

Linked Data Description of Cartographic Resources

ALCTS Webinar
Association for Library Collections and Technical Services

May 2, 2018

Presenter:

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About the presenter

- Map cataloger
- Geospatial metadata librarian
- Coordinator of the Linked Data for Production Cartographic Materials project



1 Marc equals approximately 3,200 miles.

*Africa.
Scale approximately 1:3,000,000.*

Overview of Webinar

- Linked Data for Production Cartographic Materials (LD4P-CM) project
 - Background, goals, outcomes, future work
- Introduction to the Geospatial and Cartographic Resources Ontology (GCRO)
 - Linked Open Data ontology to extend the BIBFRAME 2.0 and bibliotek-o models for the description of geospatial and cartographic resources

Linked Data for Production (LD4P)

<http://ld4p.org>

With support from the Andrew W. Mellon Foundation, the LD4P partners (Columbia, Cornell, Harvard, Library of Congress, Princeton, and Stanford)

- developing standards, guidelines, and infrastructure to communally produce metadata as linked open data,
- developing end-to-end workflows to create linked data in a technical services production environment,
- extending the BIBFRAME ontology to describe library resources in specialized domains and formats, and
- engaging the broader library community to ensure a sustainable and extensible environment.

Linked Data for Libraries Production Cartographic Materials (LD4P-CM)

Purpose

“ ...explore best practices for creating native Linked Data descriptions for library cartographic resources including printed maps, atlases, digital geospatial datasets, and other cartographic information resources... ”

Project Wiki: <https://wiki.duraspace.org/display/LD4P/Cartographic+Extension>

Objectives for LD4P-CM project

March 2016 to June 2018

- Identify use cases, user stories, researcher needs
- Evaluate ontologies (e.g. [BIBFRAME](#), [schema.org](#))
- Evaluate Linked Open Data (LOD) entity vocabularies
([id.loc.gov](#), [FAST](#), [ISNI](#), [VIAF](#), [ISO 19139](#), [GeoNames](#))
- Develop BIBFRAME+ Cartographic Materials LOD application profile
- Help develop customized cataloging production environment ([VitroLib](#))
- Catalog variety of selected materials
- Written evaluation of project / recommendations
- Engage with CM/LOD communities to help develop community Best Practices

LD4P-CM Working Group

Team

Marc McGee (coordinator) (Harvard)
Christine Fernsebner Eslao (Harvard)
Craig Thomas (Harvard)
Iris Taylor (Library of Congress)
Kathy Weimer (Rice)
Kim Durante (Stanford)
Louise Ratliff (UCLA)
Megan Rush (East View Geospatial)
Min Zhang (Library of Congress)
Seanna Tsung (Library of Congress)
Steven Folsom (Cornell, former member)
Tammy Wong (Library of Congress)
Tim Kiser (Michigan State)



Cartographic and Geospatial Resources Use Cases

- Target use cases to help guide the modeling work
- 5 Researcher, 3 Student, 3 Librarian-focused use cases

Examples:

Student (S3) - I am a student studying **land development** of **Shanghai, China, 1900 to the present**, and would like to compare a **map** from **each decade** at **1:50,000 or larger scale**

Librarian (L1) - As the Maps Librarian responsible for curating exhibits, I would like to identify and select material from my library's collection of **maps** that show **natural features of South America** using **hachures as relief technique**

Geospatial and Cartographic Resources Ontology (GCRO)

- Intended to extend and supplement BIBFRAME and bibliotek-o to support description of geospatial and cartographic resources
- Re-use existing LOD ontologies where appropriate –
(RDA, GeoSPARQL, Web Annotations, DCMI Metadata Terms, FOAF)
- Recommendations for selecting supporting entity vocabularies
- OWL-based ontology – currently available as Beta version

https://github.com/LD4P/Cartographic_Materials/blob/master/ontologies/cm_target-ontologies/geo_cart_ont.owl

Primary ontologies used with GCRO for LD4P-CM project

Descriptive Area	Model/Ontology
Works ; Instances ; Items	BIBFRAME
Activities ; Titles ; Content/Carrier/Media ; Subjects ; Notes and Annotations	bibliotek-o
Scale ; Relief ; Projection ; Coordinates ; Types of Cartographic Resources	GCRO
Prime Meridians	rdau
Measurements	ArtFrame-RareMat

Identified areas of modeling needs/priorities

- Cartographic scale
- Cartographic relief
- Spatial extent / bounding box
- Projection
- Types of cartographic resources
- Prime meridian

GCRO modeling documentation:

https://github.com/LD4P/Cartographic_Materials/tree/master/modeling_recommendations

Cartographic Scale

bf:Scale

Property:	scale
Label:	Scale
Definition:	Ratio of the dimensions of a form contained or embodied in a resource to the dimensions of the entity it represents, e.g., for images or cartographic resources.
Used with:	Work or Instance
Expected Value:	Scale
Change Notes:	2016-04-21 (New) 2017-02-03 (changed from data to object property)

[\[back to property list\]](#) [\[back to top\]](#)

BIBFRAME Scale Example

MARC

```
034 1 $a a $b 158400
```

```
255 $a Scale [1:158,400]. 2 1/2 miles = 1 in.
```

```
:Work bf:scale [ a bf:Scale ;
```

```
    rdfs:label "158400" ;
```

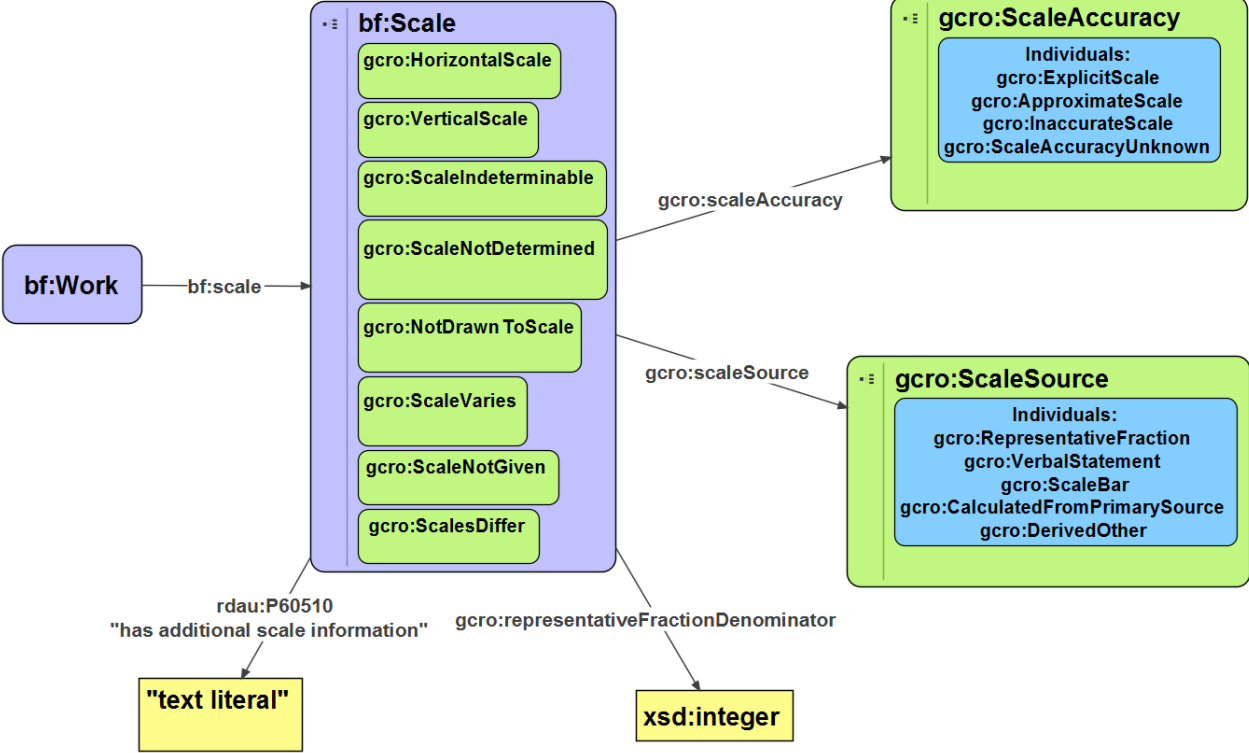
```
    bf:note [ a bf:Note ;
```

```
        rdfs:label "linear horizontal" ] ],
```

```
    [ a bf:Scale ;
```

```
        rdfs:label "Scale [1:158,400]. 2 1/2 miles = 1 in" ] ;
```

GCRO Scale Modeling



GCRO Scale Example

MARC

```
034 1 $a a $b 158400
```

```
255 $a Scale [1:158,400]. 2 1/2 miles = 1 in.
```

```
:Work bf:scale [ a gcro:HorizontalScale ;
```

```
gcro:scaleAccuracy gcro:ExplicitScale ;
```

```
gcro:scaleSource gcro:VerbalStatement ;
```

```
gcro:representativeFractionDenominator "158400"^^xsd:integer ;
```

```
rdau:P60510 "2 1/2 miles = 1 in" ] ;
```

More scale examples:

https://github.com/LD4P/Cartographic_Materials/blob/master/modeling_recommendations/GCRO_Cartographic_Scale_RDF_examples.pdf

Cartographic Relief

BIBFRAME Example

```
:Instance bf:cartographicAttributes [ a
    bf:Cartographic ;
    bf:note [ a bf:Note ;
        rdfs:label "spot heights" ;
        bf:noteType "relief" ] ],
    [ a bf:Cartographic ;
    bf:note [ a bf:Note ;
        rdfs:label "contours" ;
        bf:noteType "relief" ] ] ;
```

MARC

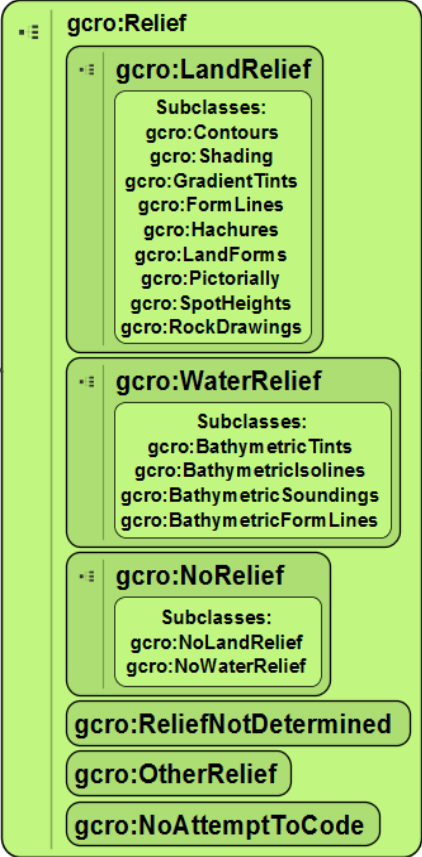
```
008 830506s1953 dcuag cc a f 0 eng
500 $a Relief shown by contours and spot heights.
500 $a Contour interval 200 feet.
```

```
:Instance bf:note [ a bf:Note ;
    rdfs:label "Relief shown by contours
        and spot heights." ],
    [ a bf:Note ;
    rdfs:label "color" ;
    bf:noteType "Physical details" ],
    [ a bf:Note ;
    rdfs:label "Contour interval 200 feet." ]
;
```


GCRO Relief Modeling

bf:Work
or
bf:Instance

rdau:P60914
"has relief type"



rdfs:comment

"text literal"

GCRO Relief Example

MARC

```
008 830506s1953 dcuag cc a f 0 eng
500 $a Relief shown by contours and spot heights.
500 $a Contour interval 200 feet.
```

```
:Work rdau:P60914 [ a gcro:Contours ;
```

```
    rdfs:comment "Contour interval 200 feet" ],
```


```
    [ a gcro:SpotRelief ] ;
```

More relief examples:

https://github.com/LD4P/Cartographic_Materials/blob/master/modeling_recommendations/GCRO_Cartographic_Relief_RDF_examples.pdf

Cartographic Coordinates

bf:coordinates

Property:	coordinates
Label:	Cartographic coordinates
Definition:	Mathematical system for identifying the area covered by the cartographic content of a resource, expressed either by means of longitude and latitude on the surface of planets or by the angles of right ascension and declination for celestial cartographic content.
Used with:	Cartographic
Expected Value:	Literal 
Change Notes:	2016-04-21 (New)

[\[back to property list\]](#) [\[back to top\]](#)

BIBFRAME Bounding Box Coordinates Example

MARC

```
034 1 $d W0720000 $e W0704000 $f N0443000 $g N0433000  
255 $c (W 72°00'--W 70°40'/N 44°30'--N 43°30').
```

BIBFRAME

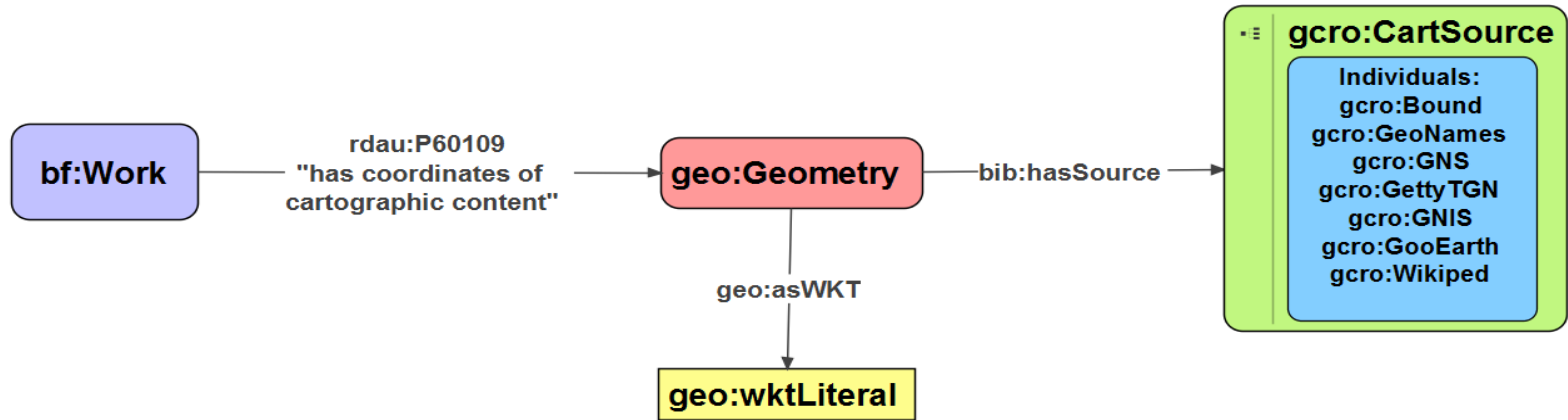
```
:Work bf:cartographicAttributes [ a bf:Cartographic ;
```

```
    bf:coordinates "W0720000 W0704000 N0443000 N0433000" ],
```

```
[ a bf:Cartographic ;
```

```
    bf:coordinates "W 72°00'--W 70°40'/N 44°30'--N 43°30'" ] ;
```

GCRO Bounding Box Coordinates Modeling



GCRO Bounding Box Coordinates Example

MARC

```
034 1 $d W0720000 $e W0704000 $f N0443000 $g N0433000  
255 $c (W 72°00' --W 70°40' /N 44°30' --N 43°30').
```

```
:Work1 rdau:P60109 [ a geo:Geometry ;
```

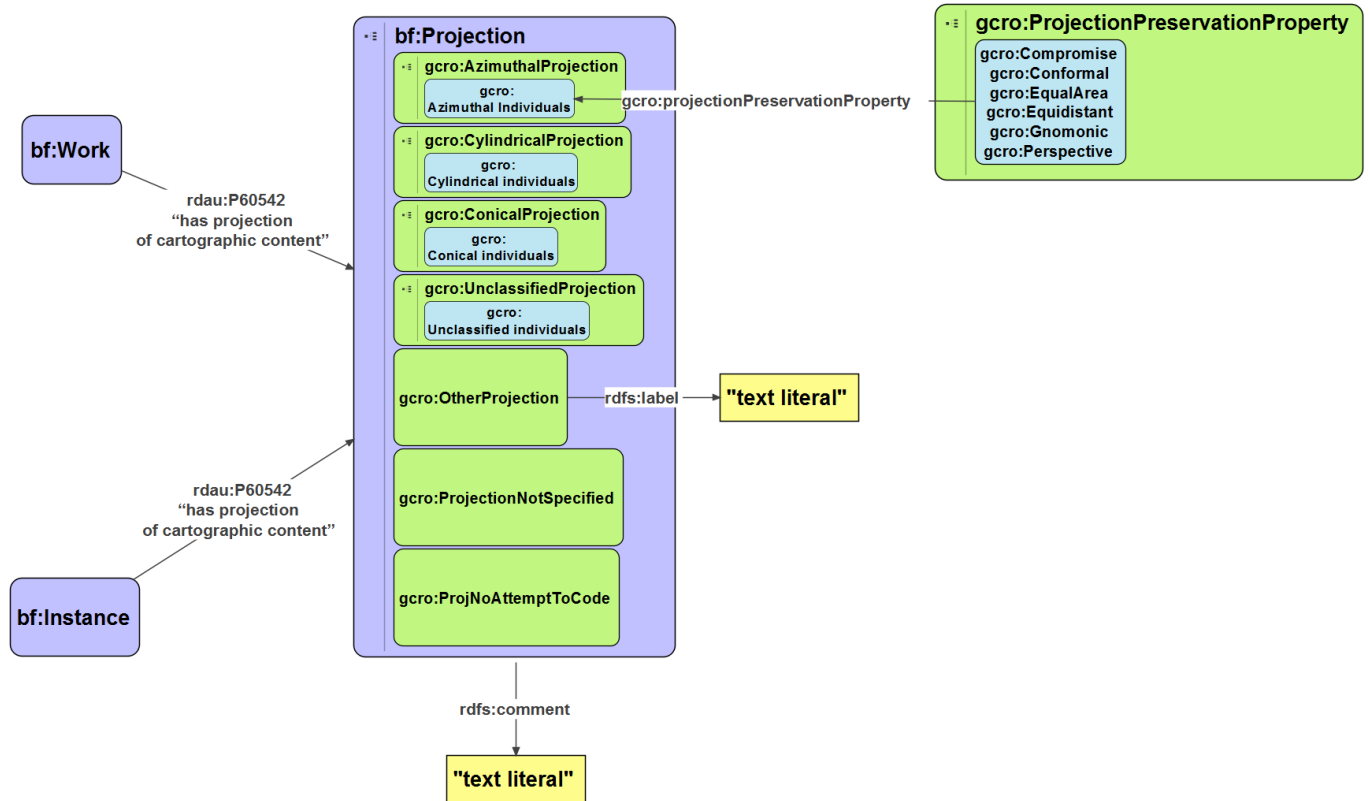
```
    bib:hasSource gcro:Bound ;          {or bib:hasSource :Work1}
```

```
    geo:asWKT "WKT POLYGON((-72.5572 45.3055, -70.5751 45.3055, -70.5751  
    42.697, -72.5572 42.697, -72.5572 45.3055))" ] ;
```

More coordinate examples:

https://github.com/LD4P/Cartographic_Materials/blob/master/modeling_recommendations/GCRO_Cartographic_Spatial_Extent_RDF_examples.pdf

Projection



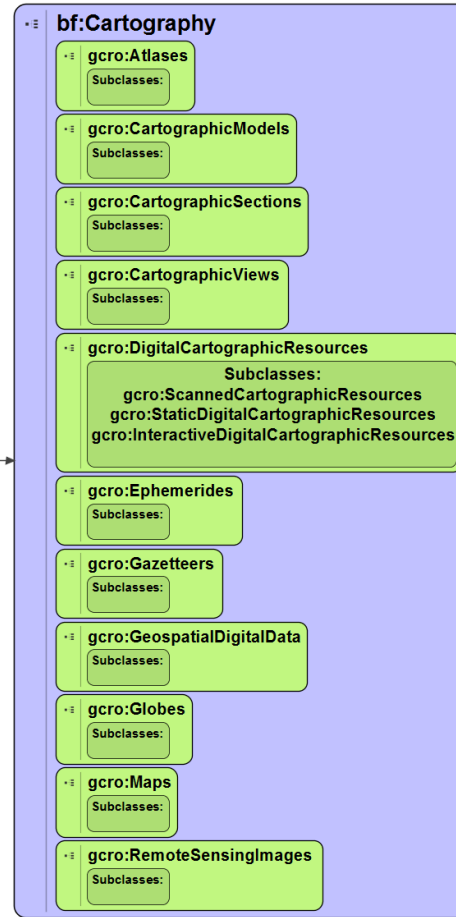
Projection examples:

https://github.com/LD4P/Cartographic Materials/blob/master/modeling_recommendations/GCRO_Cartographic_Projection_RDF_examples.pdf

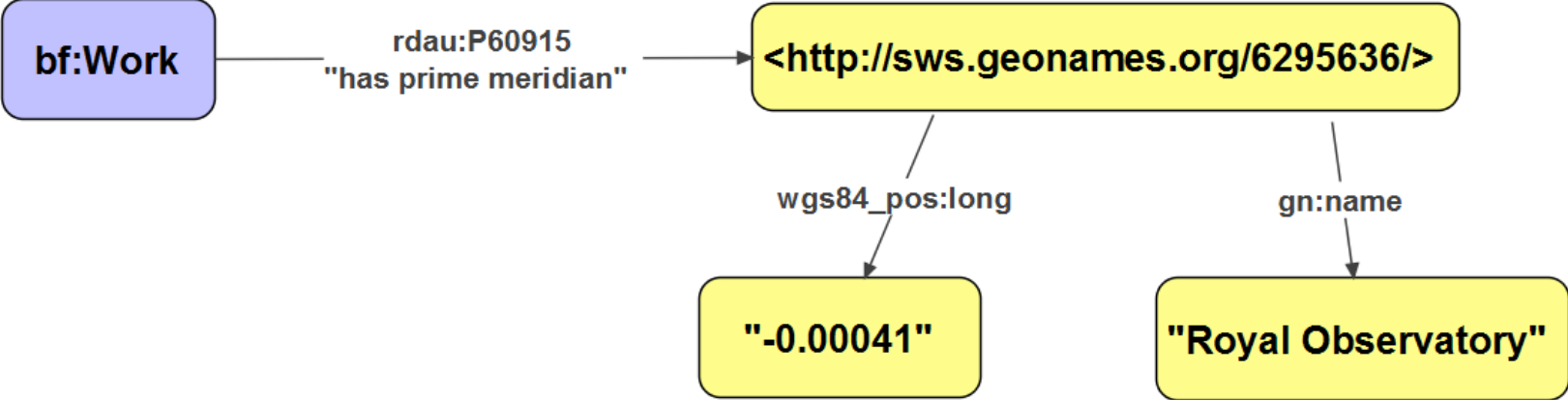
Types of cartographic resources



rdf:type →



Prime meridians



GCRO on Biblioport

<https://biblio.ontoportal.org/ontologies/GCRO>



The screenshot shows the Biblioport website interface. At the top, there is a navigation bar with the Biblioport logo on the left and links for Login, Tools, and Support on the right. Below the navigation bar, the main heading is "Geospatial and Cartographic Materials Ontology". Underneath the heading, there are several tabs: Summary, Classes, Properties, Notes, Mappings, and Widgets. The "Details" tab is selected, displaying a table with the following information:

ACRONYM	GCRO
VISIBILITY	Public
DESCRIPTION	Geospatial and Cartographic Resources Ontology is an extension ontology of the bibliotek-o BIBFRAME 2.0 extension ontology produced by the Linked Data for Libraries Cartographic Materials project for use in describing geospatial and cartographic resources
STATUS	Beta
FORMAT	OWL
CONTACT	Marc McGee, mmcgee@fas.harvard.edu
HOME PAGE	
PUBLICATIONS PAGE	
DOCUMENTATION PAGE	

To the right of the details table, there is a "Metrics" section with a help icon. It contains a table with the following data:

NUMBER OF CLASSES:	159
NUMBER OF INDIVIDUALS:	58
NUMBER OF PROPERTIES:	8
MAXIMUM DEPTH:	3
MAXIMUM NUMBER OF CHILDREN:	39
AVERAGE NUMBER OF CHILDREN:	6
CLASSES WITH A SINGLE CHILD:	5
CLASSES WITH MORE THAN 25 CHILDREN:	1
CLASSES WITH NO DEFINITION:	6

Geospatial and Cartographic Materials Ontology

Summary Classes Properties Notes Mappings Widgets

Jump To:

- Cartography
 - CartSource
- Identifier
- Projection
 - Projection preservation property
- Relief
- Scale
 - Horizontal scale**
 - Not drawn to scale
 - Scale indeterminable
 - Scale not determined
 - Scale not given
 - Scale varies
 - Scales differ
 - Vertical scale
- Scale accuracy
- Scale source
- Source

Details	Visualization	Notes (0)	Class Mappings (0)
Preferred Name			Horizontal scale
Definitions			The ratio of distances on a map to the corresponding horizontal distance in nature (Ency. Dict. of Cart.)
ID			http://ontology.library.harvard.edu/geo/HorizontalScale
definition			The ratio of distances on a map to the corresponding horizontal distance in nature (Ency. Dict. of Cart.)
issued			2018-03-26
prefixIRI			HorizontalScale
prefLabel			Horizontal scale échelle des longueurs escala horizontal
subClassOf			Scale

GCRO - No Attempt to Represent

- Parts of maps - inset maps, ancillary maps, index maps
- Date of situation
- Map features
- Places
- Geospatial metadata

VitroLib for cartographic and geospatial resources

The screenshot shows the top navigation bar of the VitroLib website. On the left is the logo for LD4L (Linked Data for Libraries). On the right, there are links for 'Index' and 'Log in', a search input field, and a 'Search' button. Below the navigation bar is a horizontal menu with the following items: Home, Works (which is highlighted with a blue underline), Instances, Items, People, and Organizations.

Works

- Cartography (13,935)
- Dataset (13,933)
- Work (13,935)

Dataset

all A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

page 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 more...

['Ain Khomān region, Egypt, 1958, Army Map Service \(AMS\) NG 35-4 \(Raster Image\)](#)

['Ain Tidjoubar region, Algeria, 1953, Army Map Service \(AMS\) NG 31-7 \(Raster Image\)](#)

['Ayn al 'Askar region, Egypt, 1958, Army Map Service \(AMS\) NH 35-14 \(Raster Image\)](#)

[1 Degree Graticule, Northeast United States, 2010](#)

[1-Meter Shaded Relief Multibeam Bathymetry Image \(Color\): Elkhorn Slough, California, 2005](#)

VitroLib with custom GCRO cartographic properties

Illuminations : the official map to the 16th annual trolley tour of Somerville's holiday displays [↗](#)

Cartographic Properties Other View All

Cartographic projection [+](#)

Scale type [+](#)

[1:25,000](#) | [✎](#) [🗑](#)

has coordinates of cartographic content [+](#)

has prime meridian [+](#)

has relief type [+](#)

[No relief shown](#) | [✎](#) [🗑](#)

Adding a GCRO relief assertion

[Home](#) | [Works](#) | [Instances](#) | [Items](#) | [People](#) | [Organizations](#)

Change entry for: has relief type

Relates a resource to a method of indicating the horizontal and vertical dimensions of land surface and terrain.

No relief shown (NoReliefShown) ▾

[Save changes](#) or [Cancel](#)

If you don't find the appropriate entry on the selection list above:

BathymetricFormLines (gcro) [Add a new item of this type](#)

- BathymetricFormLines (gcro)
- BathymetricIsolines (gcro)
- BathymetricSoundings (gcro)
- BathymetricTints (gcro)
- Contours (gcro)
- FormLines (gcro)
- GradientTints (gcro)
- Hachures (gcro)
- LandForms (gcro)
- LandRelief (gcro)
- NoAttemptToCode (gcro)
- NoReliefShown (gcro)
- OtherRelief (gcro)
- Pictorially (gcro)**
- RockDrawings (gcro)
- Shading (gcro)
- SpotHeights (gcro)
- WaterRelief (gcro)

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VitroLib RDF Output

```
40 <owl:Thing rdf:about="http://stanley.lib.harvard.edu:8080/vitrolib2/individual/n4345">
41   <rdf:type rdf:resource="http://id.loc.gov/ontologies/bibframe/Work"/>
42   <rdf:type rdf:resource="http://ontology.library.harvard.edu/geo/TouristMaps"/>
43   <rdf:type rdf:resource="http://ontology.library.harvard.edu/geo/Maps"/>
44   <rdf:type rdf:resource="http://id.loc.gov/ontologies/bibframe/Cartography"/>
45   <rdfs:label>Illuminations : the official map to the 16th annual trolley tour of Somerville's
46   holiday displays</rdfs:label>
47   <rdau:P60914>
48     <gcro:Relief rdf:about="http://stanley.lib.harvard.edu:8080/vitrolib2/individual/n7836">
49       <rdf:type rdf:resource="http://ontology.library.harvard.edu/geo/Pictorially"/>
50       <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
51       <rdf:type rdf:resource="http://ontology.library.harvard.edu/geo/LandRelief"/>
52       <rdfs:label>pictorially</rdfs:label>
53       <vitro:mostSpecificType rdf:resource="http://ontology.library.harvard.edu/geo/Pictorially"/>
54     </gcro:Relief>
  </rdau:P60914>
```


Upcoming work

- Production test cataloging in VitroLib
- SHACL (Shapes Constraint Language) profile
- Full documentation
- Finding ontology hosting home(s)
 - GCRO namespace
 - BIBFRAME integration
 - RDA and other ontologies
 - Community home - maintenance / management

Ending June 30, 2018

Feedback for LD4P-CM

- GCRO modeling decisions, implementation
- Community management & maintenance options

GitHub Issues: https://github.com/LD4P/Cartographic_Materials/issues

Related Links and Resources

Linked Data for Production (LD4P) <https://wiki.duraspace.org/display/LD4P>

LD4P-Cartographic Materials

Project wiki <https://wiki.duraspace.org/display/LD4P/Cartographic+Extension>

Ontology and documentation files https://github.com/LD4P/Cartographic_Materials

GCRO on Bibliportal <https://biblio.ontportal.org/ontologies/GCRO>

Article

Toward a Linked Data Model for Describing Cartographic Resources [article] (Marc McGee, Harvard Library, Kim Durante, Stanford University, and Katherine Hart Weimer, Rice University, Journal of Map and Geography Libraries, May 11, 2017) <http://dx.doi.org/10.1080/15420353.2017.1308291>

Related Links and Resources, continued

Linked Data for Libraries Labs (LD4L) <https://www.ld4l.org/ld4l-labs/>

Harvard LD4L Geospatial Metadata conversion project:

<https://wiki.harvard.edu/confluence/display/LibraryStaffDoc/Harvard+Geospatial+Library+%2528HGL%2529+to+Linked+Data+Metadata+Conversion>

BIBFRAME <https://www.loc.gov/bibframe/>

MARC to BIBFRAME comparison viewer <http://id.loc.gov/tools/bibframe/compare>

bibliotek-o <https://wiki.duraspace.org/display/LD4P/bibliotek-o>

SHACL <https://www.w3.org/TR/shacl/>

VitroLib <https://wiki.duraspace.org/display/ld4lLABS/The+VitroLib+Metadata+Editor>

Thanks! Questions?

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