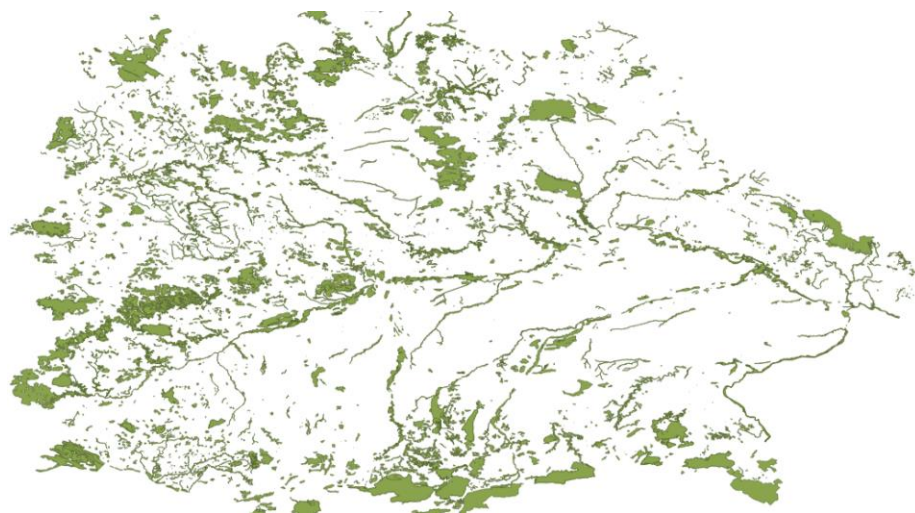


Transforming Natura2000 Shapefile into RDF

Kostis Kyzirakos and Dimitrianos Savva

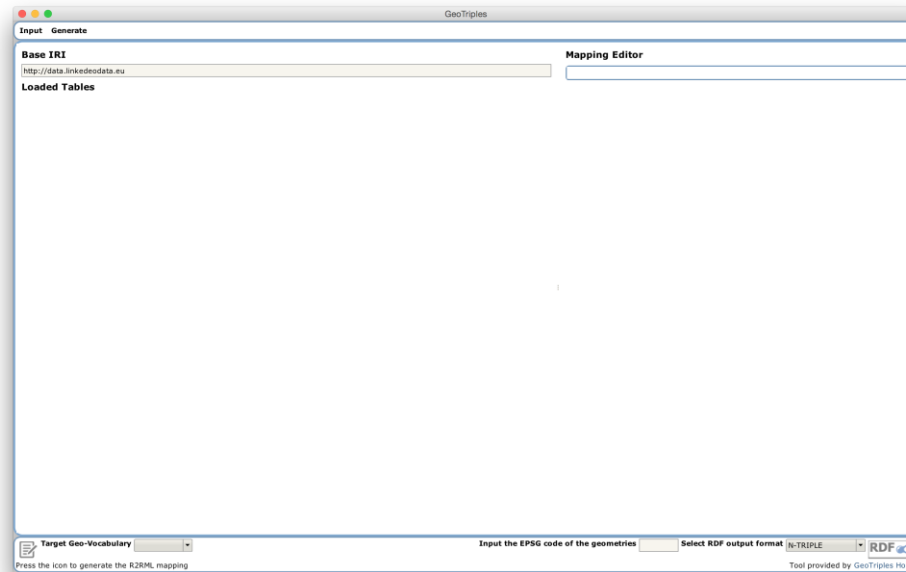
Natura2000 (South Germany)



	SITECODE ▼	SITENAME	RELEASE_DA	SITETYPE	MS	POINT_X	POINT_Y	Shape_Leng	Shape_Area
0	DE5728471	HABERGET...	2011-01-27	J	DE	4358992.591...	3003993.453...	320269.4820...	93312573.14...
1	DE5733302	MAUSOHRK...	2011-01-27	B	DE	4420517.205...	2996923.413...	1414.347607...	25004.73878...
2	DE5831373	ITZTAL VON...	2011-01-27	K	DE	4385040.932...	3000502.401...	103742.4947...	14521137.31...
3	DE5831471	ITZ-, RODA...	2011-01-27	J	DE	4382784.281...	3008481.955...	214078.6847...	37191876.13...
4	DE5838302	EGER- UND...	2011-01-27	B	DE	4471106.064...	3002104.608...	135831.6769...	9416172.531...
5	DE5921371	WIESEN UN...	2011-01-27	B	DE	4265098.139...	2989936.719...	23664.11978...	2742827.130...
6	DE5922371	LOHRBACH...	2011-01-27	K	DE	4280322.951...	2992816.707...	67519.74686...	3635569.894...
7	DE5923302	WINTERQU...	2011-01-27	B	DE	4289930.515...	2966688.766...	2818.272039...	86459.13030...
8	DE5924371	TROCKENG...	2011-01-27	E	DE	4307396.986...	2989524.458...	58180.21087...	7481499.237...
9	DE5927371	MAINTAL BE...	2011-01-27	G	DE	4341744.752...	2992441.266...	20818.98270...	3255055.133...
10	DE5929302	MAUSOHRK...	2011-01-27	B	DE	4371822.956...	3001358.363...	848.5357890...	15000.27022...

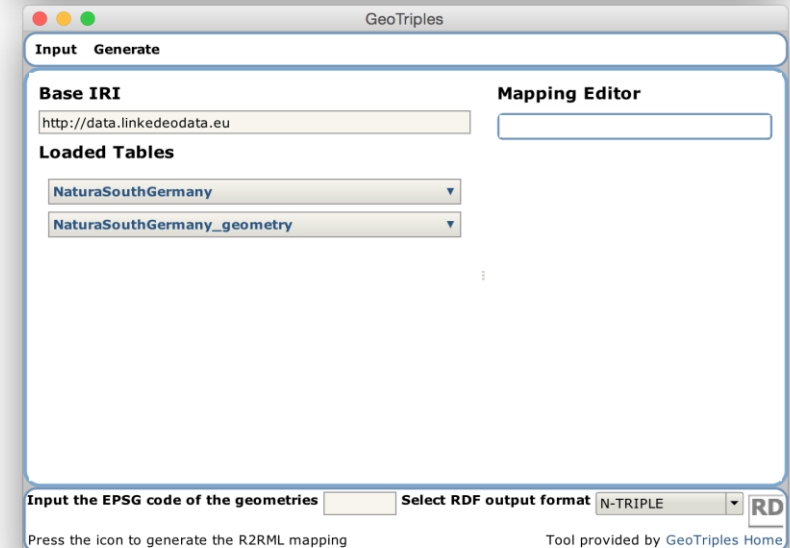
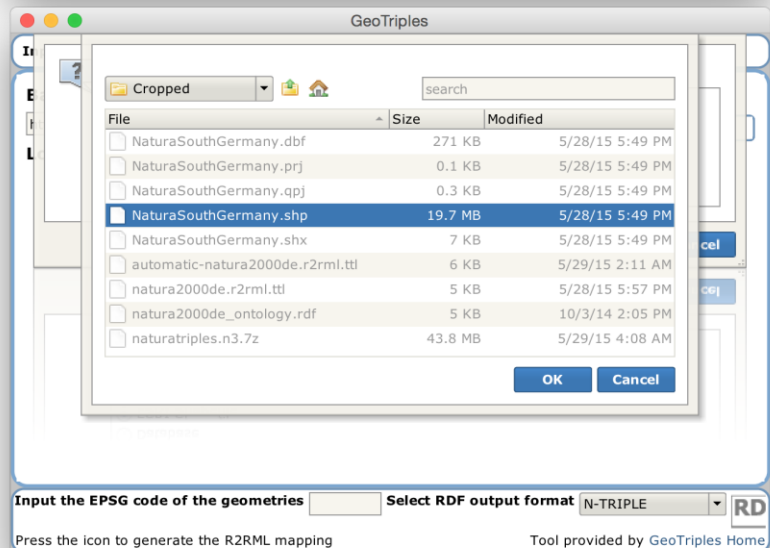
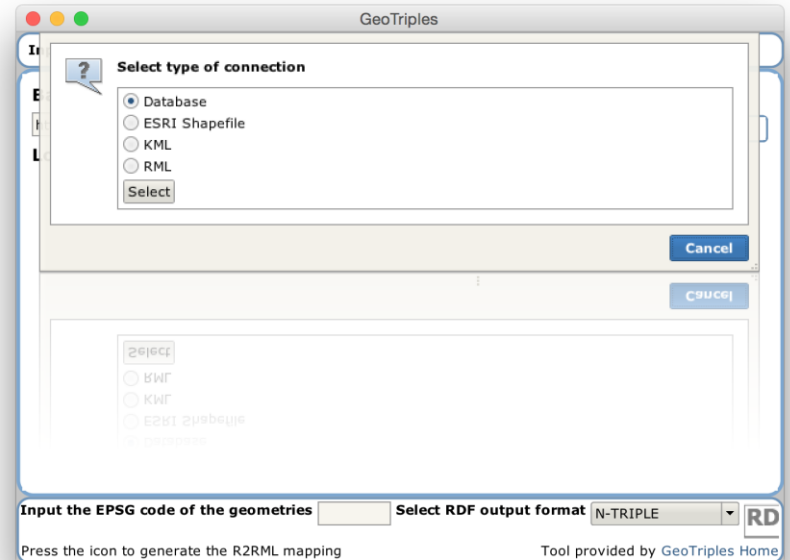
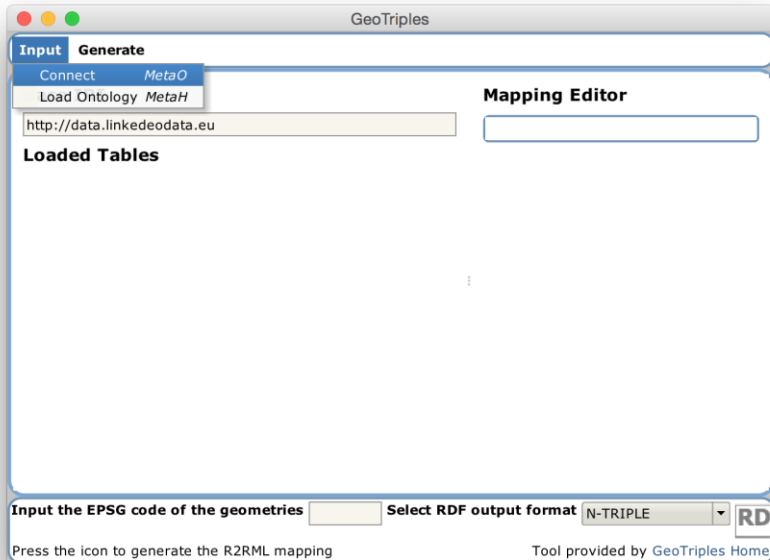
GeoTriples GUI

- From terminal execute: `geotriples-gui`



1. Connect to Natura2000 Shapefile
2. Adjust class/predicate names to ontology
3. Generate mapping
4. Dump RDF

Connect to Shapefile



GeoTriples Layout

Mapping Builder (Left)

1. Adjust triples maps
2. Change DataTypes
3. Change Predicates

Bottom Toolbar

1. Generate Mapping
2. Select your preferred geo-vocabulary
3. Define CRS
4. Select output format
5. Dump RDF

Mapping Editor (Right)

1. Change the mapping by hand

The screenshot displays the GeoTriples application interface, which is divided into several panels. The main window is titled "GeoTriples" and has a menu bar with "Input" and "Generate" options. The "Base IRI" field is set to "http://data.linkeddata.eu/natura", which is highlighted with a red rectangle. Below this, the "Loaded Tables" section shows a table for "NaturaSouthGermany".

columnName	DataType	Predicate	Transformation
the_geom	Geometry	has_the_geom	identity
SITECODE	String	has_SITECODE	identity
SITENAME	String	has_SITENAME	identity
RELEASE_DA	Date	as_RELEASE_DA	identity
SITETYPE	String	has_SITETYPE	identity
MS	String	has_MS	identity
POINT_X	Double	has_POINT_X	identity
POINT_Y	Double	has_POINT_Y	identity
Shape_Leng	Double	as_Shape_Leng	identity
Shape_Area	Double	as_Shape_Area	identity
gid	Int	has_gid	identity

Below the "Loaded Tables" section, there is a "Columns" dropdown menu and a "Generate" button. The "Mapping Editor" panel on the right shows a table for "NaturaSouthGermany_geometry".

columnName	DataType	Predicate	Transformation
the_geom	Default	asWKT	asWKT
the_geom	Default	asGML	asGML
the_geom	Default	isSimple	isSimple
the_geom	Default	is3D	is3D
the_geom	Default	hasSerialization	hasSerialization
the_geom	Default	spatialDimension	spatialDimension
the_geom	Default	dimension	dimension
the_geom	Default	ordinateDimension	ordinateDimension

The bottom toolbar contains a "Target Geo-Vocabulary" dropdown, an "Input the EPSG code of the geometries" field, a "Select RDF output format" dropdown (set to "N-TRIPLE"), and an "RDF" button. A footer note states "Tool provided by GeoTriples Home".

Adjust to Ontology

The screenshot shows the GeoTriples application with the 'Input' tab selected. A file selection dialog is open, displaying a list of files. The file 'natura2000de_ontology.rdf' is selected. The dialog has 'OK' and 'Cancel' buttons.

Base IRI
http://data.linkedeodata.eu/natura

Loaded Tables

columnName	DataType
the_geom	Geometry
SITECODE	String
SITENAME	String
RELEASE_DA	Date
SITETYPE	String
MS	String
POINT_X	Double
POINT_Y	Double
Shape_Leng	Double
Shape_Area	Double
gid	Int

Columns

columnName	DataType	Predicate	Transformation
the_geom	Default	asWKT	asWKT
the_geom	Default	asGML	asGML
the_geom	Default	isSimple	isSimple
the_geom	Default	is3D	is3D
the_geom	Default	hasSerialization	hasSerialization
the_geom	Default	spatialDimension	spatialDimension
the_geom	Default	dimension	dimension
the_geom	Default	ordinateDimension	ordinateDimension

Target Geo-Vocabulary Input the EPSG code of the geometries Select RDF output format N-TRIPLE **RDF**

Press the icon to generate the R2RML mapping Tool provided by GeoTriples Home

The screenshot shows the GeoTriples application with the 'Generate' tab selected. The 'Base IRI' is set to 'http://data.linkedeodata.eu/natura'. The 'Loaded Tables' section shows a table named 'NaturaSouthGermany' with columns: columnName, DataType, Predicate, Transformation, and ClassName. The table contains data for various columns, including the_geom, SITECODE, SITENAME, RELEASE_DA, SITETYPE, MS, POINT_X, POINT_Y, Shape_Leng, Shape_Area, and gid.

Base IRI
http://data.linkedeodata.eu/natura

Loaded Tables

columnName	DataType	Predicate	Transformation	ClassName
the_geom	Geometry	has_the_geom	identity	Natura2000Area
SITECODE	String	has_SITECODE	identity	Feature
SITENAME	String	has_SITENAME	identity	Geometry
RELEASE_DA	Date	has_RELEASE_DA	identity	SpatialObject
SITETYPE	String	has_SITETYPE	identity	Tablenam
MS	String	has_MS	identity	Transform
POINT_X	Double	has_POINT_X	identity	OrderedCollection
POINT_Y	Double	has_POINT_Y	identity	Collection
Shape_Leng	Double	has_Shape_Leng	identity	ConceptScheme
Shape_Area	Double	has_Shape_Area	identity	MultiCurve
gid	Int	has_gid	identity	Geometry

The screenshot shows the GeoTriples application with the 'Generate' tab selected. The 'Base IRI' is set to 'http://data.linkedeodata.eu/natura'. The 'Loaded Tables' section shows a table named 'NaturaSouthGermany' with columns: columnName, DataType, Predicate, Transformation, and ClassName. The table contains data for various columns, including the_geom, SITECODE, SITENAME, RELEASE_DA, SITETYPE, MS, POINT_X, POINT_Y, Shape_Leng, Shape_Area, and gid. A dropdown menu is open for the 'hasReleaseDate' predicate, showing options: hasReleaseDate, hasPoint_Y, hasPoint_X, hasMS, dimension, isSimple, asGML, hasSerialization, asWKT, coordinateDimension, isEmpty, spatialDimension, notation, and Geometry.

Base IRI
http://data.linkedeodata.eu/natura

Loaded Tables

columnName	DataType	Predicate	Transformation	ClassName
SITECODE	String	hasSiteCode	identity	Natura2000Area
SITENAME	String	hasSiteName	identity	Feature
RELEASE_DA	Date	hasReleaseDate	identity	Geometry
SITETYPE	String	hasSiteType	identity	SpatialObject
MS	String	hasSiteName	identity	Tablenam
POINT_X	Double	hasShapeLength	identity	Transform
POINT_Y	Double	hasShapeArea	identity	OrderedCollection
Shape_Leng	Double	hasReleaseDate	identity	Collection
Shape_Area	Double	hasPoint_Y	identity	ConceptScheme
gid	Int	hasPoint_X	identity	MultiCurve
		hasMS	identity	Geometry
		dimension	identity	Line
		isSimple	identity	PolyhedralSurface
		asGML	identity	Triangle
		hasSerialization	identity </tr	

Generate Mapping

InputGenerate

Base IRI

http://data.linkedeodata.eu/natura

Loaded Tables

NaturaSouthGermany

columnName	DataType	Predicate	Transformation
SITECODE	String	hasSiteCode	identity
SITENAME	String	hasSiteName	identity
RELEASE_DA	Date	hasReleaseDate	identity
SITETYPE	String	hasSiteType	identity
MS	String	hasMS	identity
POINT_X	Double	hasPoint_X	identity
POINT_Y	Double	hasPoint_Y	identity
Shape_Leng	Double	hasShapeLength	identity
Shape_Area	Double	hasShapeArea	identity
gid	Int	has_gid	identity

Columns

NaturaSouthGermany_geometry

columnName	DataType	Predicate	Transformation
the_geom	Default	asWKT	asWKT
the_geom	Default	asGML	asGML
the_geom	Default	isSimple	isSimple
the_geom	Default	is3D	is3D
the_geom	Default	hasSerialization	hasSerialization
the_geom	Default	spatialDimension	spatialDimension
the_geom	Default	dimension	dimension
the_geom	Default	dinateDimension	dinateDimension

Mapping Editor

```
@prefix geof: <http://www.opengis.net/def/function/geosparql/>.
@prefix map: <#>.
@prefix ogc: <http://www.opengis.net/ont/geosparql#>.
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>.
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>.
@prefix rr: <http://www.w3.org/ns/r2rml#>.
@prefix rrx: <http://www.w3.org/ns/r2rml-ext#>.
@prefix rxf: <http://www.w3.org/ns/r2rml-ext/functions/def/>.
@prefix strdf: <http://strdf.di.uoa.gr/ontology#>.
@prefix vocab: <ontology#>.
@prefix xsd: <http://www.w3.org/2001/XMLSchema#>.

map:NaturaSouthGermany_geometry
rr:logicalTable [ rr:tableName "NaturaSouthGermany"; ];
rr:subjectMap [ rr:class ogc:Geometry; rr:template
"http://data.linkedeodata.eu/natura/NaturaSouthGermany/Geometry/{`gid`}"; ];
rr:predicateObjectMap [
rr:predicate ogc:is3D;
rr:objectMap [
rr:datatype xsd:boolean;
rrx:function rrx:is3D;
rrx:argumentMap
(
[ rr:column "the_geom"; ]
);
];
rr:predicateObjectMap [
rr:predicate ogc:isSimple;
rr:objectMap [
rr:datatype xsd:boolean;
rrx:function rrx:isSimple;
rrx:argumentMap
(
[ rr:column "the_geom"; ]
);
];
rr:predicateObjectMap [
rr:predicate ogc:asGML;
rr:objectMap [
rr:datatype <http://opengis.net/ont/geosparql#gmlLiteral>;
rrx:function rrx:asGML;
rrx:argumentMap
(
[ rr:column "the_geom"; ]
);
];
rr:predicateObjectMap [
rr:predicate ogc:dimension;
rr:objectMap [
rr:datatype xsd:integer;
rrx:function rrx:dimension;
rrx:argumentMap
(
[ rr:column "the_geom"; ]
);
];
];
```

Target Geo-Vocabulary

GeoSPARQL

Press the icon to generate the R2RML mapping

Input the EPSG code of the geometries

Select RDF output format

N-TRIPLE

RDF

Tool provided by GeoTriples Home

Dump RDF

GeoTriples

Input Generate

Base IRI
<http://data.linkedeodata.eu/natura>

Loaded Tables

NaturaSouthGermany

columnName	DataType	Predicate
SITECODE	String	hasSiteCode
SITENAME	String	hasSiteName
RELEASE_DA	Date	hasReleaseDate
SITETYPE	String	hasSiteType
MS	String	hasMS
POINT_X	Double	hasPoint_X
POINT_Y	Double	hasPoint_Y
Shape_Leng	Double	hasShapeLength
Shape_Area	Double	hasShapeArea
gid	Int	has_gid

Columns

NaturaSouthGermany_geometry

columnName	DataType	Predicate	Transformation
the_geom	Default	asWKT	asWKT
the_geom	Default	asGML	asGML
the_geom	Default	isSimple	isSimple
the_geom	Default	is3D	is3D
the_geom	Default	hasSerialization	hasSerialization
the_geom	Default	spatialDimension	spatialDimension
the_geom	Default	dimension	dimension
the_geom	Default	coordinateDimension	coordinateDimension

Geometry

Save as

/home/leo/datasets/naturatriples.n3

File Size Modified

- Library 3 KB 11/26/14 4:04 AM
- Network 0.1 KB 9/9/14 11:47 PM
- System 0.2 KB 11/6/14 1:11 PM
- User Information 0.2 KB 11/6/14 1:34 PM
- Users 0.2 KB 11/6/14 2:31 PM
- Volumes 0.1 KB 5/29/15 5:46 AM
- bin 1 KB 2/2/15 10:59 AM
- cores 0.1 KB 11/25/14 2:39 AM
- dev 4 KB 5/21/15 4:16 PM

OK Cancel

```
www.opengis.net/ont/geosparql#>.
www.w3.org/1999/02/22-rdf-syntax-ns#>.
www.w3.org/2000/01/rdf-schema#>.
www.w3.org/ns/r2ml#>.
www.w3.org/ns/r2ml-ext#>.
www.w3.org/ns/r2ml-ext/functions/def/>.
/strdf.di.uoa.gr/ontology#>.
dgy#>.
www.w3.org/2001/XMLSchema#>.

many_geometry
ableName " NaturaSouthGermany" ;
class ogc:Geometry; rr:template
ata.eu/natura/NaturaSouthGermany/Geometry/{' gid' };
lap [
dimension;

d:integer;
xf:dimension;
Map

" the_geom" ;
];

rr:predicateObjectMap [
rr:predicate ogc:isSimple;
rr:objectMap [
rr:datatype xsd:boolean;
rr:function rrx:isSimple;
rr:argumentMap
(
[ rr:column " the_geom" ;
]
);
];

rr:predicateObjectMap [
rr:predicate ogc:asWKT;
rr:objectMap [
rr:datatype ogc:wktLiteral;
rr:function rrx:asWKT;
rr:argumentMap
(
[ rr:column " the_geom" ;
]
);
];

rr:predicateObjectMap [
rr:predicate ogc:is3D;
rr:objectMap [
rr:datatype xsd:boolean;
rr:function rrx:is3D;
rr:argumentMap
(
[ rr:column " the_geom" ;
]
);
];

rr:predicateObjectMap [
rr:predicate ogc:coordinateDimension;
rr:objectMap [
rr:datatype xsd:integer;
rr:function rrx:coordinateDimension;
```

Target Geo-Vocabulary

Input the EPSG code of the geometries

Select RDF output format N-TRIPLE

Press the icon to generate the R2RML mapping

Tool provided by GeoTriples Home

RDF

RDF graph

```
naturatriples.n3.txt
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://www.opengis.net/ont/geosparql#hasGeometry> <http://data.linkedeodata.eu/Natura2000DE/Geometry/1> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasPoint_Y> "3003993.4537"^^<http://www.w3.org/2001/XMLSchema#double> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasPoint_Y> "3003993.4537"^^<http://www.w3.org/2001/XMLSchema#double> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasShapeLength> "320269.48205"^^<http://www.w3.org/2001/XMLSchema#double> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasSiteCode> "DE5728471"^^<http://www.w3.org/2001/XMLSchema#string> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasMS> "DE"^^<http://www.w3.org/2001/XMLSchema#string> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://www.w3.org/2000/01/rdf-schema#label> "Natura2000_Spatial_Public_End2010_LAEA_Shape_DE #1" .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasSiteType> "J"^^<http://www.w3.org/2001/XMLSchema#string> .
<http://data.linkedeodata.eu/Natura2000DE/id/1> <http://data.linkedeodata.eu/natura/ontology#hasSiteName> "HABERGETRAUF UND BUNDORFER WALD"^^<http://www.w3.org/2001/XMLSchema#string> .
<http://data.linkedeodata.eu/Natura2000DE/Geometry/1> <http://data.linkedeodata.eu/natura/ontology#hasShapeArea> "9.33125731493E7"^^<http://www.w3.org/2001/XMLSchema#double> .
<http://data.linkedeodata.eu/Natura2000DE/Geometry/1> <http://www.opengis.net/ont/geosparql#dimension> "5642"^^<http://www.w3.org/2001/XMLSchema#integer> .
<http://data.linkedeodata.eu/Natura2000DE/Geometry/1> <http://www.opengis.net/ont/geosparql#isSimple> "true"^^<http://www.w3.org/2001/XMLSchema#boolean> .
<http://data.linkedeodata.eu/Natura2000DE/Geometry/1> <http://www.opengis.net/ont/geosparql#spatialDimension> "2"^^<http://www.w3.org/2001/XMLSchema#integer> .
<http://data.linkedeodata.eu/Natura2000DE/Geometry/1> <http://www.opengis.net/ont/geosparql#is3D> "false"^^<http://www.w3.org/2001/XMLSchema#boolean> .
<http://data.linkedeodata.eu/Natura2000DE/Geometry/1> <http://www.opengis.net/ont/geosparql#asWKT> "<http://www.opengis.net/def/crs/EPSG/0/4326> MULTIPOLYGON (((10.689943612628722
49.98363413154523, ..., 10.500371875184268 50.17036708209105)))"^^<http://www.opengis.net/ont/geosparql#wktLiteral> .
```

Store RDF graph to Strabon

```
# endpoint store  
http://localhost:8080/strabonendpoint  
N-Triples -t  
/home/leo/datasets/naturatriples.n3
```

Transforming OpenStreetMaps GML document into an RDF graph (1/4)

```
# cd ~/DEMO_ESWC15
# ./osmmapping.sh

--
geotriples-cmd generate_mapping
-o OSM/automatic-mapping.rml.ttl
-b http://data.linkedeodata.eu/waterways
-r waterways
-rp /ogr:FeatureCollection/gml:featureMember
-ns "gml|http://www.opengis.net/gml,
    ogr|http://ogr.maptools.org/"
-null -onto OSM/automatic-ontology.txt
-x OSM/osm_waterways.xsd OSM/osm_waterways.gml
```

Transforming OpenStreetMaps GML document into an RDF graph (2/4)

```
# cp OSM/automatic-mapping.rml.ttl  
OSM/altered-mapping.rml.ttl
```

```
# gedit OSM/altered-mapping.rml.ttl
```

Transforming OpenStreetMaps GML document into an RDF graph (3/4)

1. Change the class definition for the triples map `<#ogr:waterwaysogr:geometryProperty>`
 1. Replace the class `onto:LineStringPropertyType` with `ogc:Geometry`
2. Change the predicate that will link the thematic data with the geometric data.
 1. Find the triples map `<#waterways>`
 2. Replace the text `onto:has_geometryProperty` with `ogc:hasGeometry`

Transforming OpenStreetMaps GML document into an RDF graph (4/4)

```
# ./osmdump.sh
--

geotriples-cmd dump_rdf -rml
-o OSM/osmtriples.n3
-ns osm-namespaces.ns
OSM/altered-mapping.ttl
--

# endpoint store
http://localhost:8080/strabonendpoint N-
Triples -t
/home/leo/DEMO_ESWC15/OSM/osmtriples.n3
```

Store TalkingFields datasets to Strabon

```
# endpoint store  
http://localhost:8080/strabonendpoint  
N-Triples -t /home/leo/datasets/fb.n3
```

```
# endpoint store  
http://localhost:8080/strabonendpoint  
N-Triples -t /home/leo/datasets/rc.n3
```