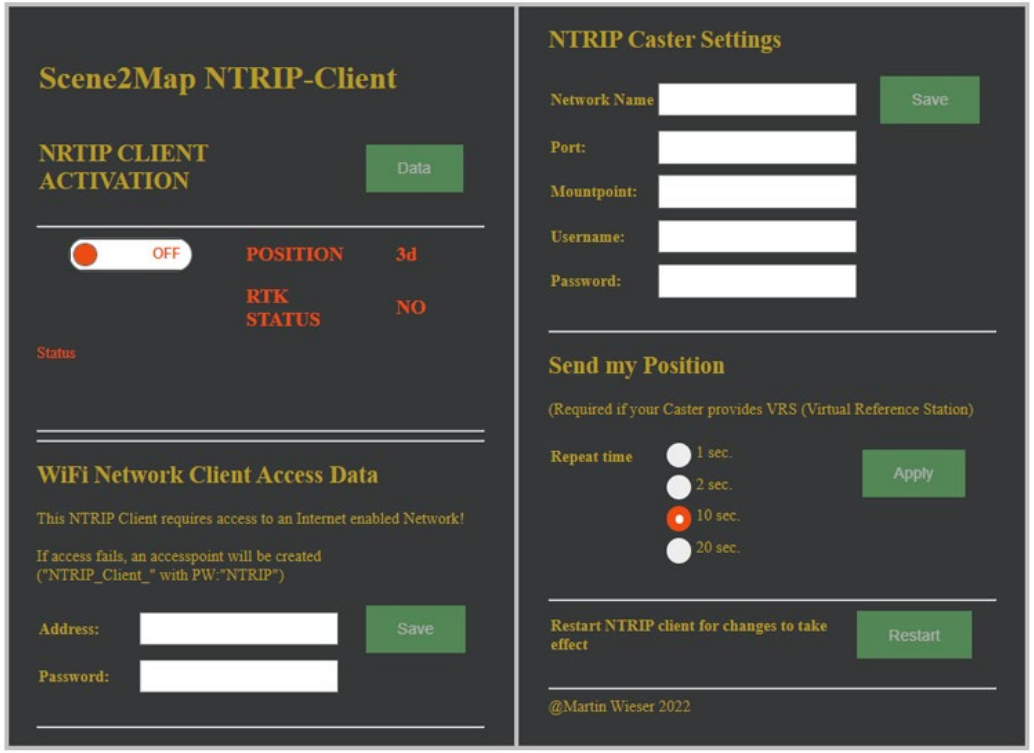
ACCURATE positioning





ACCURATE positioning





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Code Issues Pull requests Actions Projects Security Insights

main 1 branch 0 tags Go to file Code

bewild96 Update README.md	75d27bb 15 days ago	24 commits
Heritage_ClassificationResults	Add files via upload	2 months ago
images	Add files via upload	last month
src	Add files via upload	2 months ago
LICENSE	Initial commit	2 months ago
README.md	Update README.md	15 days ago

README.md

Short Description

AUTOGRAF (**AUT**omated **O**rthorectification of **GRAF**fiti photos) is an open-source python-based Metashape add-on which enables the automated orthorectification of graffiti photos at a specific site of interest. It employs state-of-the art photogrammetric computer vision techniques to allow highly accurate georeferencing and orthorectification of large numbers of photographs. A paper detailing AUTOGRAF's methodology will soon be submitted to Heritage (an MDPI journal).

AUTOGRAF is developed as part of the INDIGO project (In-ventory and DI-sseminate G-raffiti along the d-O-naukanal) carried out by the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology in close collaboration with the GEO Department of TU Wien University.

How to set up AUTOGRAF

Before AUTOGRAF can be used, the following preparatory steps [1-3] need to be performed:

1 - Install Agisoft's Metashape

About

AUTomatic Orthorectification of GRAFfiti photos

photographs graffiti orthorectification

Readme
GPL-3.0 license
6 stars
1 watching
0 forks

Releases

No releases published

Packages

No packages published

Contributors 2

bewild96
BeyondConventionalBoundaries Geert ...

Languages

Python 100.0%

AUTOGRAF

position-accurate pixels

IMAGE positioning

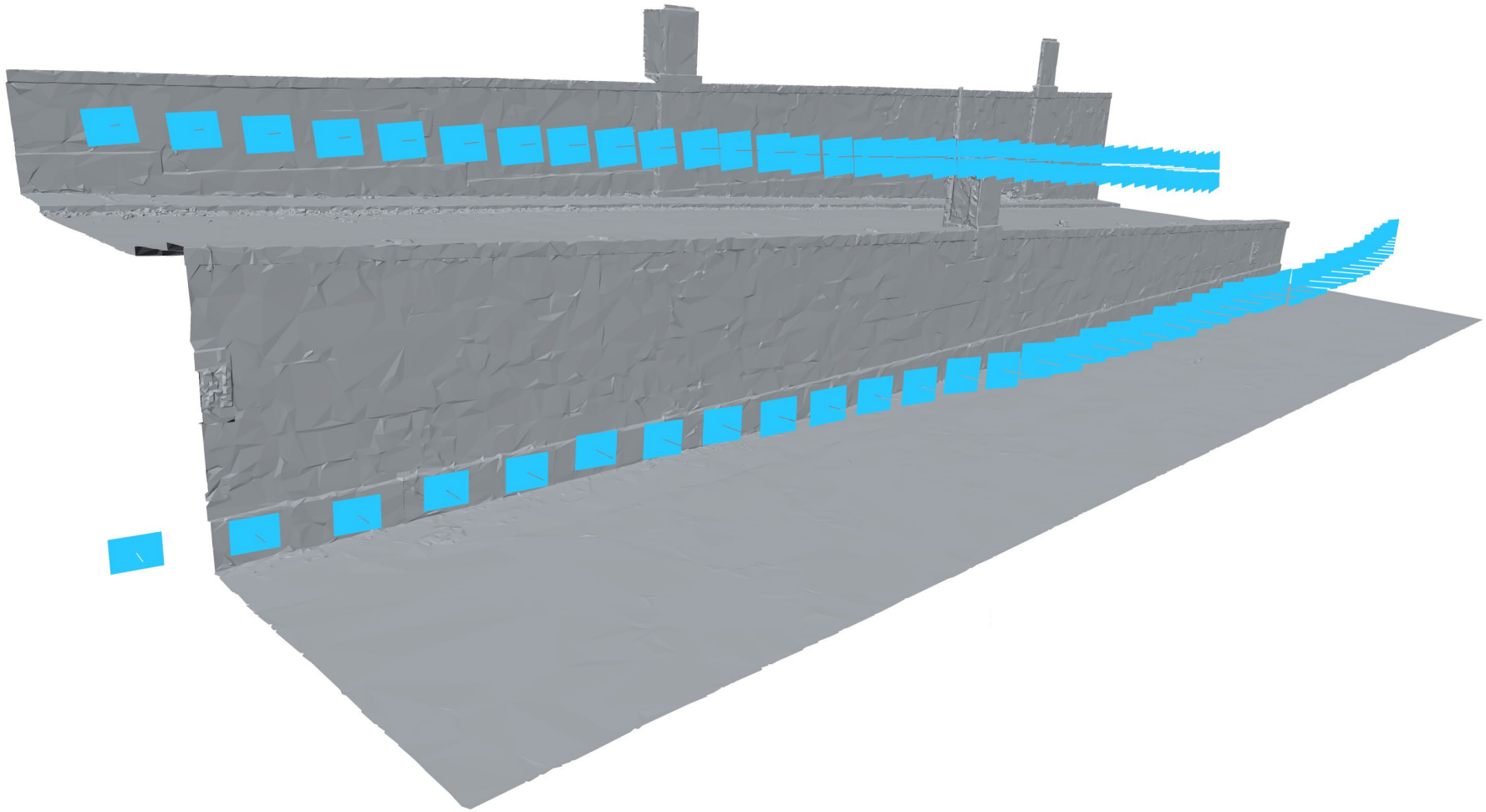


Illustration by Benjamin Wild

IMAGE positioning

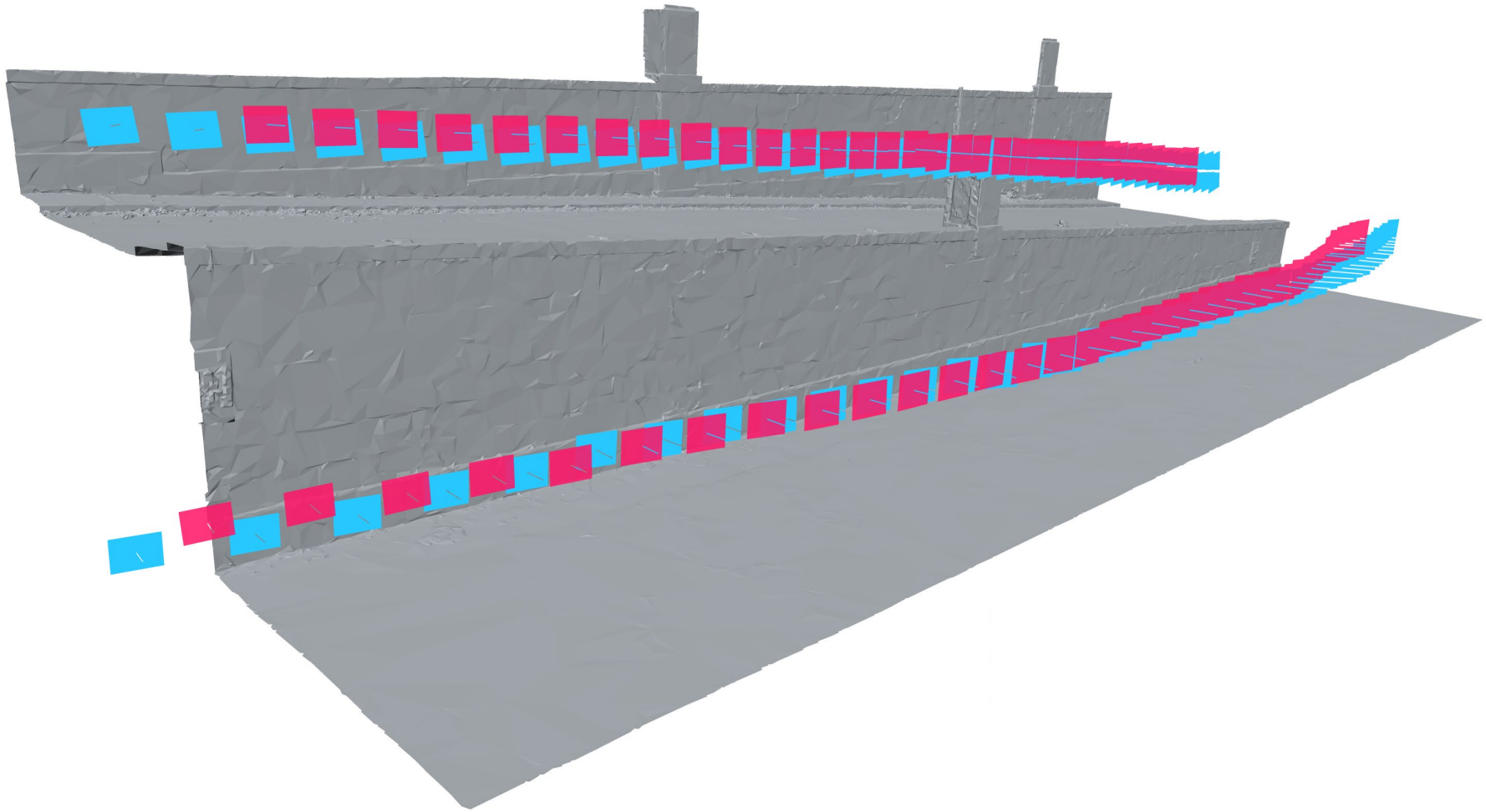


Illustration by Benjamin Wild

IMAGE positioning

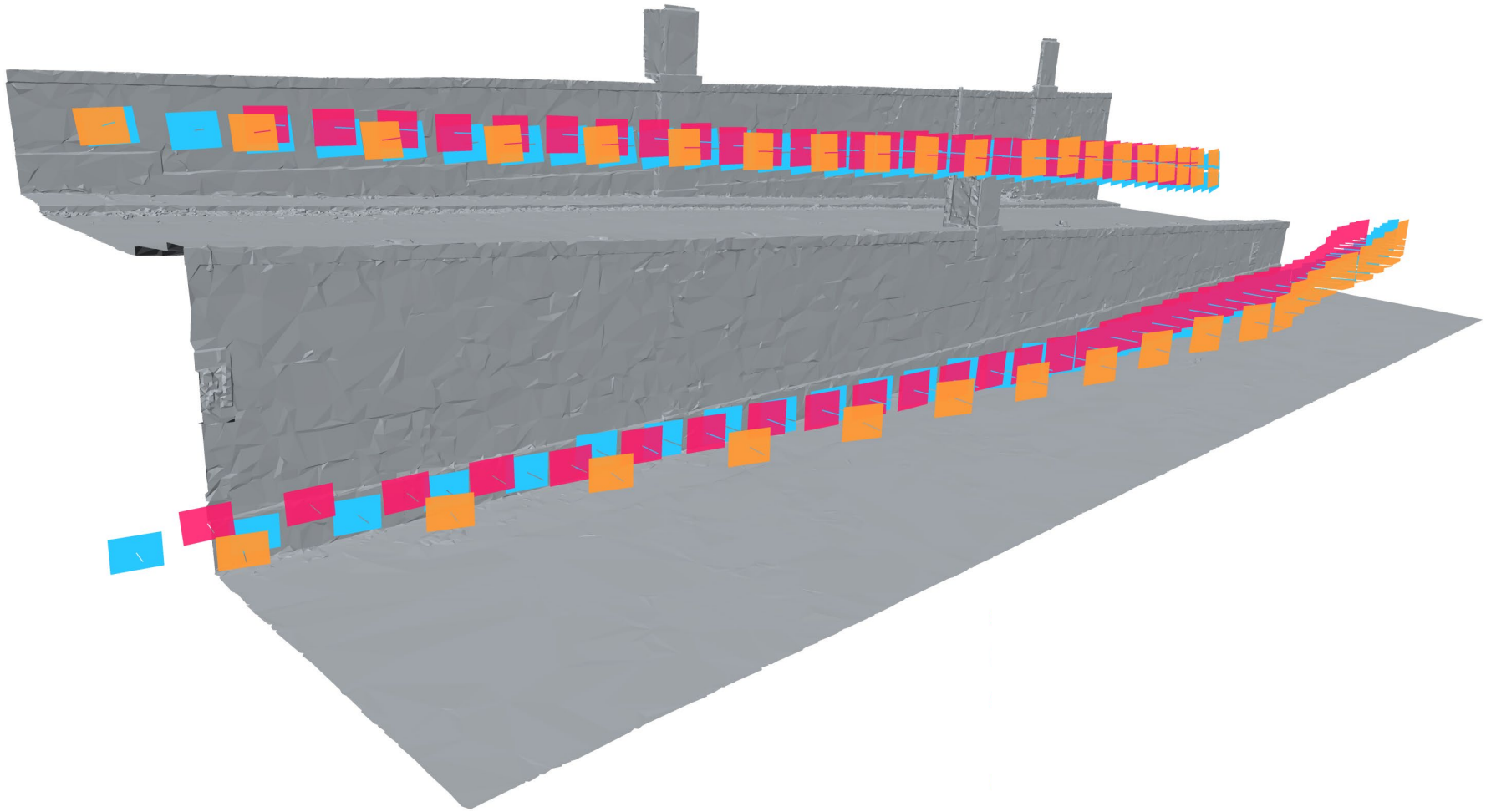


Illustration by Benjamin Wild

IMAGE positioning

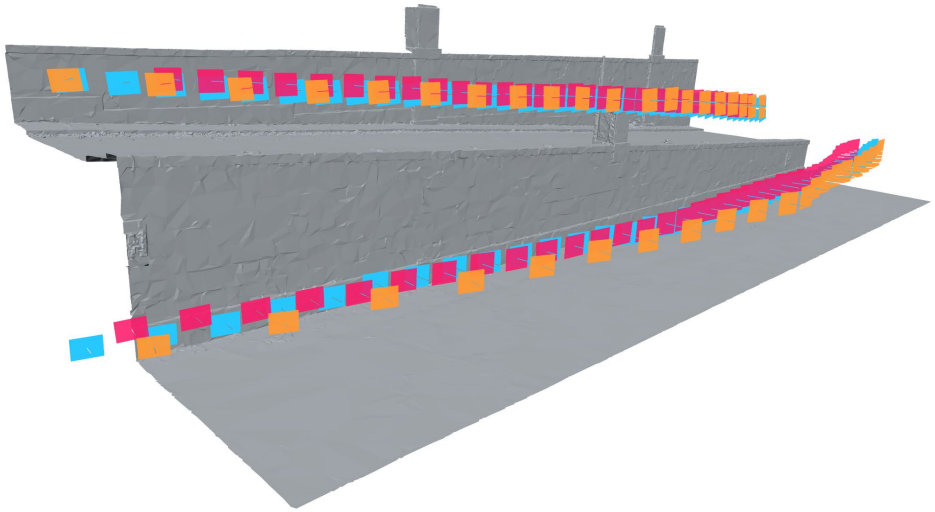








Illustration by Benjamin Wild

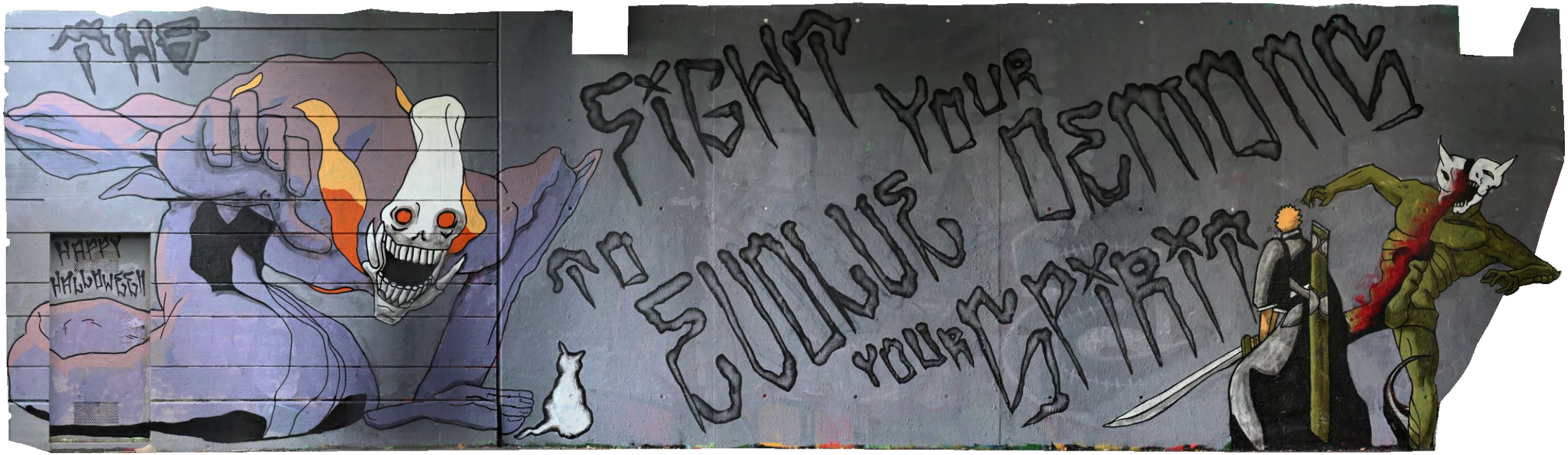
AUTOGRAF

position-accurate pixels



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position-accurate pixels



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position-accurate pixels



AUTOGRAF

position-accurate pixels



AUTOGRAF

position-accurate pixels



COOLPI

COOLPI

colour-accurate pixels



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GraffitiProjectINDIGO / COOLPI Public

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main 1 branch 0 tags Go to file Code

amolada Add files via upload 0bbf6c3 on Oct 20, 2022 155 commits

dist	Add files via upload	9 months ago
docs	Add files via upload	9 months ago
graffiti_image_processing	Add files via upload	9 months ago
notebooks	Add files via upload	10 months ago
src	Add files via upload	9 months ago
tests/coolpi-gui-test	Add files via upload	10 months ago
wpp_data	Add files via upload	10 months ago
LICENSE	Initial commit	last year
LICENSE.txt	Add files via upload	9 months ago
MANIFEST.in	Add files via upload	9 months ago
README.md	Add files via upload	9 months ago
pyproject.toml	Add files via upload	9 months ago

README.md

COOLPI

Description

COlour Operations Library for Processing Images (COOLPI) is an open-source toolbox programmed in Python for the treatment of colorimetric and spectral data. It includes classes, methods and functions developed and tested following the colorimetric standards published by the Commission Internationale de l'Éclairage (CIE, 2018).

The COOLPI package has been developed as part of the INDIGO project (IN-ventory and DI-sseminate G-raffiti along the d-O-naukanal) carried out by the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology in close collaboration with the GEO Department of TU Wien University.

The achievement of colour-accurate digital images is one of the primary research topics within the INDIGO project. Therefore, the COOLPI package also includes specific procedures for digital image processing and colour correction, particularly from images in RAW format.

About

COlour Operations Library for Processing Images

Readme
GPL-3.0, GPL-3.0 licenses found
4 stars
0 watching
1 fork
Report repository

Releases

No releases published

Packages

No packages published

Contributors 2

amolada Adolfo Molada Tebar
BeyondConventionalBoundaries Geert ...

Languages

Jupyter Notebook 98.1% Python 1.9%

COOLPI

colour-accurate pixels

COOLPI

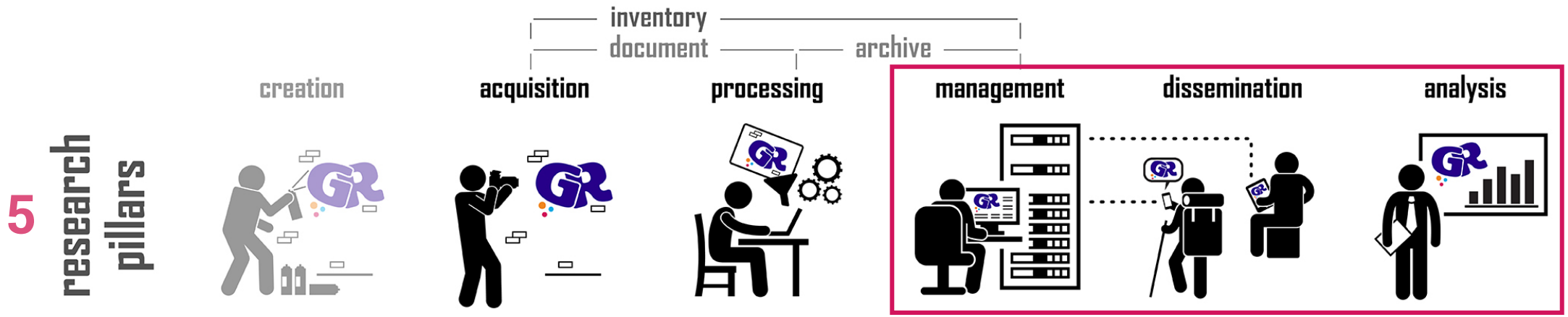
SOME results

GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*



UNIFORM metadata

TERMINOLOGY & HIERARCHY



UNIFORM metadata

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?



UNIFORM metadata

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?



UNIFORM metadata

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?



UNIFORM metadata

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?

Graffiti
|___ Street Art



UNIFORM metadata

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?

Graffiti
|___ Street Art

Street Art
|___ Graffiti



UNIFORM metadata

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?

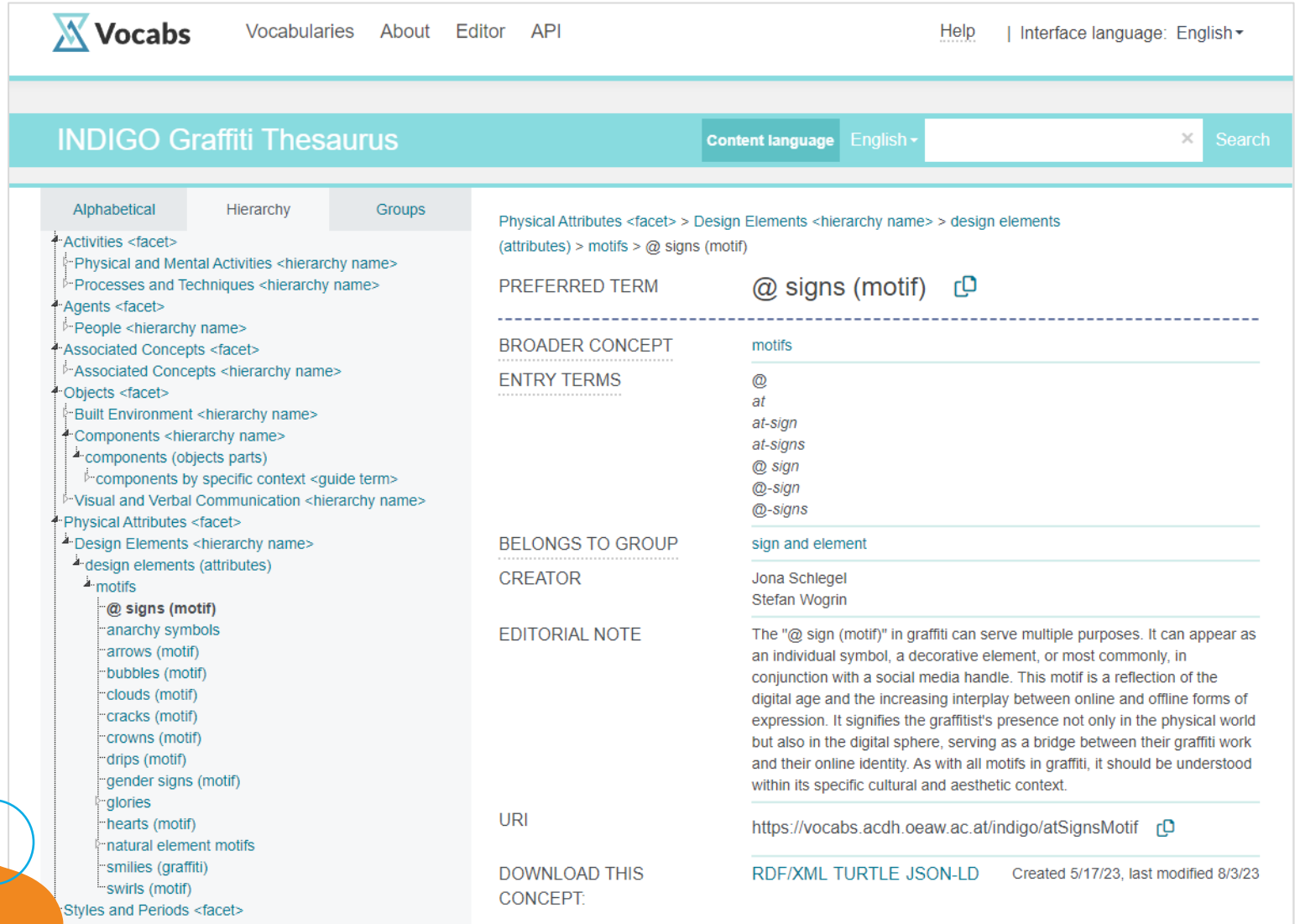
Graffiti
|___ Street Art

Street Art
|___ Graffiti

Graffiti | Street Art

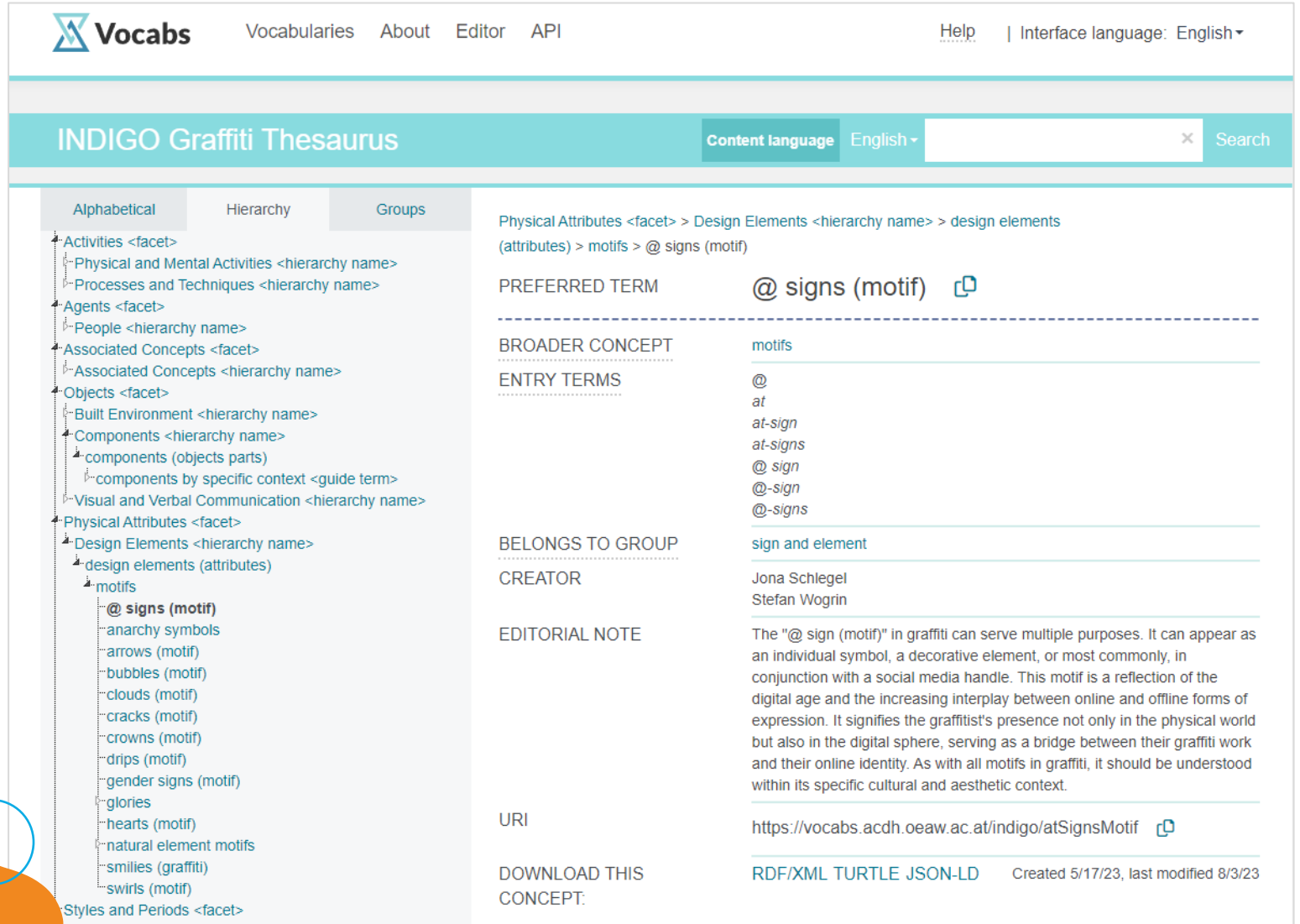


UNIFORM metadata



THESAURUS

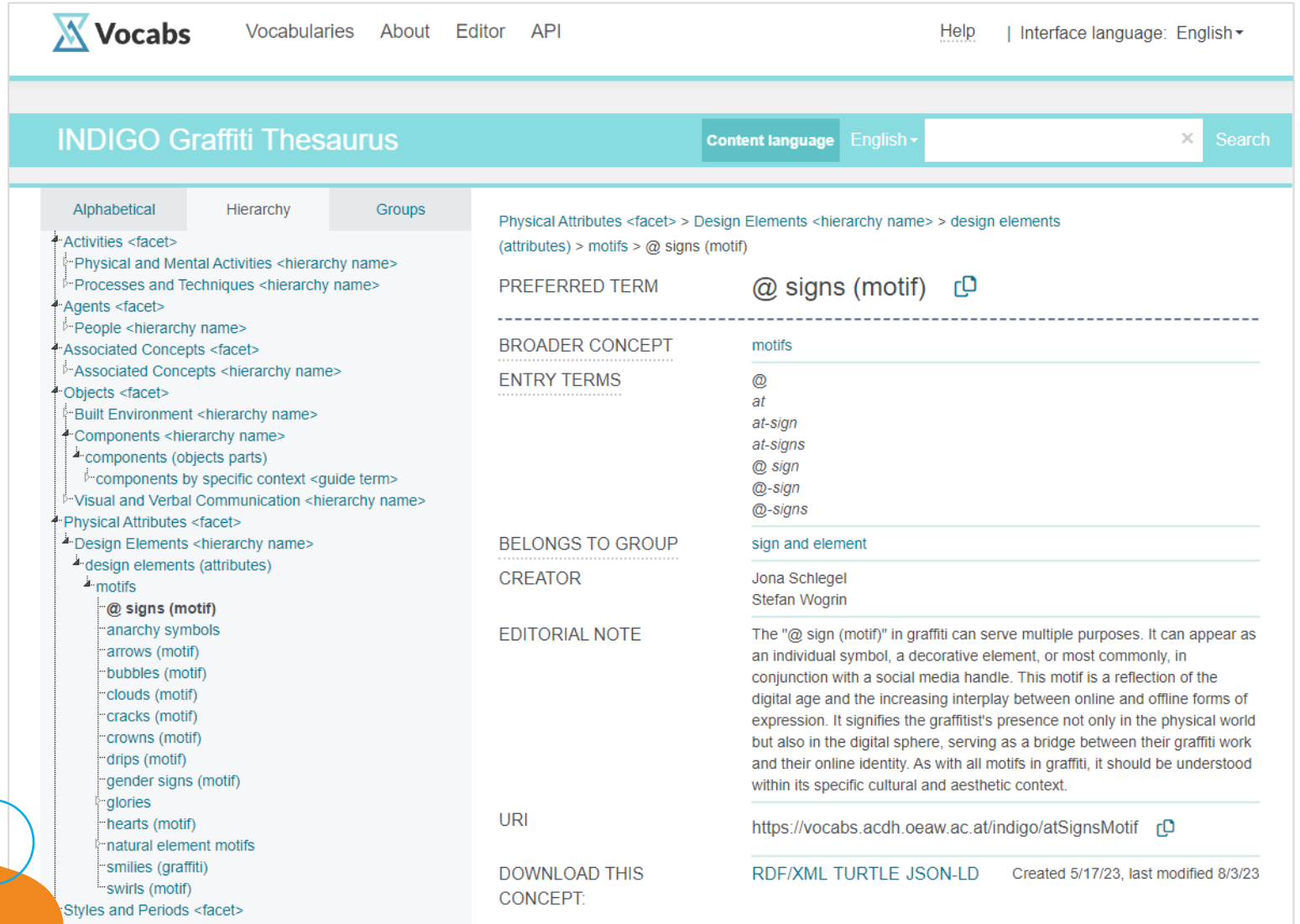
UNIFORM metadata



THESAURUS

Hierarchy

UNIFORM metadata

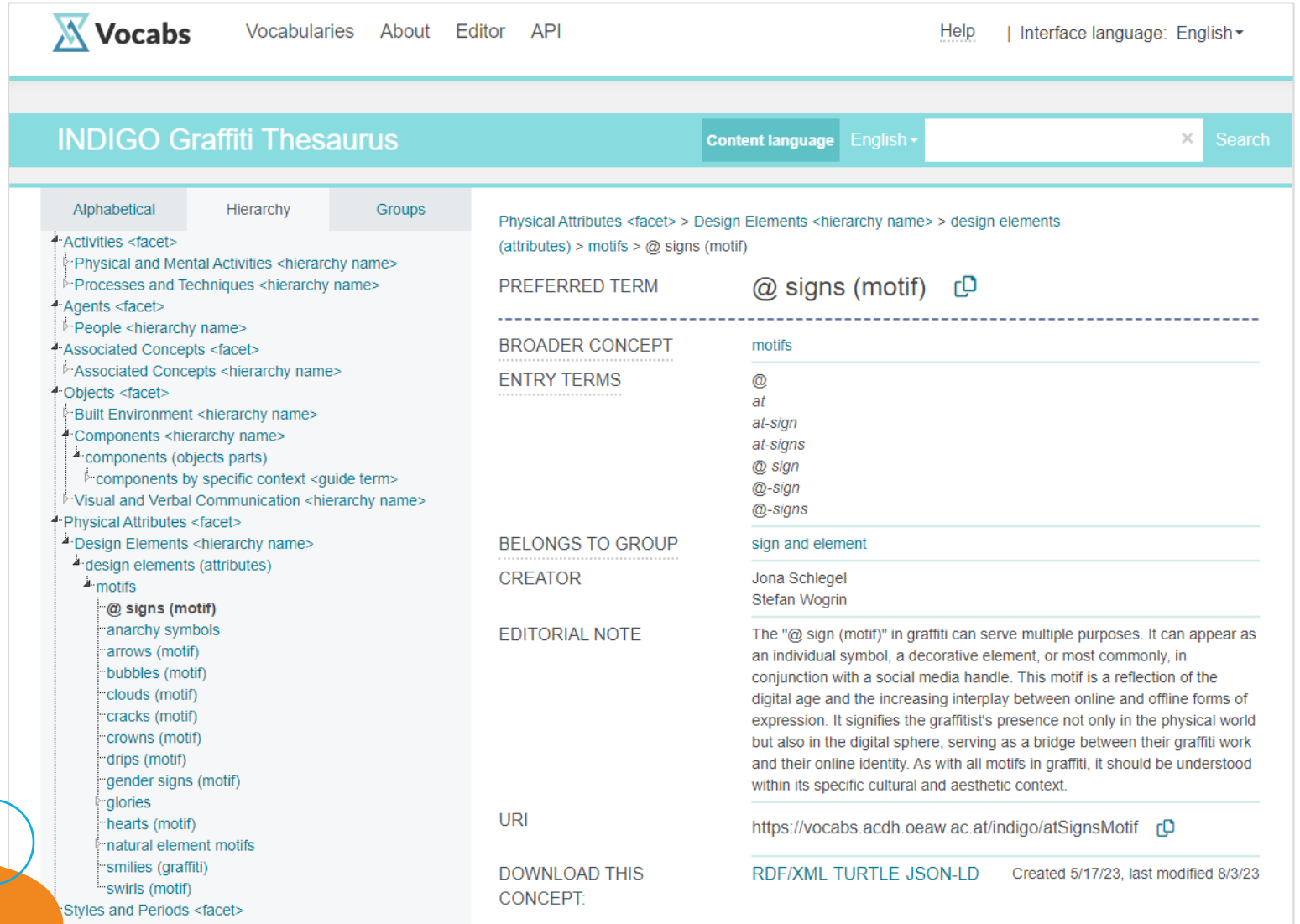


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Hierarchy

Synonyms & preferred terms

UNIFORM metadata



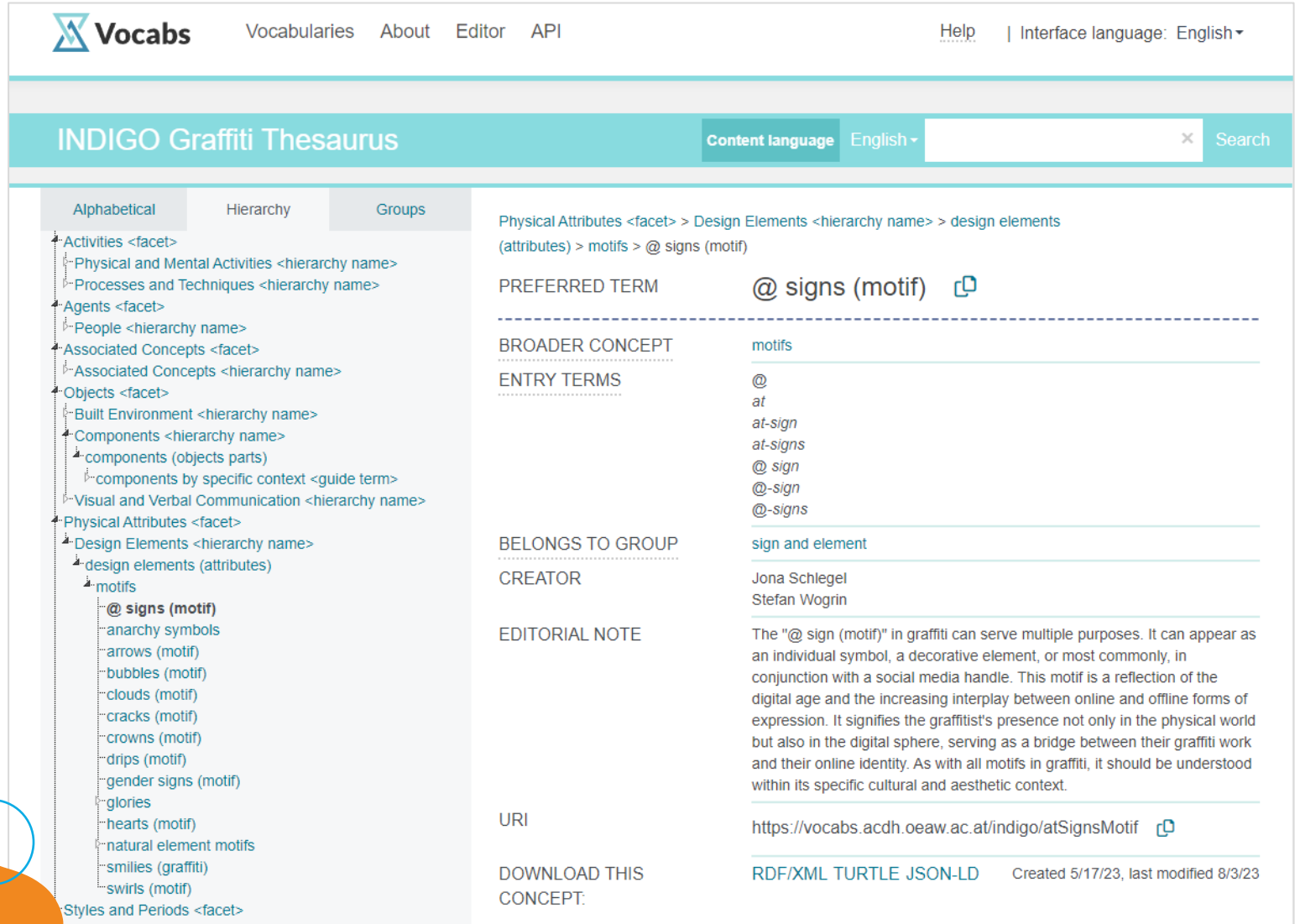
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Hierarchy

Synonyms & preferred terms

URI

UNIFORM metadata



THESAURUS

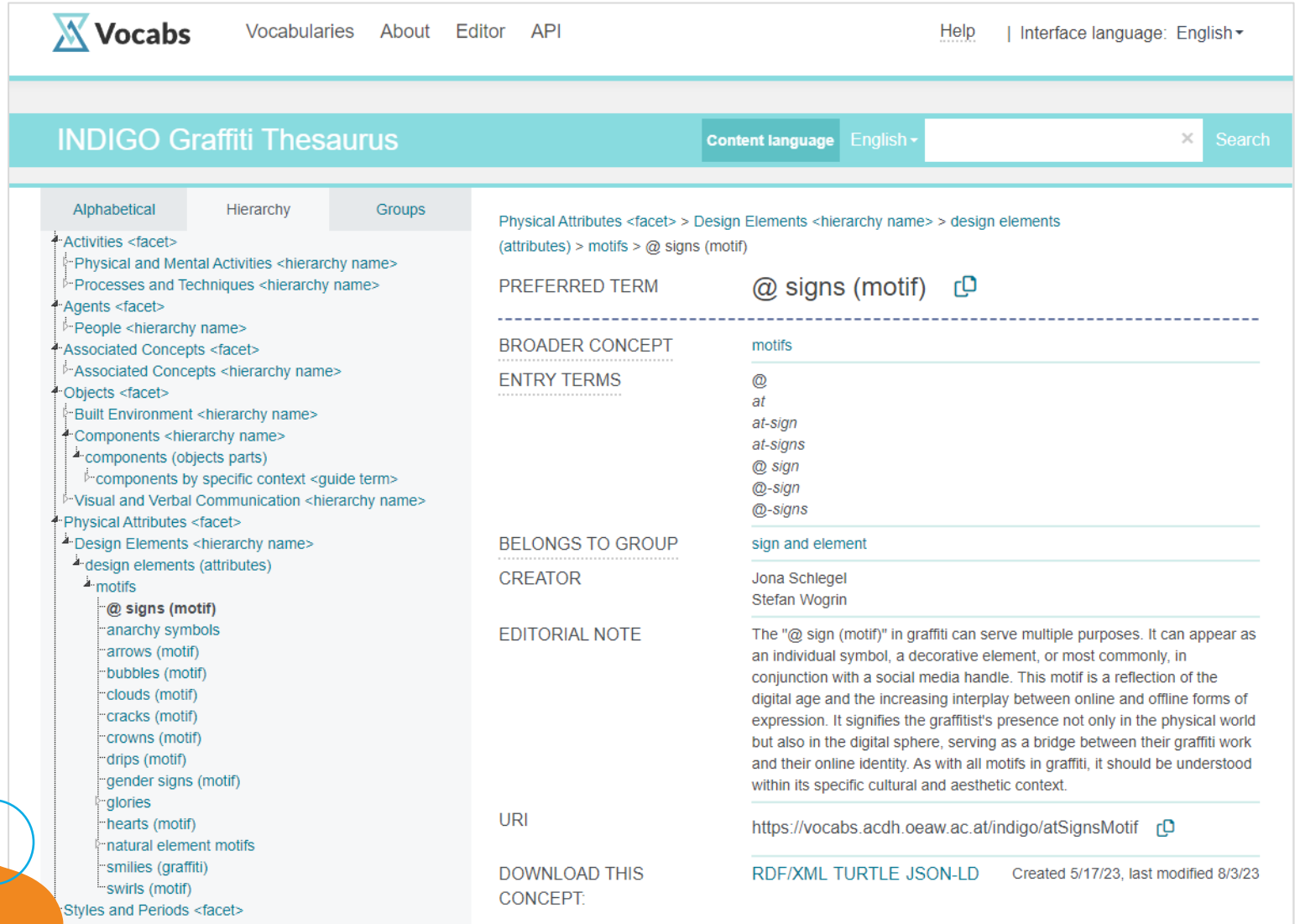
Hierarchy

Synonyms & preferred terms

URI

Semantic Web

UNIFORM metadata



THESAURUS

Hierarchy

Synonyms & preferred terms

URI

Semantic Web

Structure → Getty Art & Architecture Thesaurus

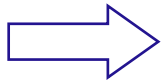
RIGHT now

RIGHT now

DATA, LOTS OF DATA

RIGHT now

DATA, LOTS OF DATA

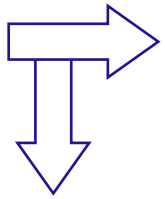




CoreTrustSeal certified data repository

RIGHT now

DATA, LOTS OF DATA



ANONYMISATION

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RIGHT now

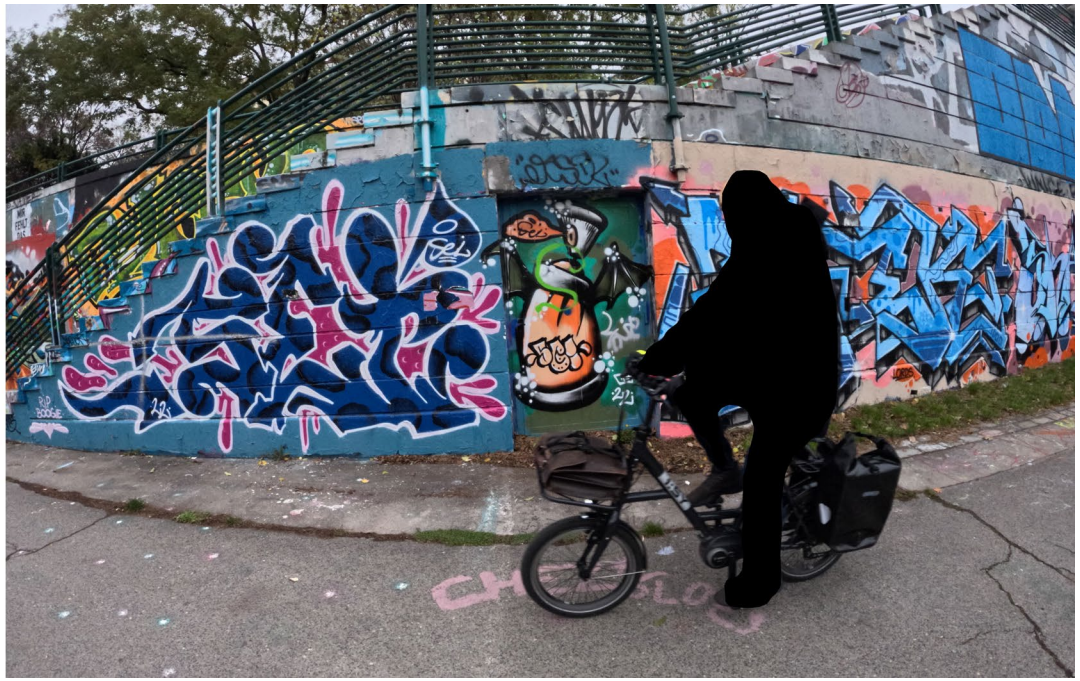
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ANONYMISATION





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ANONYMISATION





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