Chris Fleet
Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers

Online at: http://tiny.cc/755x3y
● Introduction
● Georeferencing workflows
● Open-source viewers
● Onward use and re-use
● Conclusions

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NATIONAL LIBRARY OF SCOTLAND - CAUSEWAYSIDE BUILDING
NATIONAL LIBRARY OF SCOTLAND - MAPS READING ROOM
NATIONAL LIBRARY OF SCOTLAND - MAP COLLECTIONS

- 2 million sheet maps
- 15,000 atlases
- 100,000 maps on microfilm
- Over 200 terabytes of digital mapping

Also gazetteers, cartographic reference books and periodicals, and planning reports…
NLS MAPS WEBSITE OVERVIEW

- NLS paper collections ca. 2 million maps
- NLS Map Images website 220,000 online maps - ca. 12% of whole collection
- ca. 600 georeferenced layers
- 2012-2018 - ca. 30,000 new maps digitised per annum

Google Analytics - maps.nls.uk
February 2019

- 151,139 users
- 293,859 sessions
- 1,271,049 page views
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STRUCTURAL MODEL OF MAP WEBSITE COMPONENTS

Users

Find By Place Viewer

OpenLayers Viewer

Explore Georeferenced maps Viewer

WMS / WMTS Services, API

Shapefiles / bounding boxes

Descriptive Metadata

Derivative Images

Georeferenced Images

Metadata

TIFF master images

GeoTIFF master images

Maps
BOUNDING BOXES FOR SIX-INCH MAPPING
FIND BY PLACE - BOUNding BOX SEARCH INTERFACE

https://maps.nls.uk/geo/find/
EXPLORE GEOREFERENCED MAPS - SEAMLESS GEOREFERENCED LAYER
Ordnance Survey Maps - Six-inch 2nd and later editions, Scotland, 1892-1960

The most comprehensive, topographic mapping covering all of Scotland from the 1890s. Regular updates in the 20th century for urban or rapidly changing areas to the 1960s.

Browse the maps:

- [As individual sheets using a zoomable map of Scotland](#)
- [As a seamless zoomable overlay layer on modern Google and OS maps](#)
- [By county – text lists](#)

See also:

- [Guide to abbreviations](#) – alphabetical list of standard OS abbreviations
- [Guide to symbols](#) – OS Characteristics Sheet (1897)
- [Characters of writing](#) – OS Lettering Styles (1897)
- [Conventional signs and writing](#) – OS Symbols and Lettering (ca. 1923)
- [List of Scottish counties](#), with their changes of meridian, dates of survey and publication.

Further information:

- [Map content and revision dates](#)
- [Projections, Meridians, Sheet extents and printing](#)
KLOKAN TECHNOLOGIES’ GEOREFERENCER - 2011-17

NLS Map Georeferencer home page - online map georeferencing pilot programme

The Georeferencer application is a collaborative online project, where anyone with access to Internet can help with georeferencing of various historical maps from our collection.

Why georeference maps? | About georeferencer | Help

Please help the National Library of Scotland to georeference our scanned historical maps.

Select a map at random you would like to georeference.

View maps already georeferenced:
Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers

KLOKAN TECHNOLOGIES’ GEOREFERENCER - 2011-17
SERIES MAP LAYERS

Ordnance Survey
25 inch to the mile / 1:2,500 - Great Britain

49,440 map sheets in one layer
USING QGIS MAPSHEETAUTOGEOREF PLUGIN

DETECTING SHEET CORNERS AND COORDINATES FOR AUTOMATIC GEOREFERENCING

Using the Gough Transform and OpenCV to detect sheet corners

G. Stavropolou (2014)
https://www.era.lib.ed.ac.uk/handle/1842/10347

Admiralty chart - detecting corners and graticule

Detecting sheet corner and OCR of Eastings and Northings
USING MAPTILER FOR ONLINE DELIVERY OF GEOREFERENCED IMAGES

Software for converting your data into fast zoomable maps
Load your image or geodata and get a tiled map

Features of MapTiler Desktop

https://www.maptiler.com/desktop/
MAPTILER WMTS / XYZ TILESET OUTPUT

Format:
server-and-url/zoom/x/y.png
SEAMLESS LAYER CREATED WITH MAPTILER
CROPPING SHEETS IN GEOGRAPHIC IMAGER - BEFORE
CROPPING SHEETS IN GEOGRAPHIC IMAGER - AFTER
Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers

- Introduction
- Georeferencing workflows
- Open-source viewers
- Onward use and re-use
- Conclusions
EXPLORE GEOREFERENCED MAPS VIEWER - CHOOSING LAYERS
EXPLORE GEOREFERENCED MAPS VIEWER - CHOOSING LAYERS
EXPLORE GEOREFERENCED MAPS VIEWER - CHANGING TRANSPARENCY
EXPLORE GEOREFERENCED MAPS VIEWER - CHANGING TRANSPARENCY
EXPLORE GEOREFERENCED MAPS VIEWER - CHANGING TRANSPARENCY
EXPLORE GEOREFERENCED MAPS VIEWER - SIDE-BY-SIDE

Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers
EXPLORE GEOREFERENCED MAPS VIEWER - SIDE-BY-SIDE WITH SWIPE
EXPLORE GEOREFERENCED MAPS VIEWER - SIDE-BY-SIDE
EXPLORE GEOREFERENCED MAPS VIEWER - 3D VIEWER
EXPLORE GEOREFERENCED MAPS VIEWER - 3D VIEWER
EXPLORE GEOREFERENCED MAPS VIEWER - SPY VIEWER
SHARING CODE FOR VIEWERS ON GITHUB

https://github.com/NationalLibraryOfScotland
Introduction

Georeferencing workflows

Open-source viewers

Onward use and re-use

Conclusions
HISTORIC MAPS API

NLS Historic Maps API: Historical Maps of Great Britain for use in mashups

This seamless historic map can be:
- embedded in your own website
- used for research purposes
- used as a backdrop for your own markers or geographic data
- used to create derivative work (such as OpenStreetMap) from it.

The mapping is based on out-of-copyright Ordnance Survey maps, dating from the 1920s to the 1940s.

View more information on:
- how to display the historic map in your mobile device or phone
- how to embed the historic map in your website
- how to use the map in a mashup
- announcement mailing list for news and updates
- licence and terms of use
- which map series are used
- how the historic map was prepared

View our Historic Maps Subscription API for details of other map layers available by subscription

http://maps.nls.uk/projects/api/
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API USER COMMUNITIES - OUTDOOR LEISURE

[Image of various outdoor leisure websites]

- outdoors magic
- Custom Made Maps
- WalkingForum.co.uk
- Penrith Anglers on-line
- Singletrack
- GEOCACHING

Welcome to Song of the Paddle: the online home for those with a love of, or an interest in, open canoe and canoeing. For those who hear the drum call that draws them to the water in their open canoe.
Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers

API USER COMMUNITIES - METAL DETECTING

Welcome to the Portable Antiquities Scheme website

Welcome to Finding The Past, a website recording historic artefacts found by metal detectorist Dr Patrick Brown. I am a keen supporter of the British Museum Portable Antiquities Scheme, a voluntary scheme to record archaeological objects found by members of the public. With the help of Peter Rawoll, the Shropshire and Herefordshire Portable Antiquities Officer, I record all my finds from before 1700 on this database.

For each find I detect, I run a private section on this website, with photographs of each find and a link to its Portable Antiquities Scheme entry. After recording I am happy to share my finds with the farmer. Below are some sample finds. Just click on a find's photograph to see its webpage from one of the private sections.
API USER COMMUNITIES - LOCAL HISTORY

King's Lynn Forums

Sheffield History

www.kirkcudbright.com

Mortimer Village

Kent History Forum
HISTORIC MAPS SUBSCRIPTION API

NLS Historic Maps Subscription API
Detailed historical Maps of Great Britain for use in mashups

These seamless historic map layers can be:

- embedded into your own website
- used for research purposes
- used as a backdrop for your own markers or geographic data
- used as a layer inside desktop GIS software

These layers complement our free NLS Historic Maps API, which makes available layers of mapping covering Great Britain from 1:1 million to 1:63,360 scales, dating between the 1920s and 1940s. We intend to continue this as a freely available service.

The Subscription API layers are more detailed, and have involved more work to create. Subscriptions are necessary to fund these additional costs, as well as the costs of hosting, licensing, and 24/7 availability.

View more information on:

https://maps.nls.uk/projects/subscription-api/
HISTORIC PLACE NAMES OF WALES

https://historicplacenames.rcahmw.gov.uk/
CANMORE MAP INTERFACE

https://canmore.org.uk/site/search/
DIGIMAP FOR SCHOOLS

https://digimapforschools.edina.ac.uk/
SCOTS-ITALIANS MAP VIEWER

https://maps.nls.uk/projects/italians/
LAND USE VIEWER WITH HISTORIC ENVIRONMENT SCOTLAND

https://maps.nls.uk/projects/landuse/
LEGACIES OF BRITISH SLAVE OWNERSHIP - JAMAICA
LEGACIES OF BRITISH SLAVE OWNERSHIP - JAMAICA

https://www.ucl.ac.uk/lbs/maps/
LEGACIES OF BRITISH SLAVE OWNERSHIP - JAMAICA

https://www.ucl.ac.uk/lbs/maps/
GB1900 PLACENAME TRANSCRIPTION PROJECT

Purpose:

To create a gazetteer of all the place names on detailed maps of Great Britain from a century ago.

Joint Project:

- National Library of Scotland
- National Library of Wales
- University of Portsmouth - Great Britain Historical GIS Team (Vision of Britain website)
Brown pins are pins worked on by the logged-on transcriber.
Green pins mean further work is needed - transcribed once or transcriptions don't match.
Purple pins have two separate matching transcriptions and are complete.
GB1900 - DOT DISTRIBUTION MAPS SHOWING PROGRESS

24 Oct 2016

2 Dec 2016

24 Jan 2017
GB1900 - COMPLETION!

GB1900 closed for transcriptions on 7 Jan 2018

2.52 million confirmed names - ie. input by two independent transcribers

https://geo.nls.uk/maps/gb1900/
SEARCHING GB1900 GAZETTEER ON NLS WEBSITE

http://maps.nls.uk/geo/explore/
USING GEOREFERENCED LAYERS IN QGIS - WMTS LAYER

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VECTORISATION OF MAP CONTENT - OPENSTREETMAP

Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers
**SHARED GEOSPATIAL WEB-SERVICES**

https://leaflet-extras.github.io/leaflet-providers/preview/

Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers
Paper maps can be commodified through transforming them into:

- digital maps
- georeferenced maps
- seamed georeferenced layers
- web-services - raster data (WMS/WMTS)
- extracted data
- web-services - vector data (WFS/WCS)
DAVID RUMSEY MAP COLLECTION

The David Rumsey Map Collection Database has many viewers and the Blog has numerous categories. The physical map collection is housed in the David Rumsey Map Center at the Stanford University Library. The historical map collection has over 57,000 maps and related images online. The collection includes rare 16th through 21st century maps of America, North America, South America, Europe, Asia, Africa, Pacific, Russia, and the world.
SALES OF IMAGES AND PRINTOUTS

![Line chart showing sales of images and printouts from March 2016 to February 2018. The chart displays monthly sales data, with peaks and troughs indicating variations in sales throughout the period.](chart_image)
SALES OF IMAGES AND PRINTOUTS

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of orders</th>
<th>Average order value</th>
<th>Total order value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 2019</td>
<td>141</td>
<td>£21.66</td>
<td>£3,081.65 (Predicted total: £13,647.31)</td>
</tr>
<tr>
<td>Feb 2019</td>
<td>471</td>
<td>£20.53</td>
<td>£9,671.60</td>
</tr>
<tr>
<td>Jan 2019</td>
<td>516</td>
<td>£21.18</td>
<td>£10,930.65</td>
</tr>
<tr>
<td>Dec 2018</td>
<td>659</td>
<td>£22.18</td>
<td>£14,514.45</td>
</tr>
<tr>
<td>Nov 2018</td>
<td>655</td>
<td>£21.15</td>
<td>£13,852.50</td>
</tr>
<tr>
<td>Oct 2018</td>
<td>499</td>
<td>£21.85</td>
<td>£10,904.70</td>
</tr>
<tr>
<td>Sep 2018</td>
<td>433</td>
<td>£19.73</td>
<td>£8,544.55</td>
</tr>
<tr>
<td>Aug 2018</td>
<td>458 (457 via PayPal)</td>
<td>£21.39</td>
<td>£9,795.10</td>
</tr>
<tr>
<td>Jul 2018</td>
<td>414</td>
<td>£20.27</td>
<td>£8,390.05</td>
</tr>
<tr>
<td>Jun 2018</td>
<td>369</td>
<td>£20.81</td>
<td>£7,680.35</td>
</tr>
</tbody>
</table>

Action: View orders
## COMMERCIAL USAGE OF MAPS

### Non-georeferenced:
- Map jigsaws
- Use in films and television
- Use in print media publications (covers, illustrations, calendars, etc.)

### Georeferenced:
- Archaeological site consultancy
- Assessing environmental risk
- Conveyancing of property and land
- Custom wallpaper and fabric
- Genealogy
- Graphics
- Use in digital map apps
CUSTOMISED WALLPAPER

https://www.custom-wallpaper-printing.co.uk/wallpaper-historic-os-maps.html
Maps in Libraries, 2019 - Creating, Managing, and Maximising the Potential of Large Online Georeferenced Map Layers

CUSTOMISED WALLPAPER

Historical Wallpaper Maps from 1888-1913
Ordnance Survey: Six-Inch To The Mile (1:10,560)

You can make an eye catching feature of any wall at home or in the office with our historic wallpaper maps sourced from the Ordnance Survey County Series mapping at Six inches to the mile (1:10,560), dating between 1888-1913. The six inch maps are immensely valuable for local and family history and is the most detailed topographic mapping that covers all of Great Britain, allowing most features in the landscape to be shown.

From the 1884 surveys were carried out at increasingly detailed scales and were used for many purposes including railway construction, geological survey and sanitary works. In order to ensure complete and accurate coverage, the 1842 Survey Act had already given surveyors the right to “enter into and upon any land” in the course of their studies.

The Ordnance Survey County Series captures Britain at the height of its imperial prosperity. All but the two largest cities still had clearly defined boundaries, but within most of the urban spread that has since overtook so much of the landscape. The construction of over 10,000 miles of railway track had made its mark on the physical landscape.

The maps still clearly show many of Britain’s ancient features and settlements, but these are now dominated by the new Victorian urban society which in many ways forms the basis of our own.

Order Your Six-Inch To The Mile Historic Wallpaper Map

1888-1913 Ordnance Survey Map Great for a detailed wallpaper map of your local area. The original mapping scale is six inches to the mile (1:10,560).

https://www.custom-wallpaper-printing.co.uk/wallpaper-historic-os-maps.html
PERSONALISED LOCATION-BASED ANTIQUE PRODUCTS

https://www.atlas-and-i.com/
PERSONALISED LOCATION-BASED ANTIQUE PRODUCTS

https://www.atlas-and-i.com/
Conclusions

Large georeferenced layers and web-services:
- are straightforward to create with series bounding boxes
- reach significantly more users
- can easily integrate with existing OGC services and applications
- encourage many new applications with minimum work for map libraries
- maximise opportunities for gazetteer generation, feature extraction and vectorisation
- have a significant income-generation potential
THANK YOU

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Online at: http://tiny.cc/755x3y