

Maxim Romanov, Leipzig University

Leipzig University, Jan 16, 2017

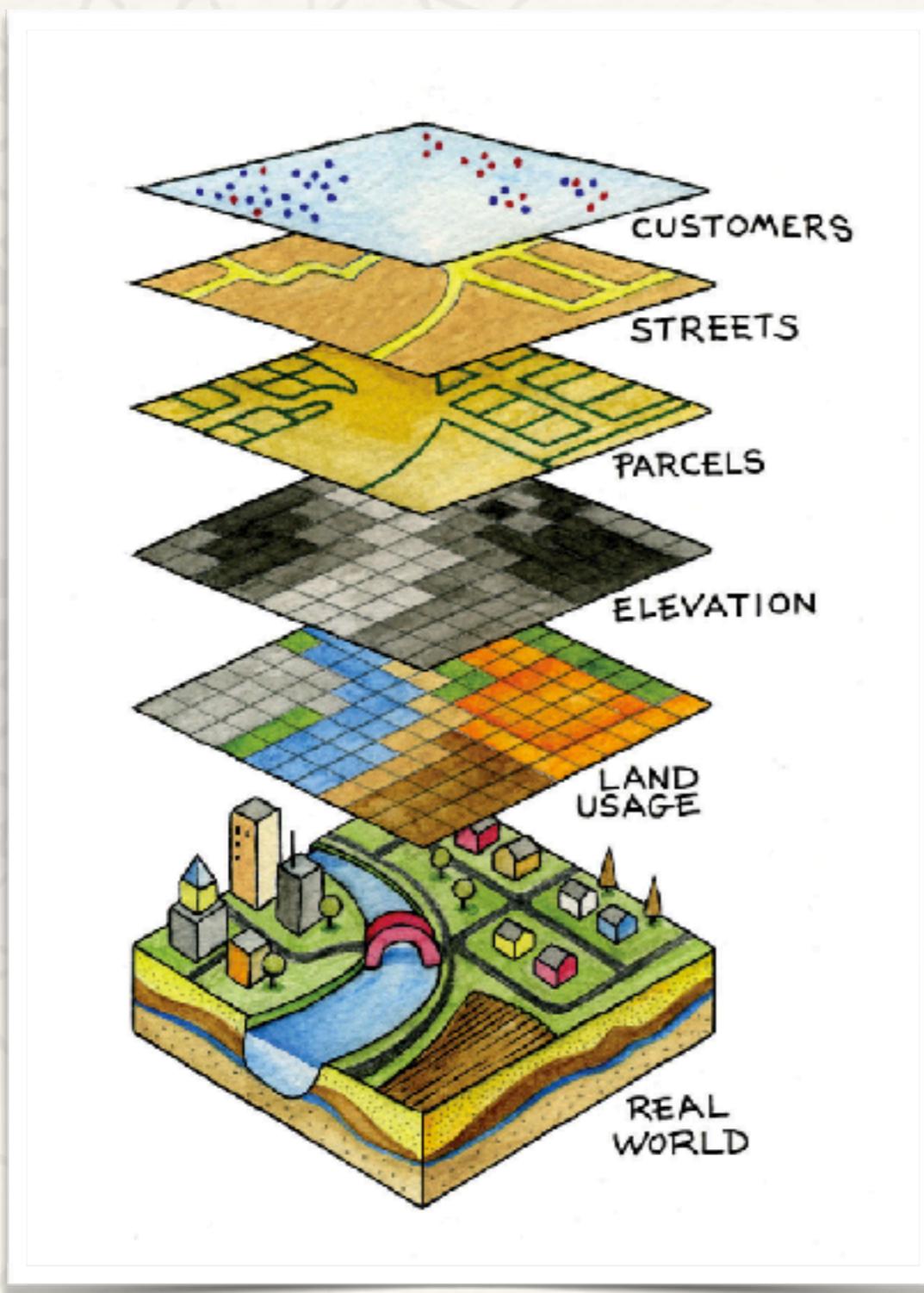
Mapping Humanities Data

Introduction to Digital Humanities
Winter 2016-2017

Why to build a “map” (cartogram)?!

- ❖ To visualize spatial distribution of a phenomenon
- ❖ To compare the distribution of different phenomena on the spatial plane
- ❖ Trace change of the distribution of various phenomena over time
- ❖ Visualize conceptualizations of space
- ❖ Model spacial entities and processes

What is a “map”? *Layers of Goodness*



- ❖ **Layers:**
 - ❖ *Analytical Layer*
 - ❖ Our Data
 - ❖ Annotation/Legend
 - ❖ *Social Geography*
 - ❖ Political Boundaries
 - ❖ Settlements, etc.
 - ❖ *Physical Geography*
 - ❖ Types of surface
 - ❖ Continents / Coastal Line
 - ❖ Elevation profile
 - ❖ Rivers, Lakes, etc.
 - ❖ *Base Layer: Graticule*

Projection Issues

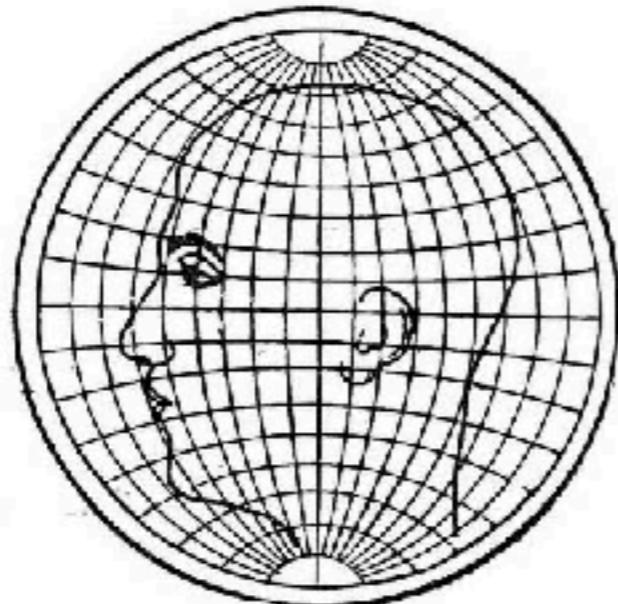


FIG. 42.—Man's head drawn on globular projection.

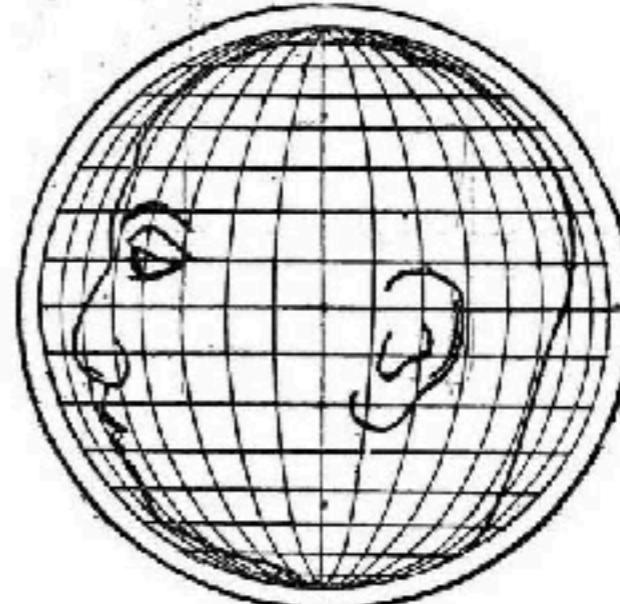


FIG. 43.—Man's head plotted on orthographic projection.

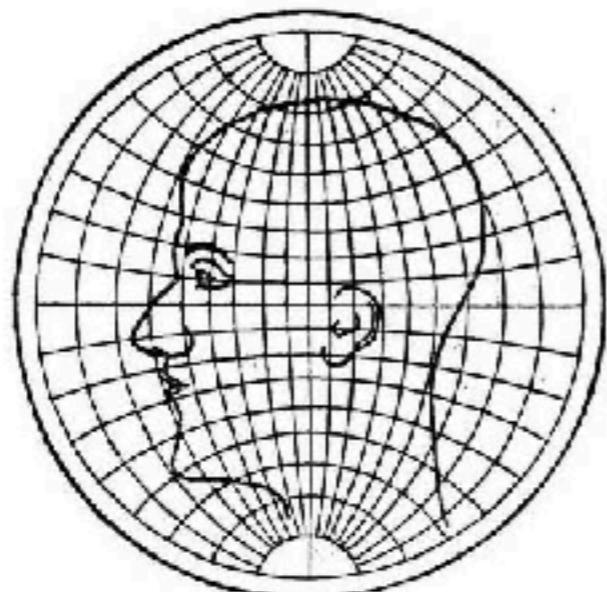


FIG. 44.—Man's head plotted on stereographic projection.

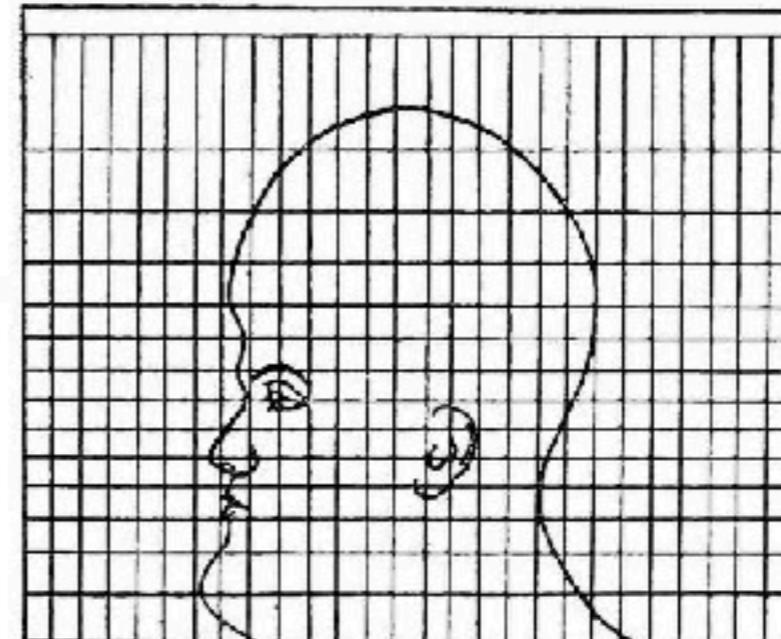
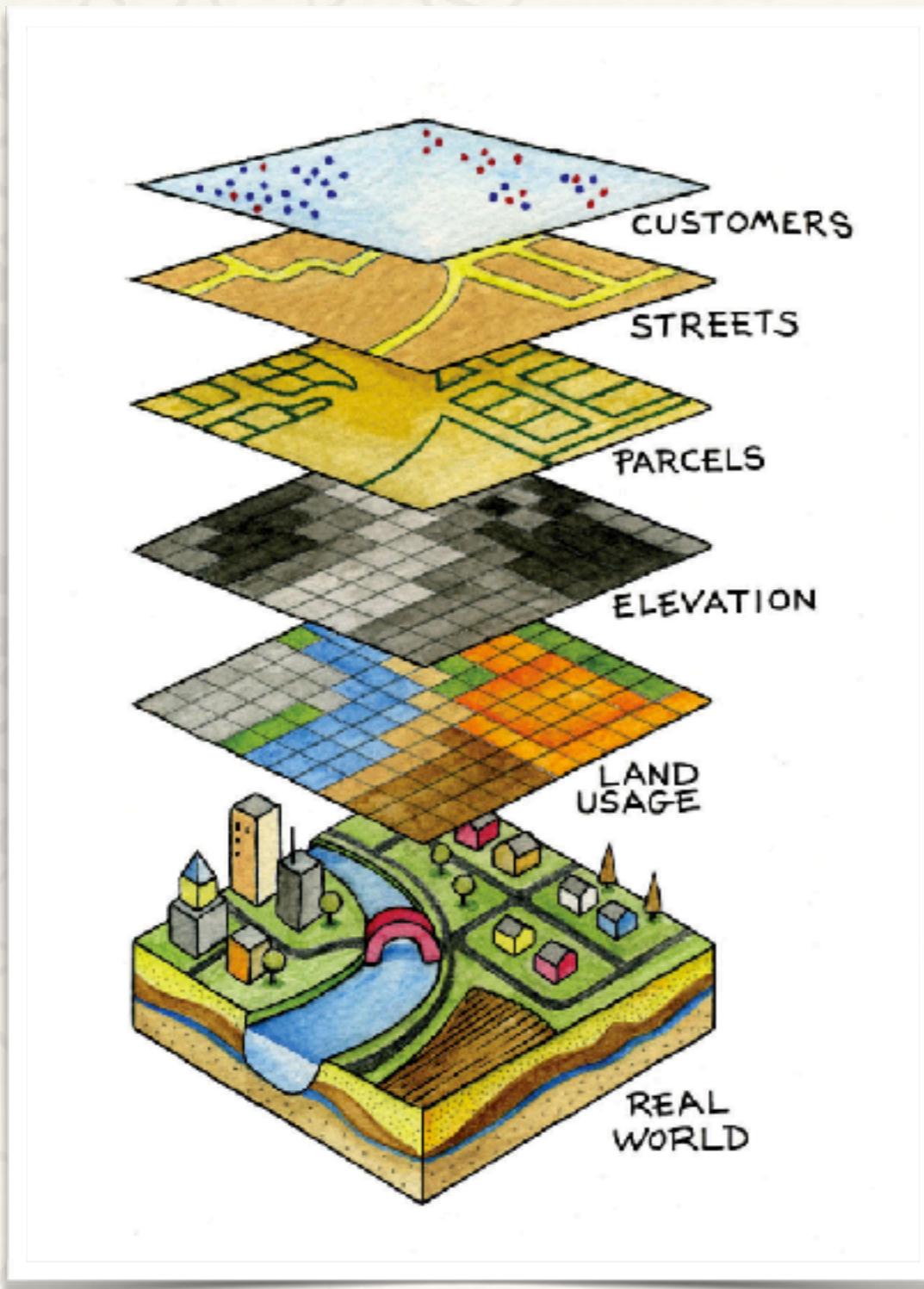


FIG. 45.—Man's head plotted on Mercator projection.

Analytical Layer: Machine-Readable Data



❖ *Analytical Layer*

❖ Our Data

❖ Points:

❖ item, x^* , $point(lat, lon)^{**}$

❖ Lines:

❖ item, x^* , $from(lat, lon)^{**}$, $to(lat, lon)^{**}$

❖ Polygons:

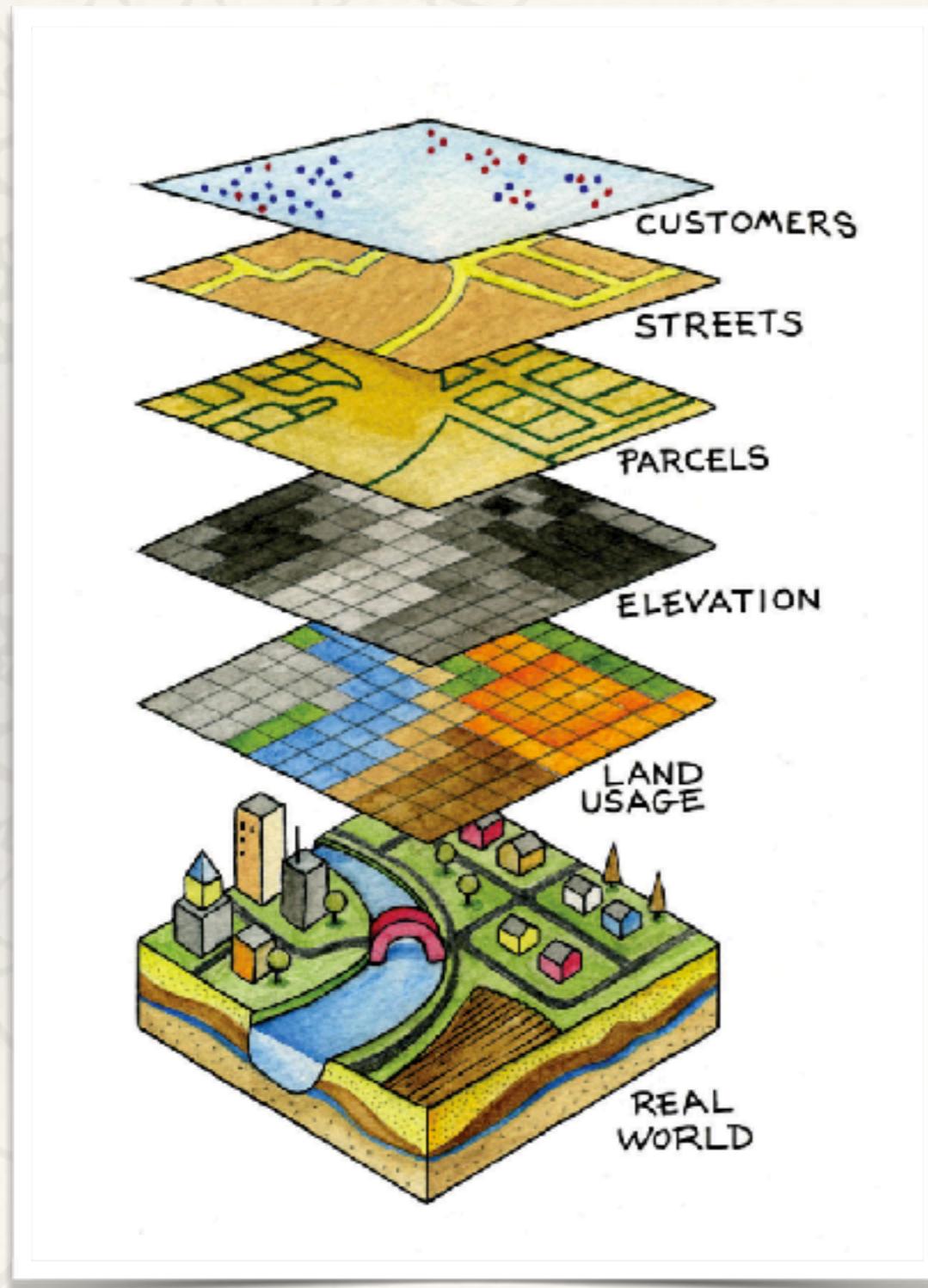
❖ item, x , $area(lat, lon; lat, lon; \dots lat, lon)^{**}$

❖ Annotation/Legend

* where x is a categorical parameter

** lat/lon : decimal coordinates (not DMS)

Analytical Layer: Machine-Readable Data



- ❖ *Analytical Layer Formats*
- ❖ CSV / TSV
- ❖ KML (Keyhole Markup Lang)
- ❖ JSON (GeoJSON; TopoJSON)

The Most Difficult Part (In Practical Terms)

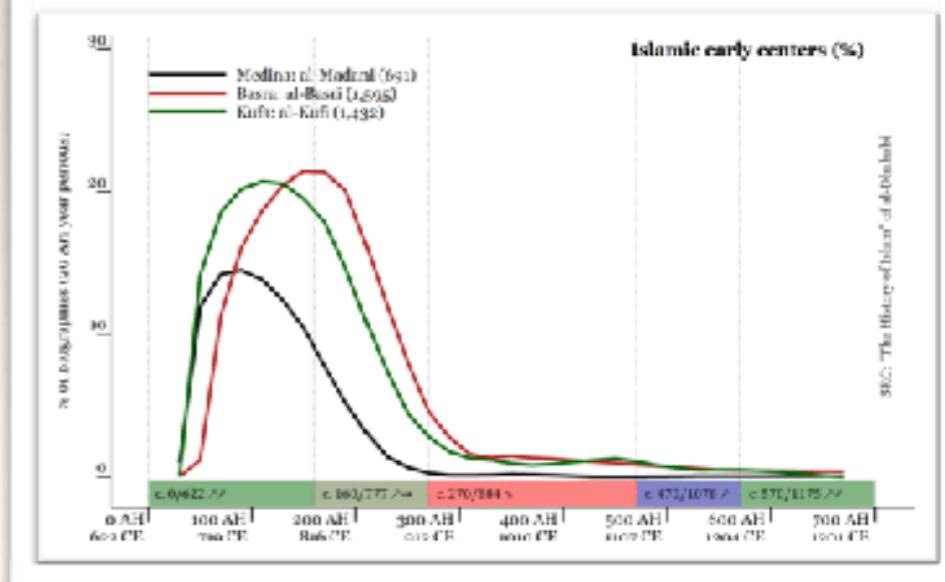
Source



Machine-
Readable
Data

Points
Lines
Polygons

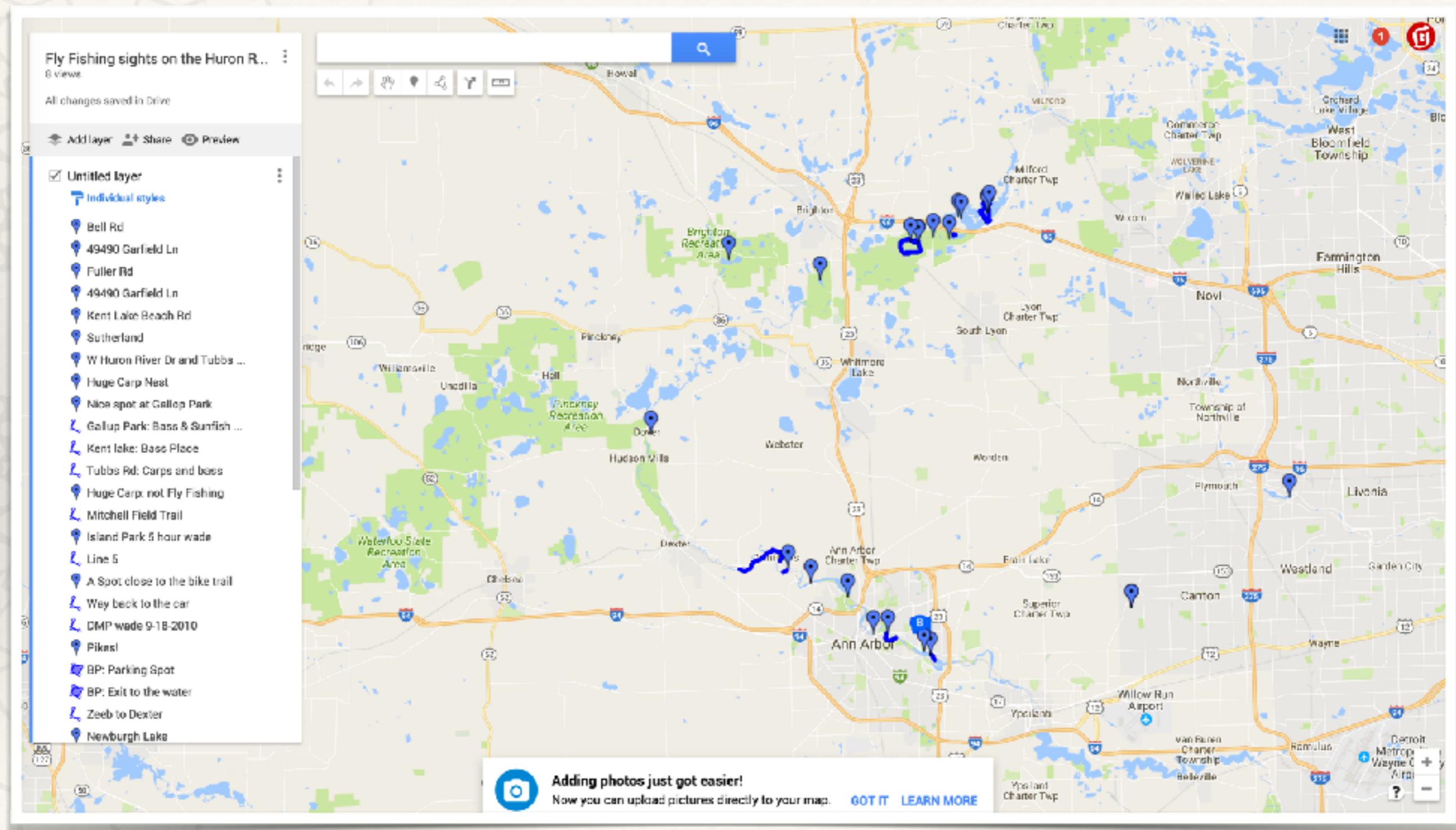
Cartograms



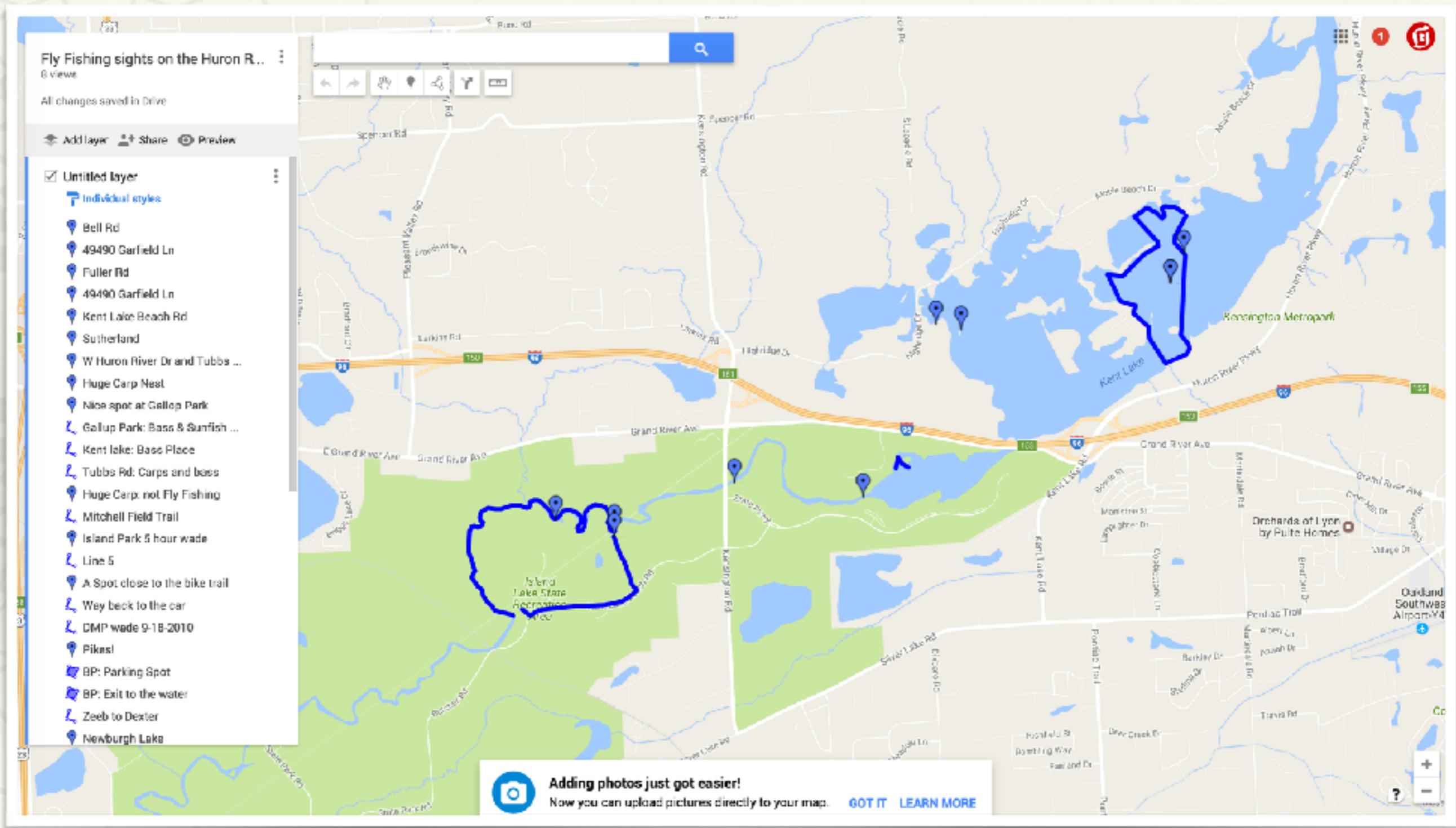
Cartograms: Geographical Information Systems (GIS)

- ❖ *Simple*
 - ❖ Google Maps
 - ❖ Carto(DB)
 - ❖ ... and many others
- ❖ *Complex*
 - ❖ ArcGIS (commercial)
 - ❖ QGIS (open source)
 - ❖ R (open source)

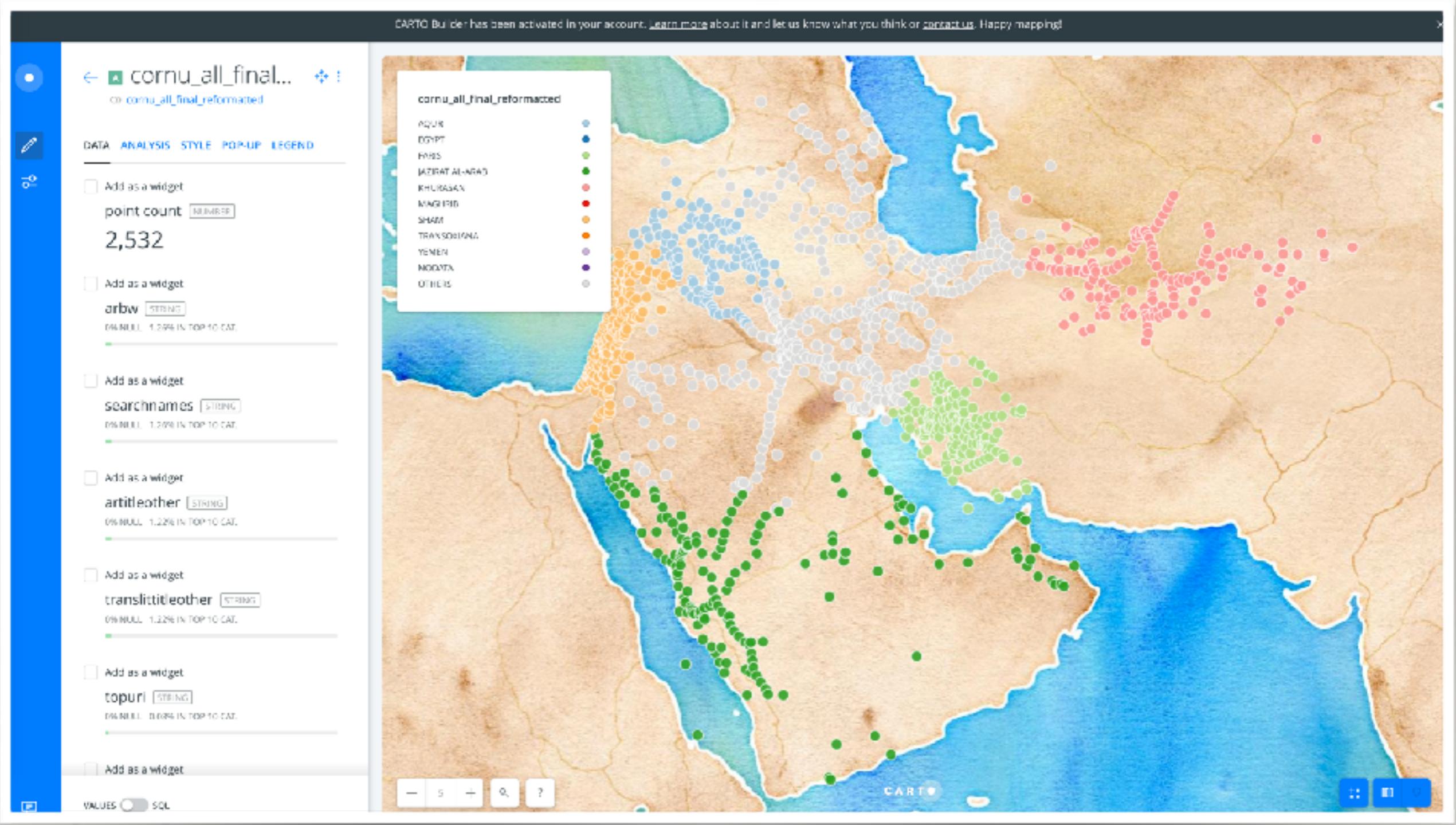
Simple: Google Maps (Google Earth)



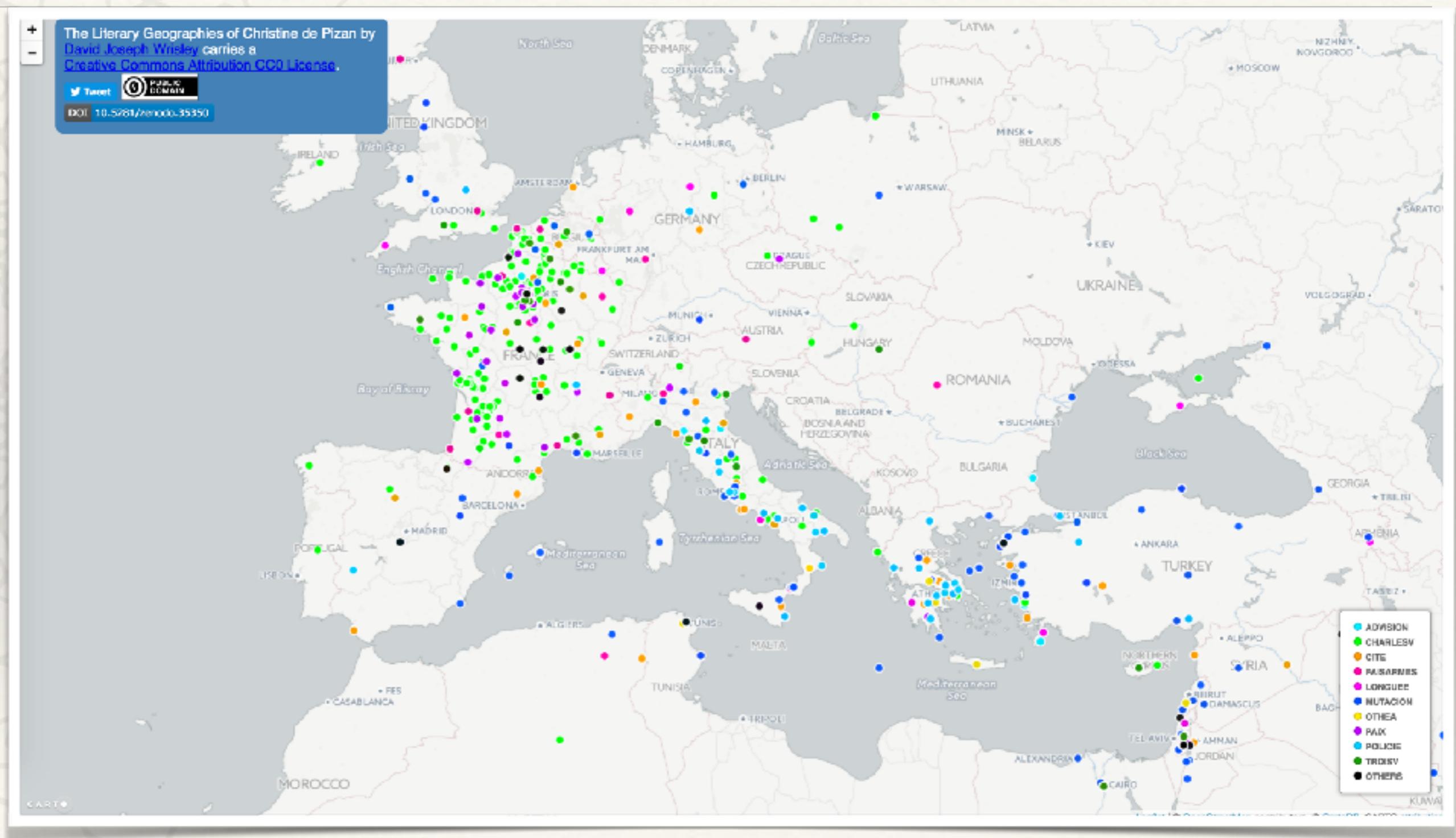
Simple: Google Maps (Google Earth)



More Complex: Carto[DB]



More Complex: Carto[DB]



Complex: ArcGIS, QGIS, R

About ArcGIS

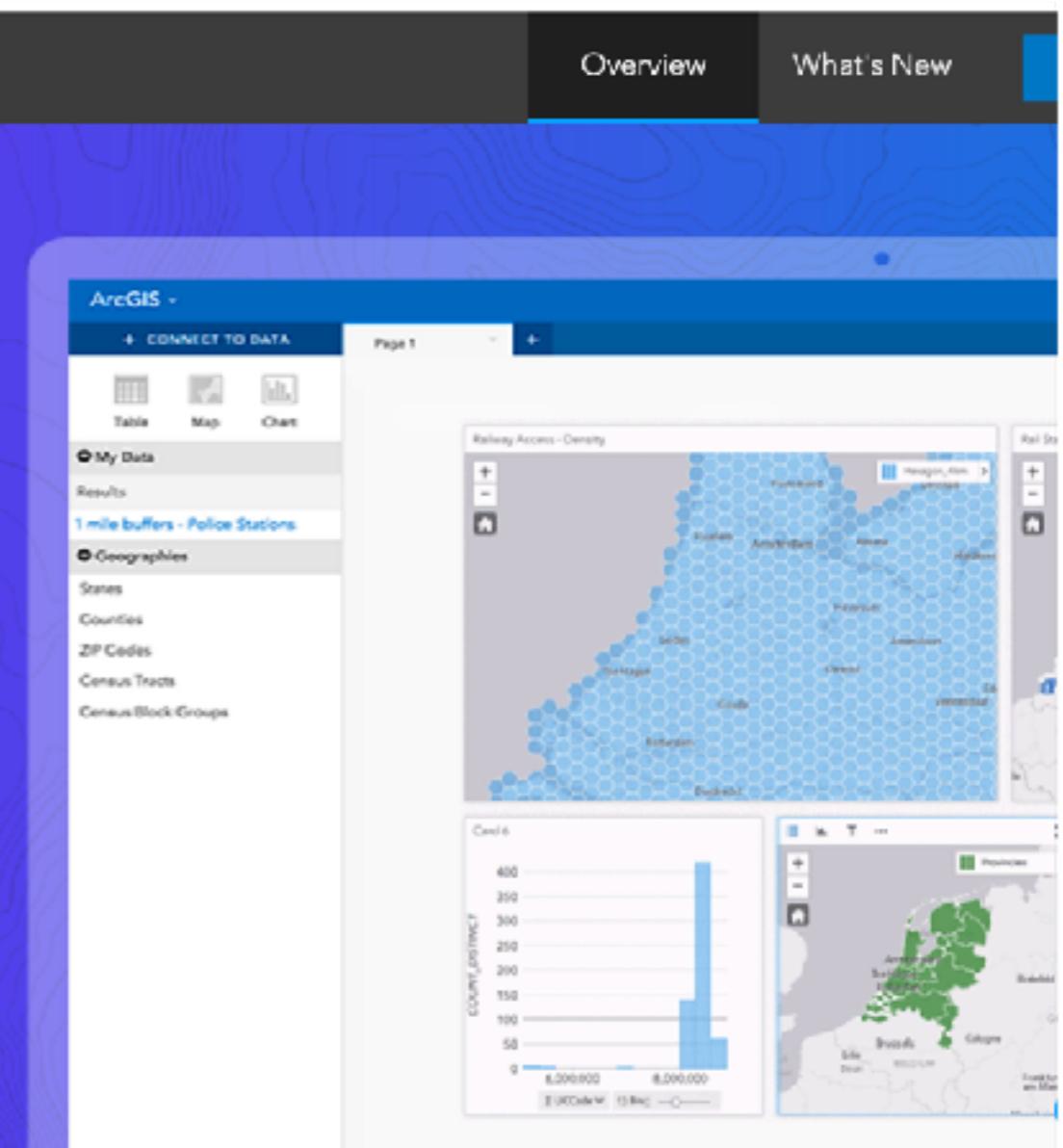
Overview

What's New

Work Smarter With ArcGIS

The Mapping & Analytics Platform

ArcGIS provides contextual tools for mapping and spatial reasoning so you can explore data and share location-based insights. ArcGIS creates deeper understanding, allowing you to quickly see where things are happening and how information is connected.



Complex: ArcGIS, QGIS, R



Create, edit, visualise, analyse and publish geospatial information on Windows, Mac, Linux, BSD (Android coming soon)

For your desktop, server, in your web browser and as developer libraries

[Download Now](#)

[Support QGIS](#)

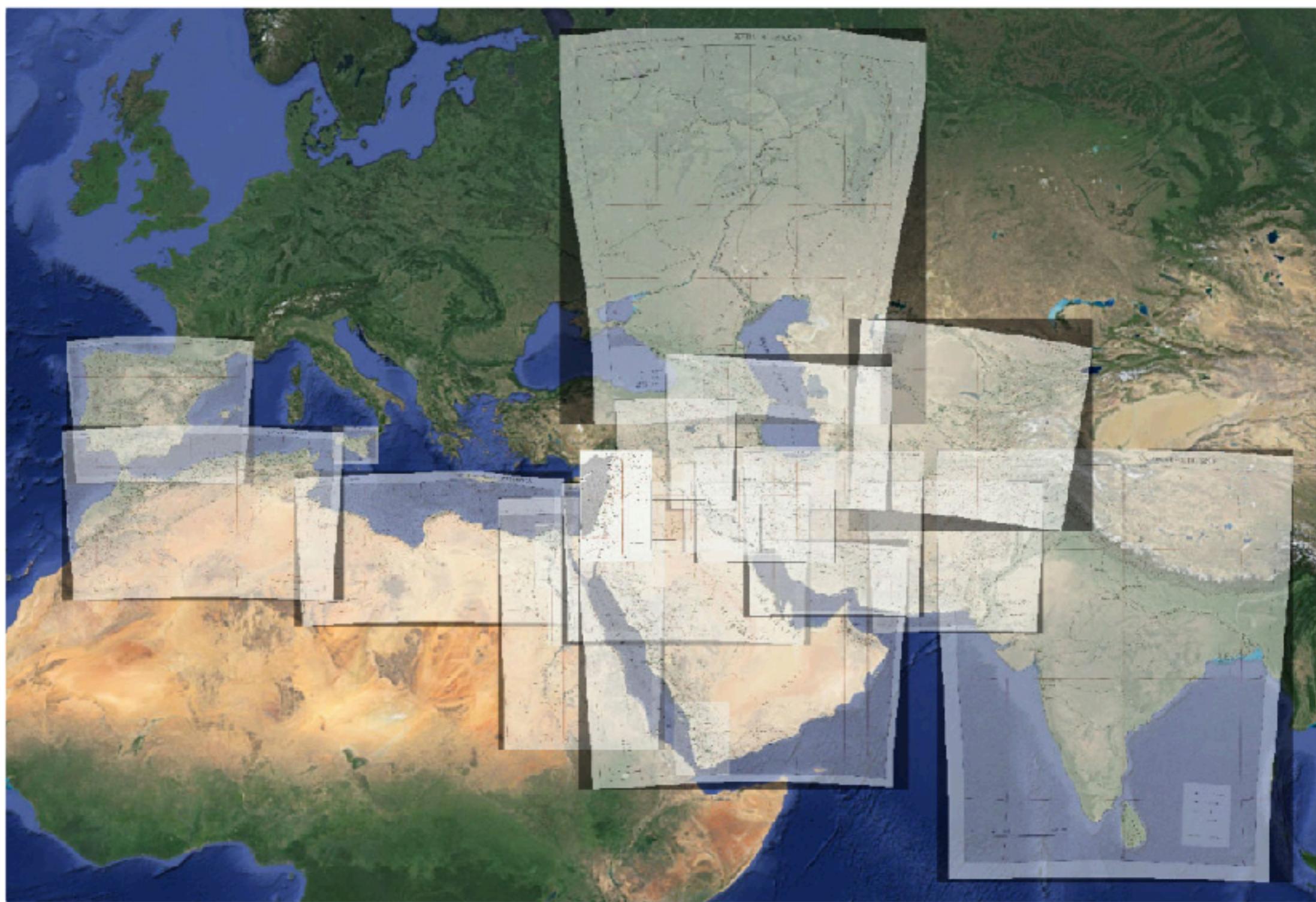
Version 2.18.2
LTR Version 2.14.10

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Complex: ArcGIS, QGIS, R

Georeferencing



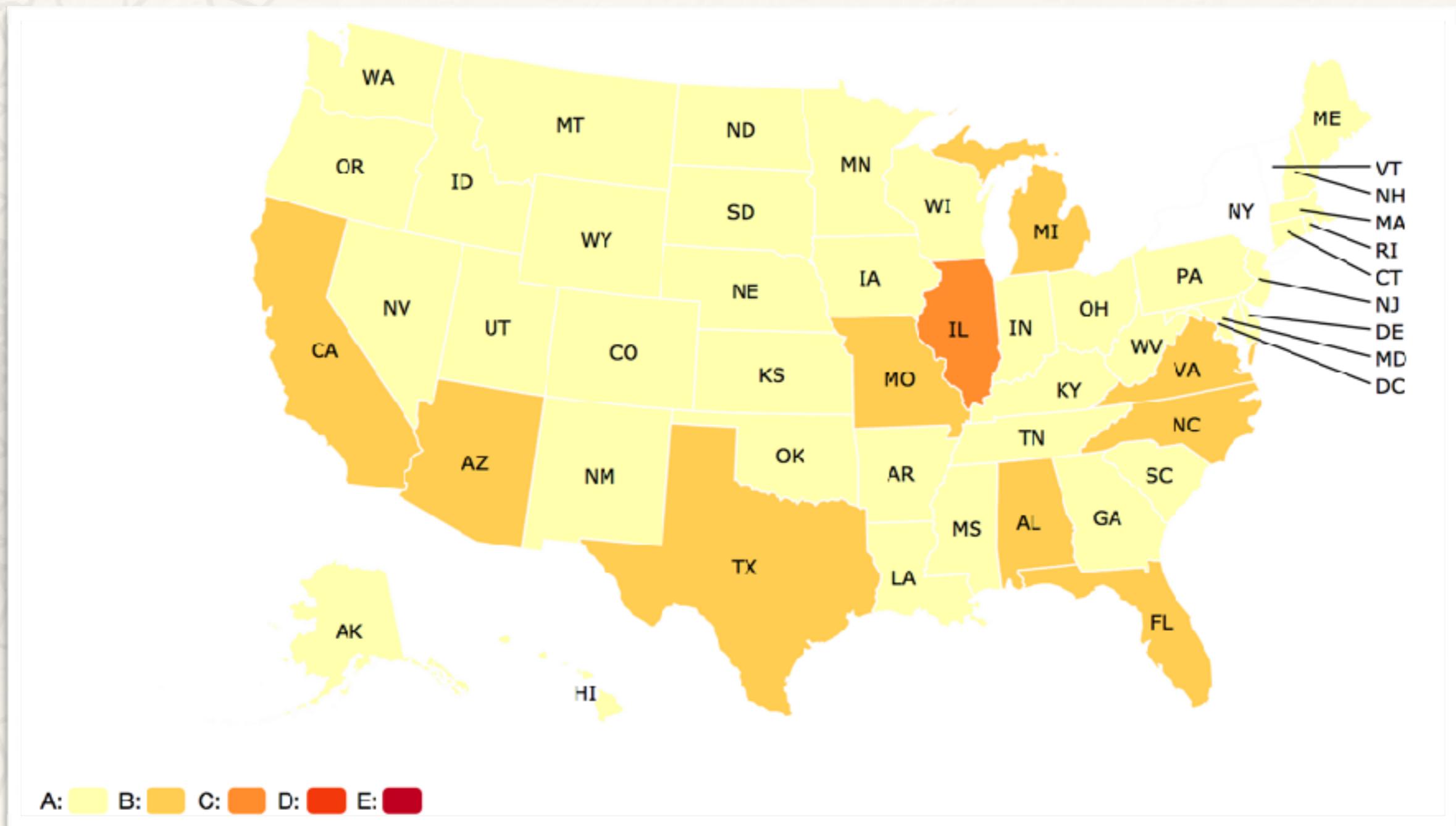
Georeferencing

Complex: ArcGIS, QGIS, R



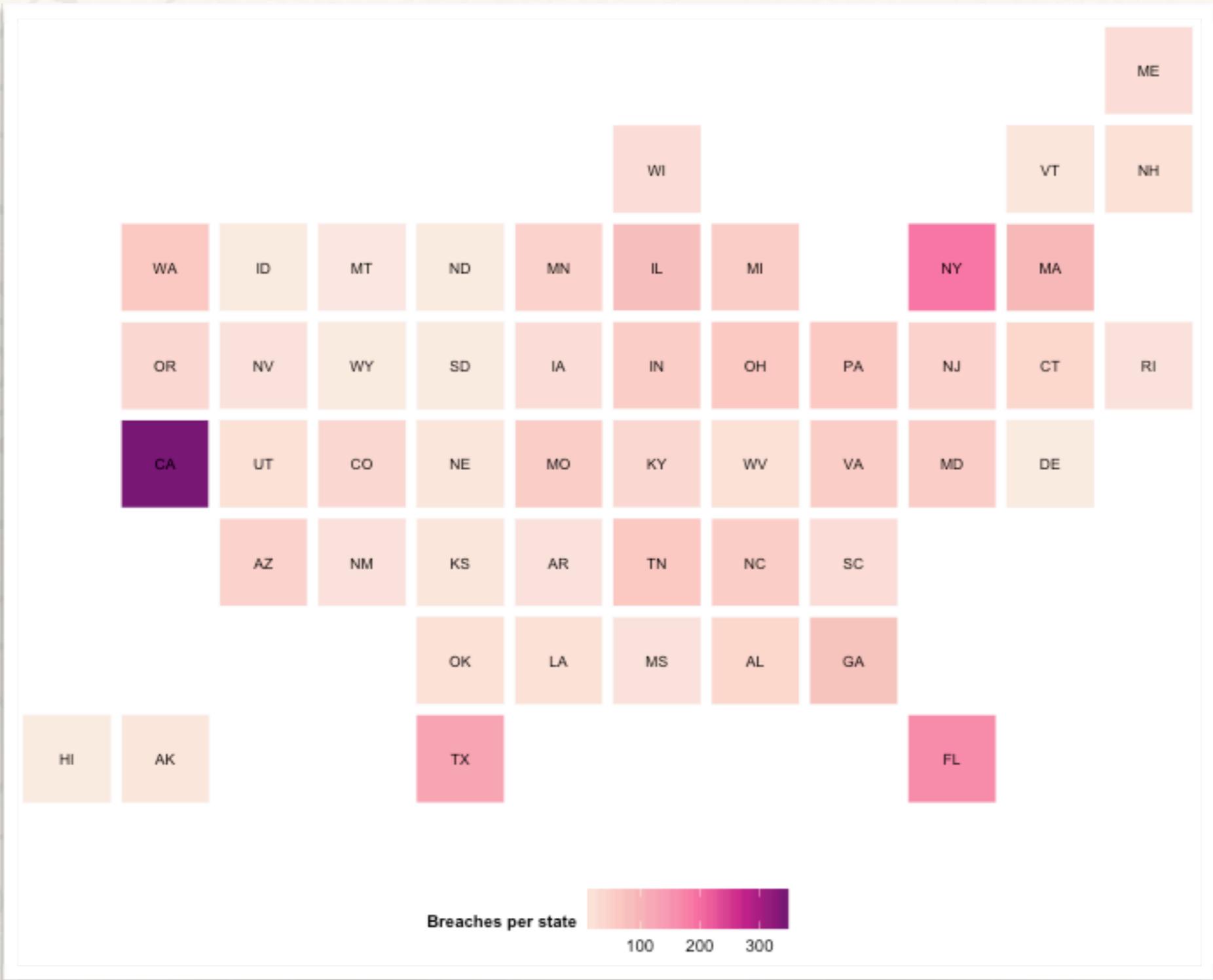
Complex: ArcGIS, QGIS, R

Dynamic Cartogramming



Dynamic Cartogramming

Complex: ArcGIS, QGIS, R



Islamic History in Maps: Overview

- ❖ Analysis of a biographical collection
- ❖ Modeling Islamic geography

The Most Difficult Part (In Practical Terms)

Source



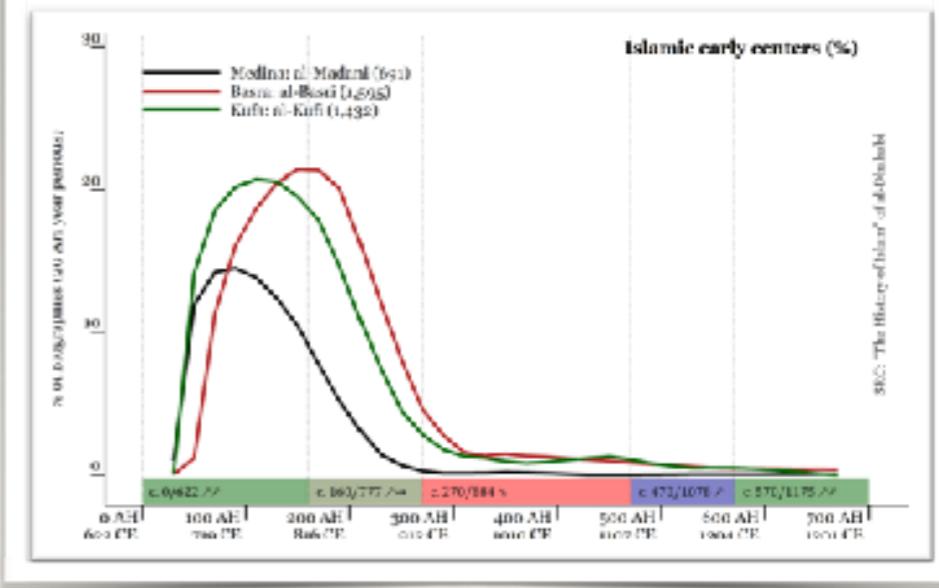
Machine-
Readable
Data

Points
Lines
Polygons

Cartograms

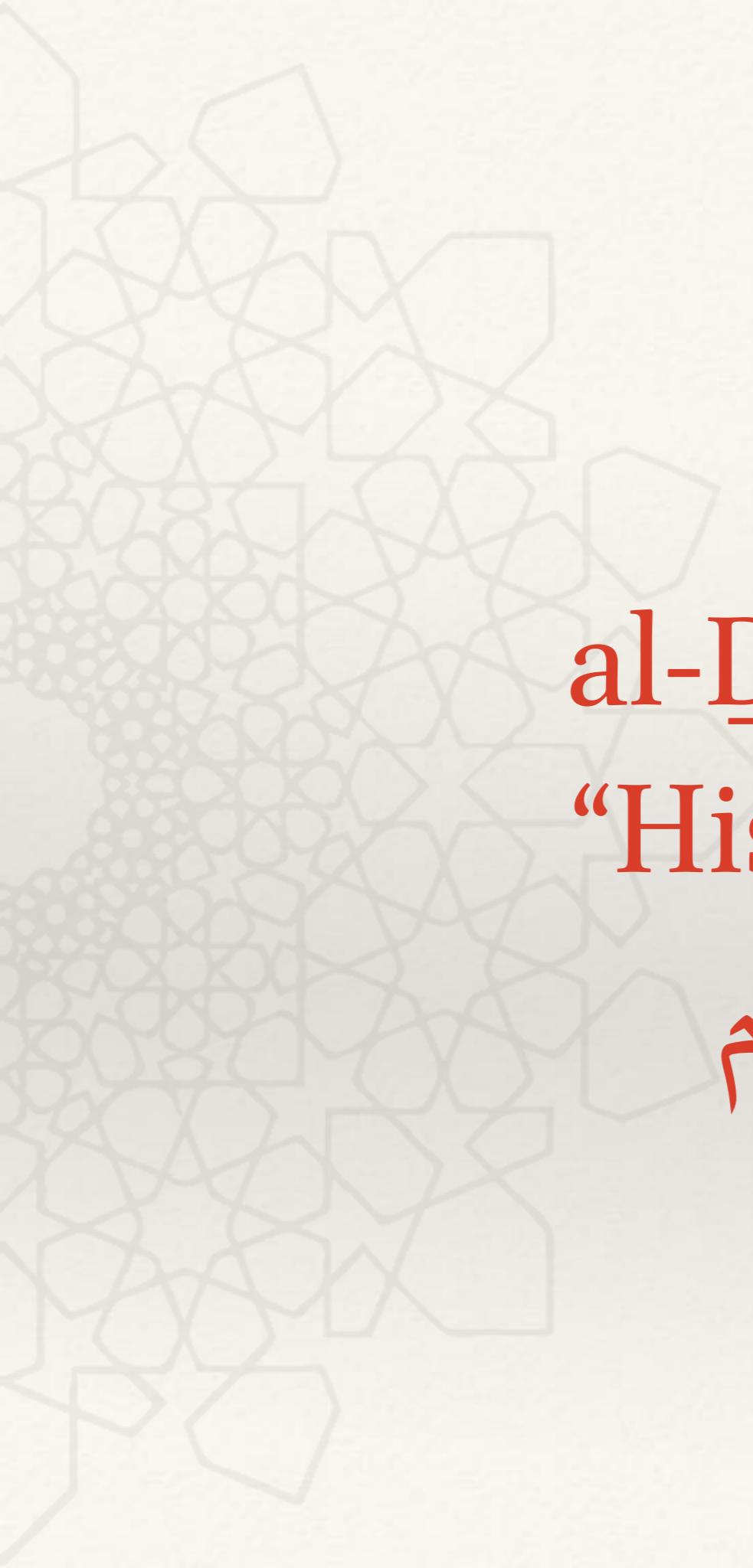


0797-0845 CE
Islamic World Changing



Islamic History in Maps: Overview

- ❖ Analysis of a biographical collection
- ❖ Modeling Islamic geography

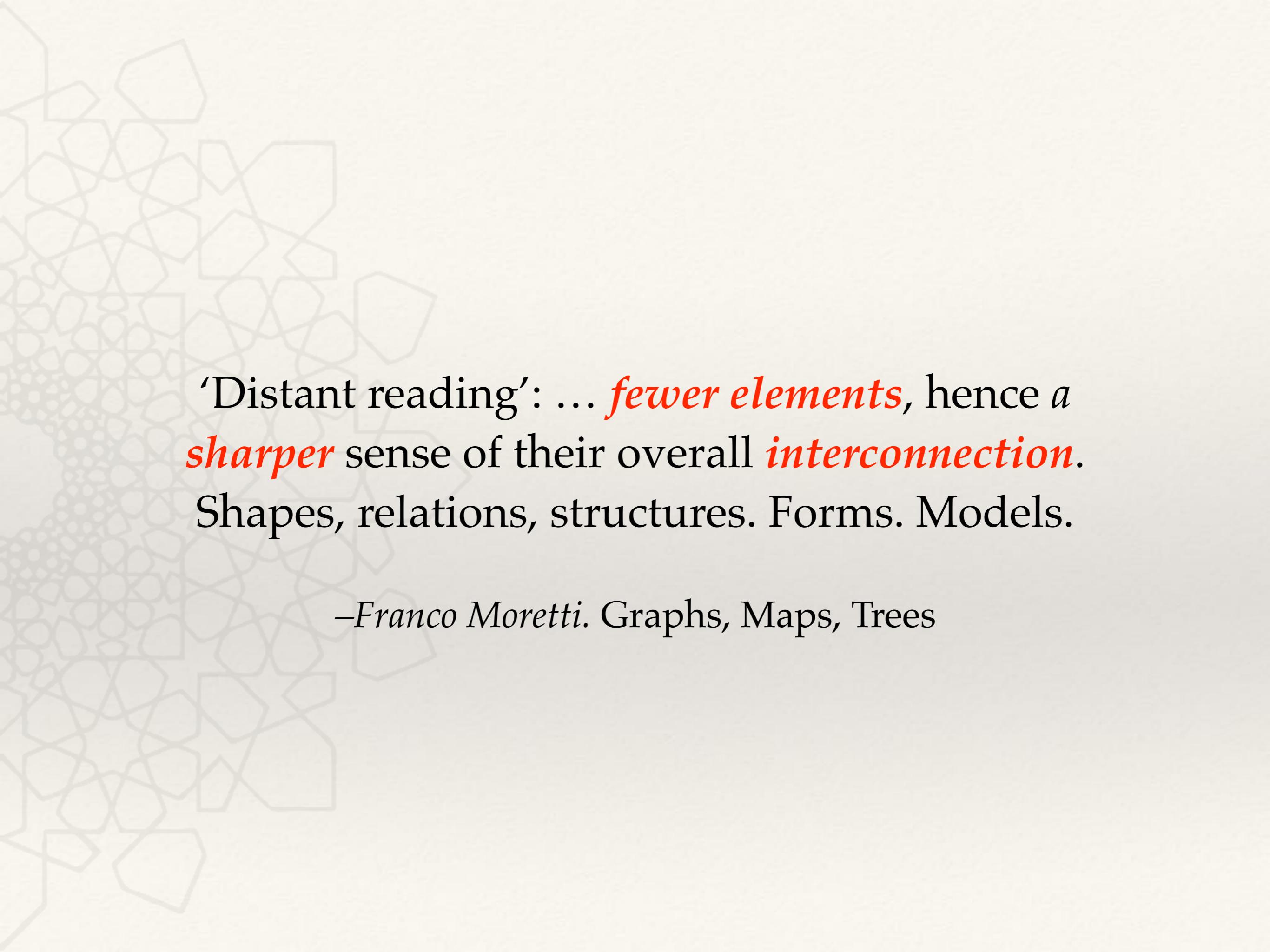


al-Dahabī and his “History of Islam”

تاریخ اسلام

al-Dahabī (d. 748/1347 CE)

- ❖ a Damascene religious scholar, Šāfi‘ī jurist and historian
 - ❖ “The History of Islam” (*Ta’rīh al-islām*)
 - ❖ “first draft” in 714/1314 CE
 - ❖ 50 volumes (here: 4-50)
 - ❖ 7 centuries (here: 41-700/661-1300 CE)
 - ❖ over 30,000 biographies (here: ~29,100)
 - ❖ ~ 3,2 mln. words



‘Distant reading’: ... *fewer elements*, hence *a sharper* sense of their overall *interconnection*.
Shapes, relations, structures. Forms. Models.

—Franco Moretti. Graphs, Maps, Trees

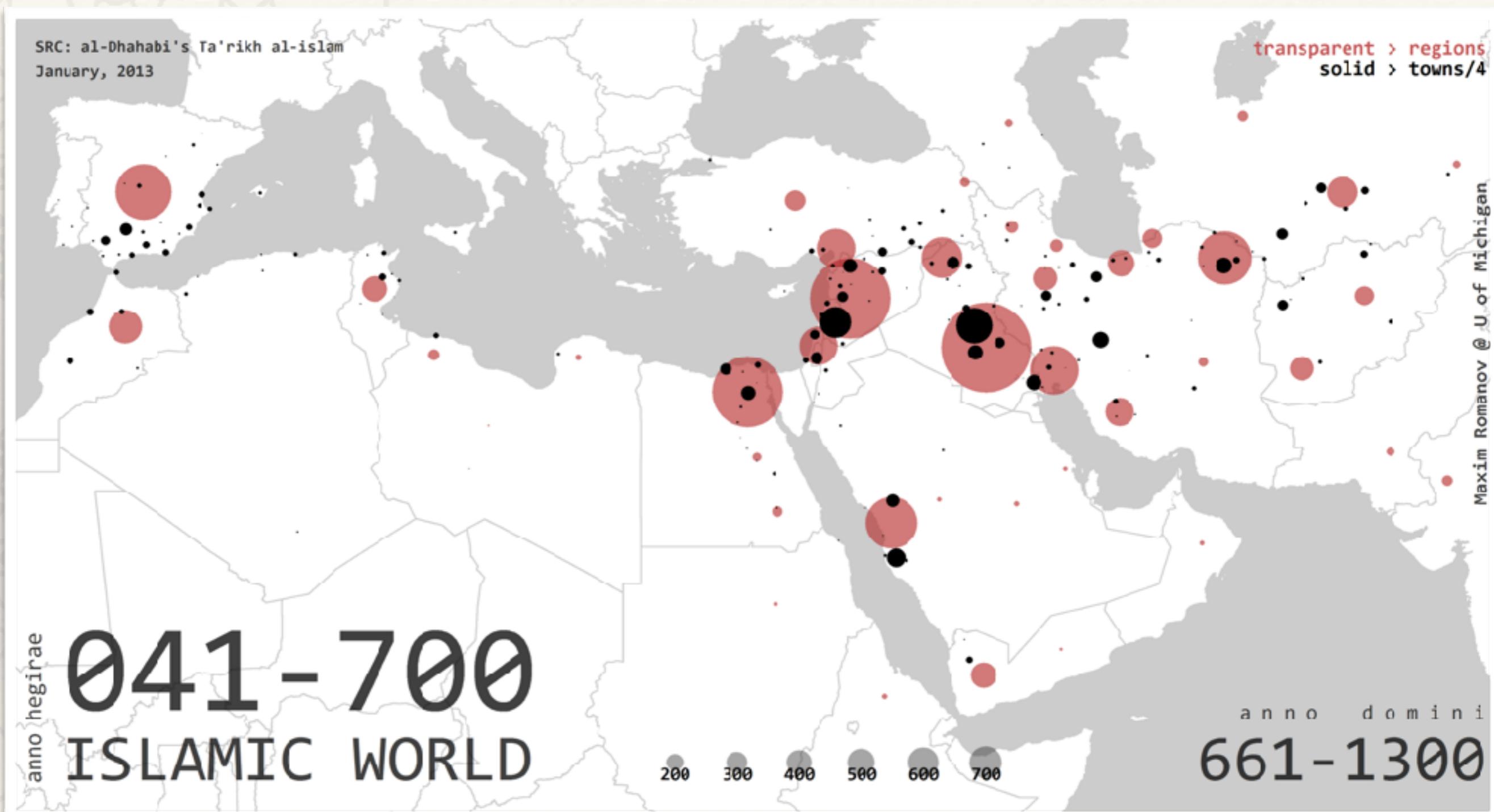
“The History of Islam”: Distant Reading

- ❖ Death dates
- ❖ Place names / Toponyms
- ❖ “Descriptive names” (*nisbats*)
 - ❖ 700 unique (frequency 10 and higher)
 - ❖ 70,000 total
 - ❖ ~ social profile (issue with their meaning*)

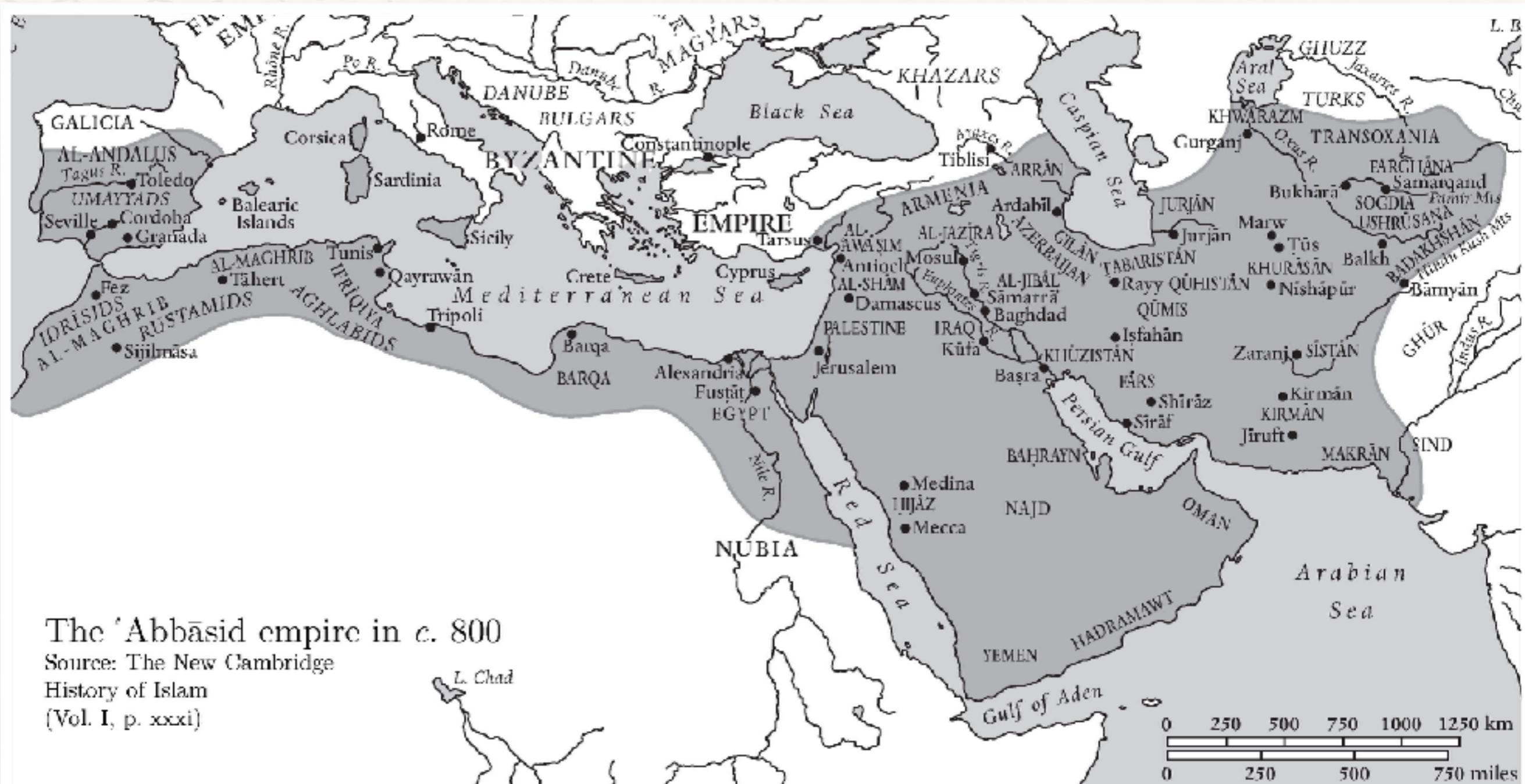


Social Geography: Coverage

Geographical Coverage



Geographical Coverage

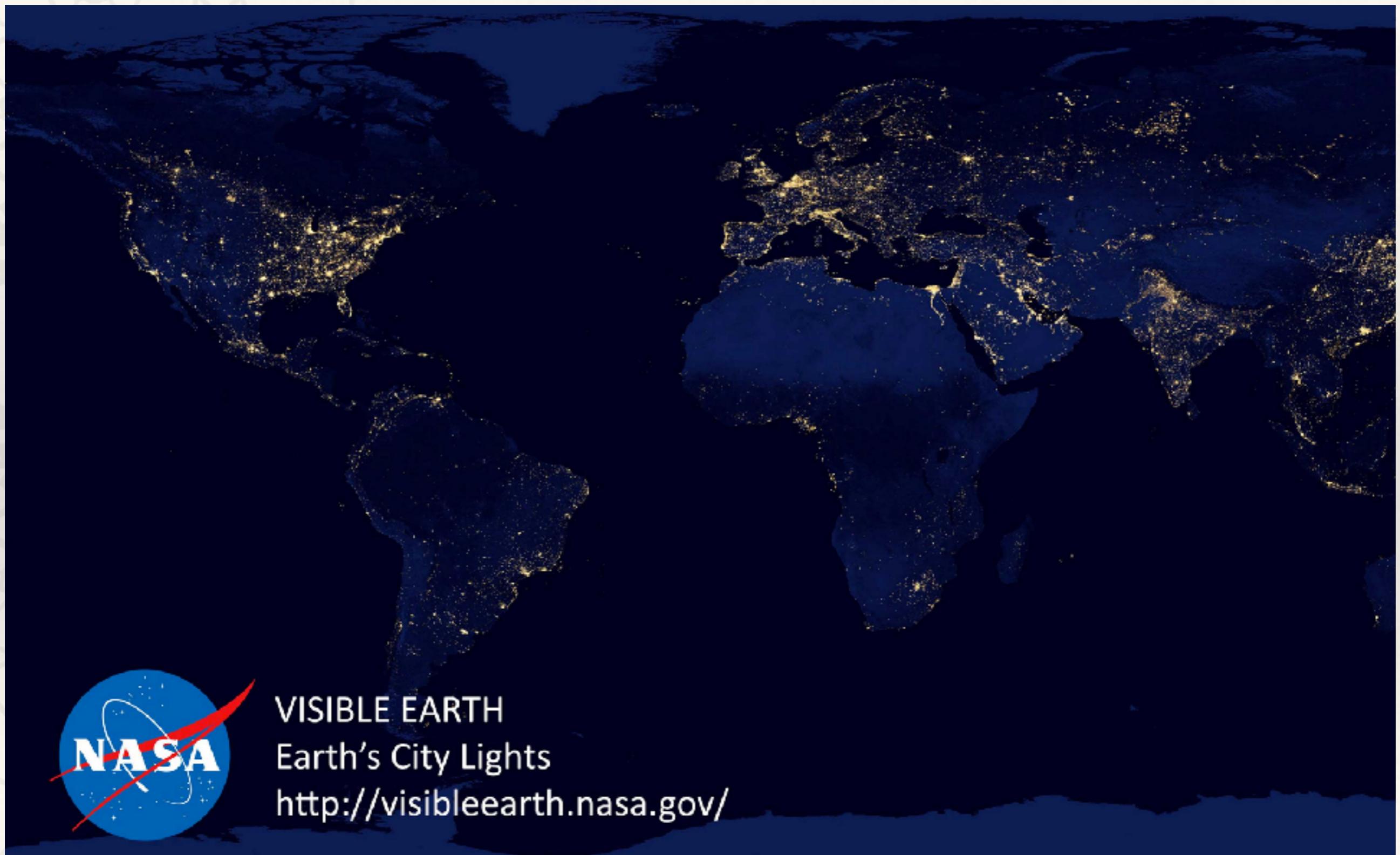


Source: Robinson, Chase F., ed. *The New Cambridge History of Islam*. 1st ed. Cambridge University Press, 2010.

Geographical Coverage: Dynamically...

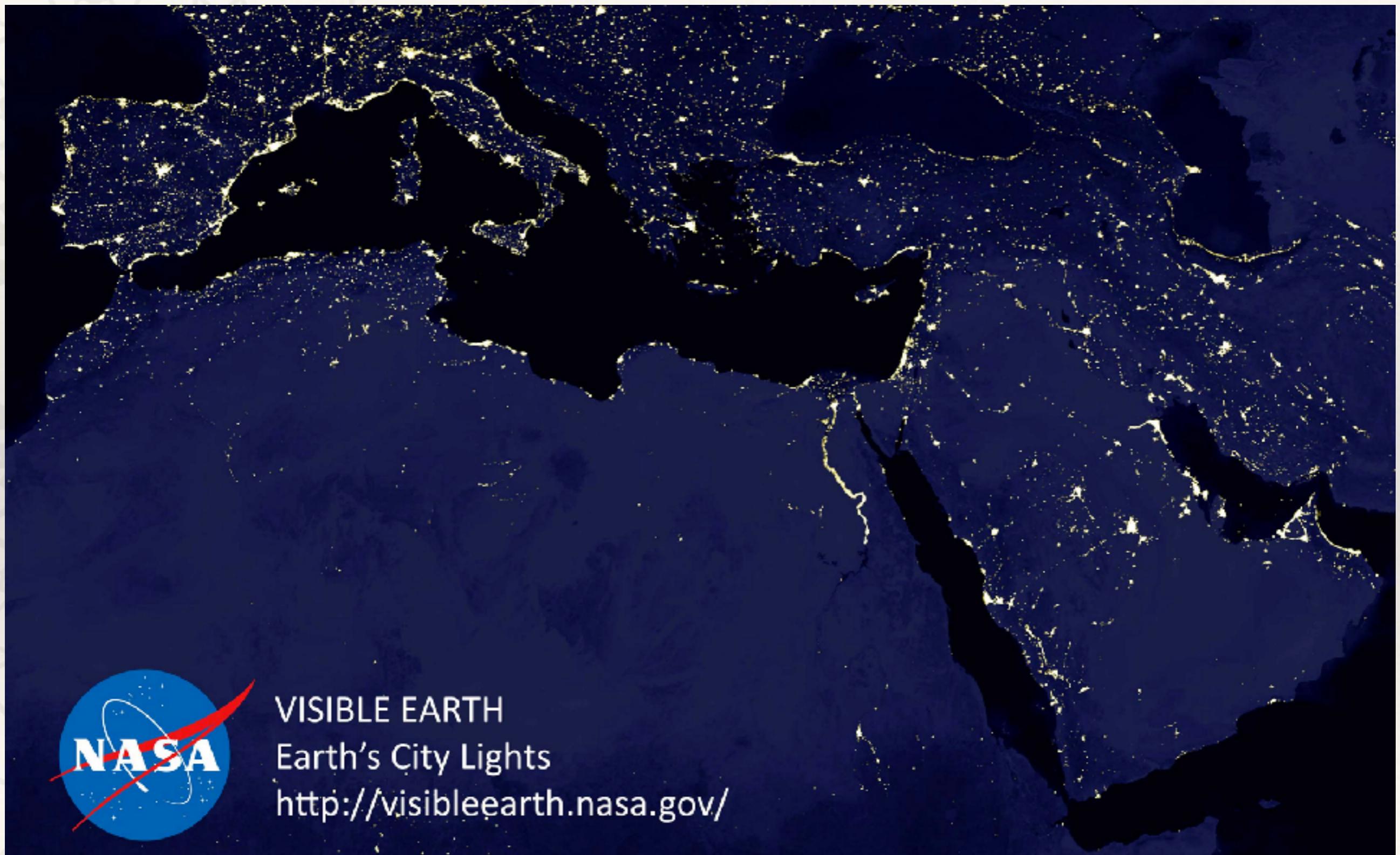


Geographical Coverage



VISIBLE EARTH
Earth's City Lights
<http://visibleearth.nasa.gov/>

Geographical Coverage



Geographical Coverage

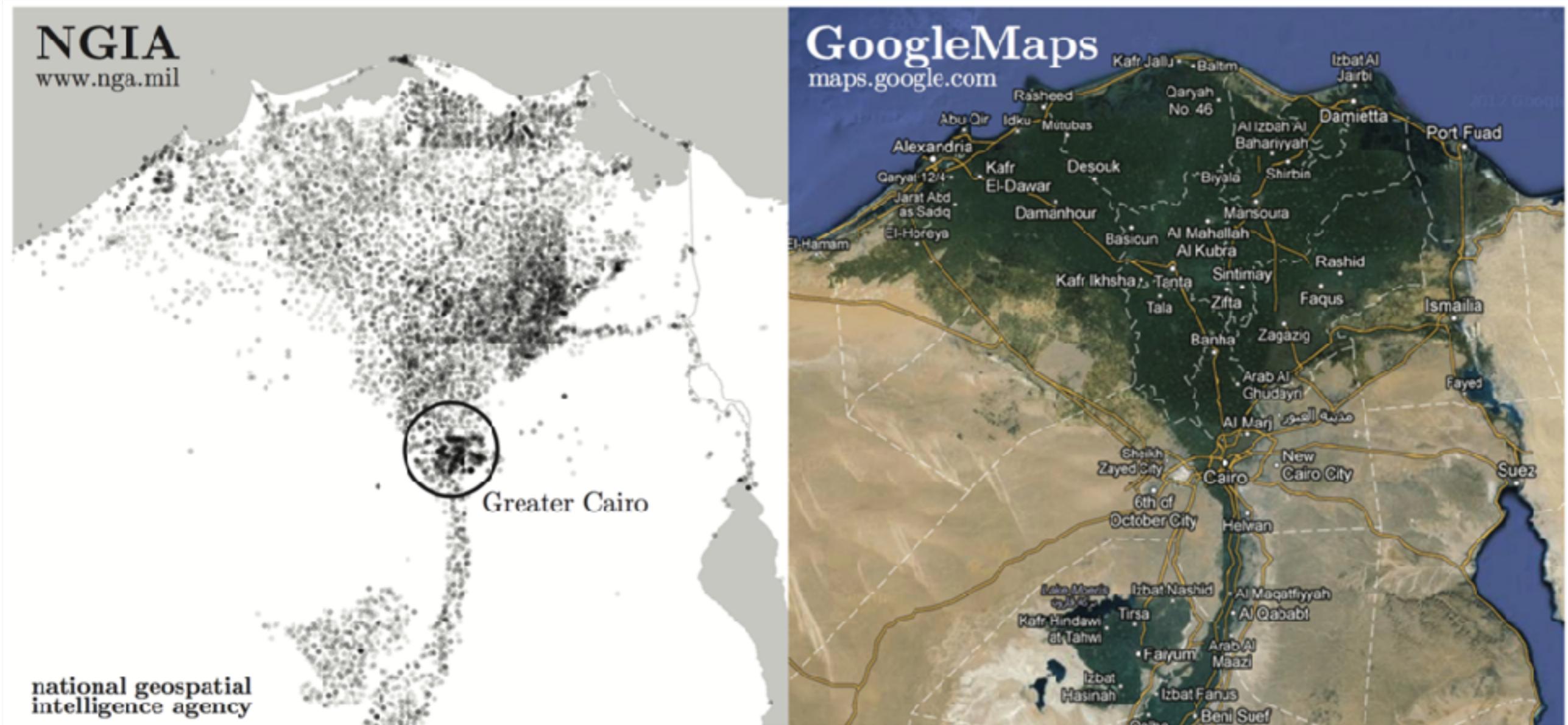
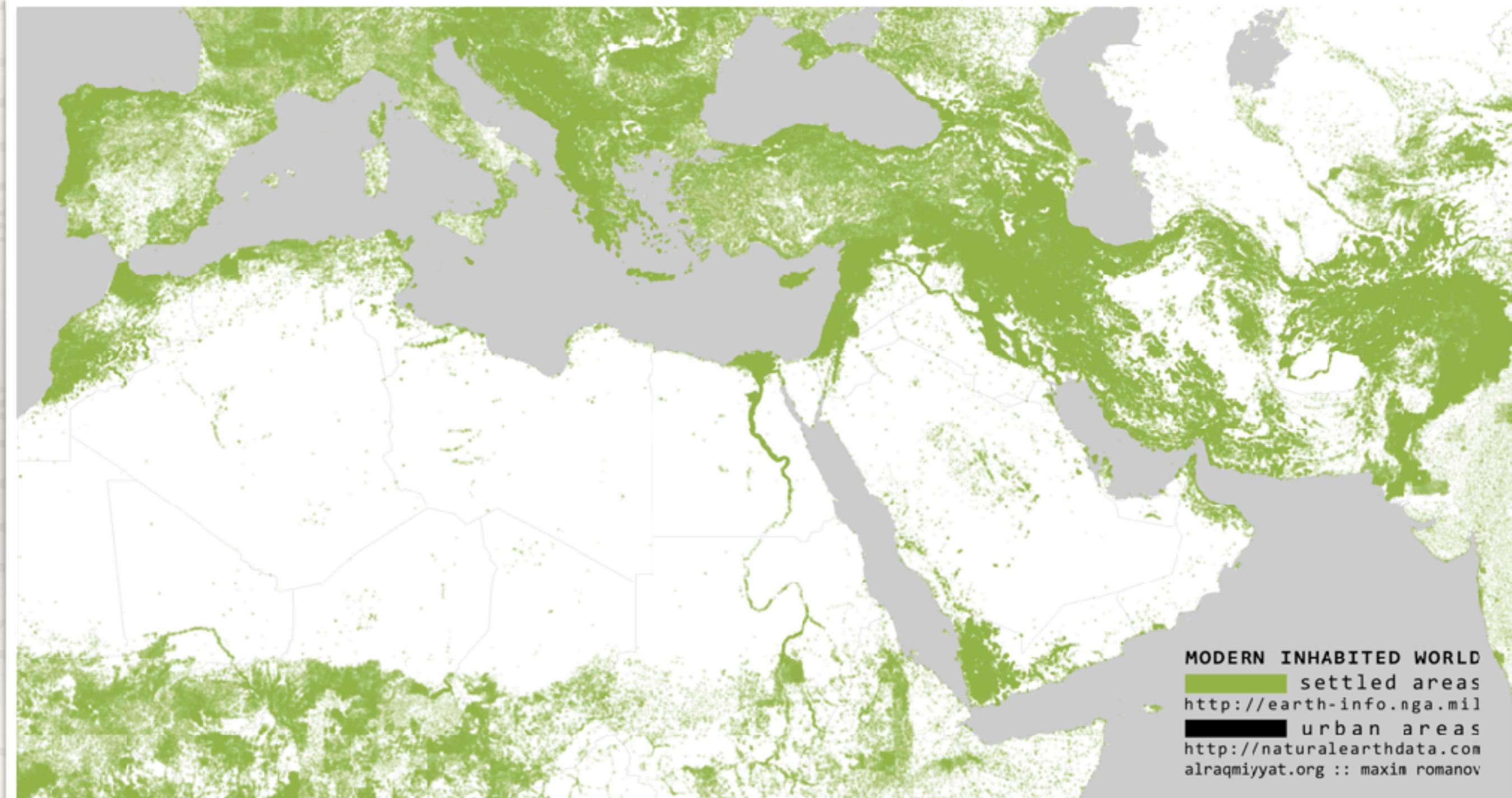
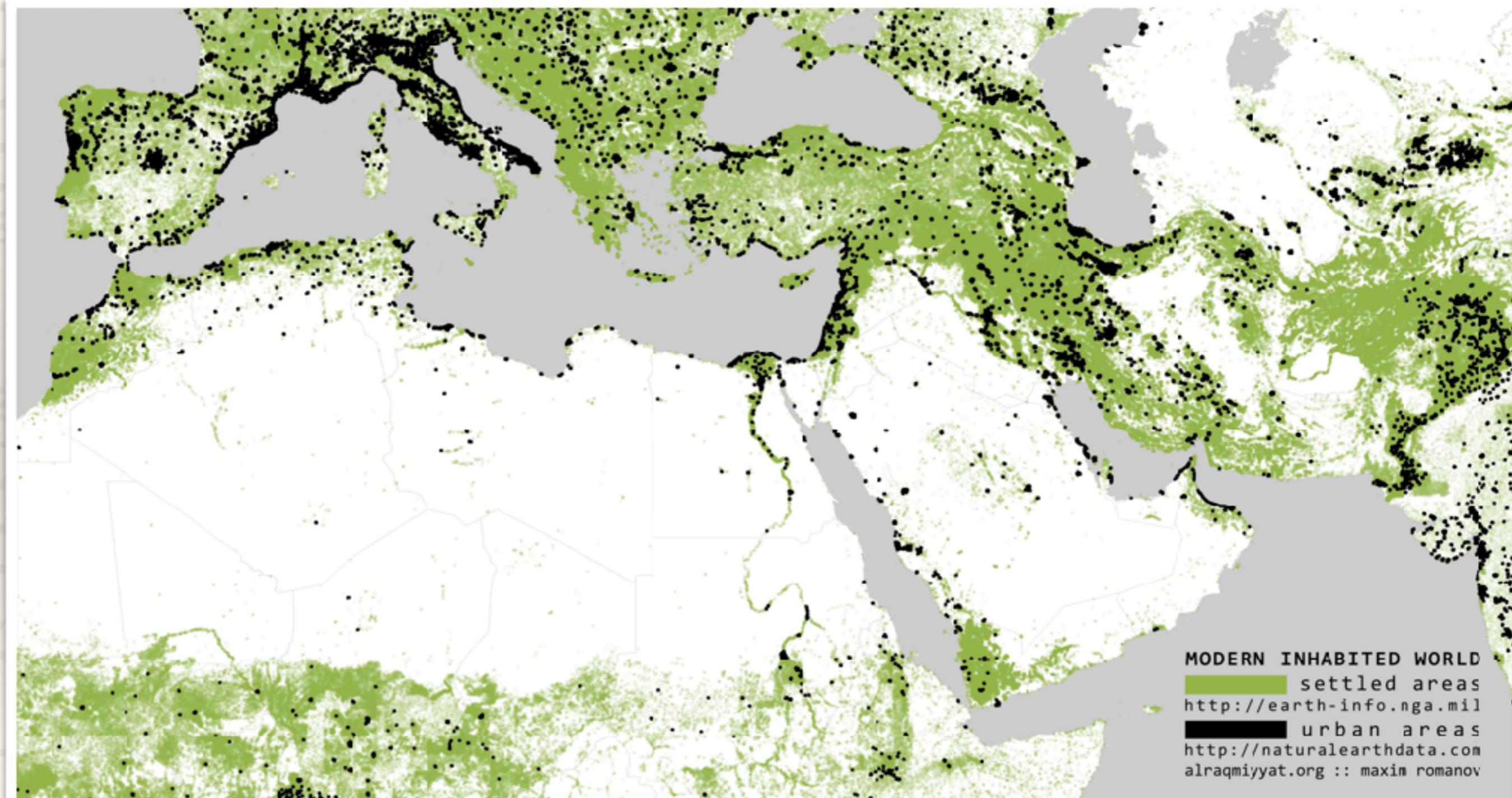


Figure 1.9: The Inhabited World: Using GIS data, one can build a map of the inhabited areas. The map on the left shows how settlements shape the Nile Delta, the valley of the Nile river, the Fayyūm Oasis, and, to a certain extent, the Suez canal; the darkest cluster represents the Cairo metropolitan area.

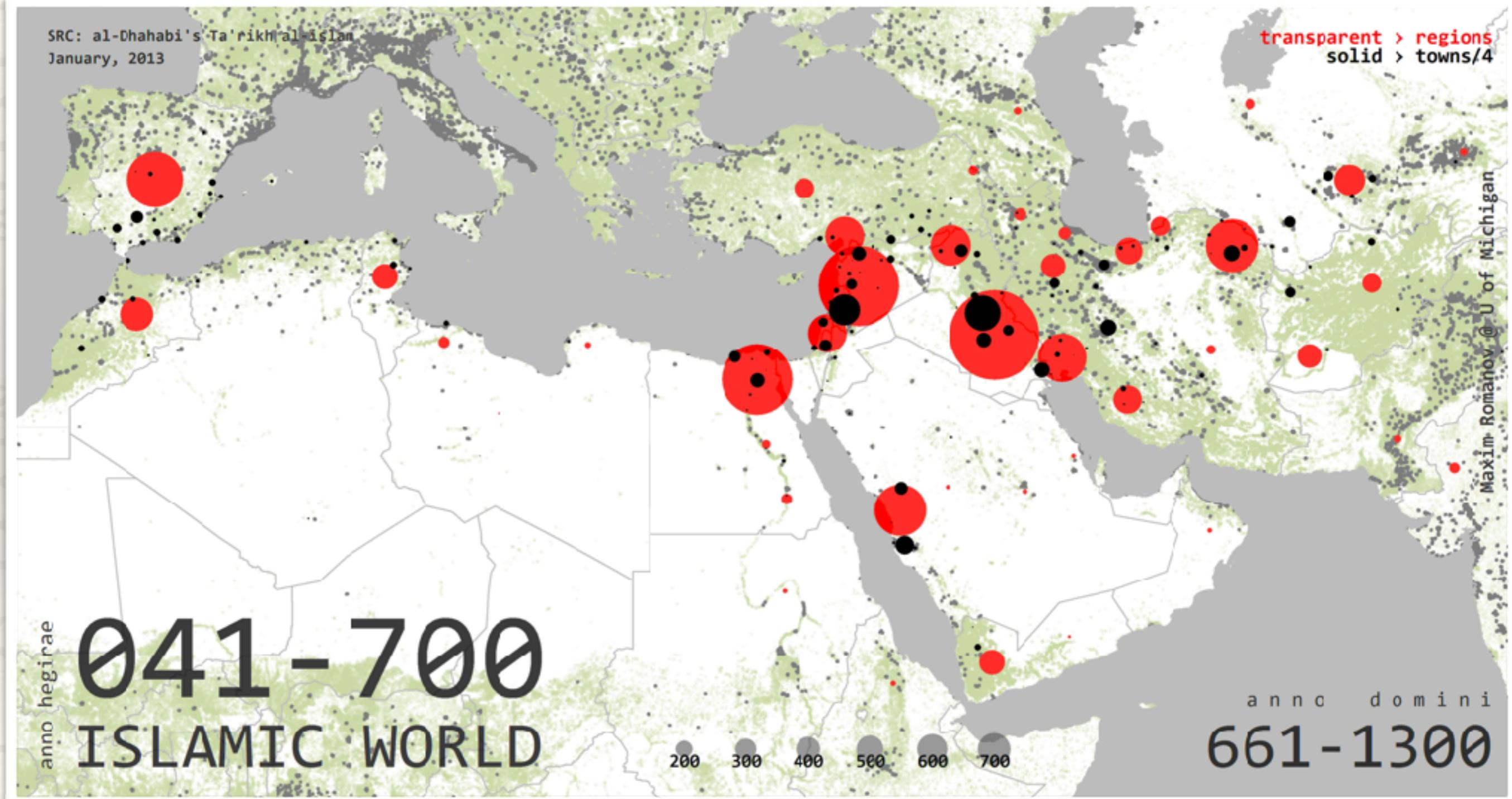
Geographical Coverage



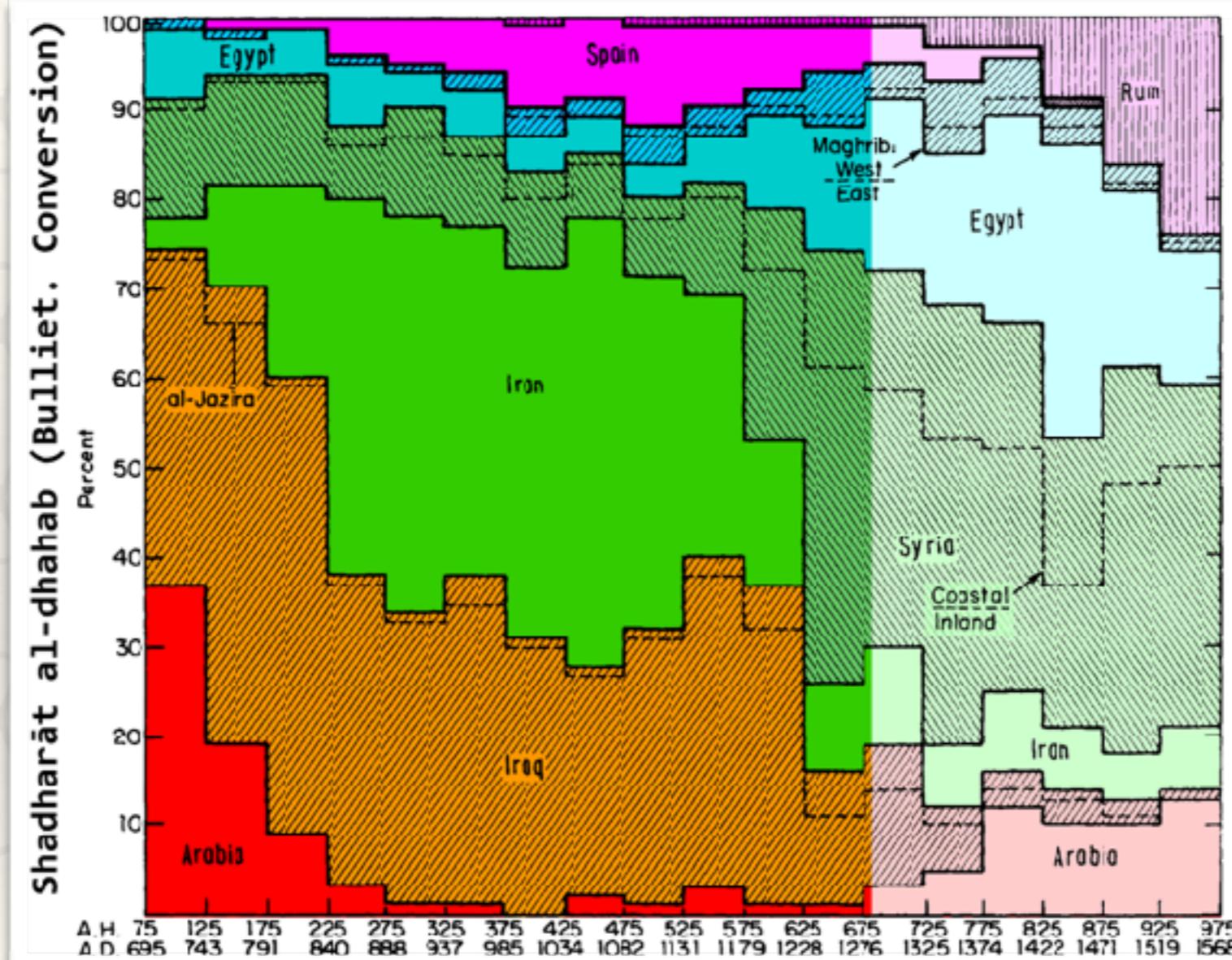
Geographical Coverage



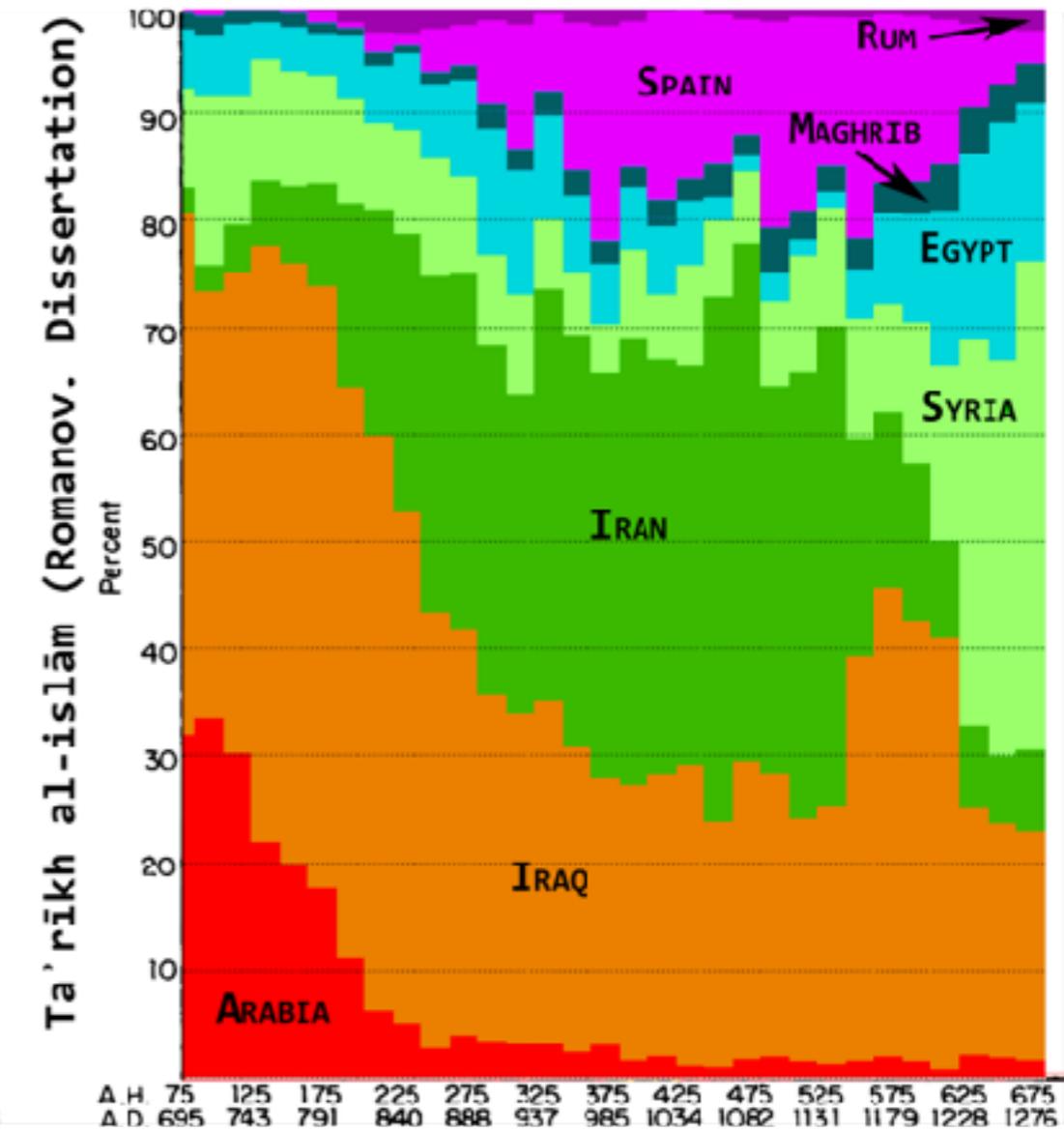
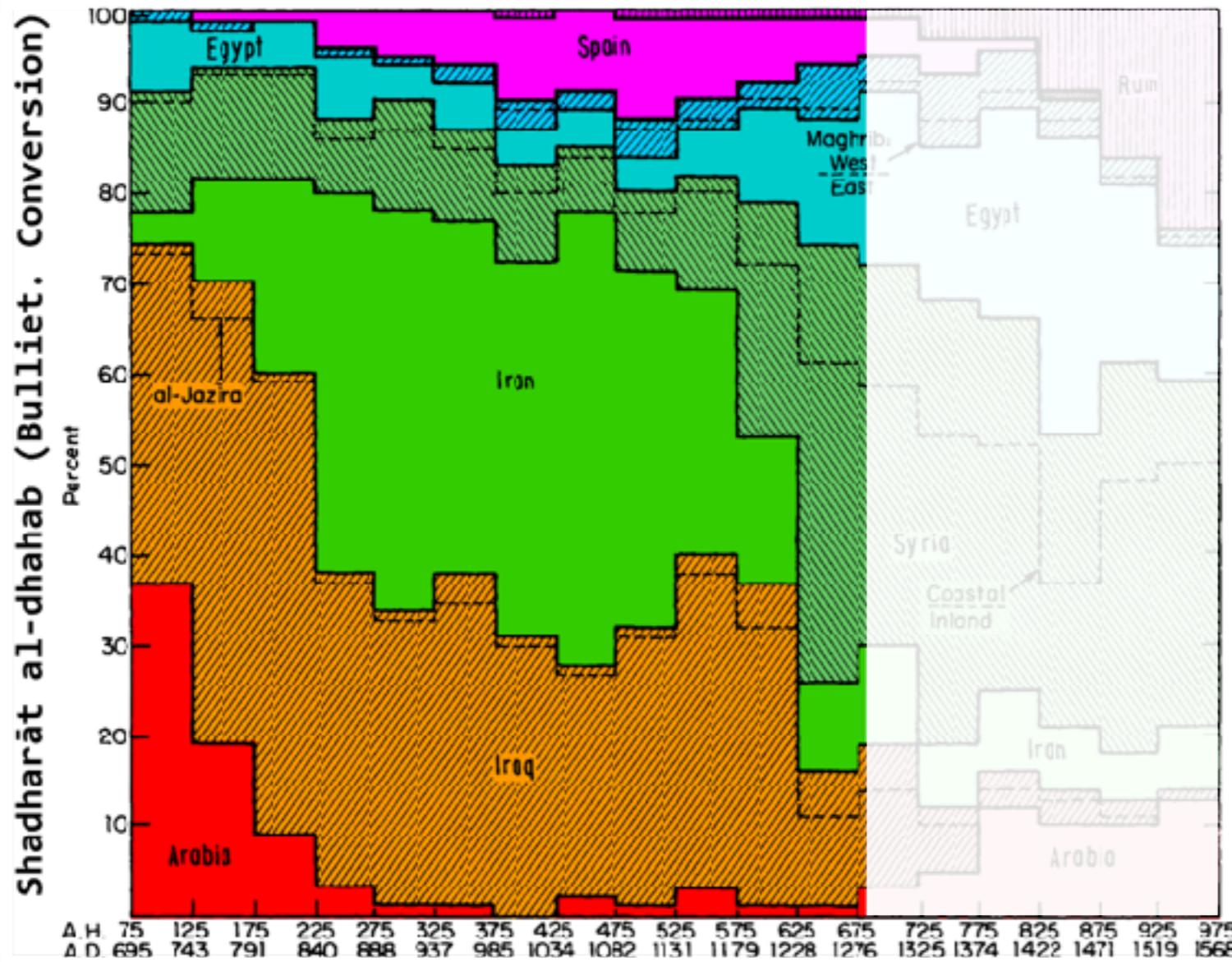
Geographical Coverage



Geo-Chronological Coverage: Comparative Perspective

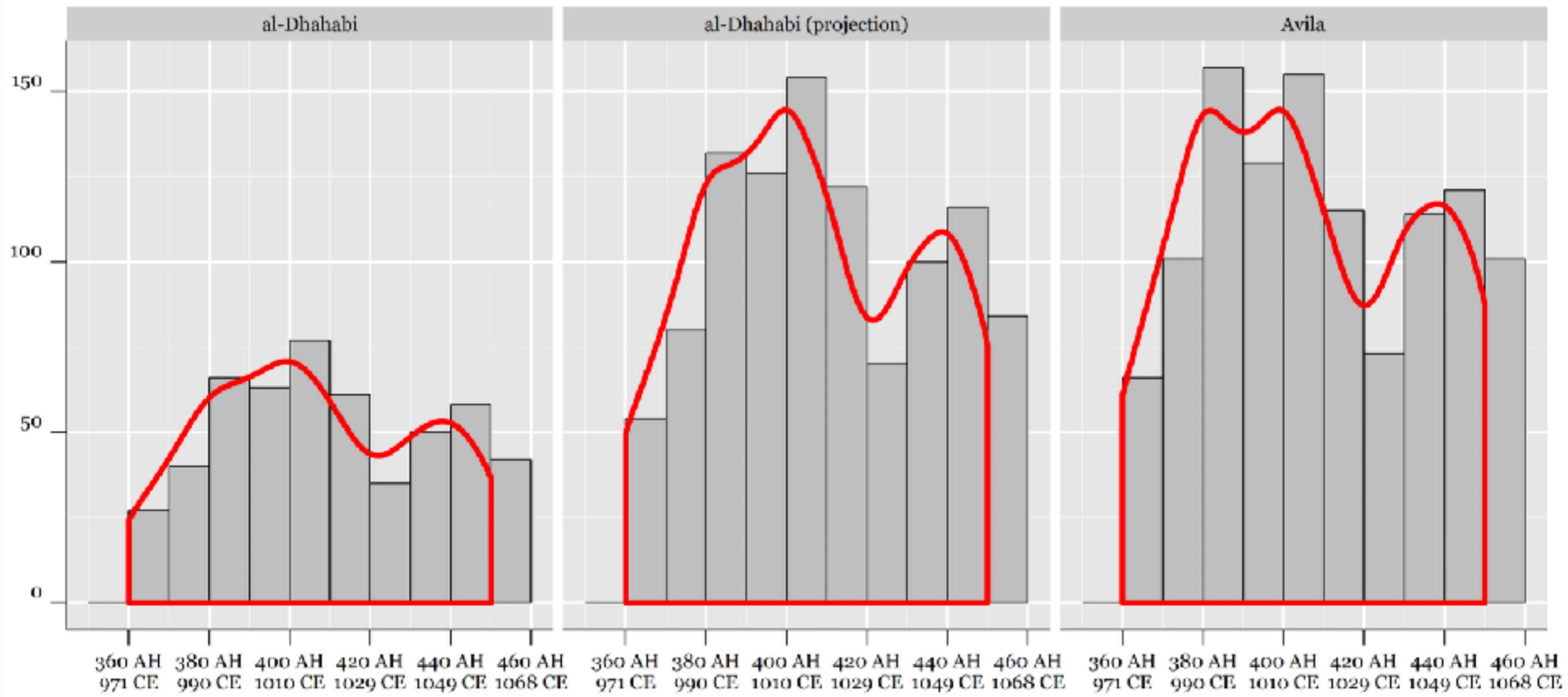


Geo-Chronological Coverage: Comparative Perspective

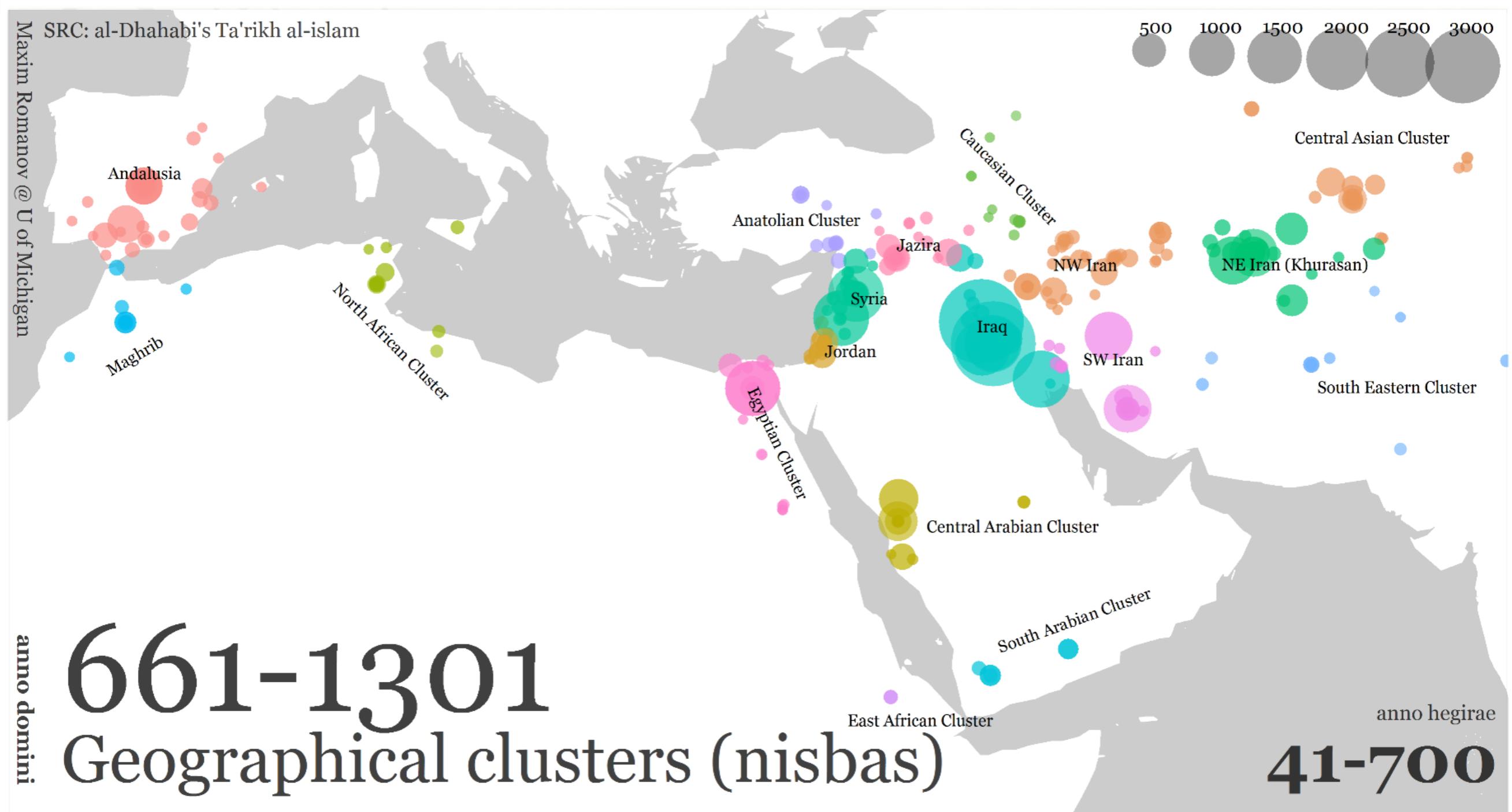


Geo-Chronological Coverage: Comparative Perspective

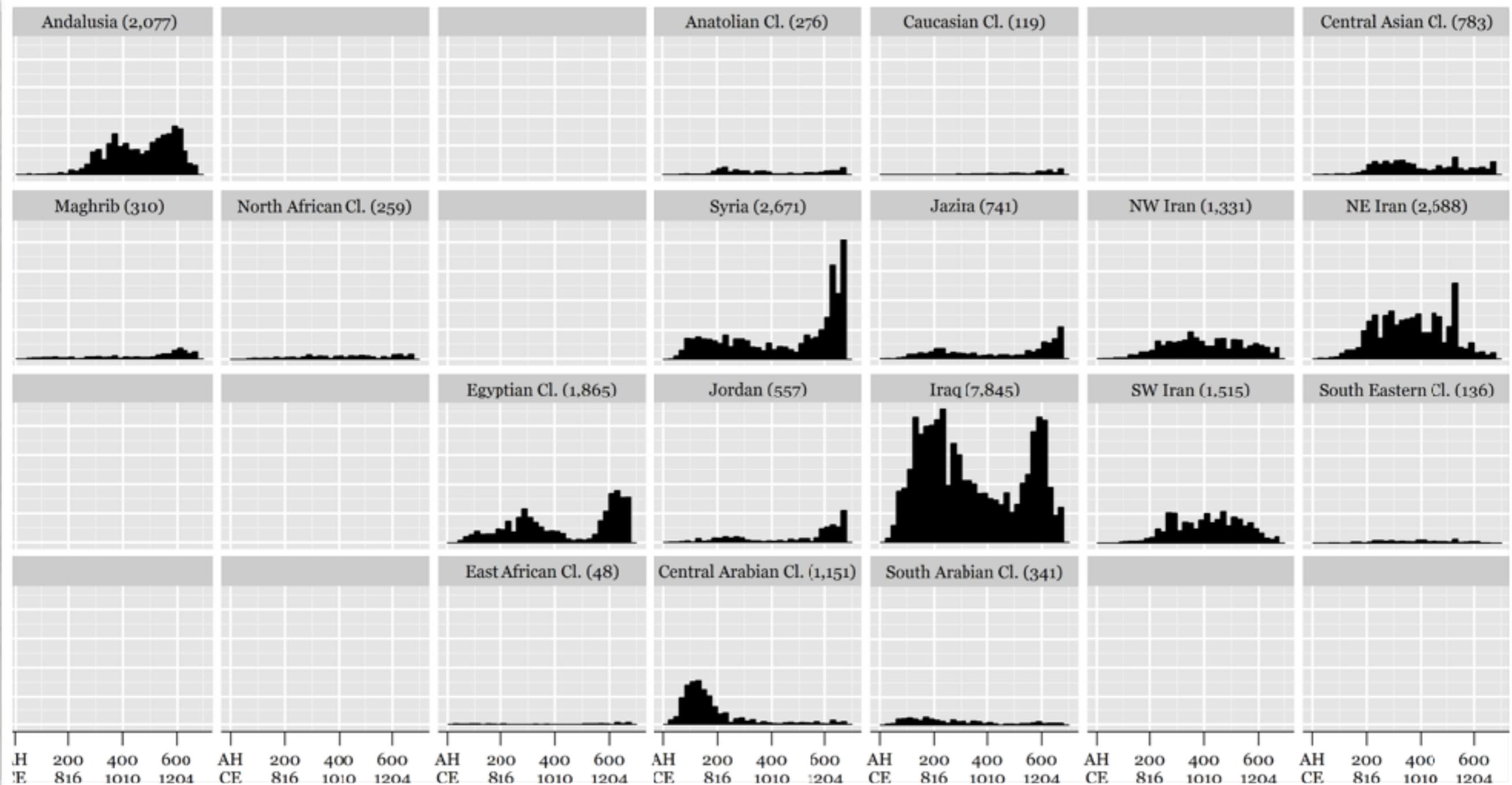
AH	370	380	390	400	410	420	430	440	450	460
in TI	42%	40%	42%	49%	49%	53%	49%	44%	48%	41%

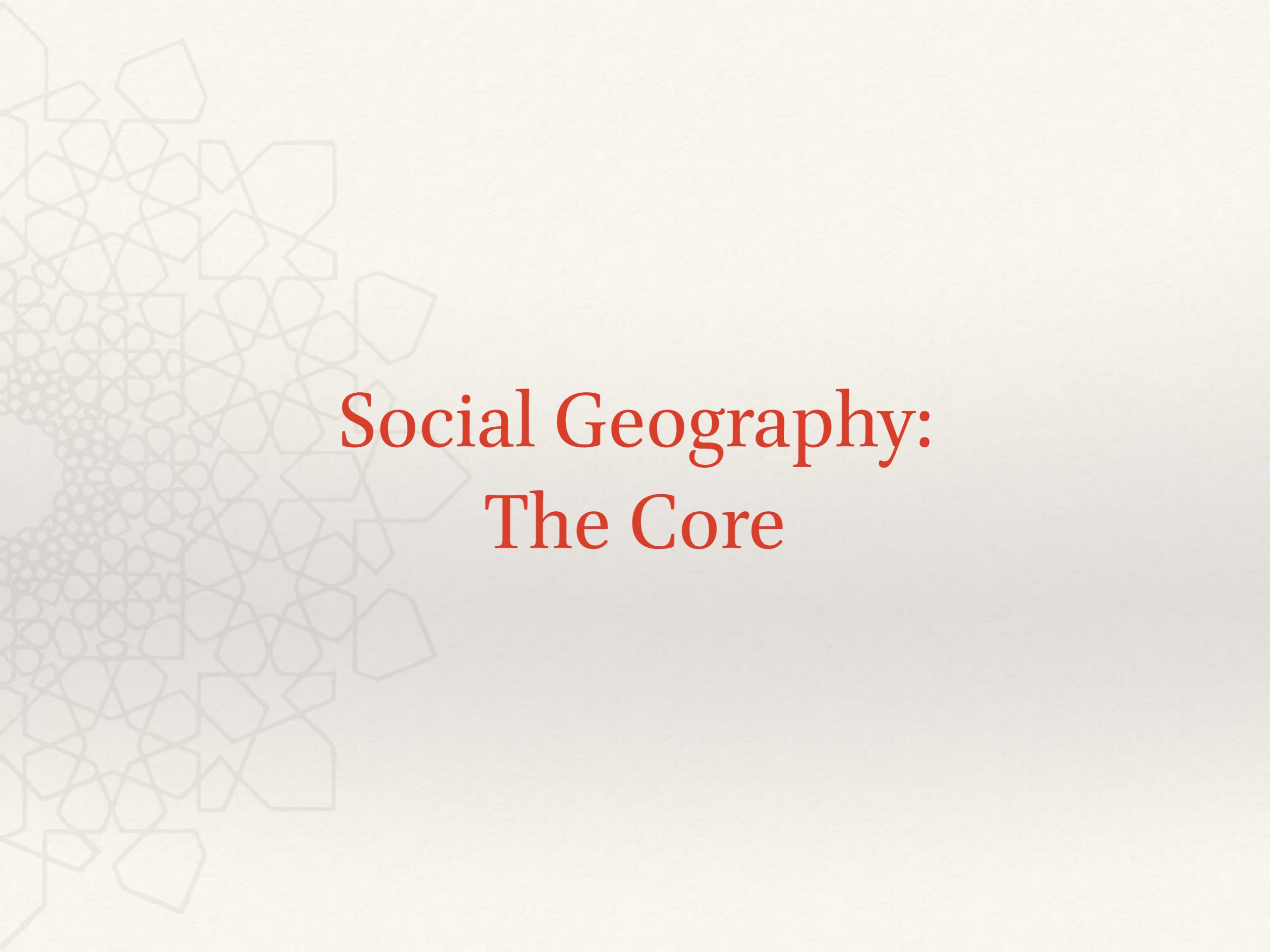


Geographical Coverage



Geo-Chronological Coverage





Social Geography: The Core

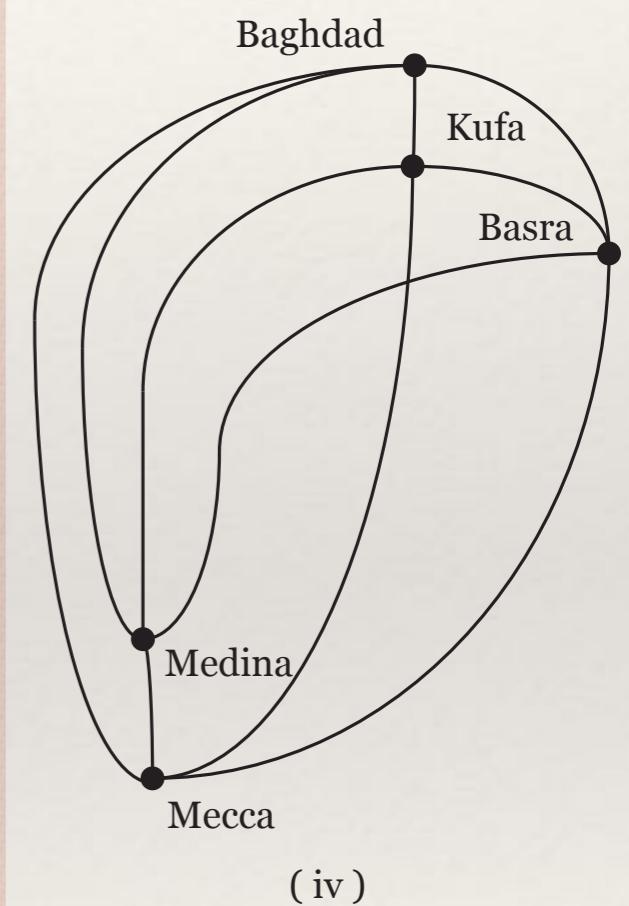
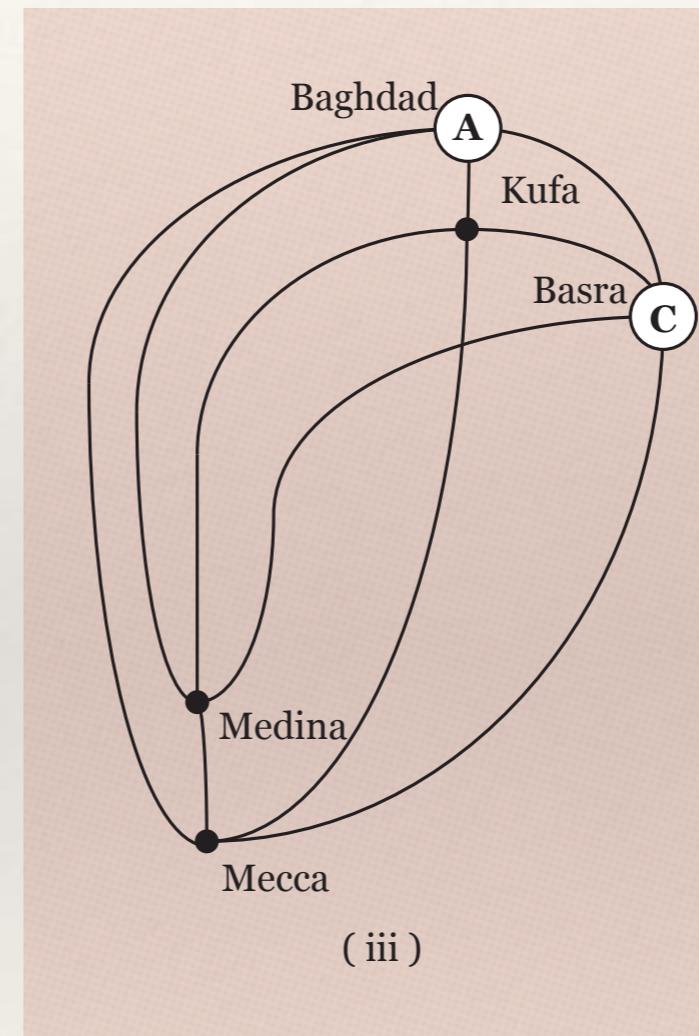
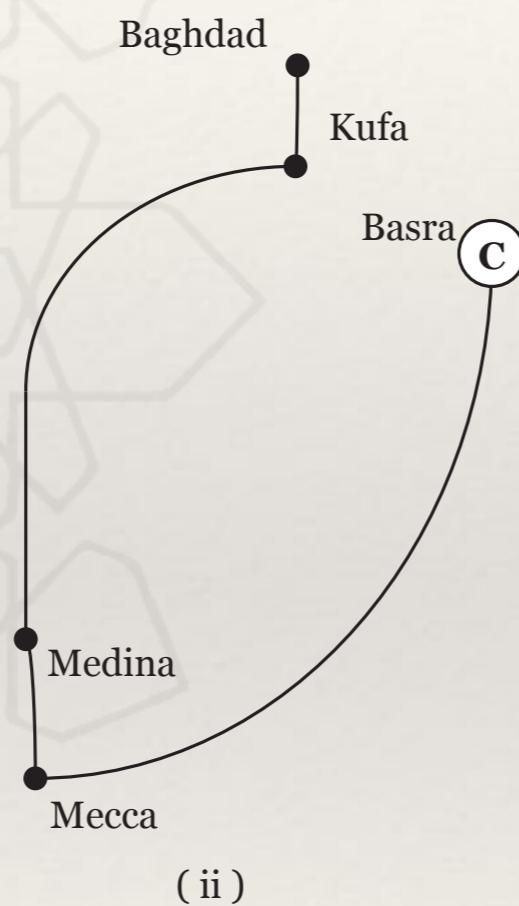
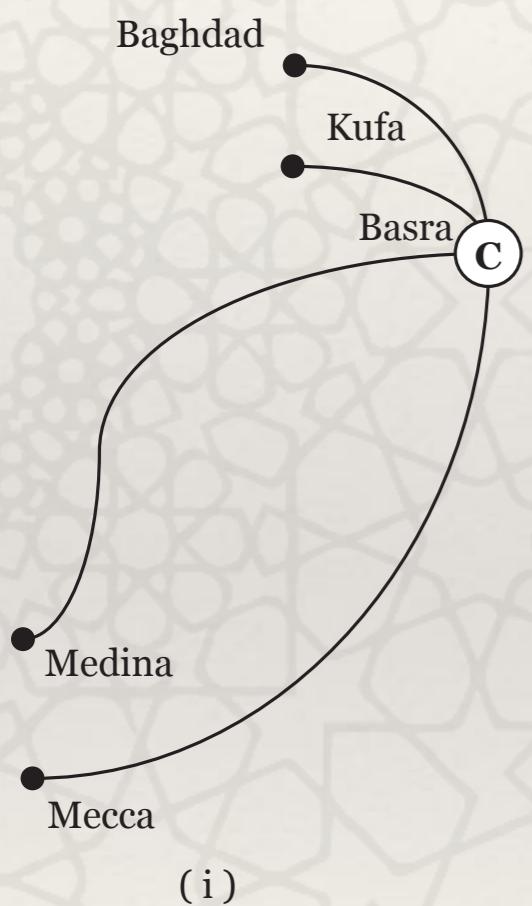
Modeling the Core



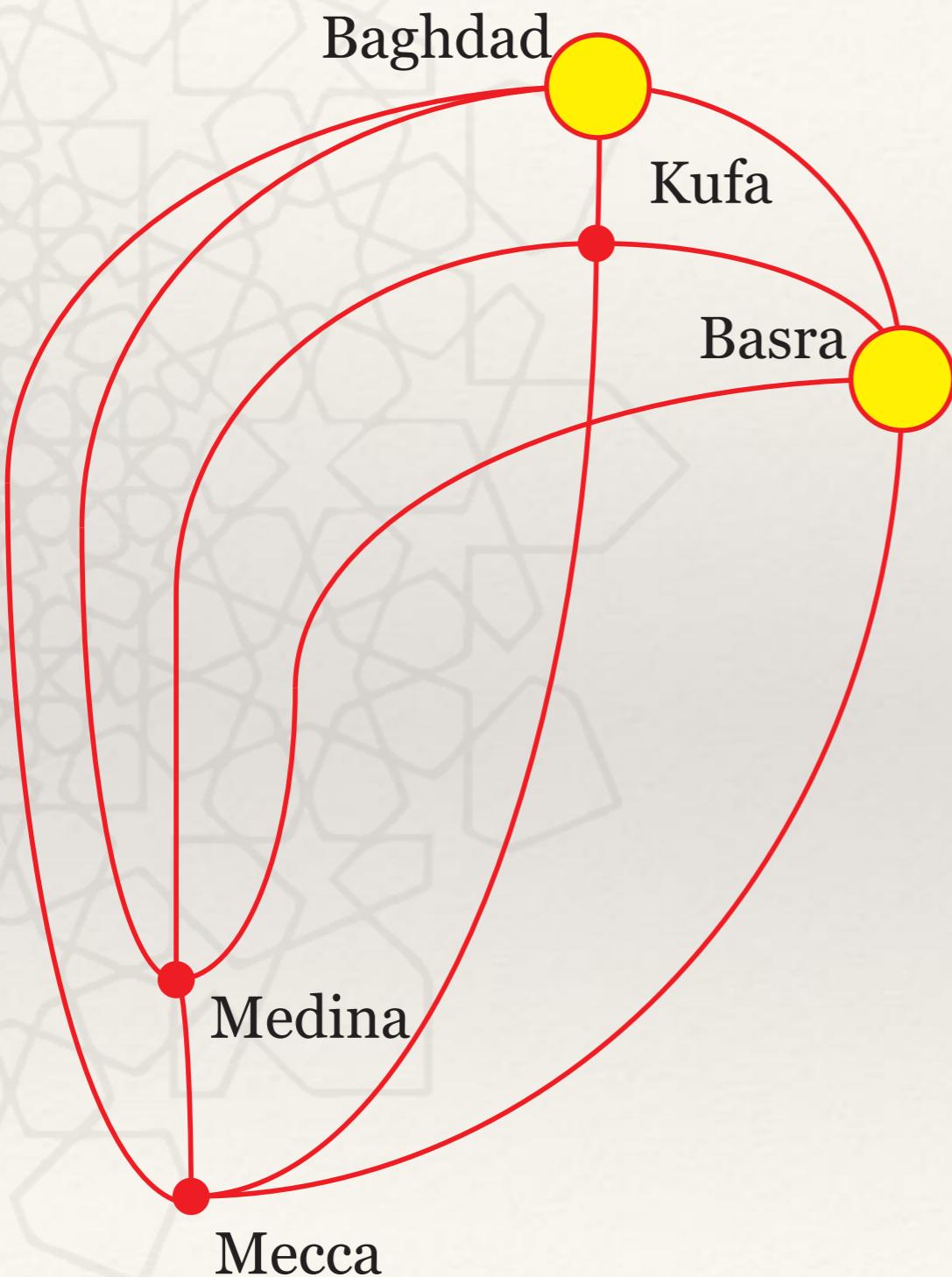
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SOURCE

Modeling Geographical Connections

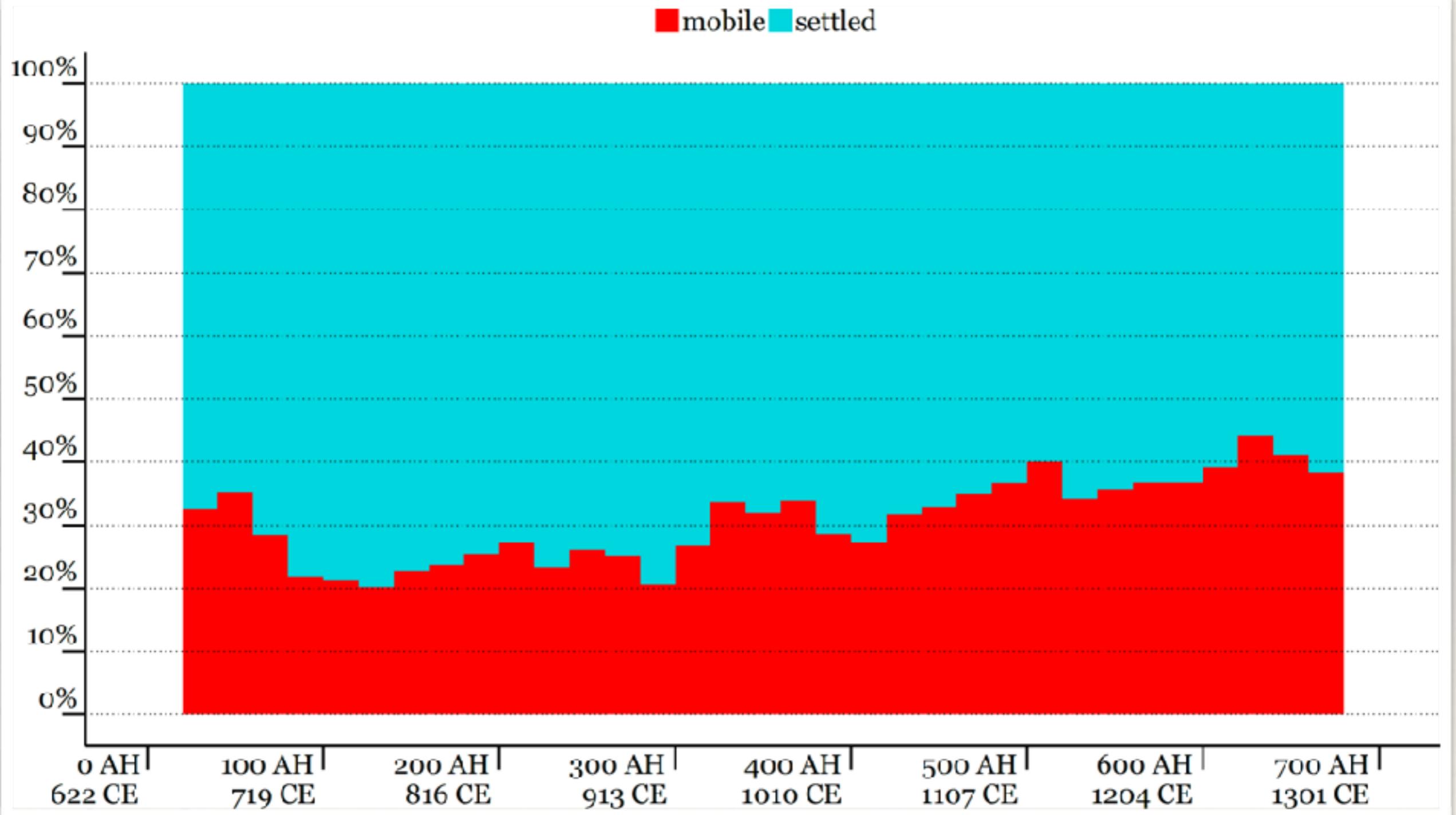


Modeling Geographical Connections



- ❖ A cartogram of a person—*al-Bağdādī* and *al-Basrī*—whose biography mentions Baghdad, Kufa, Basra, Medina and Mecca
- ❖ Such data can be grouped to show particular groups and/or periods

Transregional Mobility



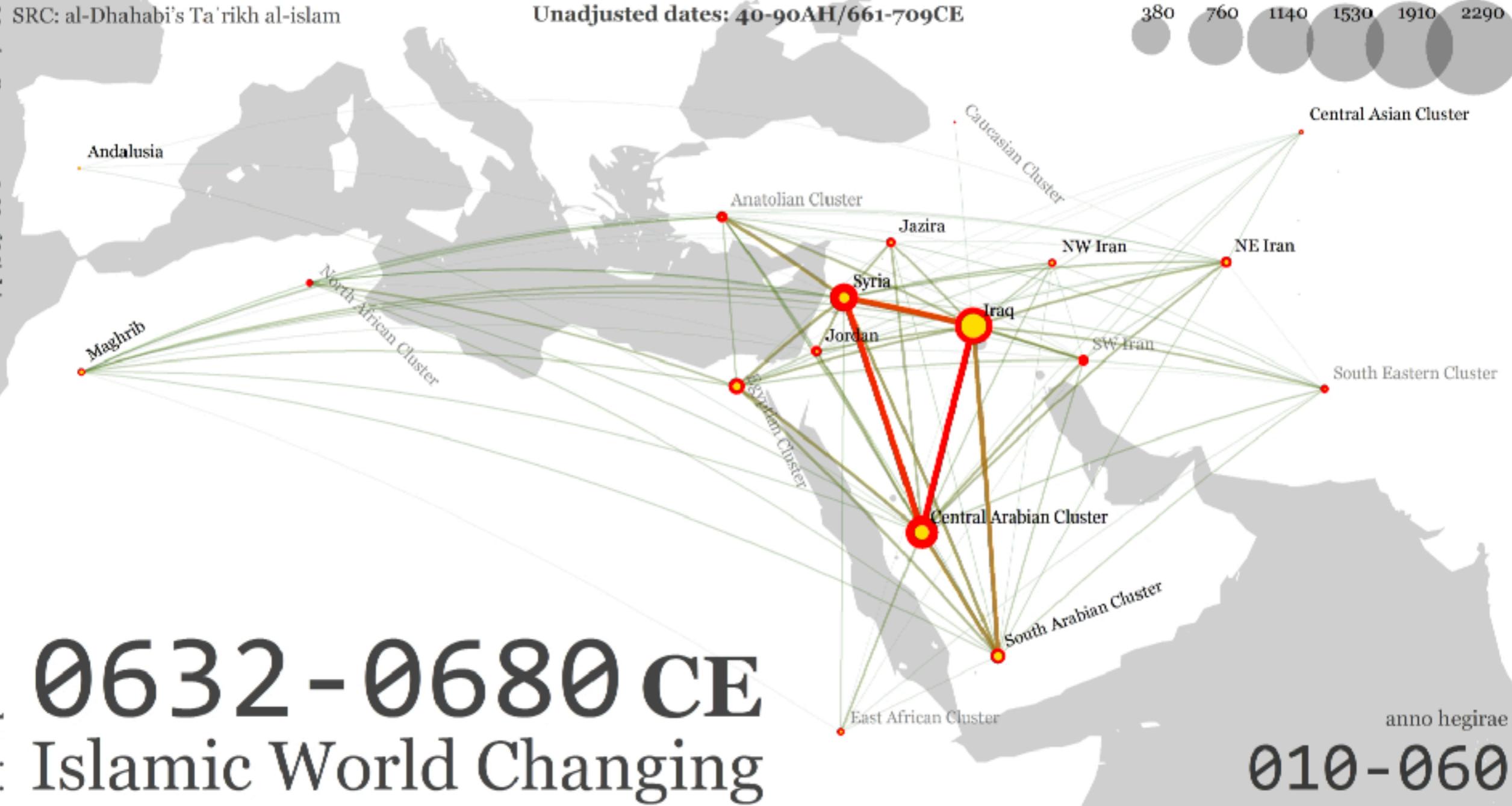
Note: 33% (9,700) with transregional connections, fluctuating within the range of 22-46%

anno domini
0632 - 0680 CE
Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 40-90AH/661-709CE

380 760 1140 1530 1910 2290



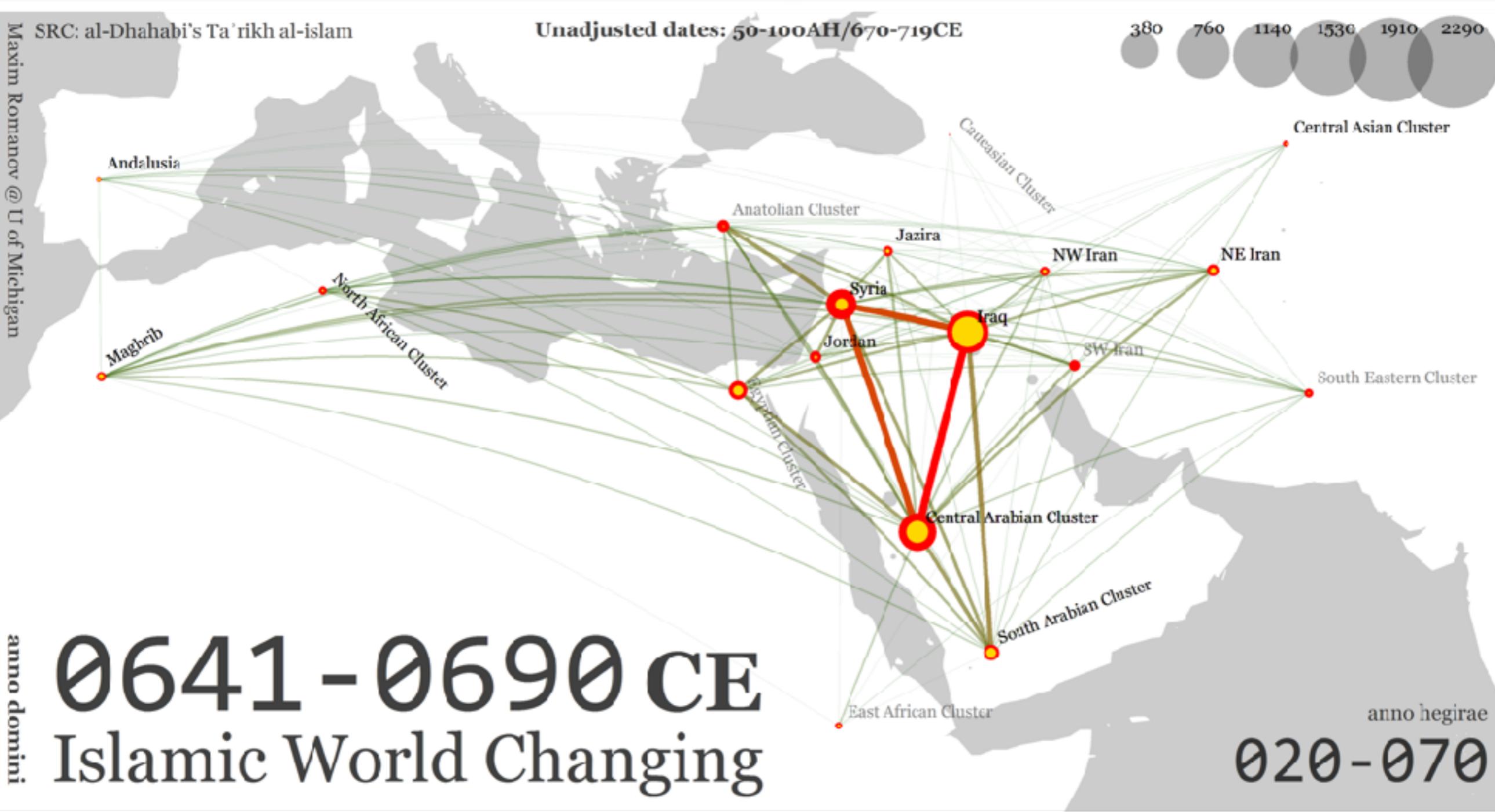
anno hegirae

010 - 060

0641 - 0690 CE
Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 50-100AH/670-719CE



anno hegirae

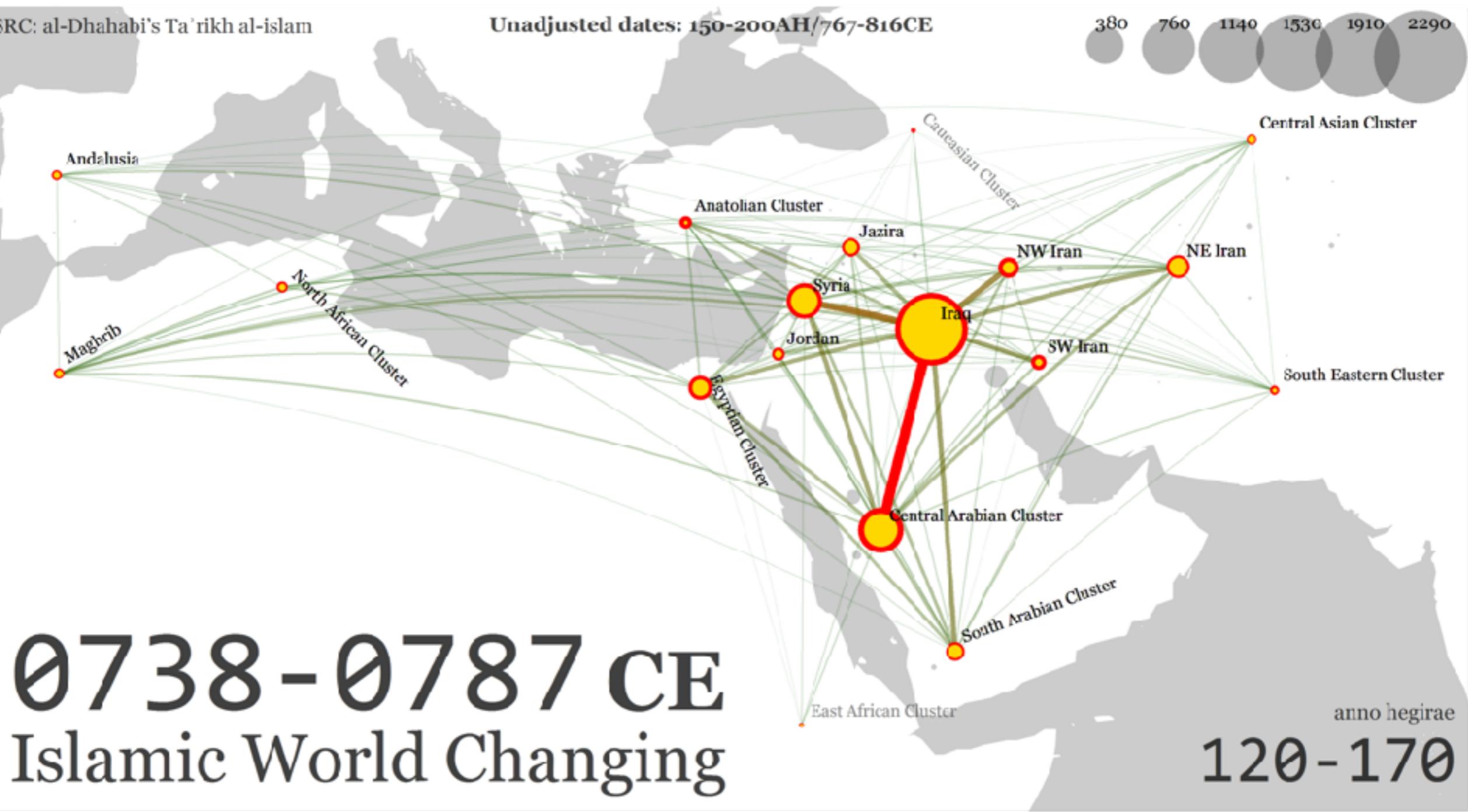
020 - 070

anno domini
0738-0787 CE
Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 150-200AH/767-816CE

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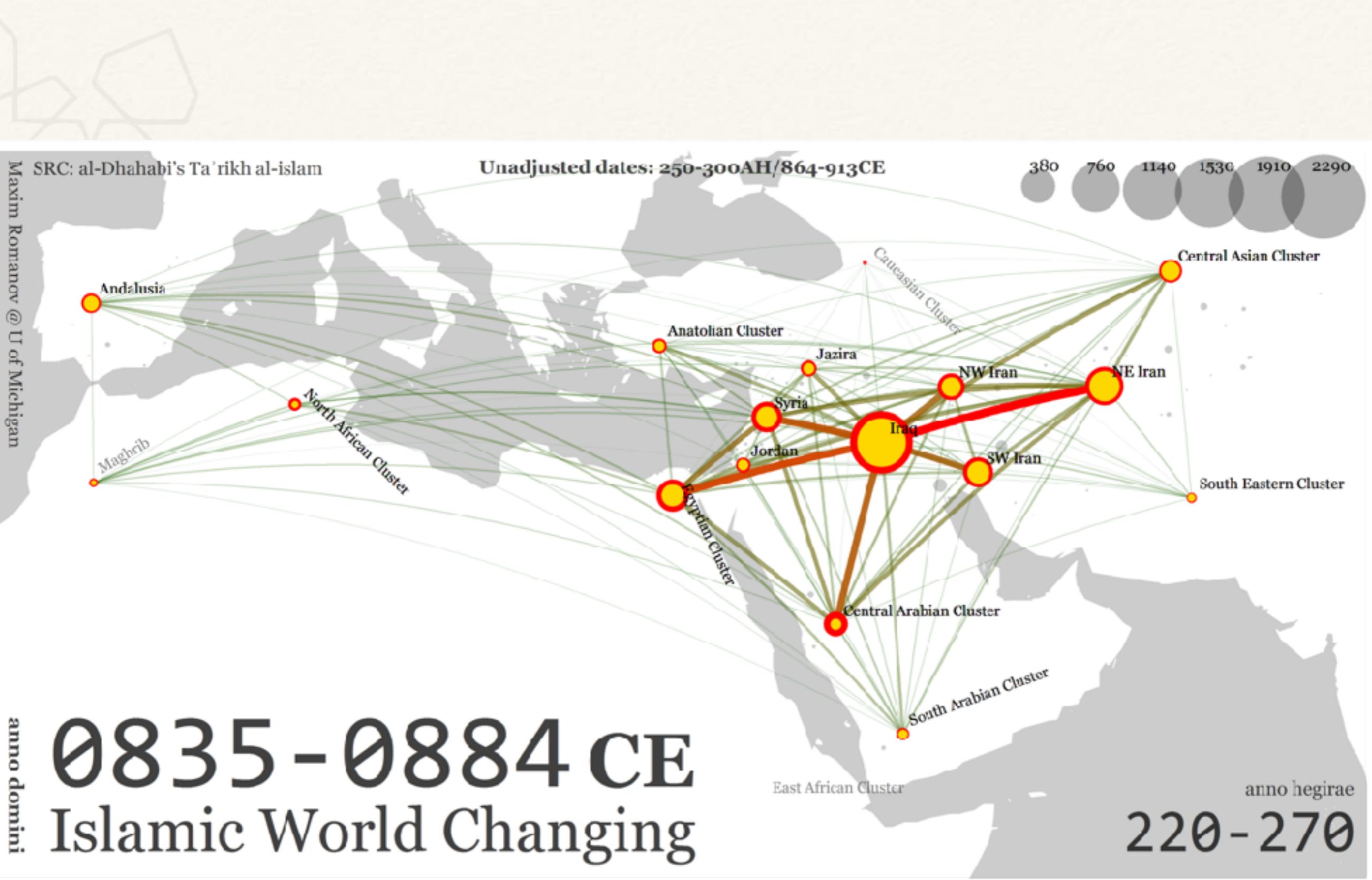
anno hegirae
120-170

0835 - 0884 CE Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 250-300AH/864-913CE

380 760 1140 1536 1910 2290



anno hegirae

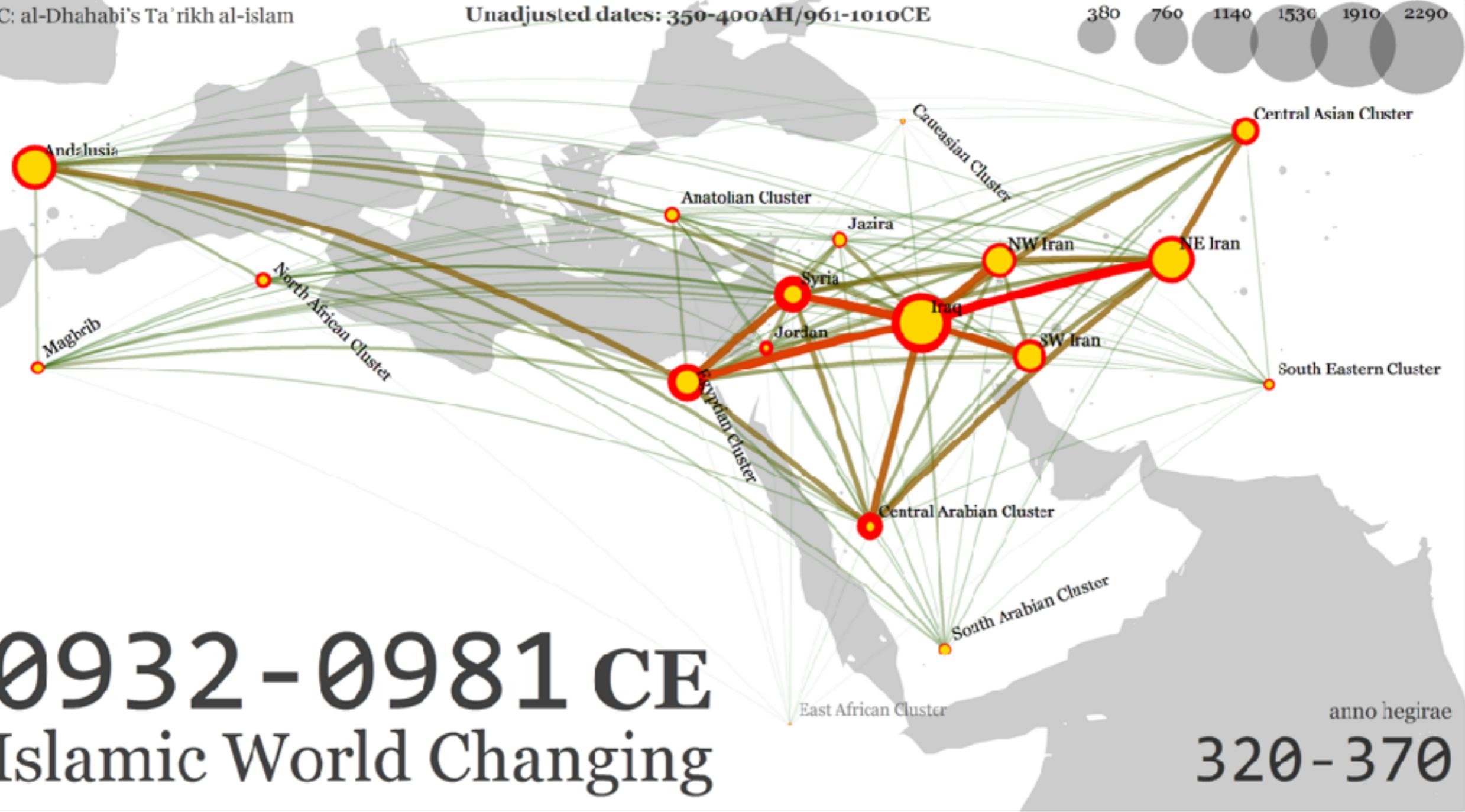
220-270

0932-0981 CE Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 350-400AH/961-1010CE

380 760 1140 1536 1910 2290



anno hegirae

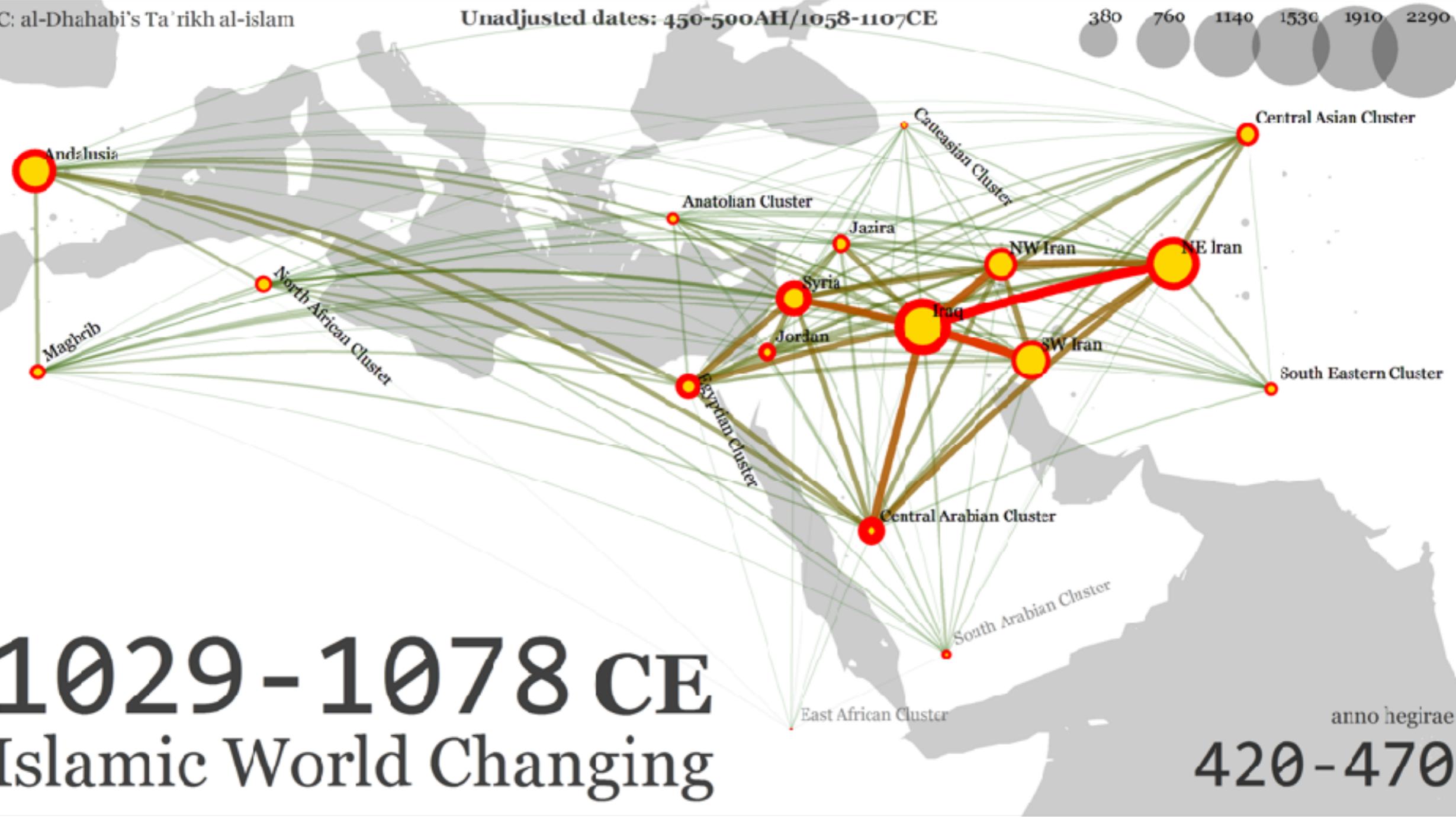
320-370

1029-1078 CE Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 450-500AH/1058-1107CE

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anno hegirae

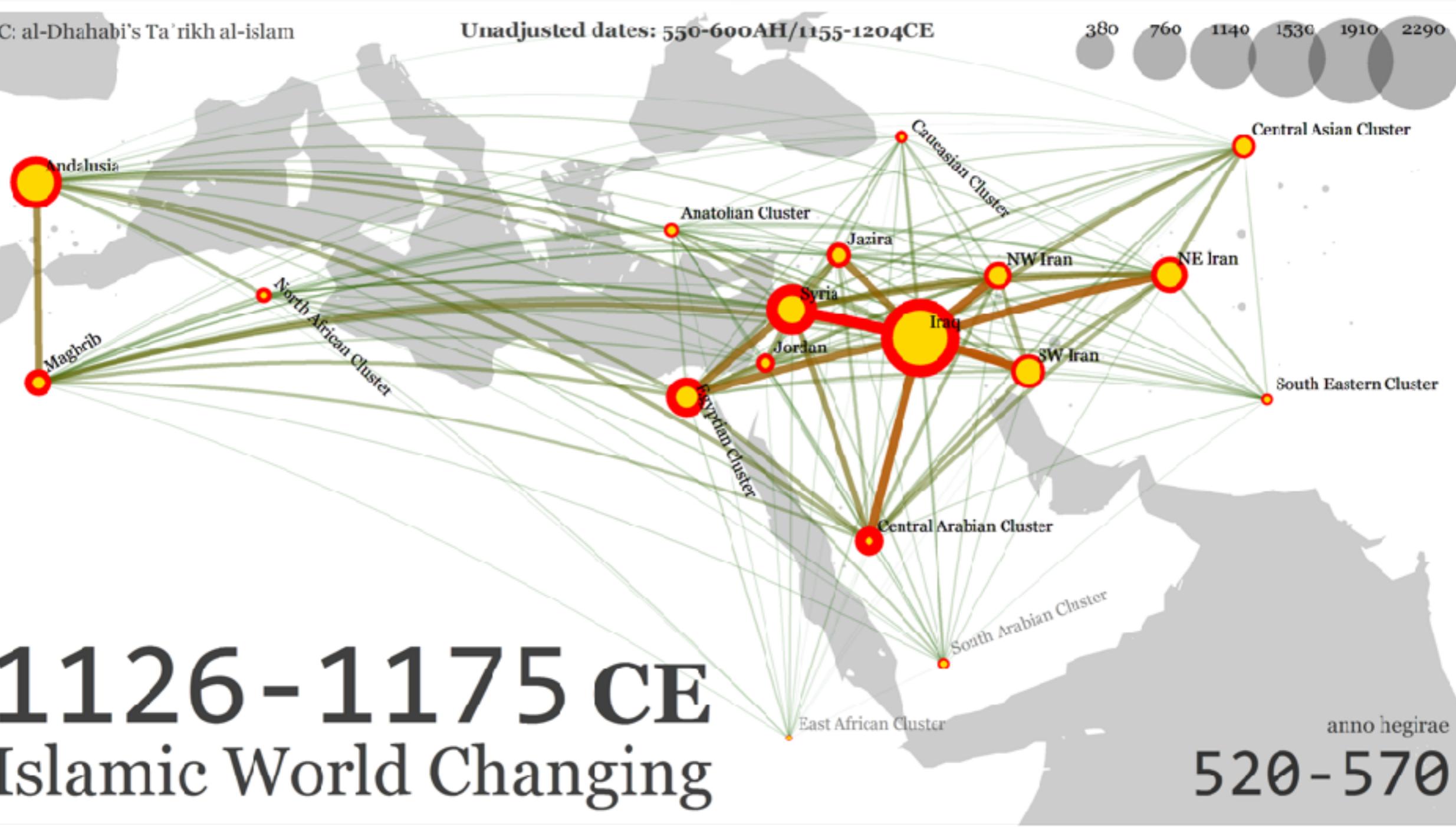
420-470

1126-1175 CE Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 550-600AH/1155-1204CE

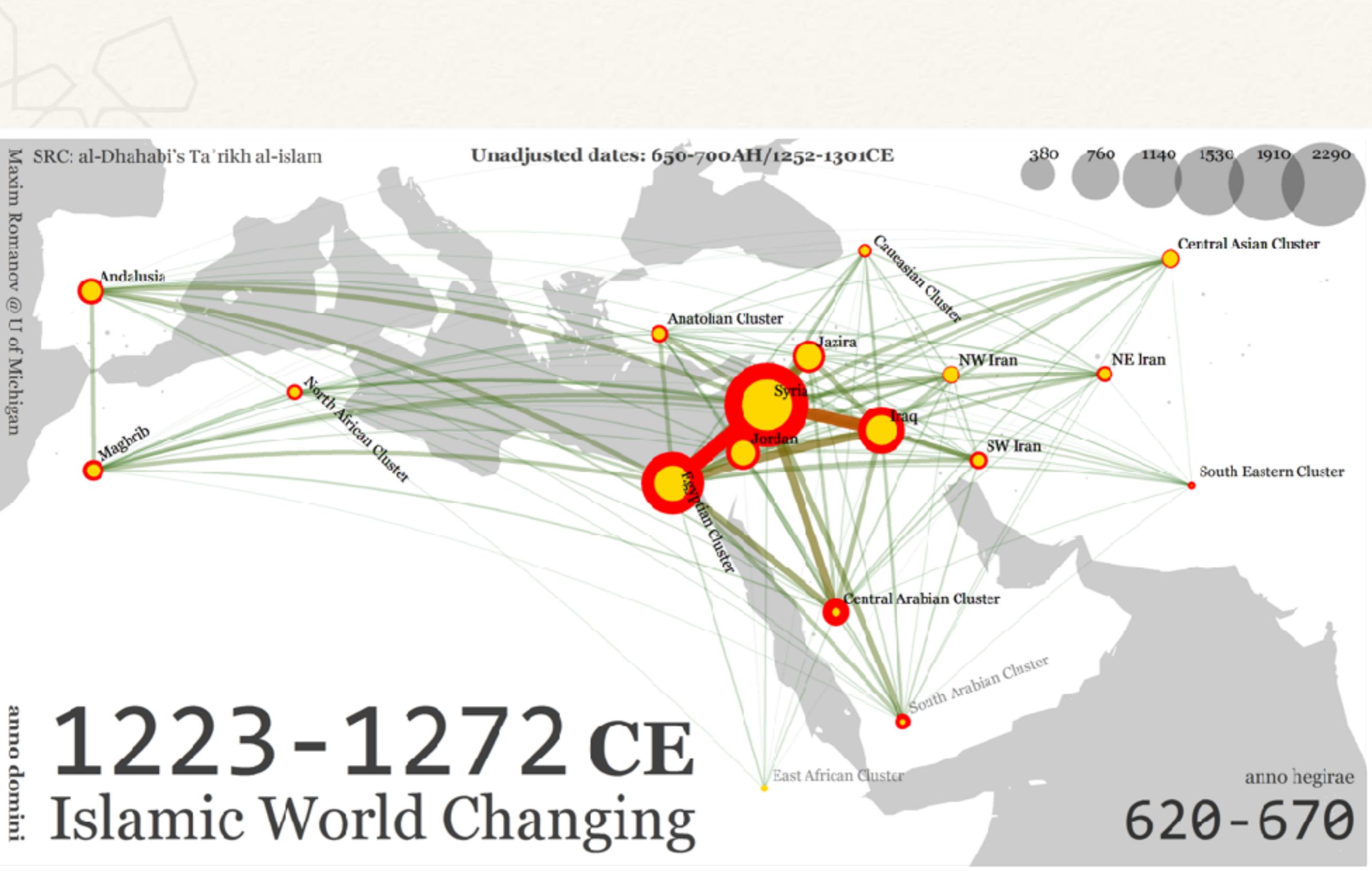
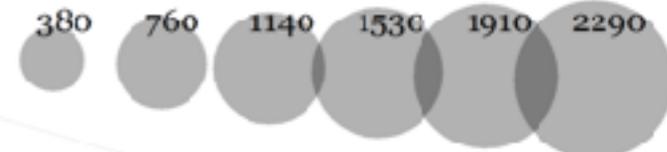
380 760 1140 1536 1910 2290



1223-1272 CE Islamic World Changing

SRC: al-Dhahabi's *Ta'rikh al-islam*

Unadjusted dates: 650-700AH/1252-1301CE



anno hegirae

620-670

For the Seminar

