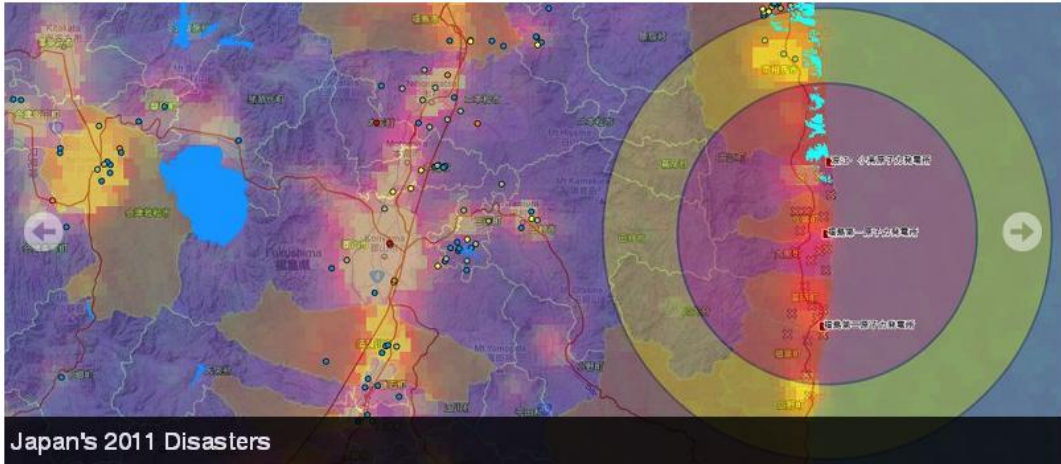


# WorldMap

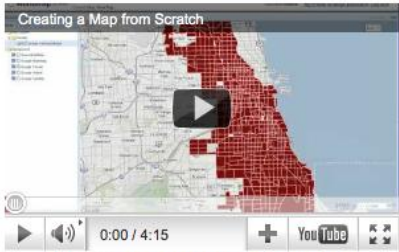
## a Spatial Perspective for Collaborative Research & Education

Create a Map   View a Map   About



Japan's 2011 Disasters

Build your own mapping portal and publish it to the world or to just a few collaborators. WorldMap is open source software.



[Watch the WorldMap Quick Start video](#)

# WorldMap Overview

## Why WorldMap & what are its features?

### A brief history of WorldMap

- Purpose & Features – visitation & user

### Basic Concepts & Definitions

- Layers – a virtual stratigraphy
- Spherical Mercator – the Google/Bing projection
- Base map options – Google & OpenStreetMap

### Simple Examples

- Georeferenced aerial photos – Tunisia 1974
- Georeferenced topographic maps – Giza
- Political boundaries – Cyprus 1975

**Online Georeferencing** – [warp.worldmap.harvard.edu](http://warp.worldmap.harvard.edu)

**Large Scale Maps with extensive micro data**

**Web Services**

Sites & Documentation – integration with the Dataverse Network

Mediterranean Coast GIS -Phoenician Harbor in Cyprus

Middle East Spatial Collaborative

# Why WorldMap?

**WorldMap provides researchers with the ability to:**

<http://about.worldmap.harvard.edu>

**Upload** large datasets and overlay them up with thousands of other layers

**Create and edit maps** and link map features to rich media content

**Share edit or view access** with small or large groups

**Export data** to standard formats

Make use of powerful **online cartographic tools**

**Georeference** paper maps online

<http://warp.worldmap.harvard.edu>

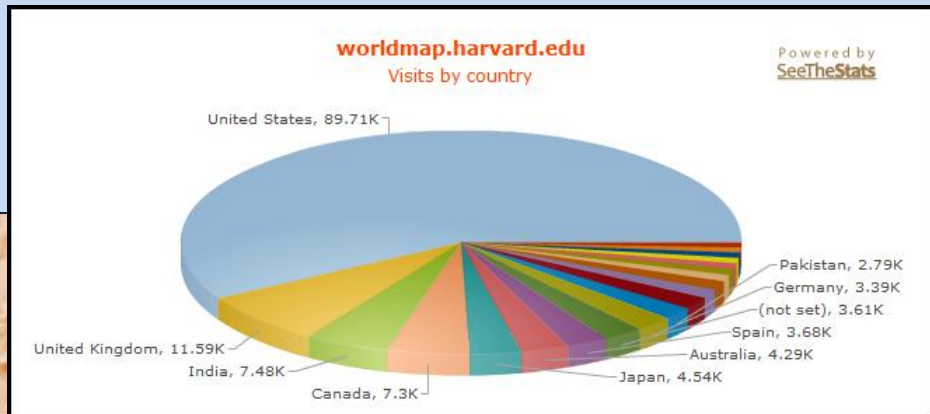
**Publish** one's data to the world or to just a few collaborators

© 2012 Center for Geographic Analysis at Harvard

# WorldMap System Statistics

## Since the release last July 2011:

- 3,891 registered users
- 4,216 data layers – 61,180 fields
- 1018 maps published
- 138,000 visitors from every country in the world
- 700 visitors / day average



© 2012 Center for Geographic Analysis at Harvard

# History of WorldMap

**Africa Map** – 2009 release of Phase 1 provides demonstration of concepts and some functionality

## Purposes

- Make data available for research projects and public use
- Provide a repository for maps and data that would be difficult to access after a project is completed.
- Encourage collaboration among researchers
- Provide resources not easily found and readily
- 1 million place name gazetteer that is searchable
- Locational reference to online images, videos & web services
- Provide political, ethnographic and language data previously scattered in many sources.

**Demonstrate the uses for web-based GIS** – no longer requires sophisticated desktop software to accomplish fundamental tasks like georeferencing maps [warp.worldmap.harvard.edu](http://warp.worldmap.harvard.edu)

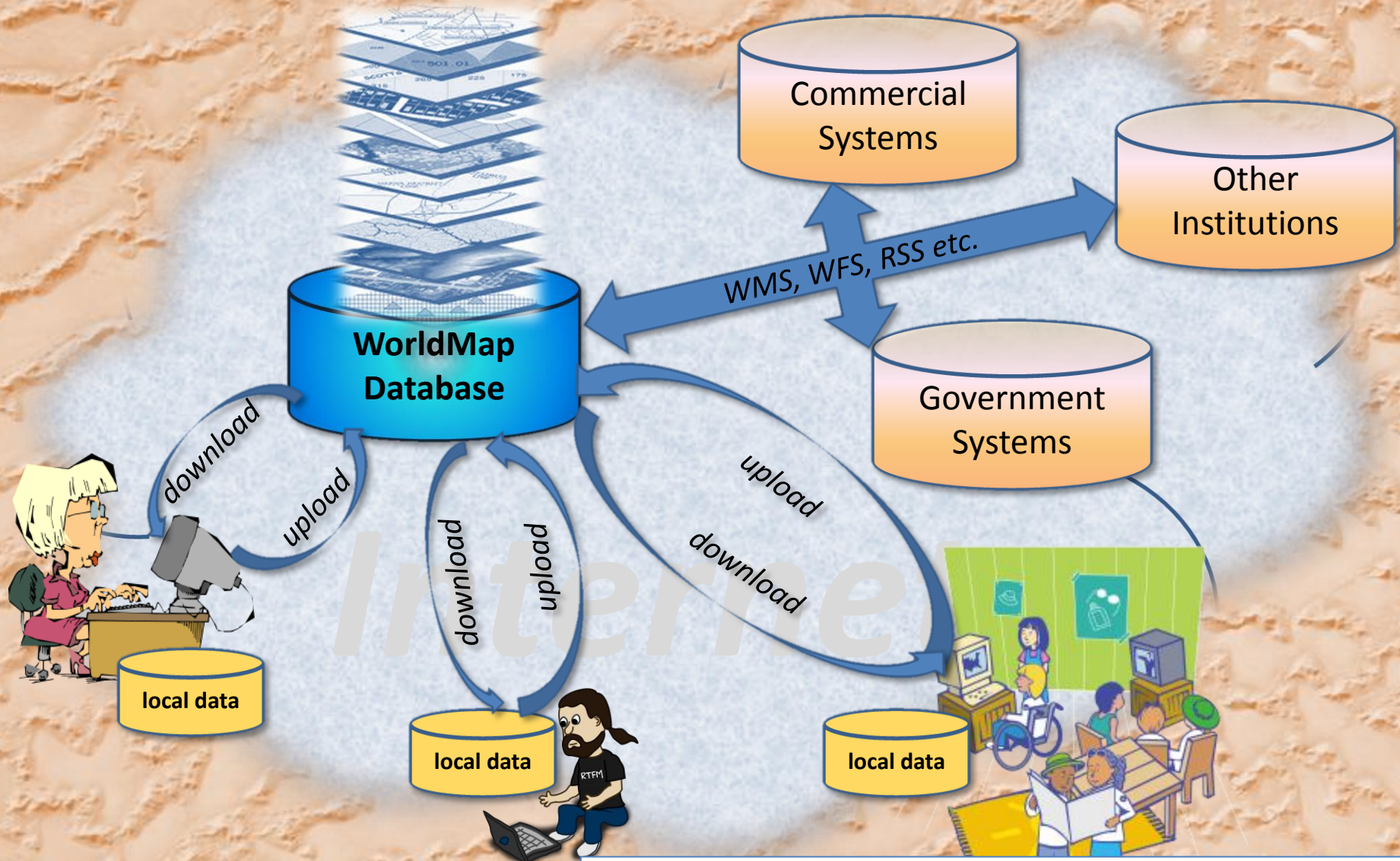
# What is WorldMap?

- A new way to share geospatial information
- Blends library and workbench
- Online creation and publishing
- Fine-grained access control
- Service oriented architecture
- Collaboration at levels of code, hosting, and functionality
- Online analysis ... coming soon

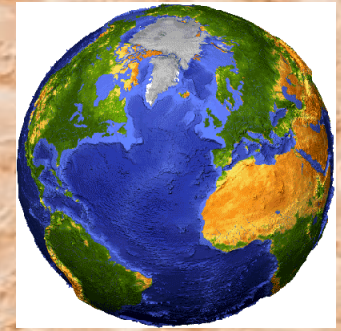
# WorldMap Allows One to...

- **Discover** data and visualize it in new ways
- **Organize** one's own (large) mapping datasets online
- **Mashup / Overlay** one's data with those of others
- **Animate** **change over time** for large datasets
- **Collaborate** by letting several people edit the same map
- **Publish** your data to the world or to just a few collaborators

# Sharing via System Interoperability







## Names and Concepts across the Geography Spectrum

Cartographers – among the first ‘geographers’

Tourism Geography

Human Geography

Arab & Greek Geographers – Ptolemy (2<sup>nd</sup> Cent. C.E.)

Central Place Theory

Location Theory

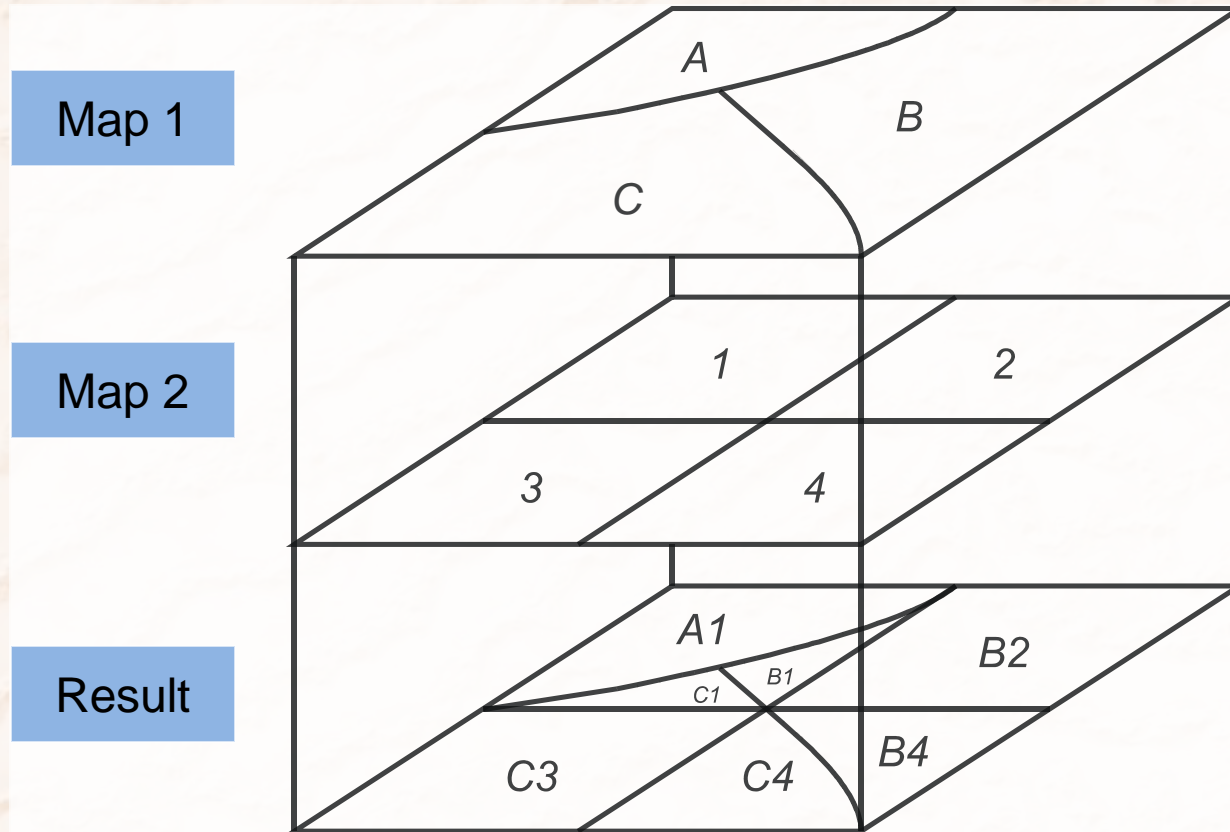
Economic Geography

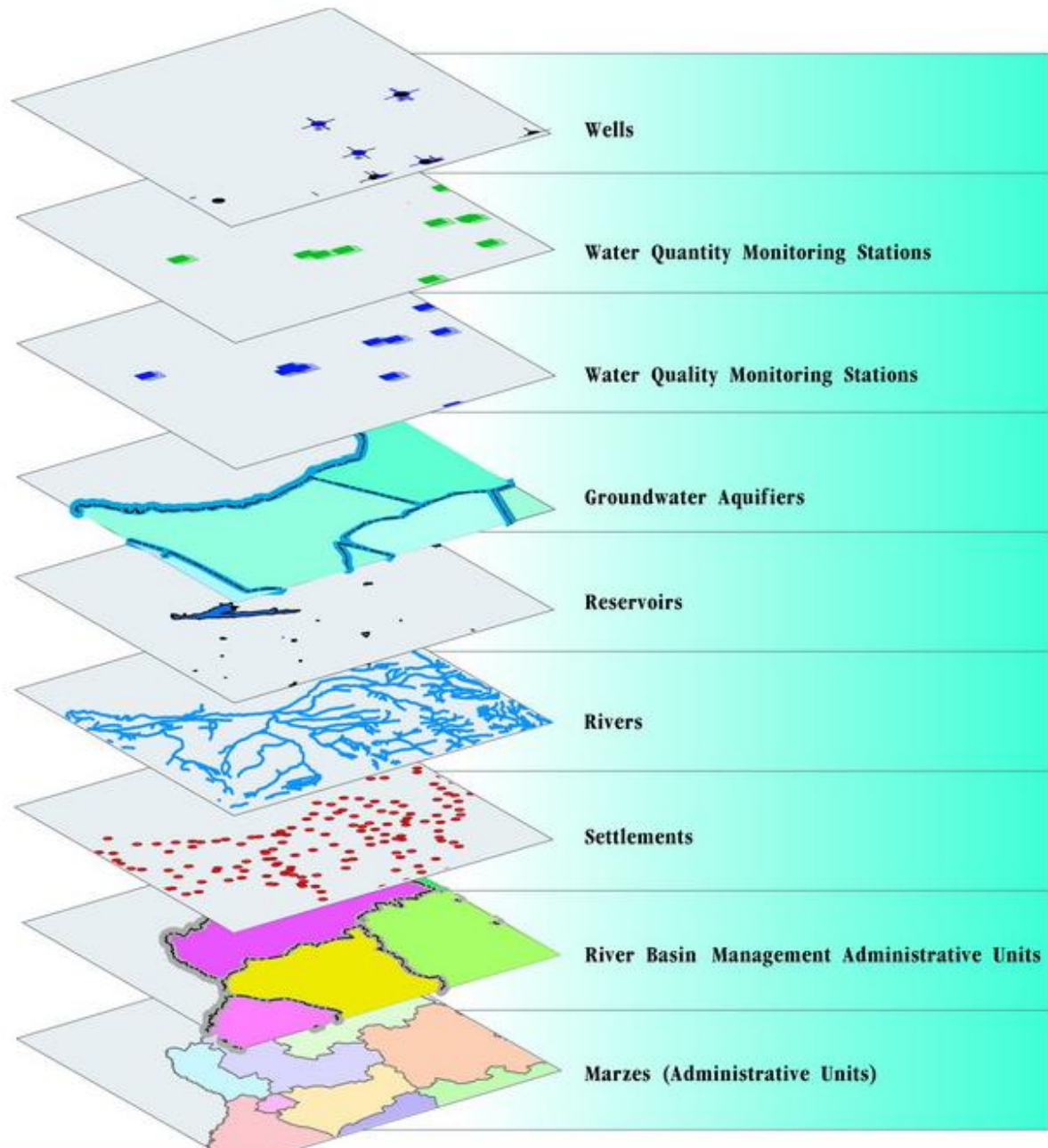
German vs. British schools of geography

Ecotourism

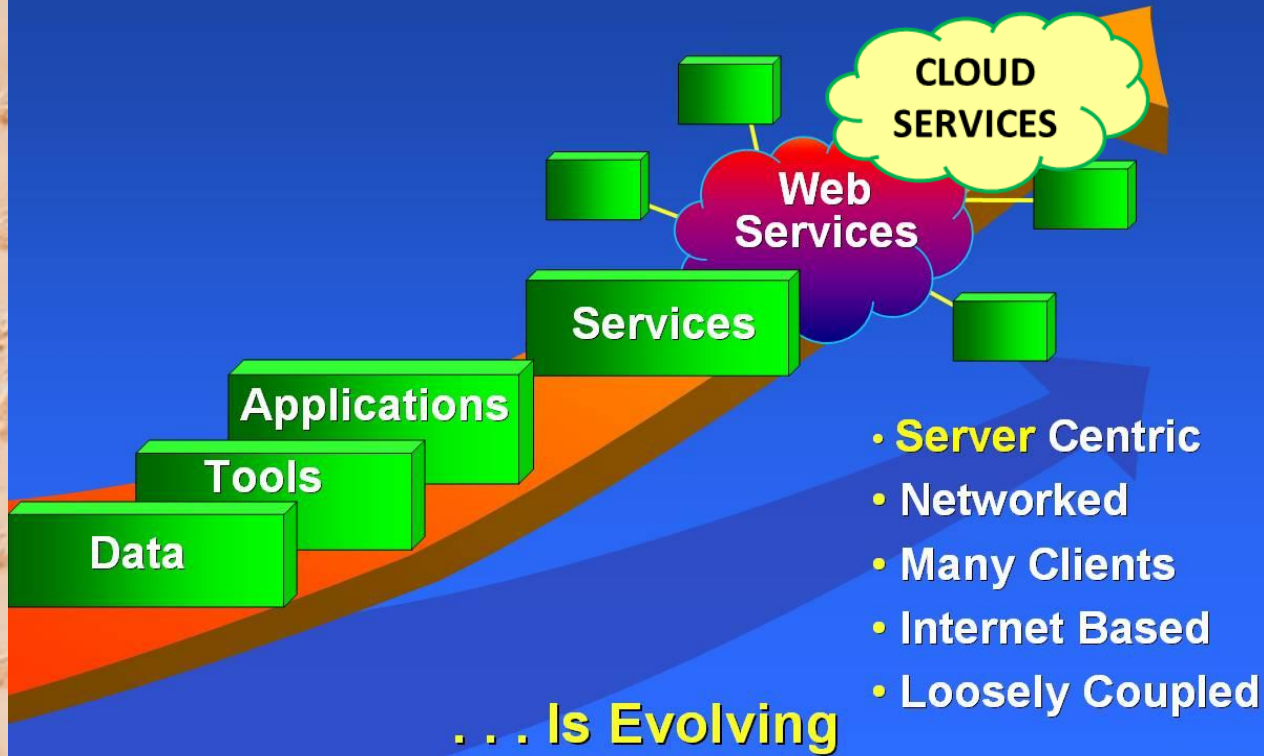
Political Geography

What is the result of the overlay of 3 maps? Logical combination (overlay) of information layers (*thematic maps*) to derive new spatial information.





# Geographic Information Software



UC2002Final-JD 6

[http://140.112.64.84/course/GIS\\_Intro/Week01/concept/1-2.htm](http://140.112.64.84/course/GIS_Intro/Week01/concept/1-2.htm)

# Cloud Services & WorldMap

- **Cloud Services** – application hosting in a remote data center with high-availability and the ability to expand (add more servers) or reduce resources depending upon user demand.

**WorldMap** runs on Amazon's Cloud [aws.amazon.com/ec2](https://aws.amazon.com/ec2)

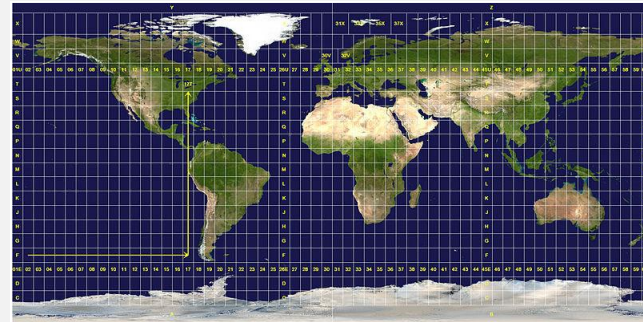
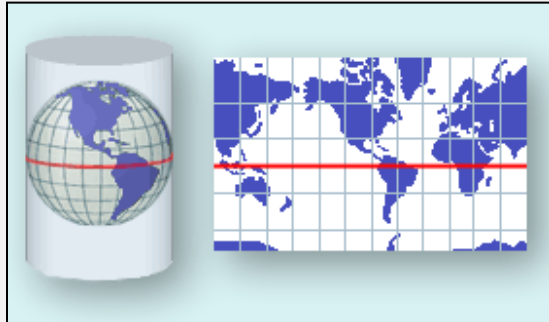
- **Web-based application** deployment requires no on-site IT support except a broad Internet connection and user laptops/desktops.

**WorldMap** – uses Firefox, Internet Explorer & Chrome

# GIS Basics

**Georeferencing** – a system for referencing information to a position on the earth's surface

Coordinate System – Universal Transverse Mercator (first adopted in US 1930's)



The transverse Mercator projection orients the 'equator' north-south (through the poles), thus providing a north-south oriented swath with *little distortion*.

[geology.isu.edu/geostac/Field\\_Exercise/topomaps/utm.htm](http://geology.isu.edu/geostac/Field_Exercise/topomaps/utm.htm)

#1 Story Street, Cambridge, MA  
(from Google Earth)

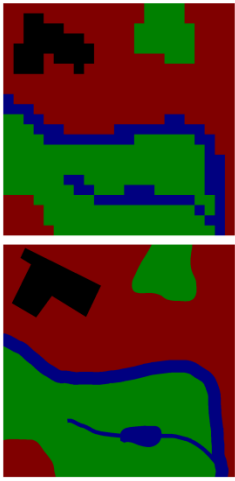
42°22'26.89"N  
42.374136

71° 7'18.59"W  
-71.121831

The decimals can be carried out to four places, resulting in a notation of "DD.XXXX". When using four decimal places, the decimal degree system is accurate to within  $\pm 36.5$  feet (11.12 m).

**Google and Bing** both use a '**spherical projection**' of **imagery tiles** which differs from the traditional 'flat' projection systems commonly used on maps.

## Images



**Raster Image** - made up of a specific number of dots. If you blow up a [raster graphic](#) it will look blocky, or "pixelated."

Common formats - [.BMP](#), [.TIF](#), [.GIF](#), [.JPG](#) - Typical file formats

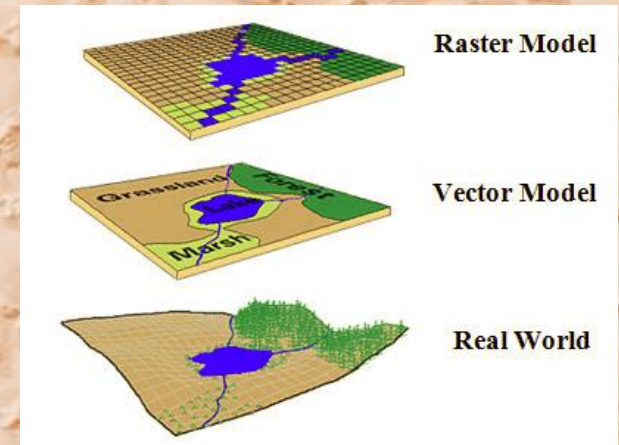
[www.techterms.com/definition/rastergraphic](http://www.techterms.com/definition/rastergraphic)

**Vector** - comprised of paths, which are defined by a start and end point, along with other points, curves, and angles along the way. A path can be a line, a square, a triangle, or a curvy shape. [.AI](#), [.EPS](#), [.SVG](#), [.DRW](#) - Typical file formats.

[www.techterms.com/definition/vectorgraphic](http://www.techterms.com/definition/vectorgraphic)

In GIS work, **raster images** are the basic type of images that are georeferenced and then added as a layer in a GIS project

GIS applications often produce **vector images** that are the end result of creating polygons or other areas



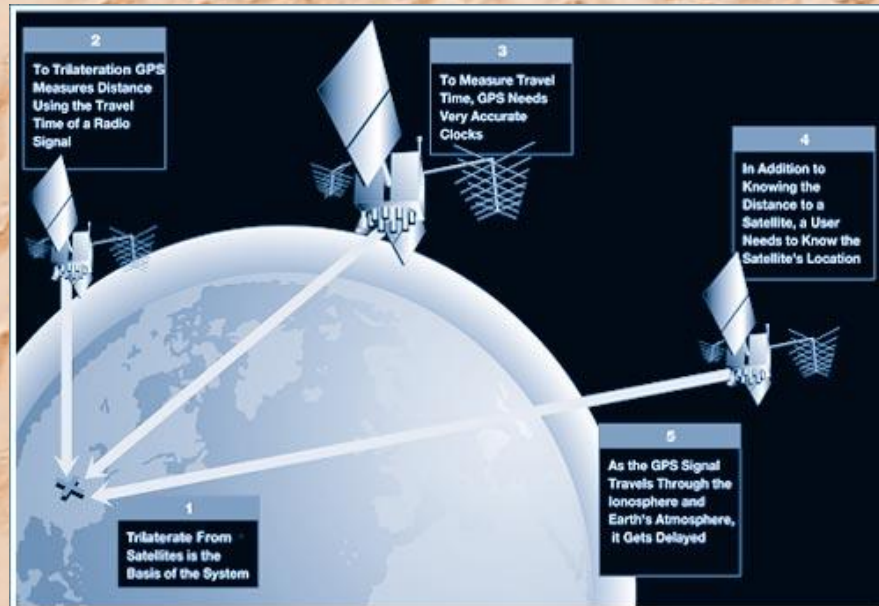
<http://www.stonecourses.net/environment/gis2.html>



## GPS – Global Positioning System

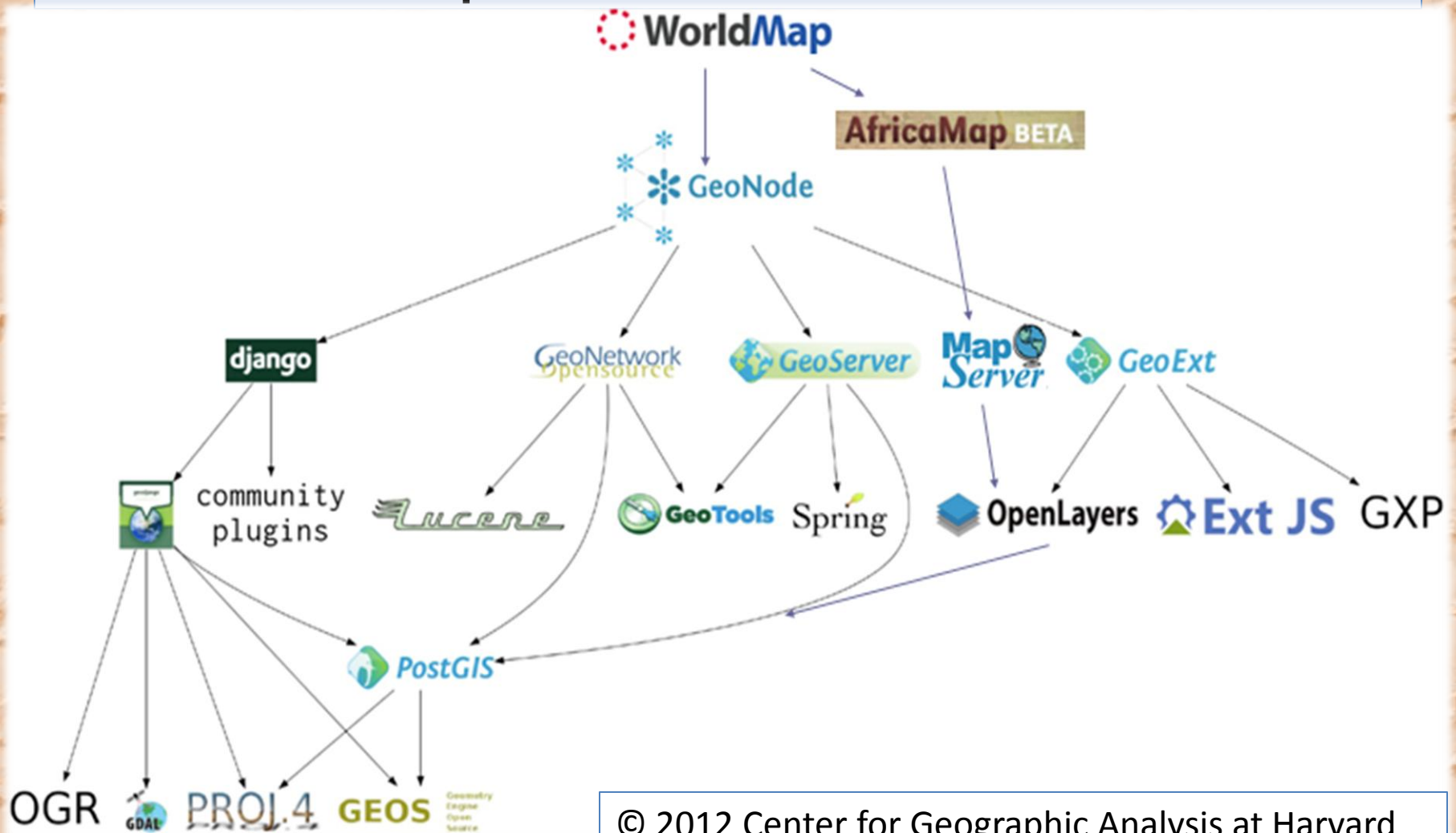
There are at least 24 operational GPS satellites at all times plus a number of spares. The satellites, operated by the US DoD, orbit with a period of 12 hours (two orbits per day) at a height of about 11,500 miles traveling at 9,000 mph (3.9km/s or 14,000 kph). Ground stations are used to precisely track each satellite's orbit.

<http://www.pocketgpsworld.com/howgpsworks.php>

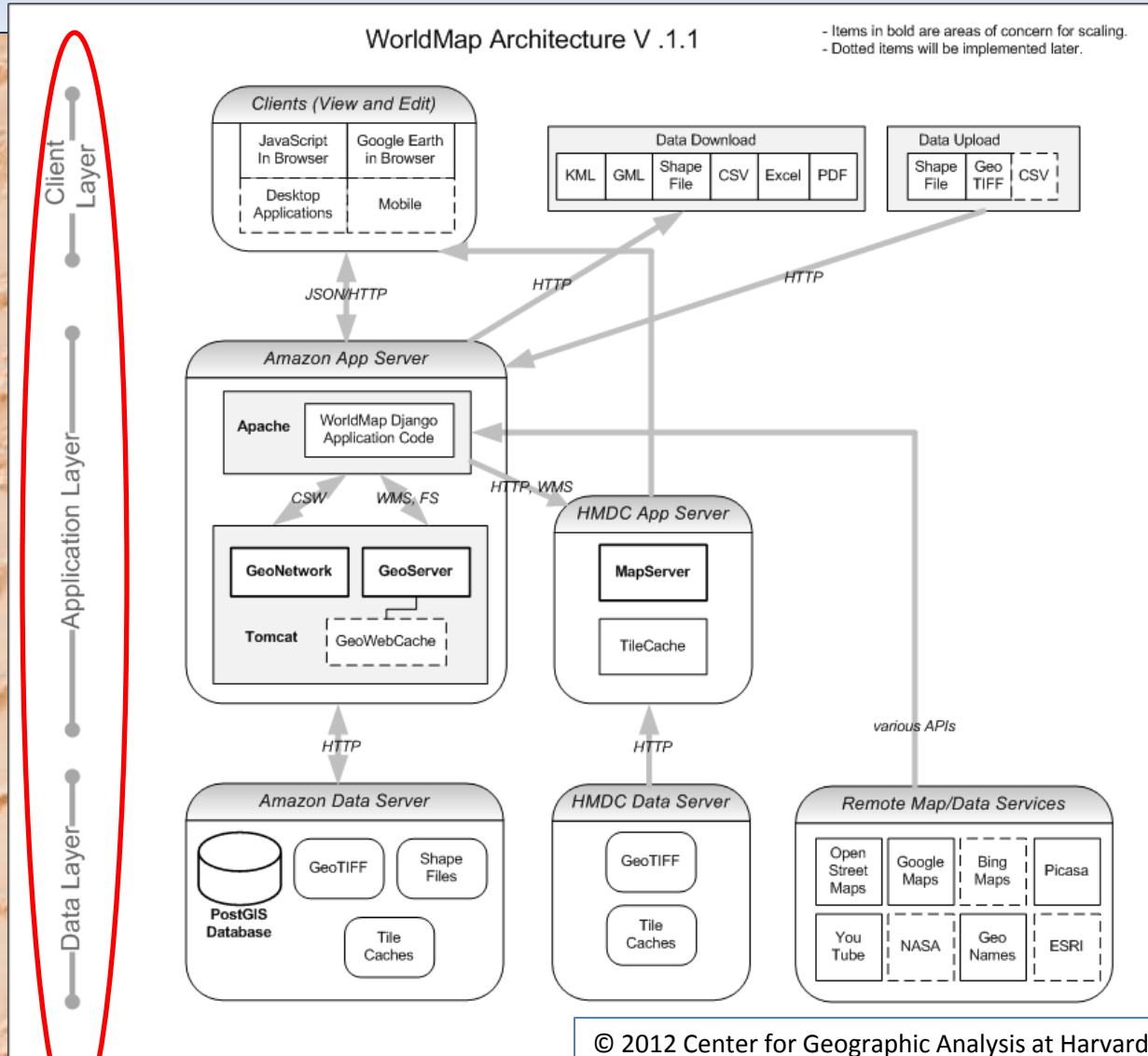




# WorldMap Foundation: Open Source Code



# Basic Architecture



# WorldMap in the Classroom

- “World Religions and Multicultural America” taught by Diana Eck
- “Reinventing Boston: The Changing American City” taught by Rob Sampson and David Luberoff
- “Societies of the World 28” taught by Kelly O’Neill
- “Environmental Management of Tourism Development” taught by Megan Epler Wood
- “The African City”, “The African Past: Art and History to 1800” taught by Suzanne Blier
  - [Ile-Ife](http://worldmap.harvard.edu/maps/834/DX2) <http://worldmap.harvard.edu/maps/834/DX2>
- “Chinese History 200R”, “Societies of the World 12”, “Culture and Belief 26” taught by Peter Bol
- **Approx 8 more coming**

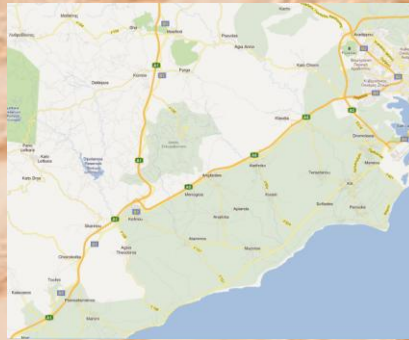
# Backgrounds – Google: Terrain, Streets, Satellite

(Base Map Options)

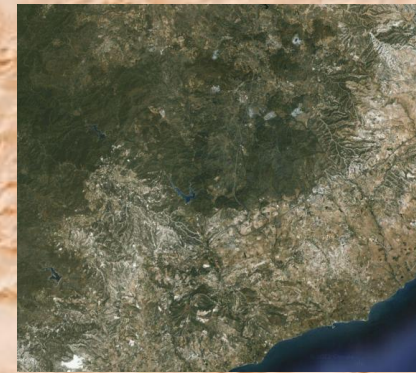
# OpenStreetMap – ESRI Imagery - Bing Maps with Labels



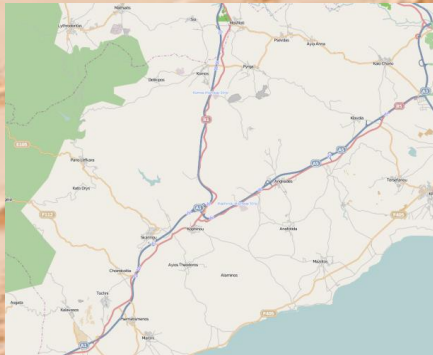
Google Terrain



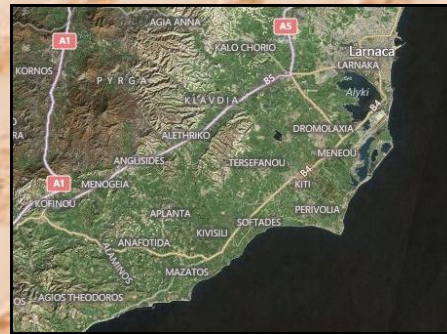
Google Streets



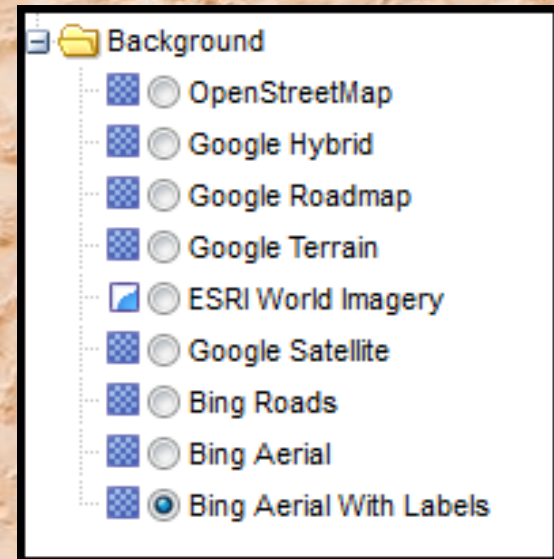
Google Satellite



OpenStreetMap.org



Bing with Labels



Hint: **Windows+Shift** key permits selecting a **zoom window** | Mac uses Shift+Command+Left Click

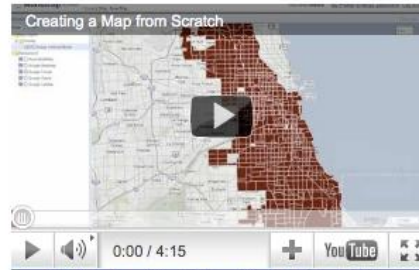
Create a Map

View a Map

About



Build your own mapping portal and publish it to the world or to just a few collaborators. WorldMap is open source software.



[Watch the WorldMap Quick Start video](#)

WorldMap BETA Search For Maps

Search for maps

Title	Profile	Last Modified
<a href="#">JapanMap</a>	<a href="#">Lex</a>	July 14, 2011
<a href="#">AfricaMap</a>	<a href="#">Suzanne blier</a>	June 24, 2011
<a href="#">ChinaMap</a>	<a href="#">Lex</a>	June 16, 2011
<a href="#">ChicagoMap</a>	<a href="#">Matt Bertrand</a>	May 3, 2011
<a href="#">Boston Research Map</a>	<a href="#">Ben Lewis</a>	April 10, 2011
<a href="#">Safe Survey 2015 South Carolina</a>	<a href="#">iblossom</a>	March 11, 2011
<a href="#">Sierra Leone</a>	<a href="#">Tuchscherer</a>	November 10, 2011
<a href="#">Nebraska</a>	<a href="#">KathleenSchwille</a>	November 8, 2011
<a href="#">Panama Pacific International Exposition</a>	<a href="#">mhaya</a>	November 6, 2011
<a href="#">Montreal expo 67</a>	<a href="#">cfish</a>	November 6, 2011
<a href="#">CPD 1939 New York World's Fair</a>	<a href="#">cpd</a>	November 6, 2011
<a href="#">Site Plan Development of Chicago's Cj</a>	<a href="#">eldrawalker</a>	November 6, 2011
<a href="#">Golden Gate International Expo Map</a>	<a href="#">reinescamilla</a>	November 6, 2011
<a href="#">1964 New York World's Fair Ground F</a>	<a href="#">SamuelHarland</a>	November 6, 2011
<a href="#">YorubaMap</a>	<a href="#">Suzanne blier</a>	November 6, 2011
<a href="#">Philadelphia Centennial 1876 Color Gr</a>	<a href="#">dianaalante</a>	November 5, 2011
<a href="#">Philadelphia Centennial 1876</a>	<a href="#">dianaalante</a>	November 5, 2011
<a href="#">ghana political</a>	<a href="#">Suzanne blier</a>	November 4, 2011
<a href="#">Morocco</a>	<a href="#">Suzanne blier</a>	November 4, 2011
<a href="#">Tang China 840 - Ennin's Travels</a>	<a href="#">Peter K. Boj</a>	November 3, 2011
<a href="#">Crystal Palace at Sydenham 1862</a>	<a href="#">elzacoeman83</a>	November 3, 2011
<a href="#">1851 Great Exhibition - Hyde Park</a>	<a href="#">elzacoeman83</a>	November 3, 2011
<a href="#">Explorers</a>	<a href="#">Suzanne blier</a>	November 3, 2011
<a href="#">Spain</a>	<a href="#">mdowns</a>	November 3, 2011
<a href="#">Virginia Funny Place Names</a>	<a href="#">coast</a>	November 3, 2011

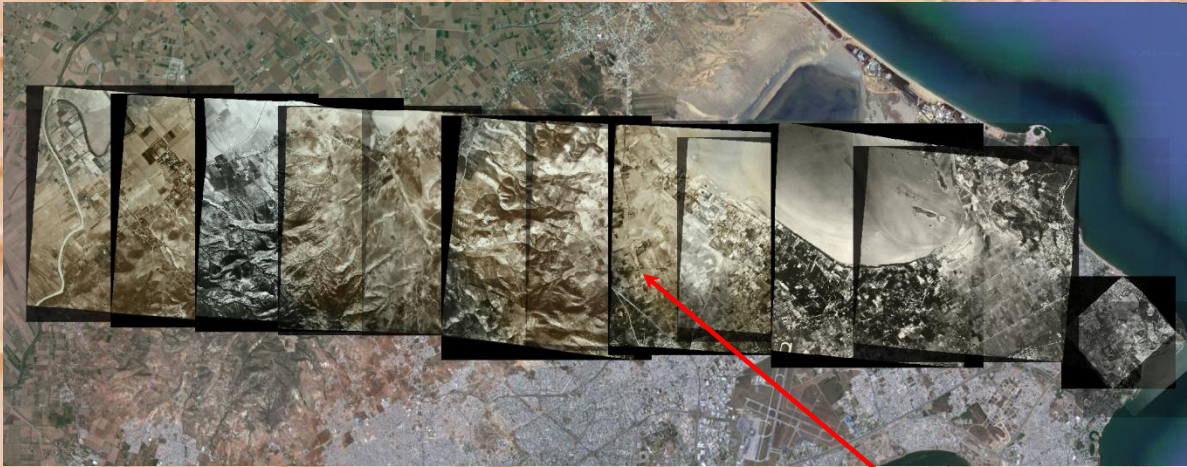
Showing 1-25 of 347

[Sign in](#) | [Create Map](#) | [View Map](#) | [Help](#)

[JUMP TO LIVE DEMO](#)

## Georeferencing Images

Tunisia 1974 – Aerial Imagery

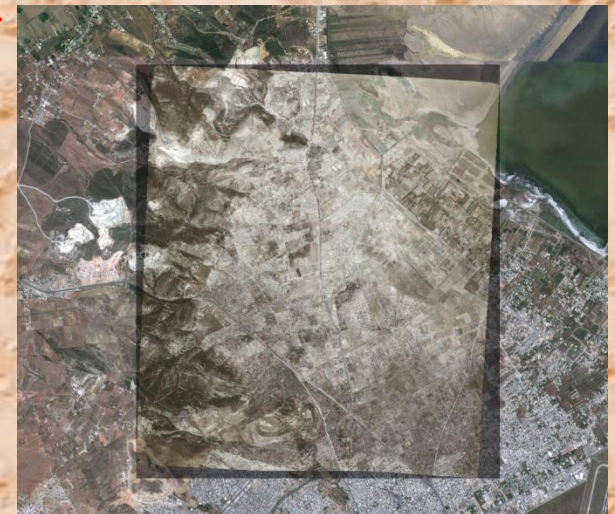


<http://worldmap.harvard.edu/maps/neareastcollab/DX6>

Ariana 132

Right Corner of Aerial

Mosaic view



# Georeferenced topographic maps – Tunis

<http://worldmap.harvard.edu/maps/mideastcollab/BJC>



# Political boundaries – Cyprus 1975

<http://worldmap.harvard.edu/maps/neareastcollab/DYX>





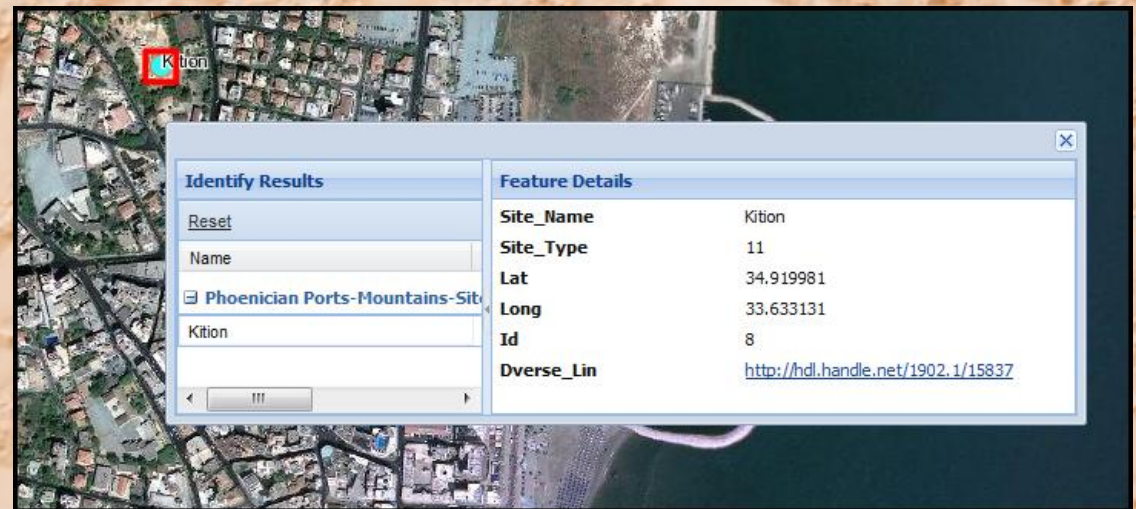
## Kition – close-up of the port's original location

<http://worldmap.harvard.edu/maps/MedCoastGIS/BZo>



Clicking on “Link” button in the WorldMap navigation bar and then the Kition marker provides metadata, including a URL to the publication of a study about sailing the Cypriot coast:

<http://hdl.handle.net/1902.1/15837>



Identify Results		Feature Details	
<a href="#">Reset</a>		<b>Site_Name</b>	Kition
Name		<b>Site_Type</b>	11
<input type="checkbox"/> Phoenician Ports-Mountains-Sit		<b>Lat</b>	34.919981
Kition		<b>Long</b>	33.633131
		<b>Id</b>	8
		<b>Dverse_Lin</b>	<a href="http://hdl.handle.net/1902.1/15837">http://hdl.handle.net/1902.1/15837</a>

## Connecting to the Mediterranean Coast GIS Dataverse

<http://dvn.iq.harvard.edu/dvn/dv/MedCoastGIS/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/15837>

IQSS Dataverse Network >

### Mediterranean Coast GIS Dataverse

#### NAVIGATING FROM SALAMIS TO KITION, CYPRUS

hdl:1902.1/15837


Version: 3— Released: Mon Nov 14 01:26:20 EST 2011

CATALOGING INFORMATION

Data & Analysis

Comments

Versions

 If you use these data, please add the following citation to your scholarly references. [Why cite?](#)

Jeff Howry, 2011-05-12, "Navigating from Salamis to Kition, Cyprus", <http://hdl.handle.net/1902.1/15837>


"Navigating from Salamis to Kition, Cyprus"  
Click on **Data & Analysis** tab

Cataloging Information

**DATA & ANALYSIS**

Comments

Versions


 Use the check boxes next to the file name to download multiple files. Data files will be downloaded in their default format. You can also download Study files that have restricted access will not be downloaded.

Select all files

[Download All Selected Files](#)

Viewshed Navigation

Sailing to Kition from Salamis.pdf  
Adobe PDF - 1 MB - 9 downloads

 [Download](#)

# Viewing of Layers is controlled by "Permissions"

## Phoenician Ports-Mountains-Sites

Abstract: Phoenician Ports-Mountains-Sites



Type: Vector Data

Keywords: Phoenician Ports Mountains Sites

Category: Place Locations

Citation: copyright

Owner: [jhowry](#)

Point of Contact: [jhowry](#)

Attributes: Id, Lat, Dverse\_Lin, Long, Site\_Type, Site\_Name.

Bounding Box: SRID=EPSG:4326;POLYGON((-5.655922 35.905354,-5.655922 38.649648,33.8840060811141 38.649648,33.8840060811141 35.905354,-5.655922 35.905354))

Native SRS: EPSG:4326

## Download

Data: [Zipped Shapefile](#) [GML 2.0](#) [GML 3.1.1](#) [CSV](#) [Excel](#) [GeoJSON](#) [GeoTIFF](#) [JPEG](#) [PDF](#) [PNG](#) [KML](#) [View in Google Earth](#)

Layer Metadata: [TC211](#)

## Maps Which Use This Layer

- [Antiquity and Today - Training for WorldMap](#)
- [Mediterranean Coast GIS](#)

## Layer Views

This layer has been viewed 191 time(s) by 91 user(s)

## Layer Styles

The following styles are associated with this data set. Choose a style to view it in the preview to the left. Click on a style name to view or edit the style.

- Ports\_Kition\_Dvn\_Fqr [SLD](#)

Default style: Ports\_Kition\_Dvn\_Fqr

[Create new style](#)

## Manage Layer

- [Update the description of this data](#)
- [Upload a new version of this data](#)
- [Remove](#)

## Permissions

Who can view or download this?

- Anyone
- Any registered user
- Harvard Users
- Only users who can edit

Who can edit this?

- Any registered user
- Harvard Users
- Only users who can edit

[Add user...](#)

Who can manage and edit this?

- jhowry
- [Add user...](#)

## Permissions

Who can view or download this?

- Anyone
- Any registered user
- Harvard Users
- Only users who can edit

Who can edit this?

- Any registered user
- Harvard Users
- Only users who can edit

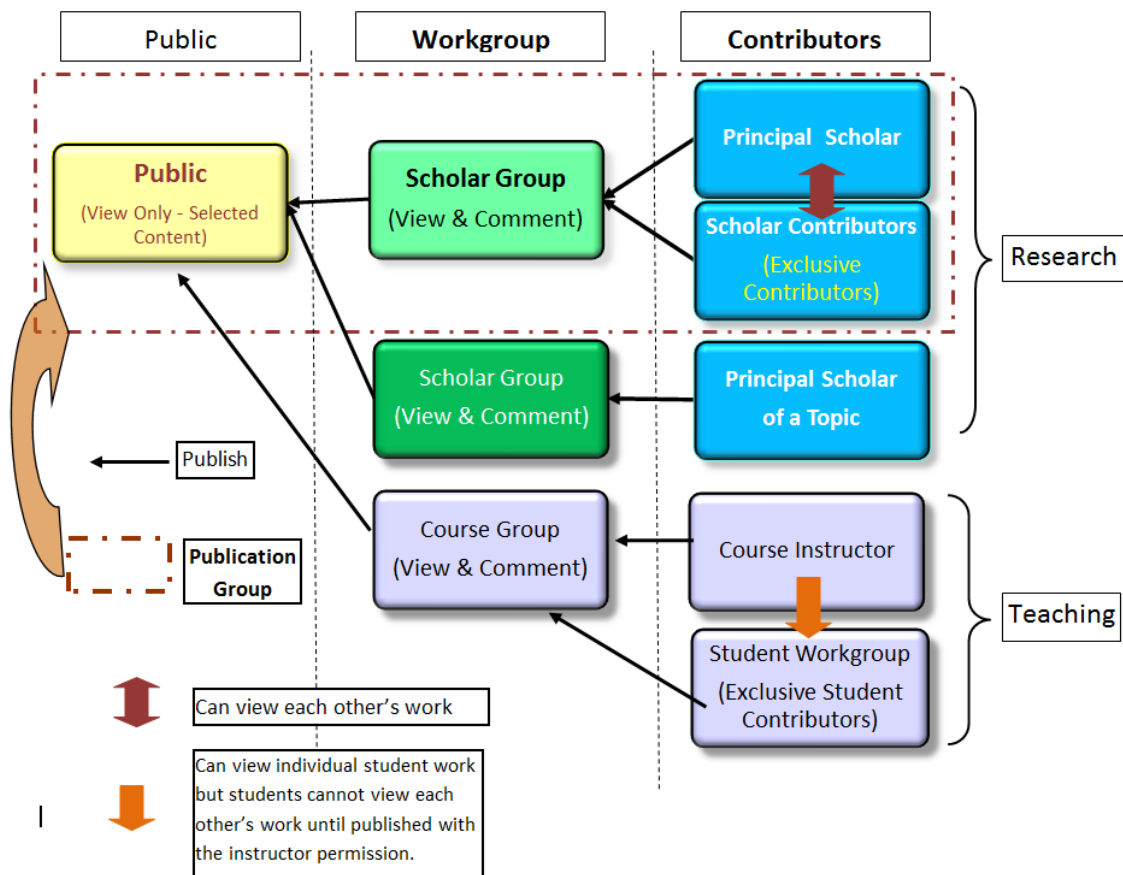
[Add user...](#)

Who can manage and edit this?

- jhowry
- [Add user...](#)

# Model for Scholarly Collaboration and Education

WorldMap – Publication Relationships and Permissions



**WorldMap** and the **Dataverse Network** can be restricted to selected individuals or shared with the world.

The control remains with creator of the **WorldMap** or individual layers can be selectively displayed or shared.

# Features in Development...

- **Time Animation of large datasets**
- **Mobile client**
- **Annotation**
- **Ranking commenting tools**
- **Place name gazetteer**
- **Spatial analysis tools**
- **Heatmap visualization tools**
- **Integration with Dataverse Network**

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# Contacts

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**Giovanni Zambotti – CGA Support** - [gzambotti@cga.harvard.edu](mailto:gzambotti@cga.harvard.edu)

**Jeff Howry – WorldMap Collaborative** – a community for training & support [jhowry@fas.harvard.edu](mailto:jhowry@fas.harvard.edu)

**More info** – [about.worldmap.harvard.edu](http://about.worldmap.harvard.edu)

Acknowledgements: many thanks for the generous time and effort of the Center for Geographic Analysis ([cga.harvard.edu](http://cga.harvard.edu)) and the Institute for Quantitative Social Science ([iq.harvard.edu](http://iq.harvard.edu)): Ben Lewis, Jeff Blossom, Giovanni Zambotti, Wendy Guan, Merce Crosas & the Dataverse Network team.

## Resources

Center for Geographic Analysis [cga.harvard.edu](http://cga.harvard.edu)

Harvard Geospatial Consortium

<http://calvert.hul.harvard.edu:8080/opengeoportal/>

Worldwide data (free) [www.diva-gis.org/gdata](http://www.diva-gis.org/gdata)

Eden Project (free) [ergodd.zoo.ox.ac.uk/eden/index.php?p=57](http://ergodd.zoo.ox.ac.uk/eden/index.php?p=57)

**QUANTUM GIS** – [www.qgis.org](http://www.qgis.org) – desktop GIS software for creating layers to upload to WorldMap

Windows, Max OSX, Linux [www.qgis.org/wiki/Download](http://www.qgis.org/wiki/Download)

**DIVA GIS** – [www.diva-gis.org](http://www.diva-gis.org) – desktop GIS software

PC or Mac OSX <http://www.diva-gis.org/download>