

Maxim Romanov, Leipzig University

Leipzig University, Jan 16, 2017

Mapping Humanities Data

Introduction to Digital Humanities

Winter 2016-2017



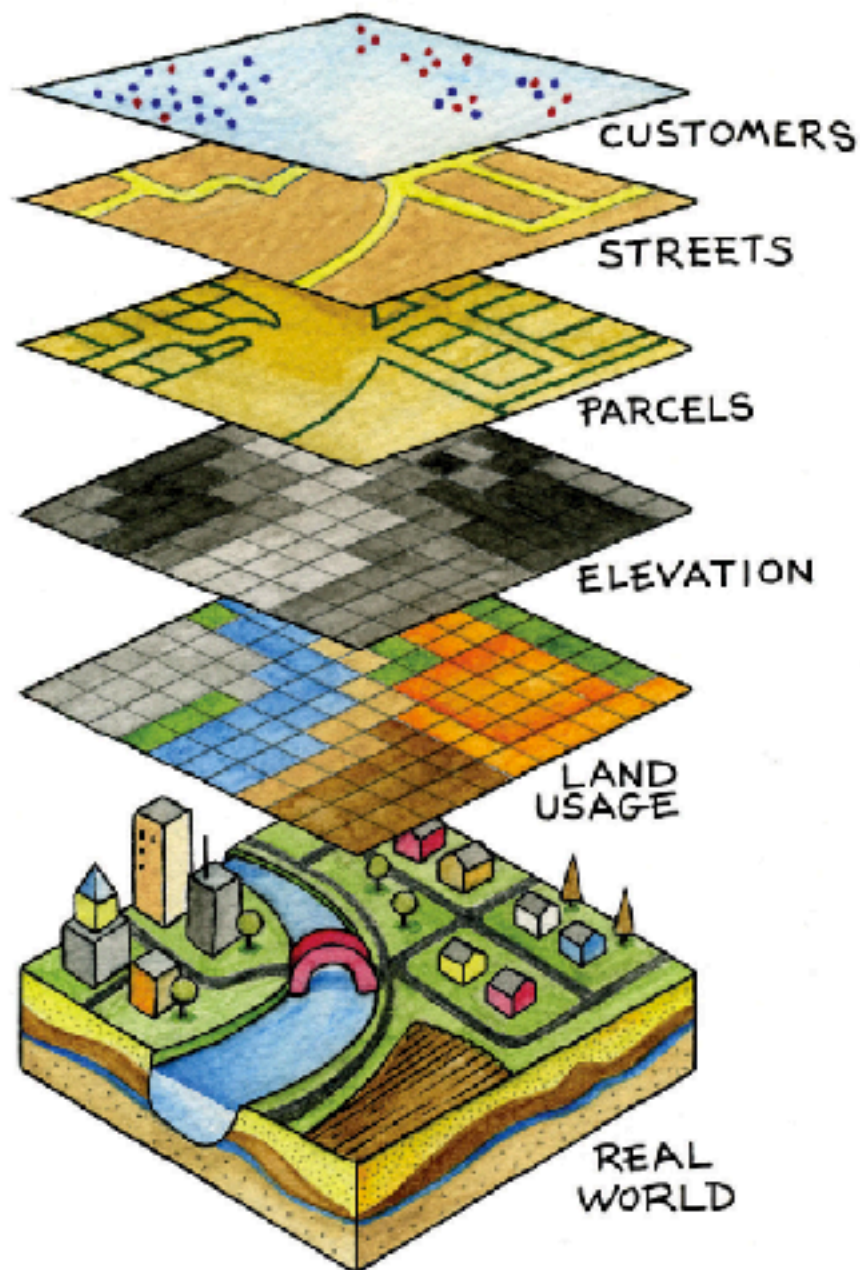
Digital Humanities

UNIVERSITÄT LEIPZIG

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

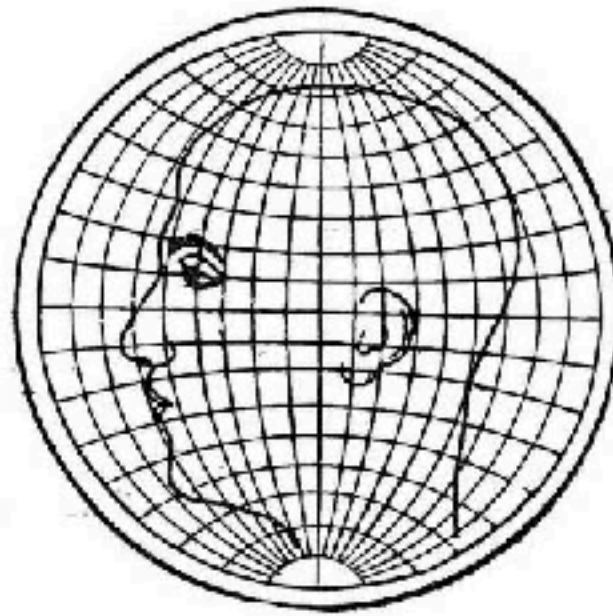


FIG. 42.—Man's head drawn on globular projection.

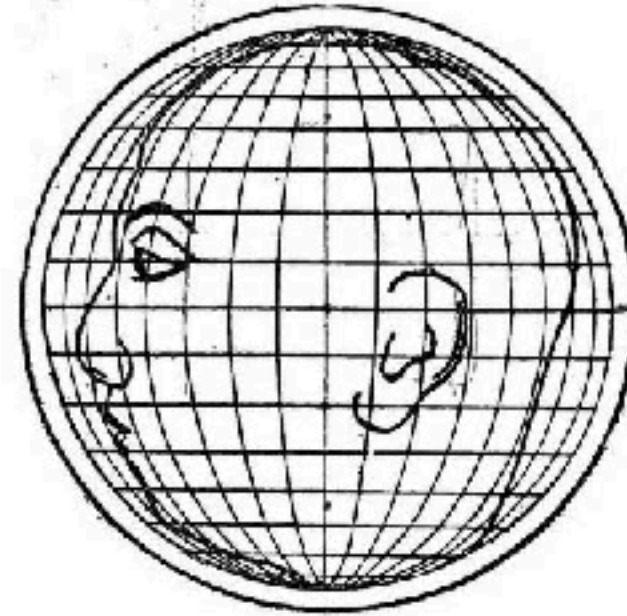


FIG. 43.—Man's head plotted on orthographic projection.

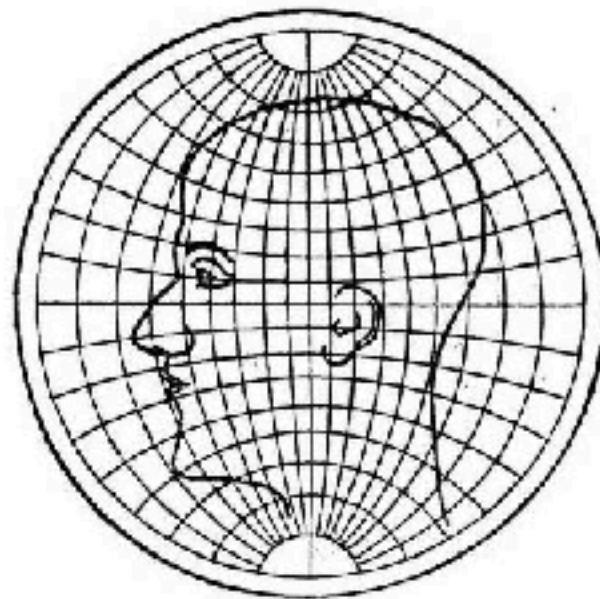


FIG. 44.—Man's head plotted on stereographic projection.

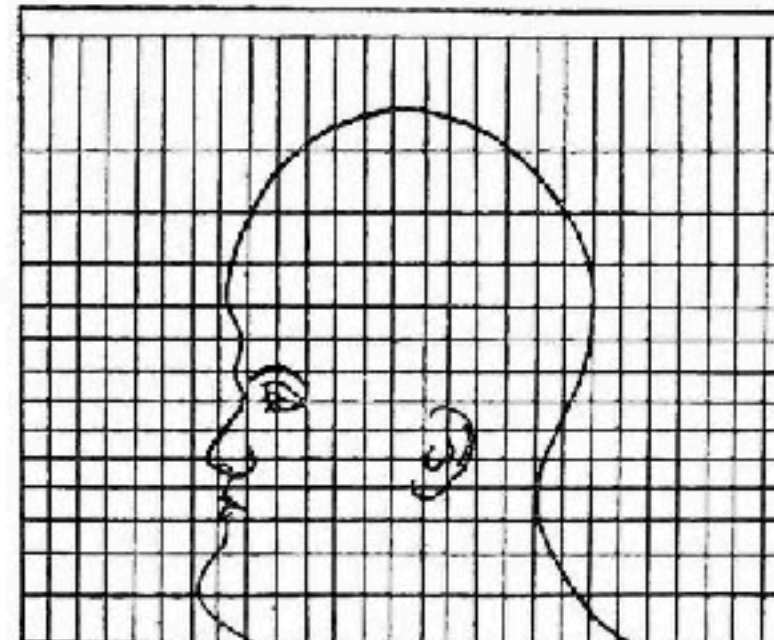
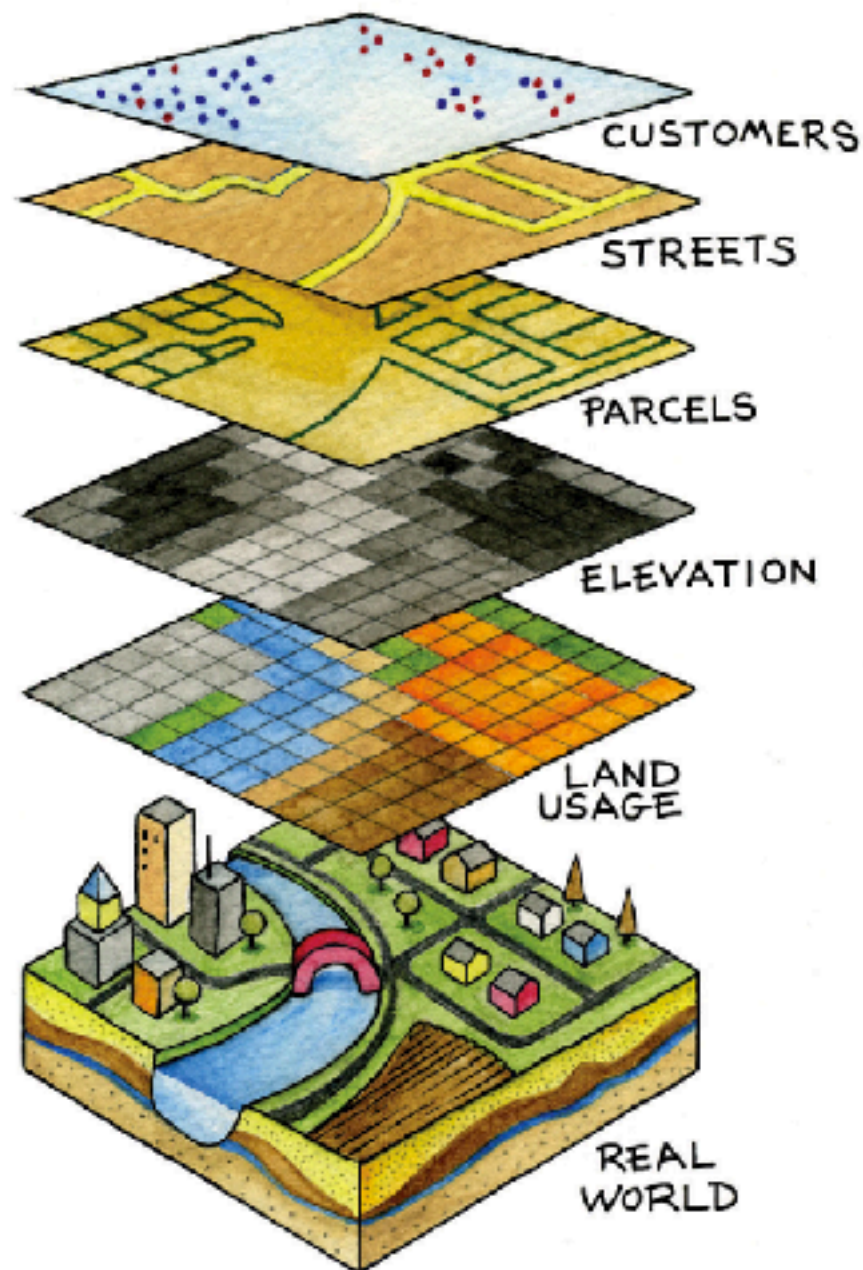


FIG. 45.—Man's head plotted on Mercator projection.

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:

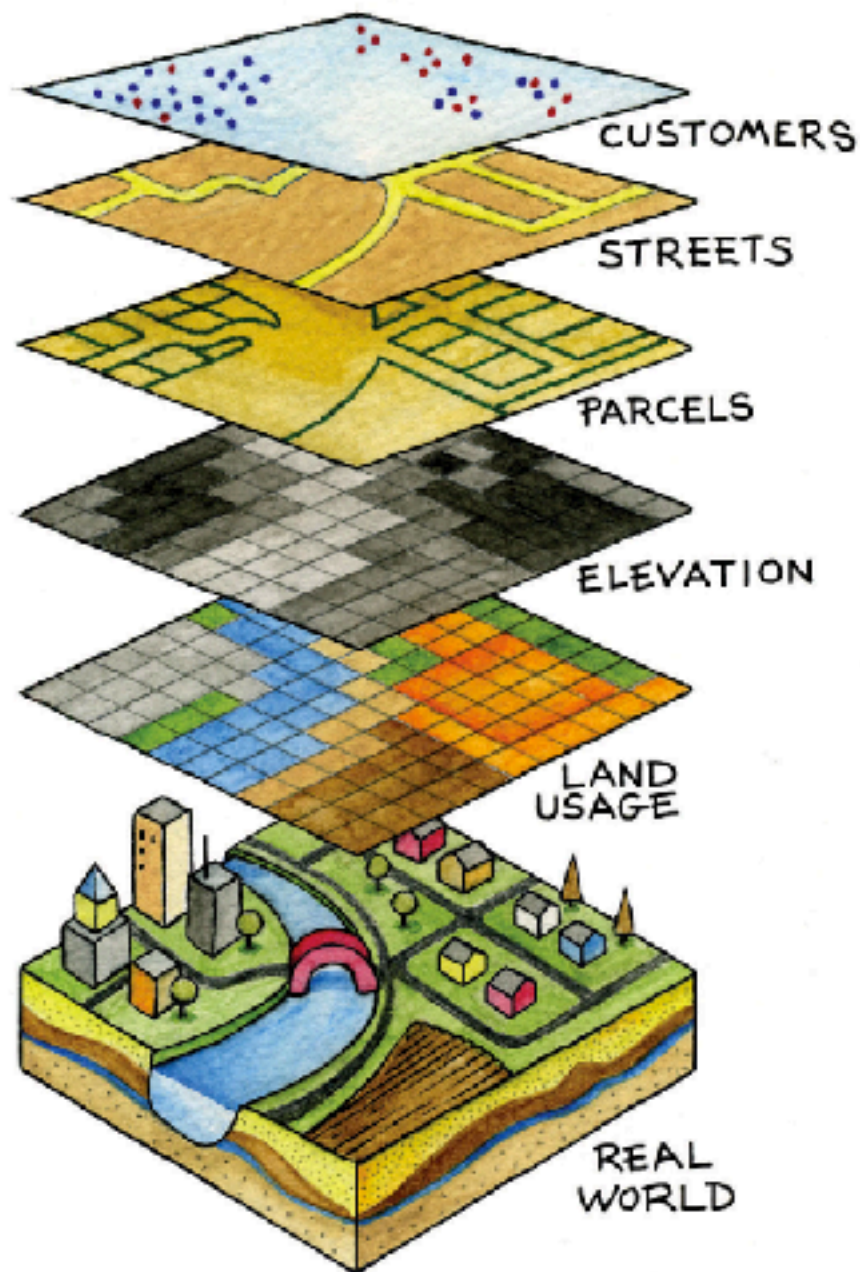
❖ item, x , $area(lat, lon; lat, lon; \dots lat, lon)^{**}$

❖ 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)

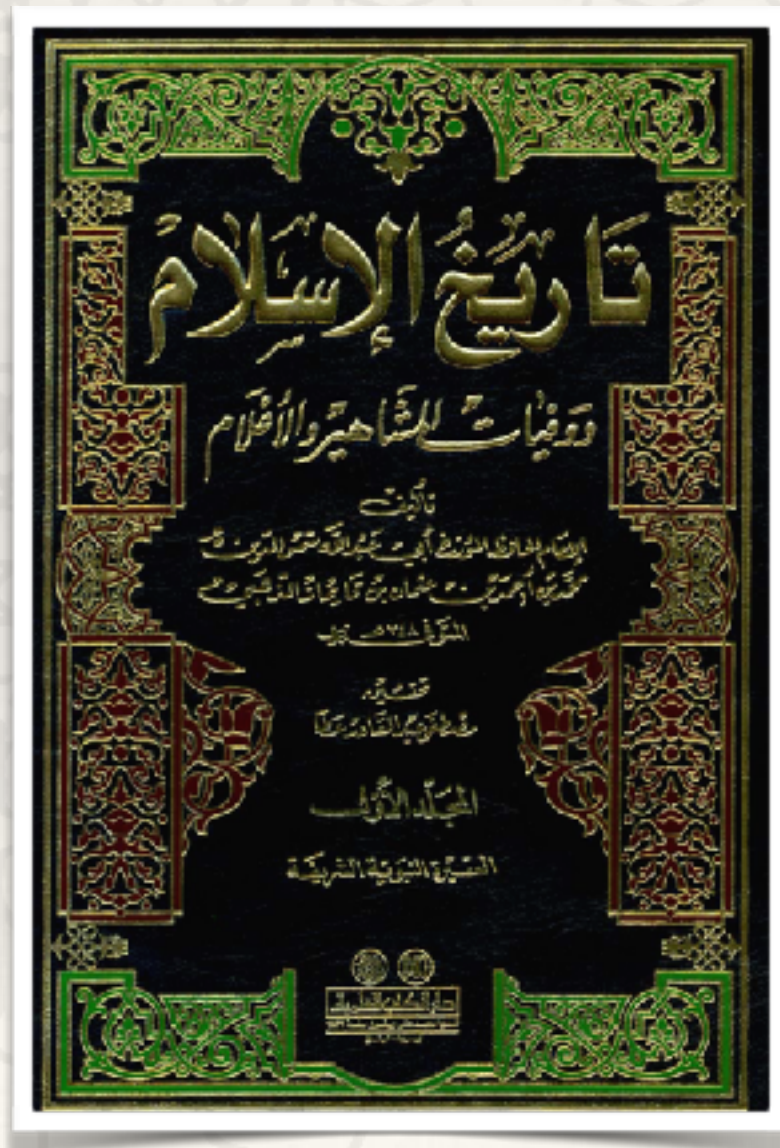
Source



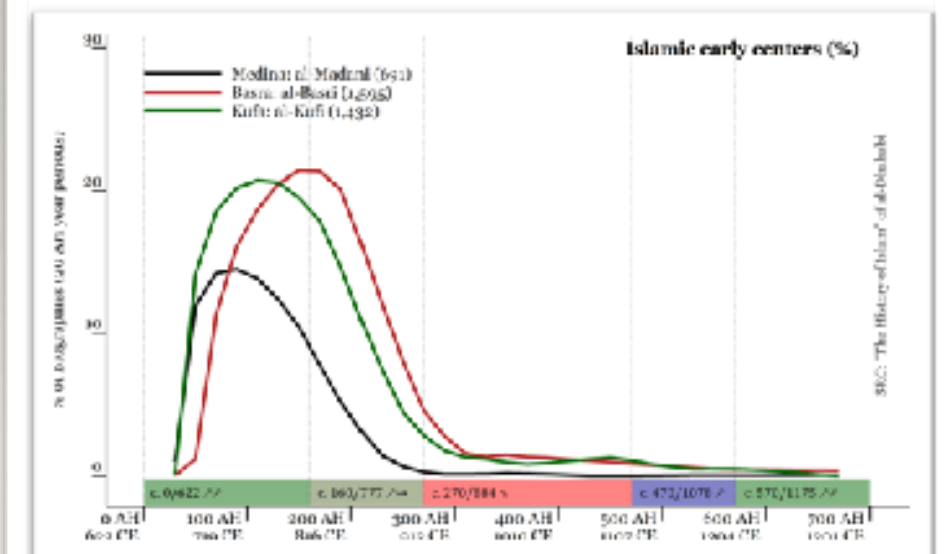
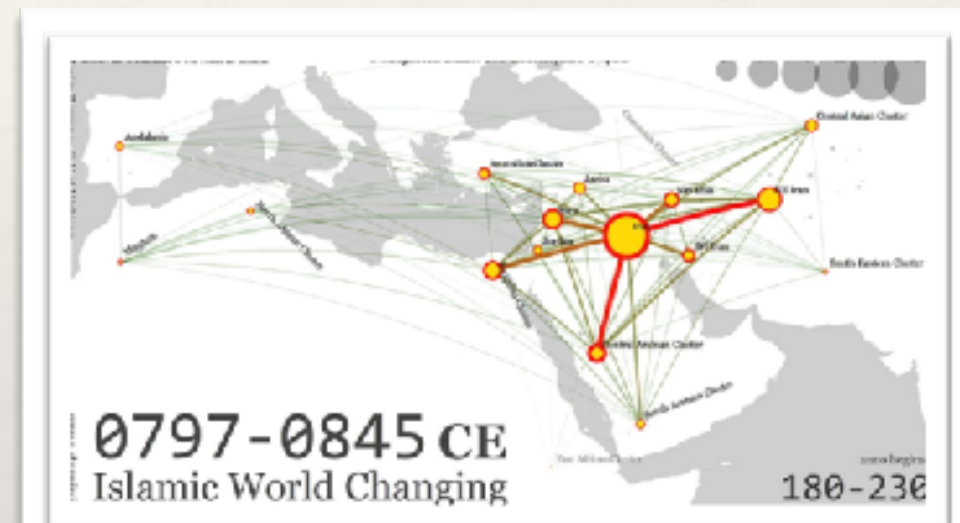
Machine-
Readable
Data



Cartograms



Points
Lines
Polygons



Cartograms: Geographical Information Systems (GIS)

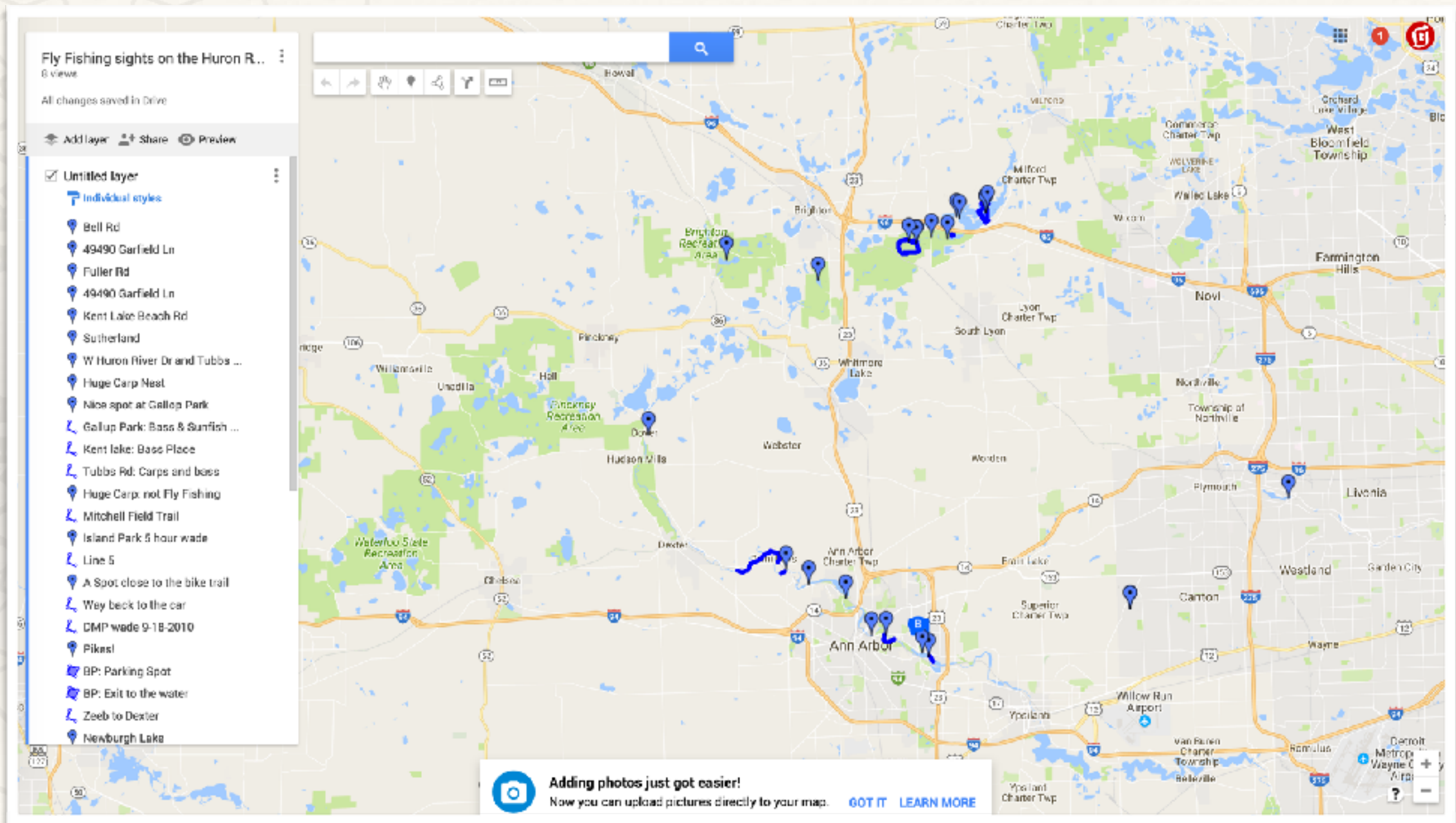
- ❖ *Simple*

- ❖ Google Maps
- ❖ Carto(DB)
- ❖ ... *and many others*

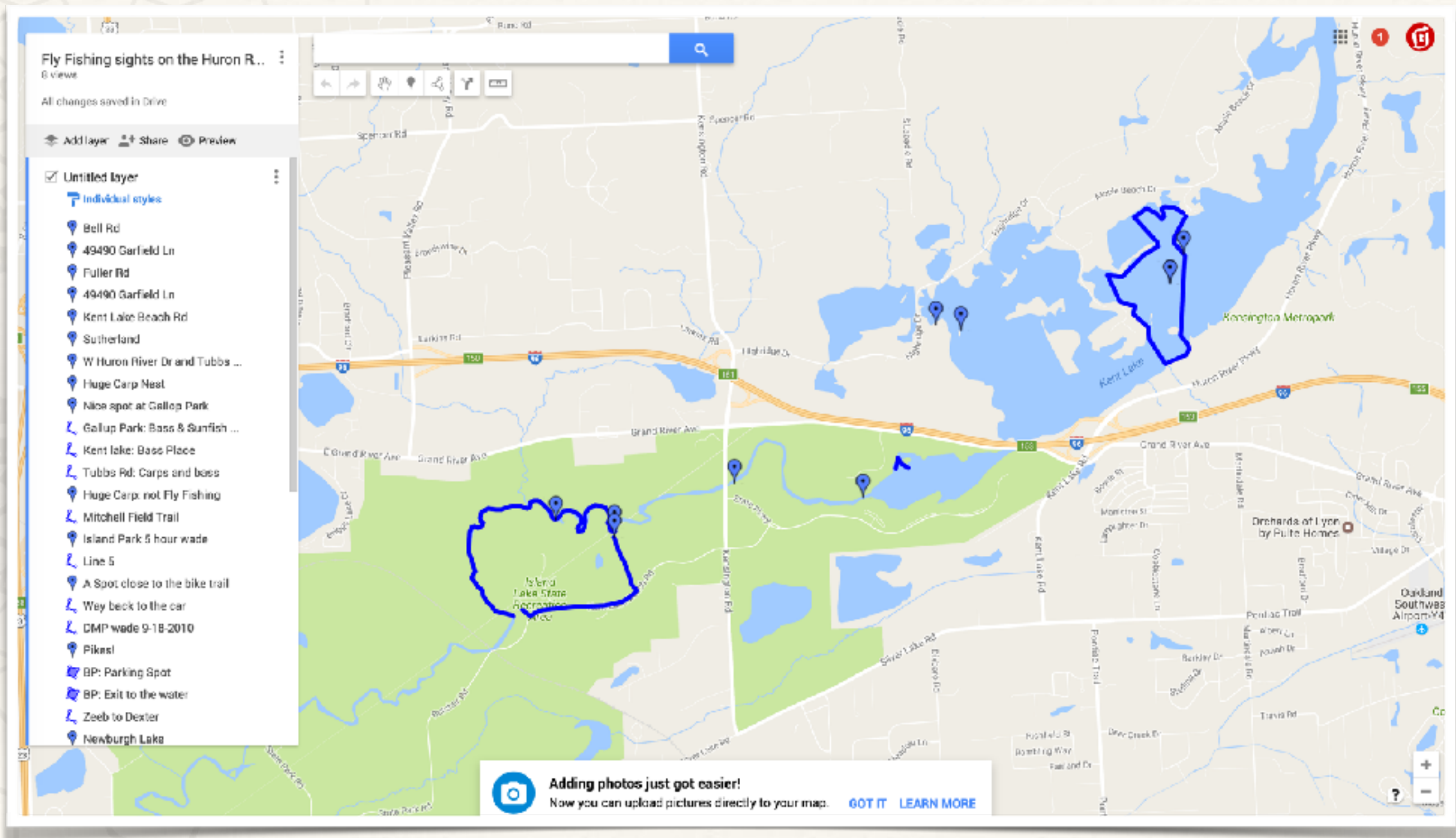
- ❖ *Complex*

- ❖ ArcGIS (commercial)
- ❖ QGIS (open source)
- ❖ R (open source)

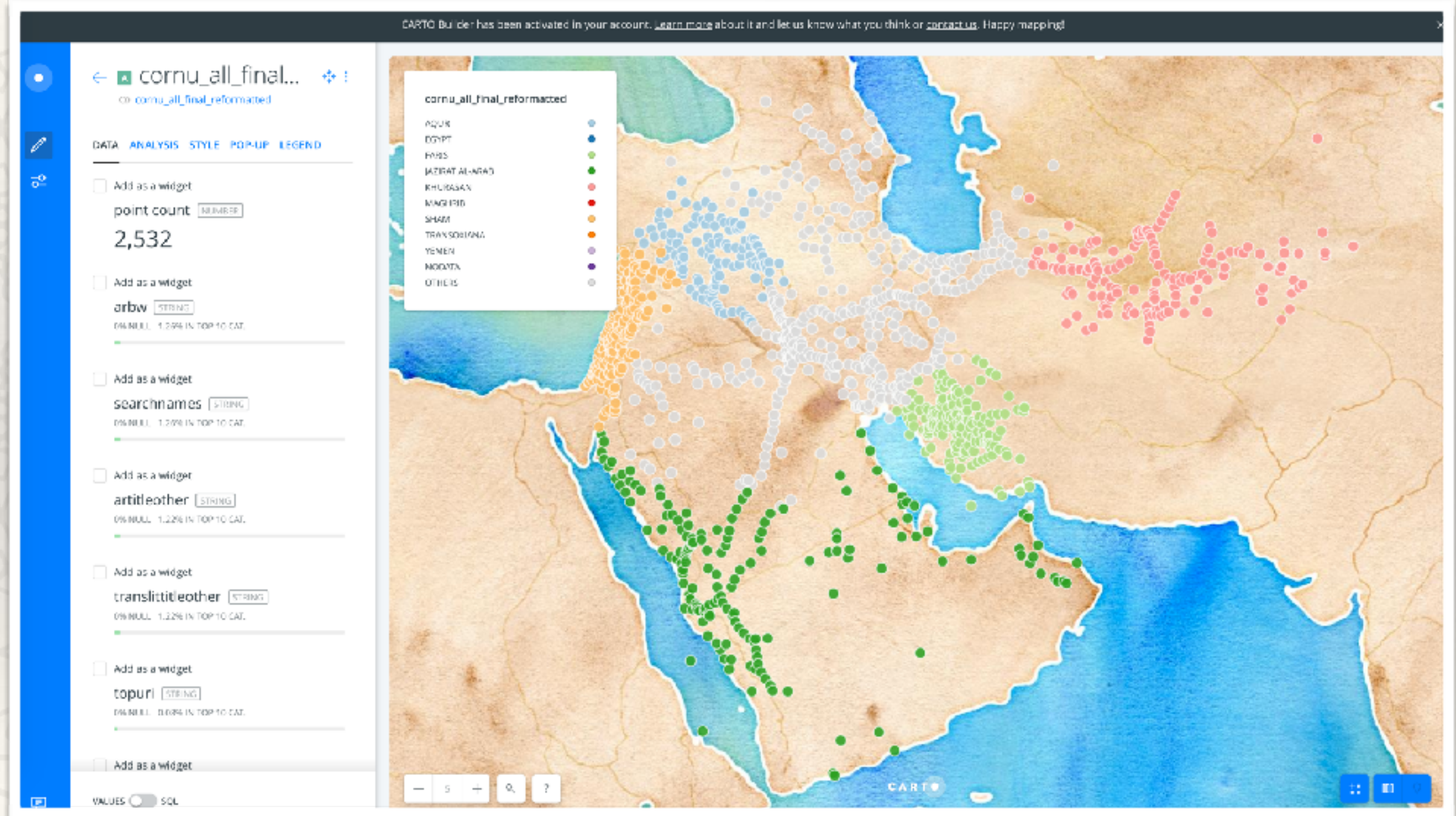
Simple: Google Maps (Google Earth)



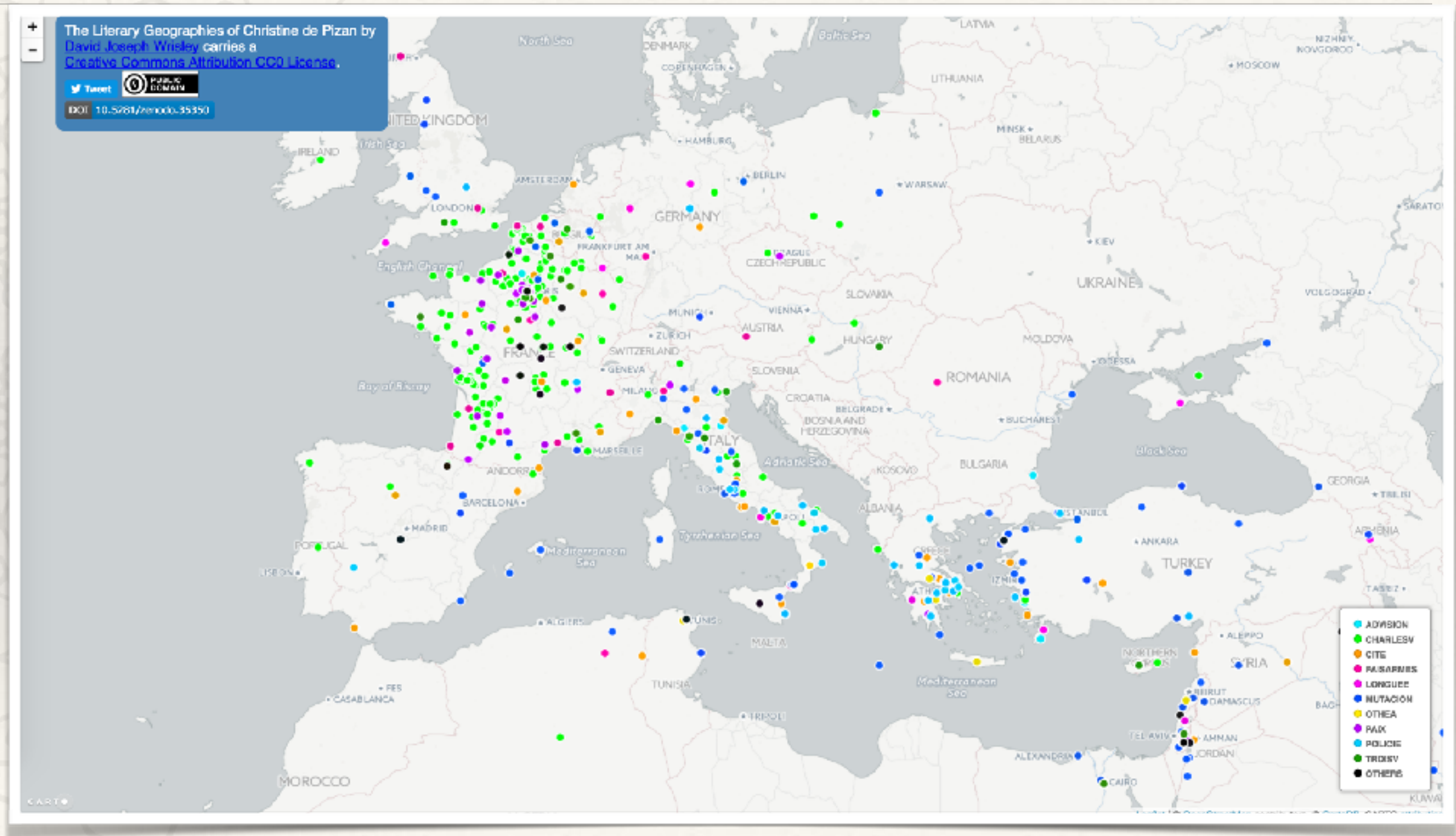
Simple: Google Maps (Google Earth)



More Complex: Carto[DB]



More Complex: Carto[DB]



Complex: ArcGIS, QGIS, R

The image shows a screenshot of the ArcGIS website. The background is a blue topographic map. On the left, the text 'About ArcGIS' is visible. The main heading is 'Work Smarter With ArcGIS' with the subtitle 'The Mapping & Analytics Platform'. Below this, a paragraph states: '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.'

On the right, a laptop displays the ArcGIS web application interface. The interface includes a sidebar with 'My Data' and a list of geographies (States, Counties, ZIP Codes, Census Tracts, Census Block Groups). The main area shows a map titled 'Railway Access - Density' with a blue hexagonal overlay. Below the map is a bar chart titled 'Count by District' showing a distribution of counts across districts. The chart has a y-axis labeled 'COUNT BY DISTRICT' ranging from 0 to 400 and an x-axis with two categories: '1,000,000' and '2,000,000'. The bar for '2,000,000' is significantly higher, reaching approximately 400. To the right of the chart is a small map of the United Kingdom with green regions highlighted.

Complex: ArcGIS, QGIS, R



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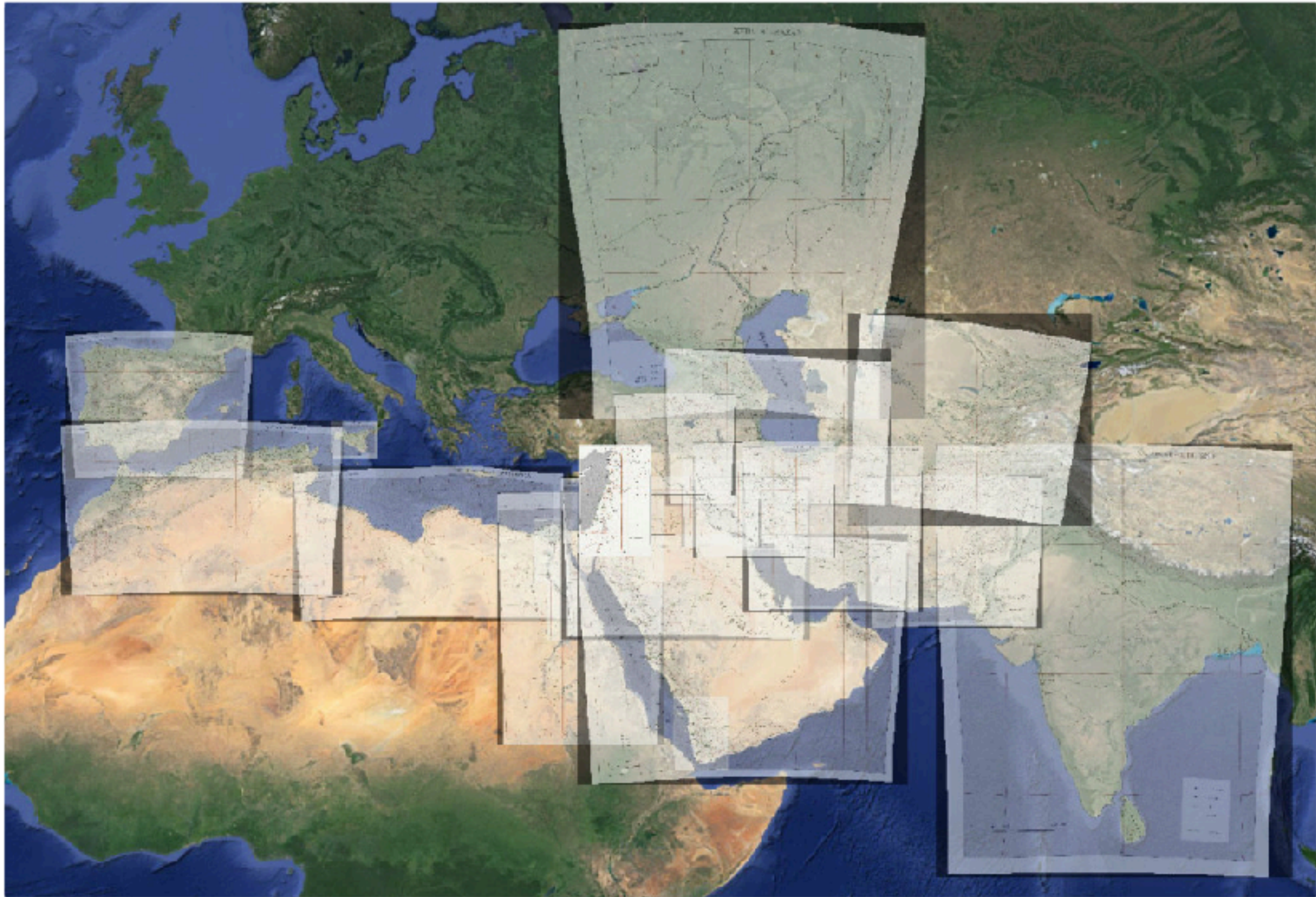
Version 2.18.2
LTR Version 2.14.10

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Complex: ArcGIS, QGIS, R

Georeferencing



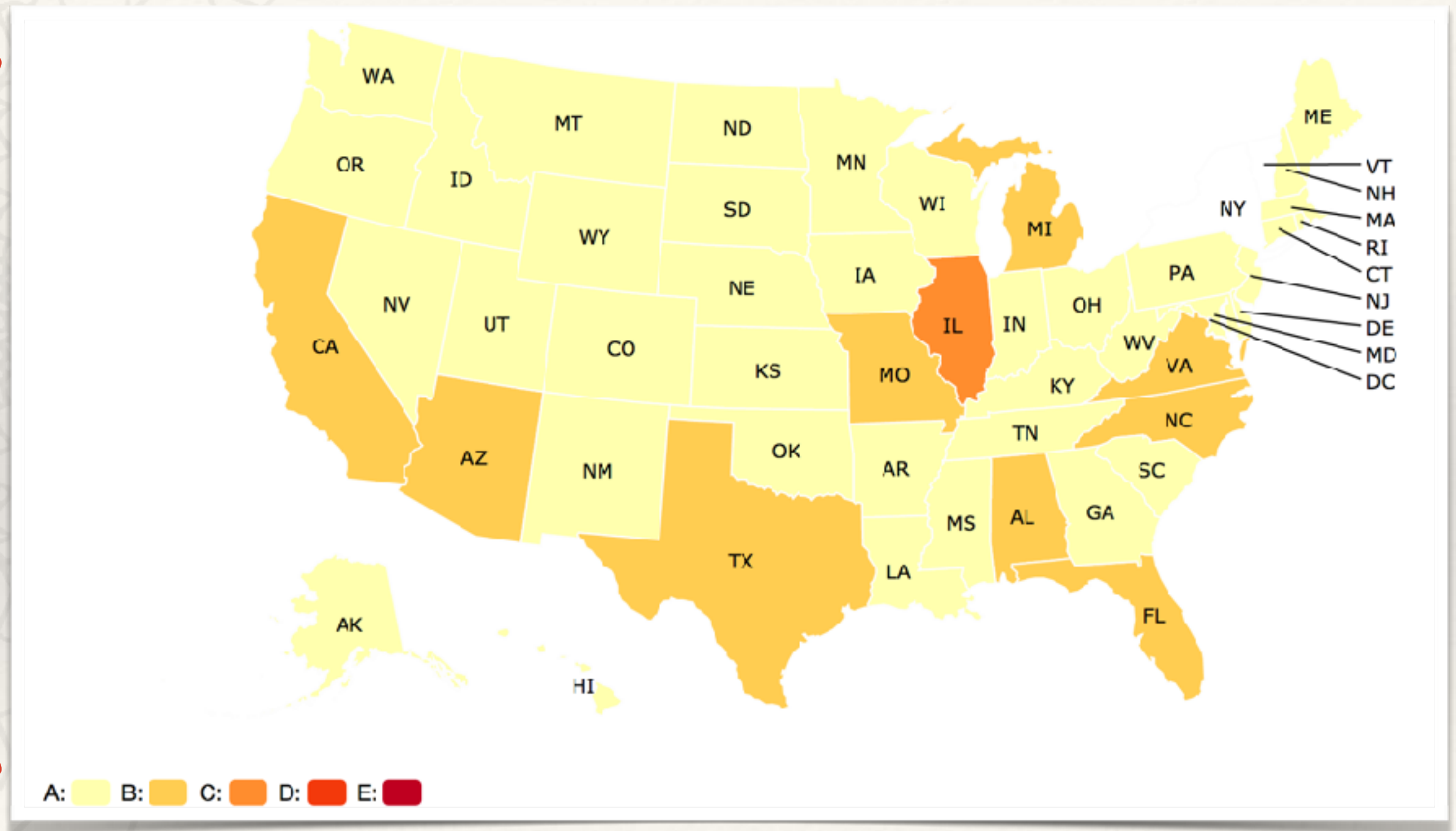
Complex: ArcGIS, QGIS, R

Georeferencing



Complex: ArcGIS, QGIS, R

Dynamic Cartogramming



Dynamic Cartogramming



Islamic History in Maps: Overview

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

The Most Difficult Part (In Practical Terms)

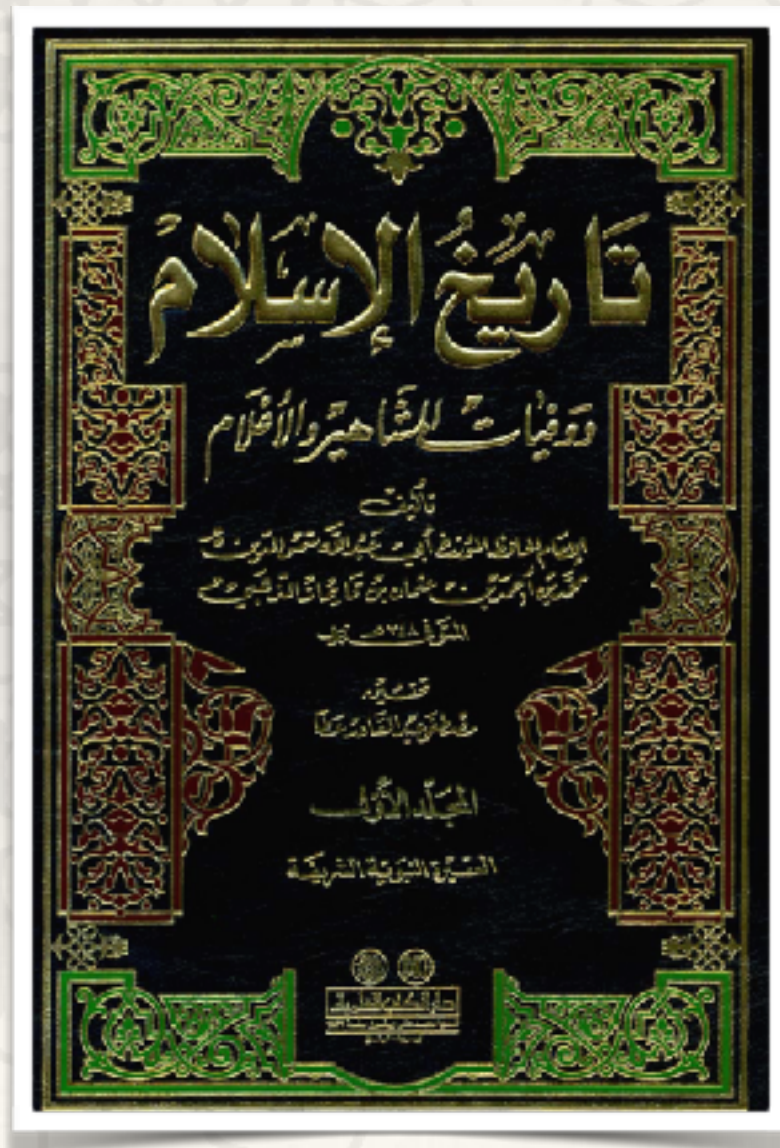
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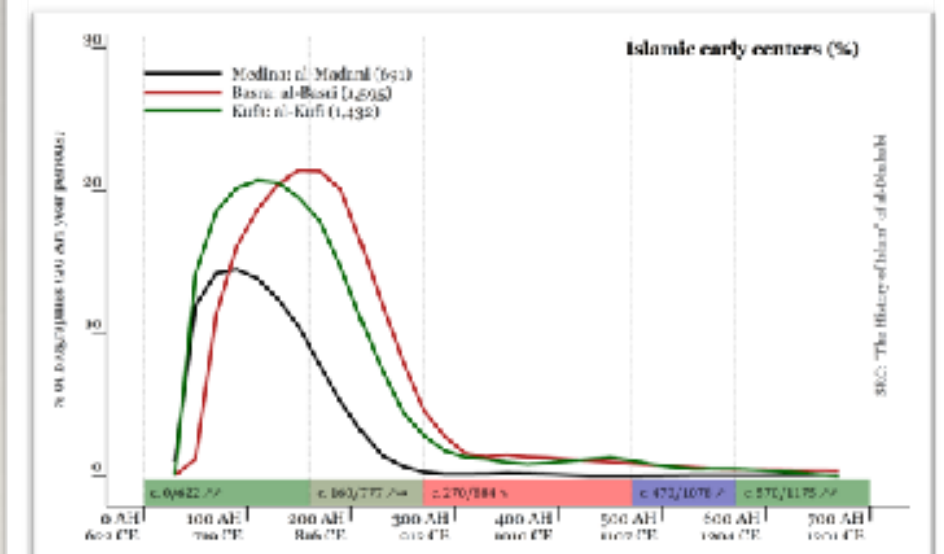
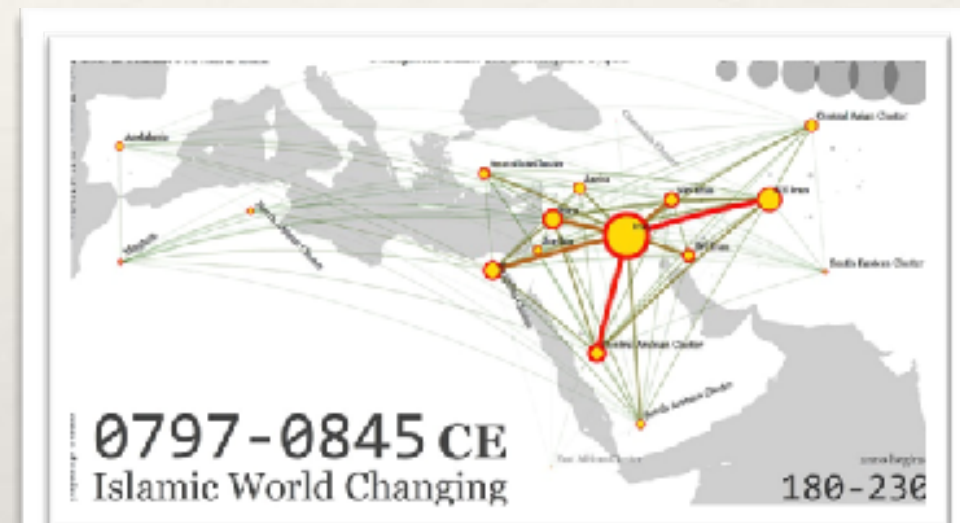
Machine-
Readable
Data



Cartograms

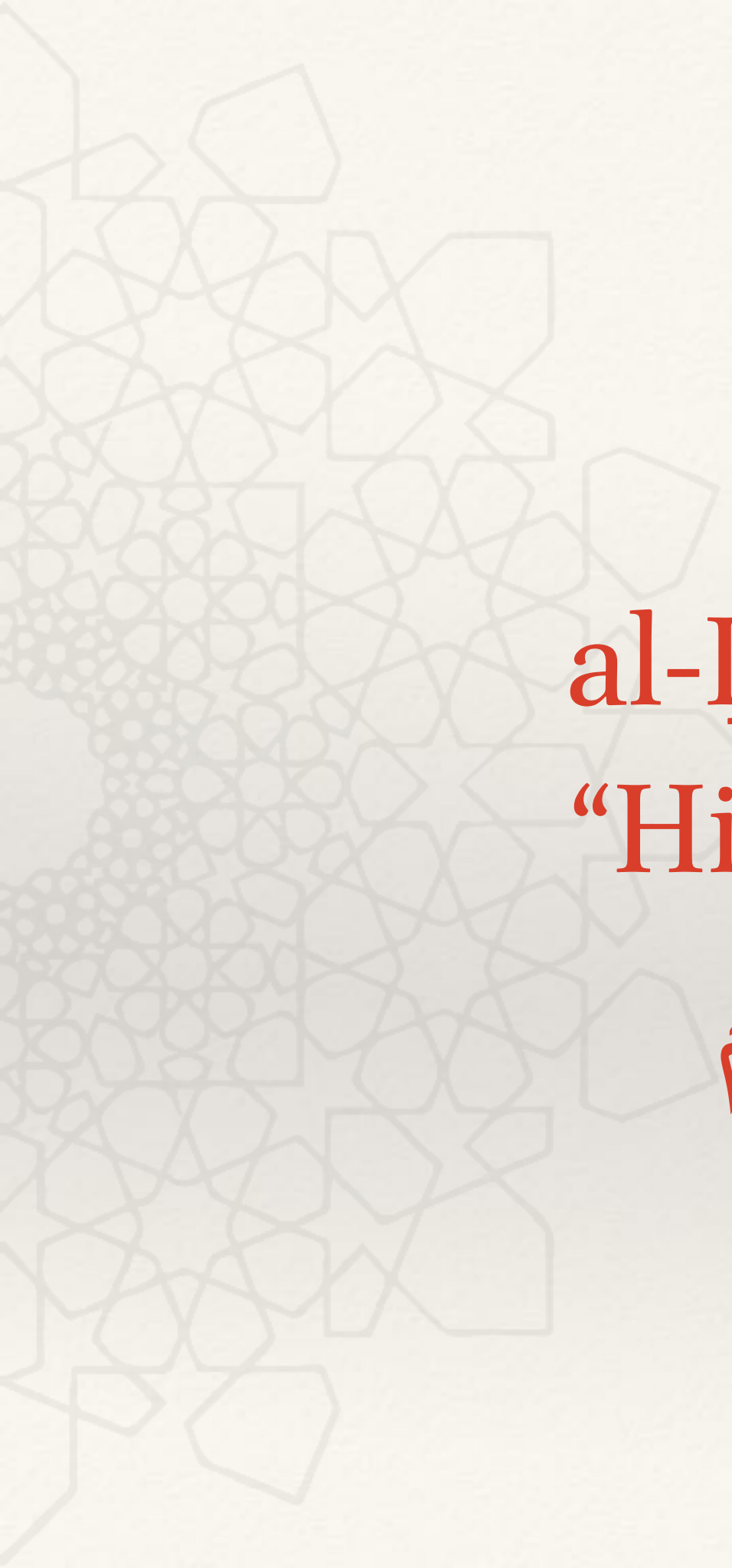


Points
Lines
Polygons



Islamic History in Maps: Overview

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

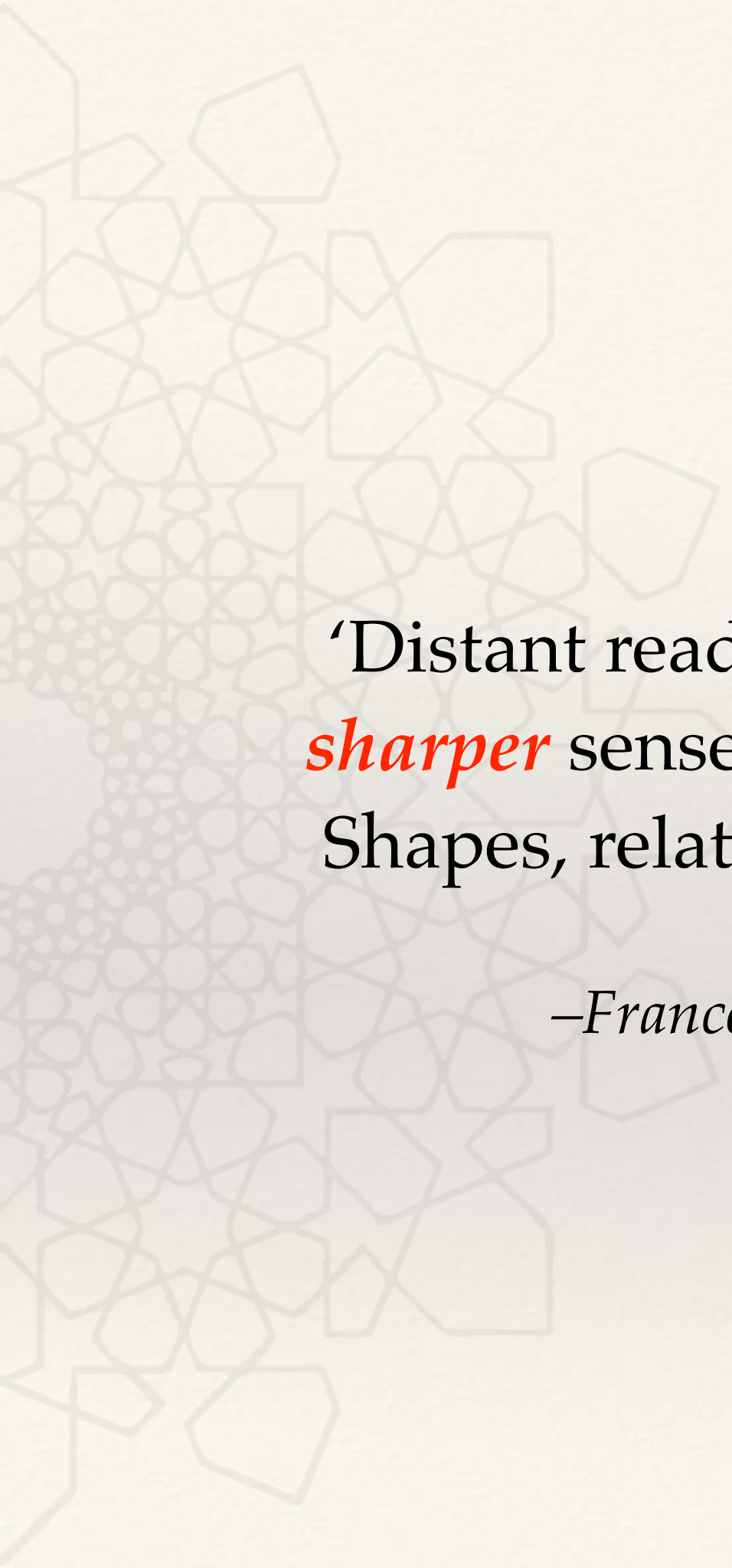


al-Dahabī and his
“History of Islam”

تاريخ الإسلام

al-Ḍahabī (d. 748/1347 CE)

- ❖ a Damascene religious scholar, Ṣāfiʿī jurist and historian
 - ❖ “The History of Islam” (*Taʾrīḥ 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

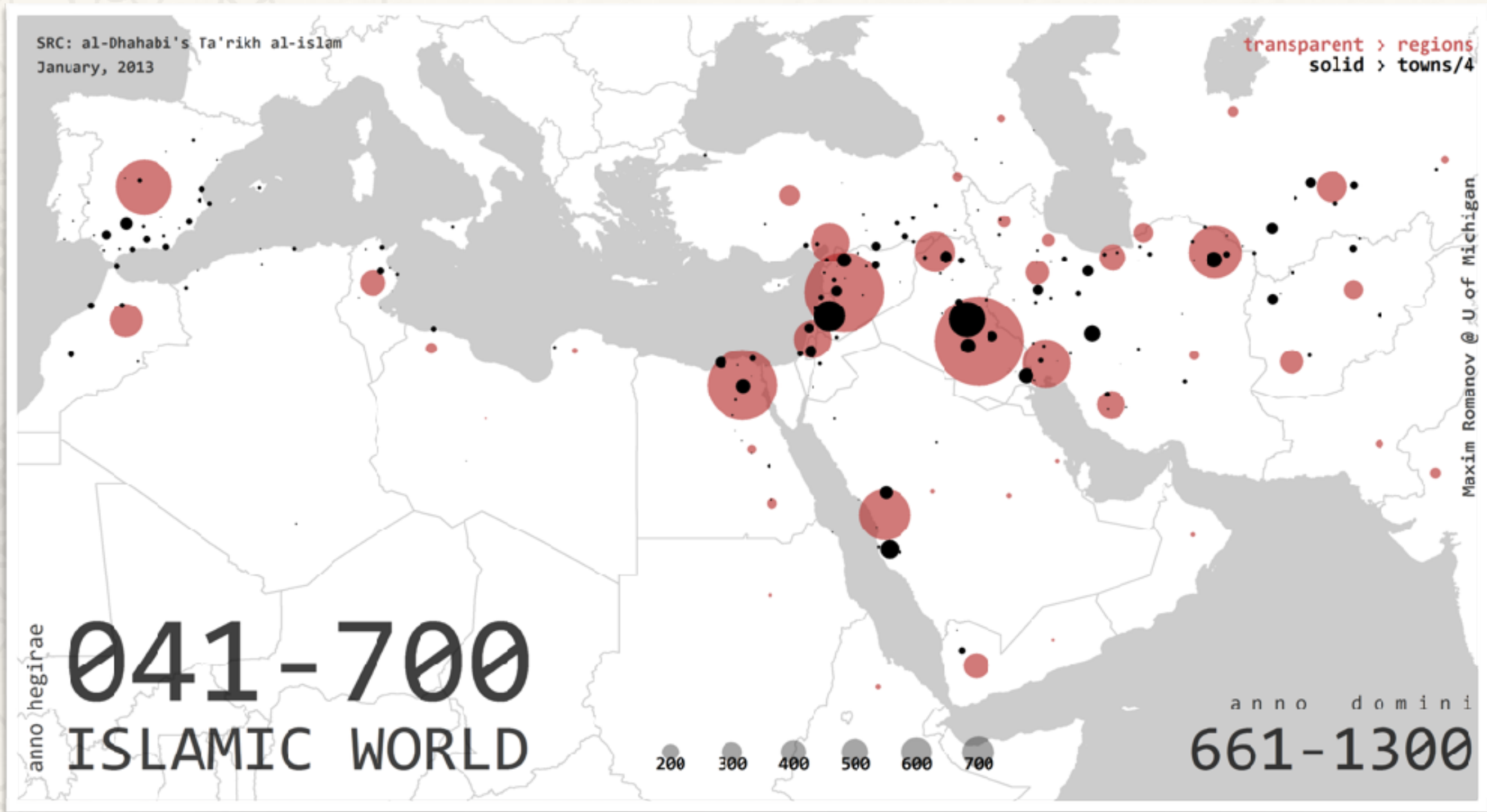
“The History of Islam”: Distant Reading

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

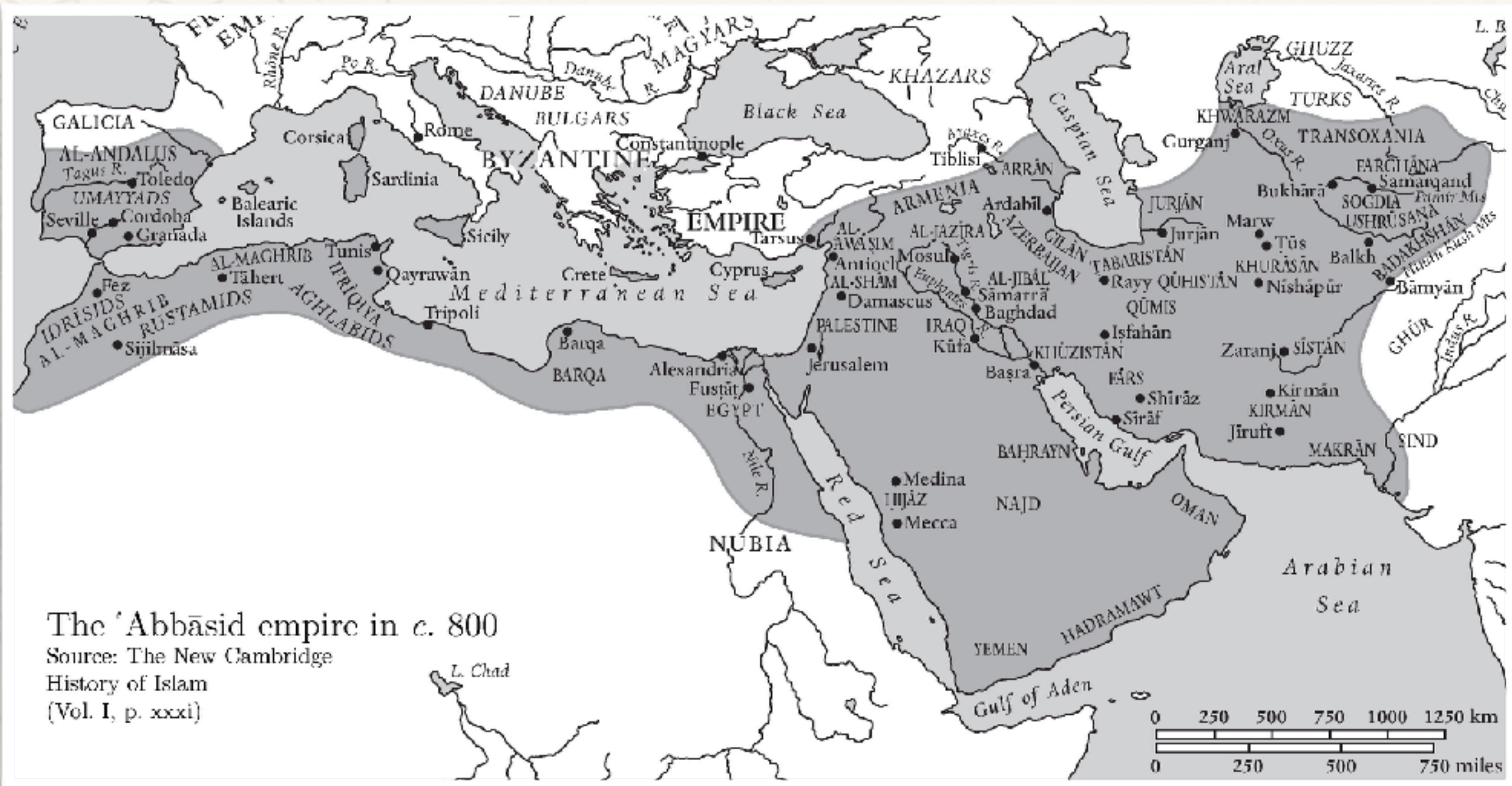


Social Geography: Coverage

Geographical Coverage



Geographical Coverage

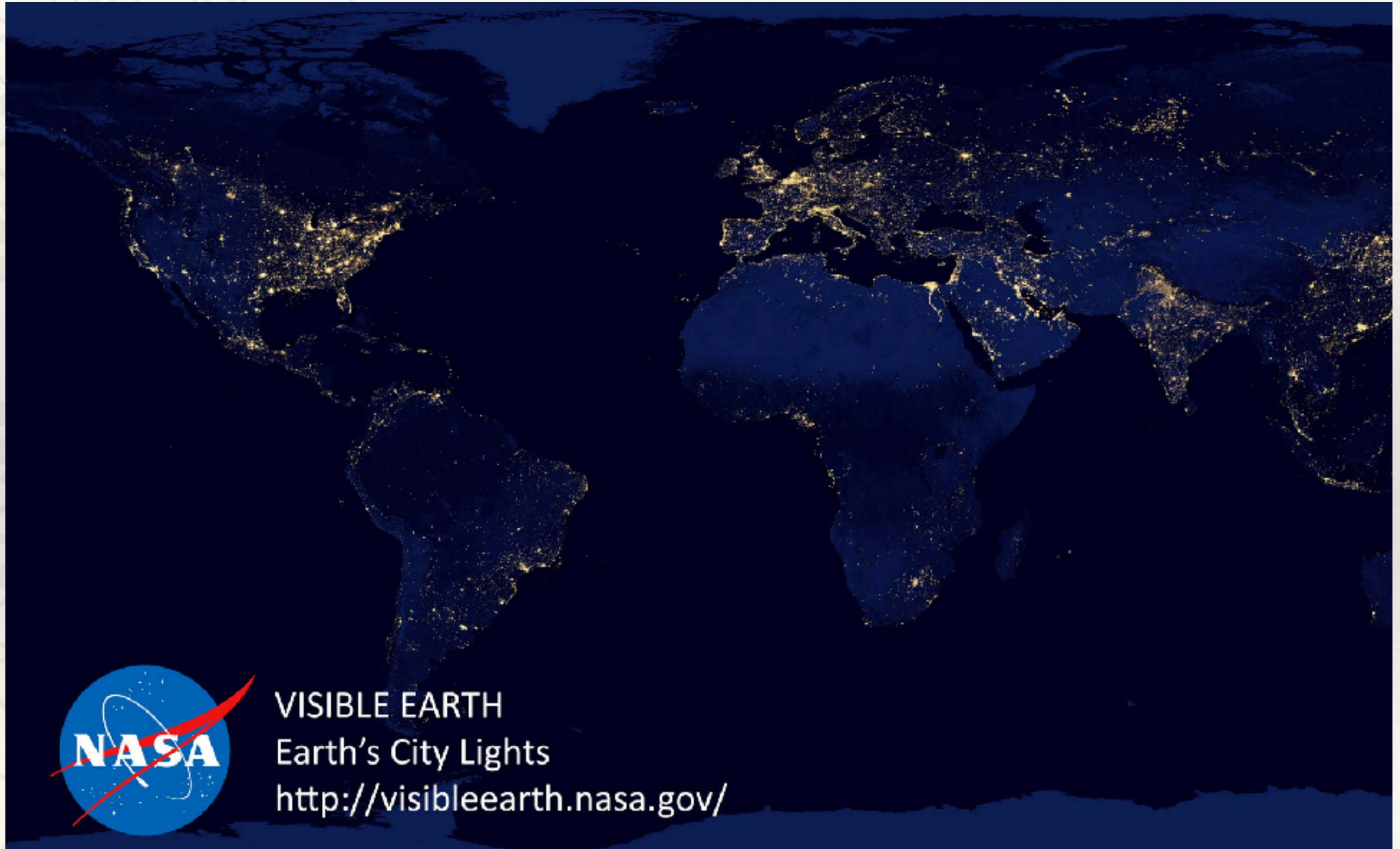


Source: Robinson, Chase F., ed. *The New Cambridge History of Islam*. 1st ed. Cambridge University Press, 2010.

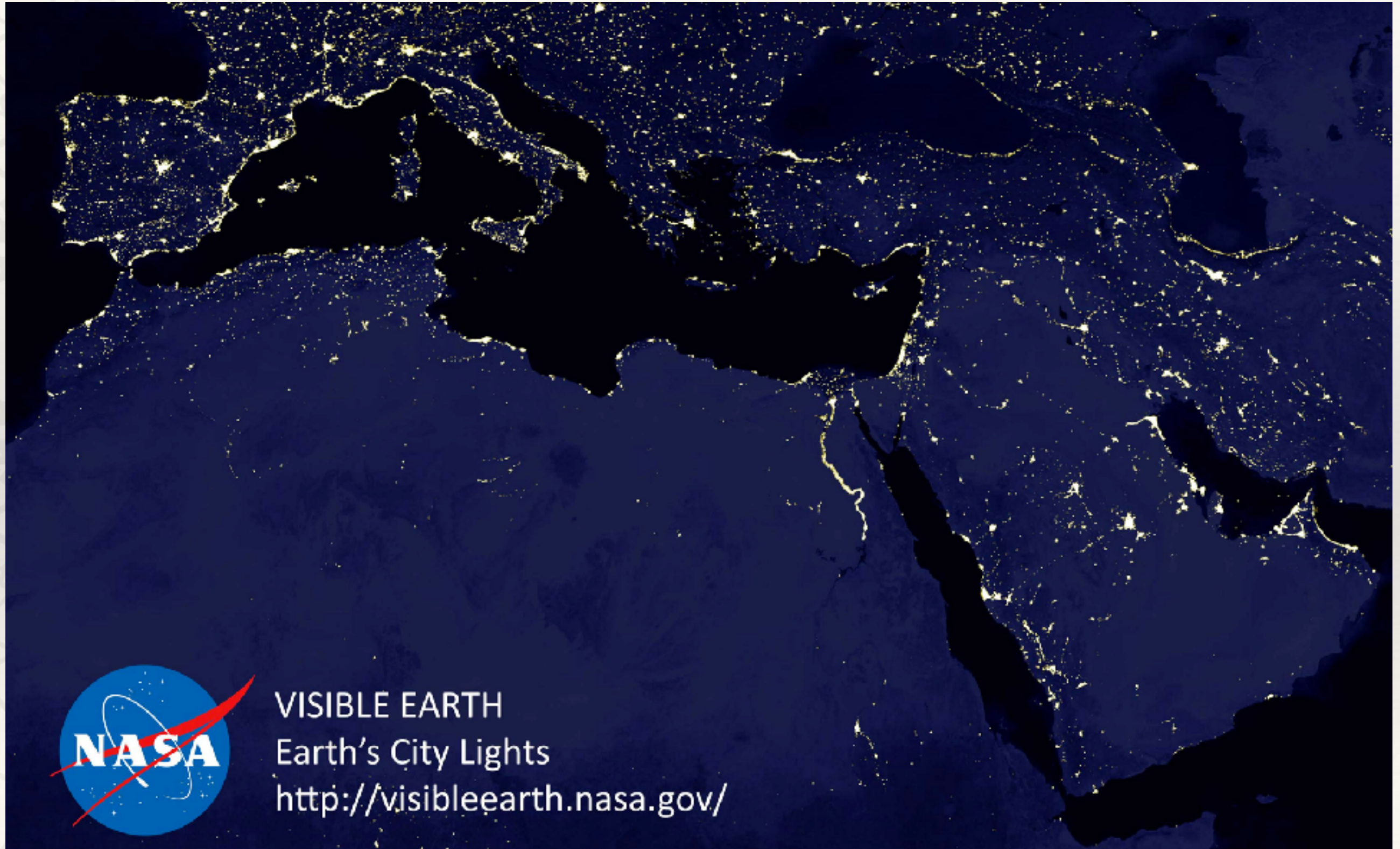
Geographical Coverage: Dynamically...



Geographical Coverage



Geographical Coverage



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

Geographical Coverage

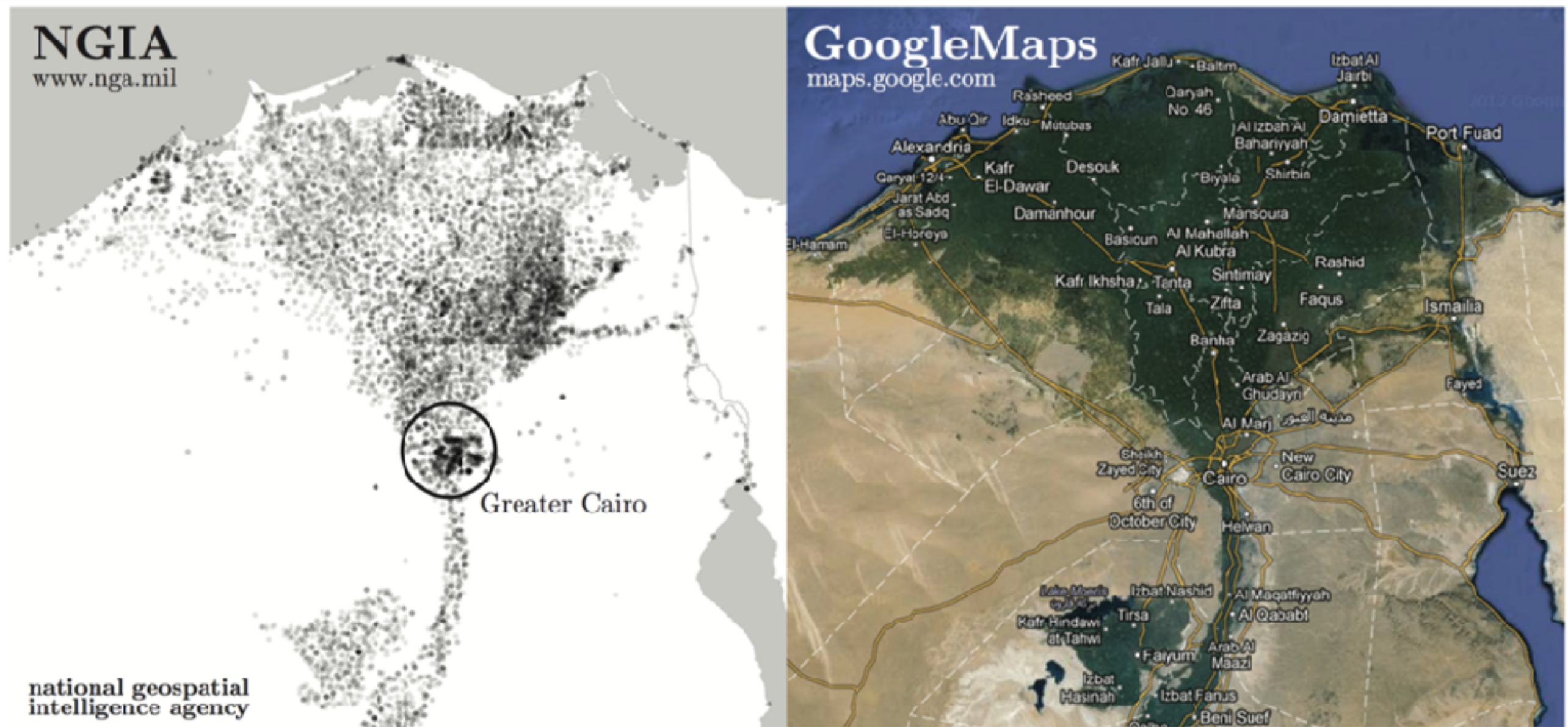
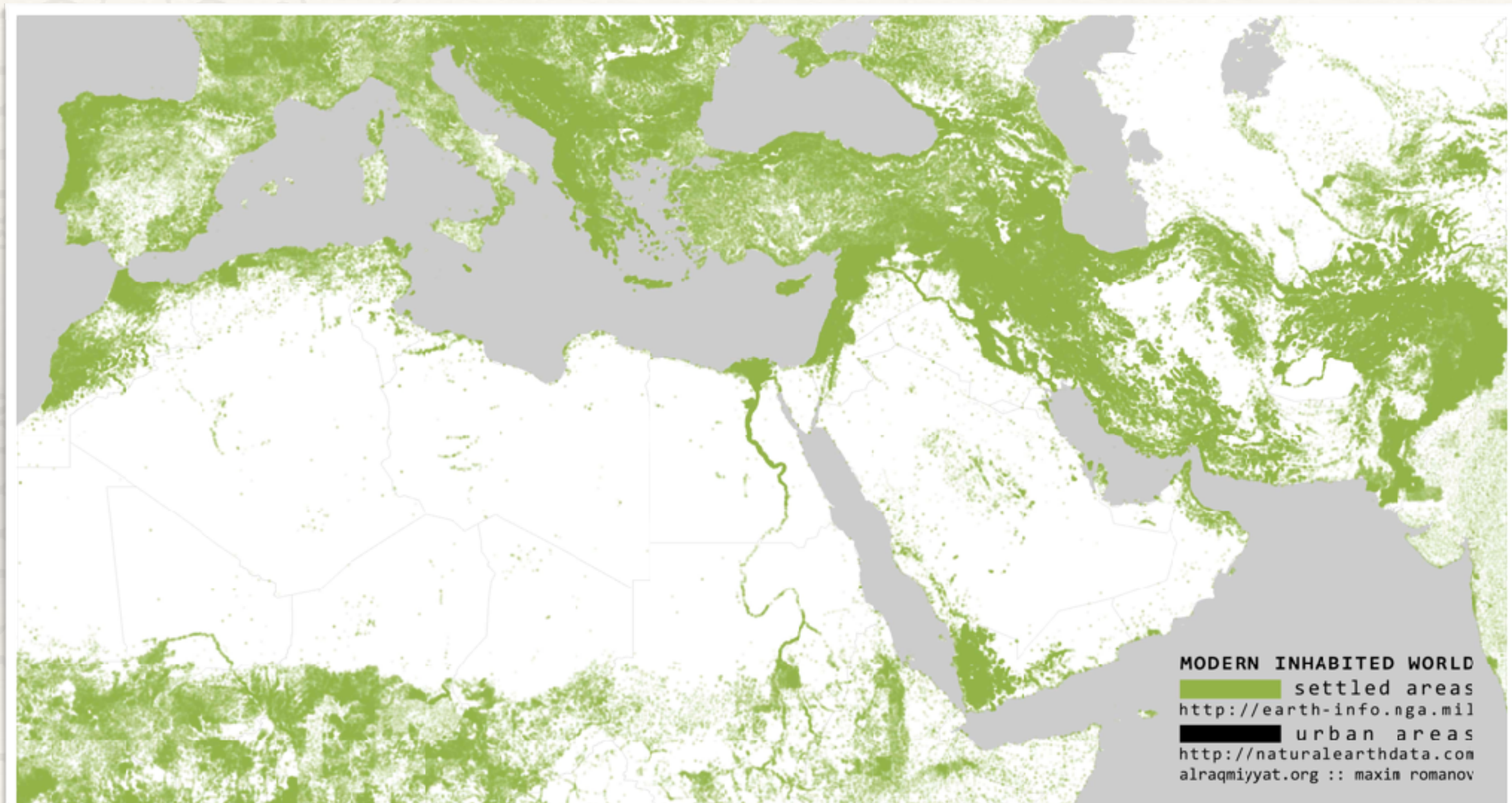
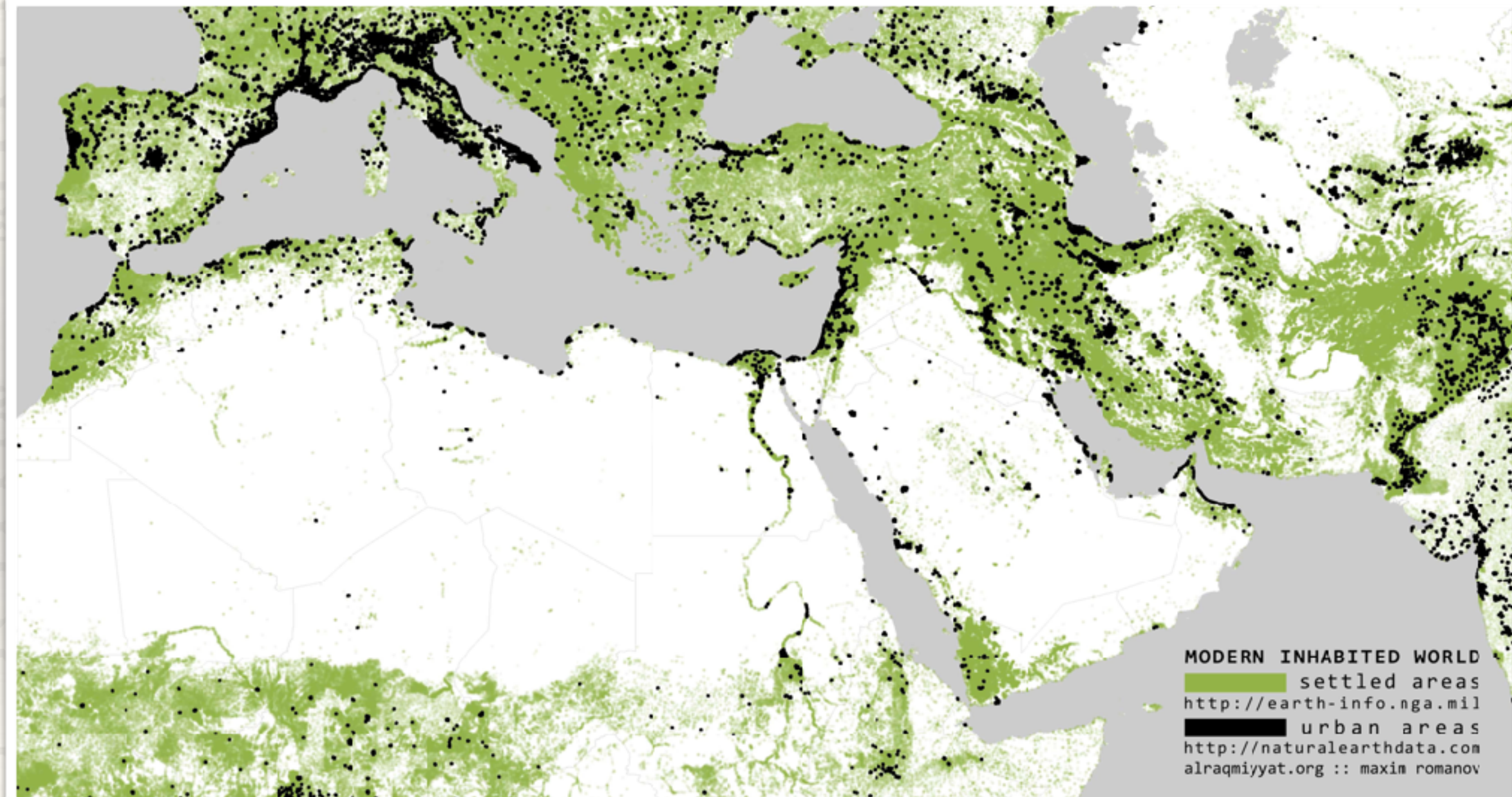


Figure 1.9: The Inhabited World: Using GIS data, one can build a map of the inhabited areas. The map on the left shows how settlements shape the Nile Delta, the valley of the Nile river, the Fayyūm Oasis, and, to a certain extent, the Suez canal; the darkest cluster represents the Cairo metropolitan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

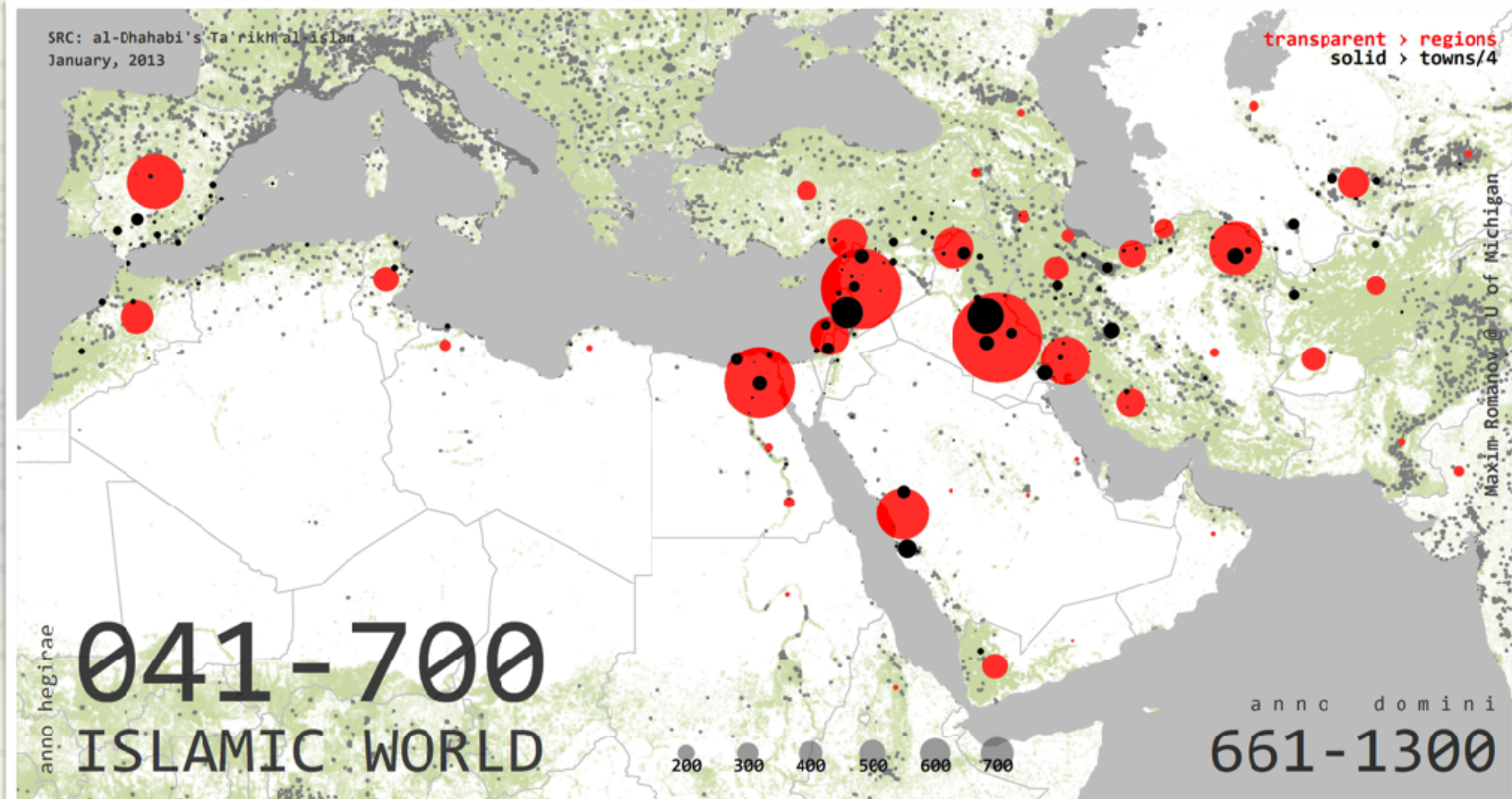
Geographical Coverage



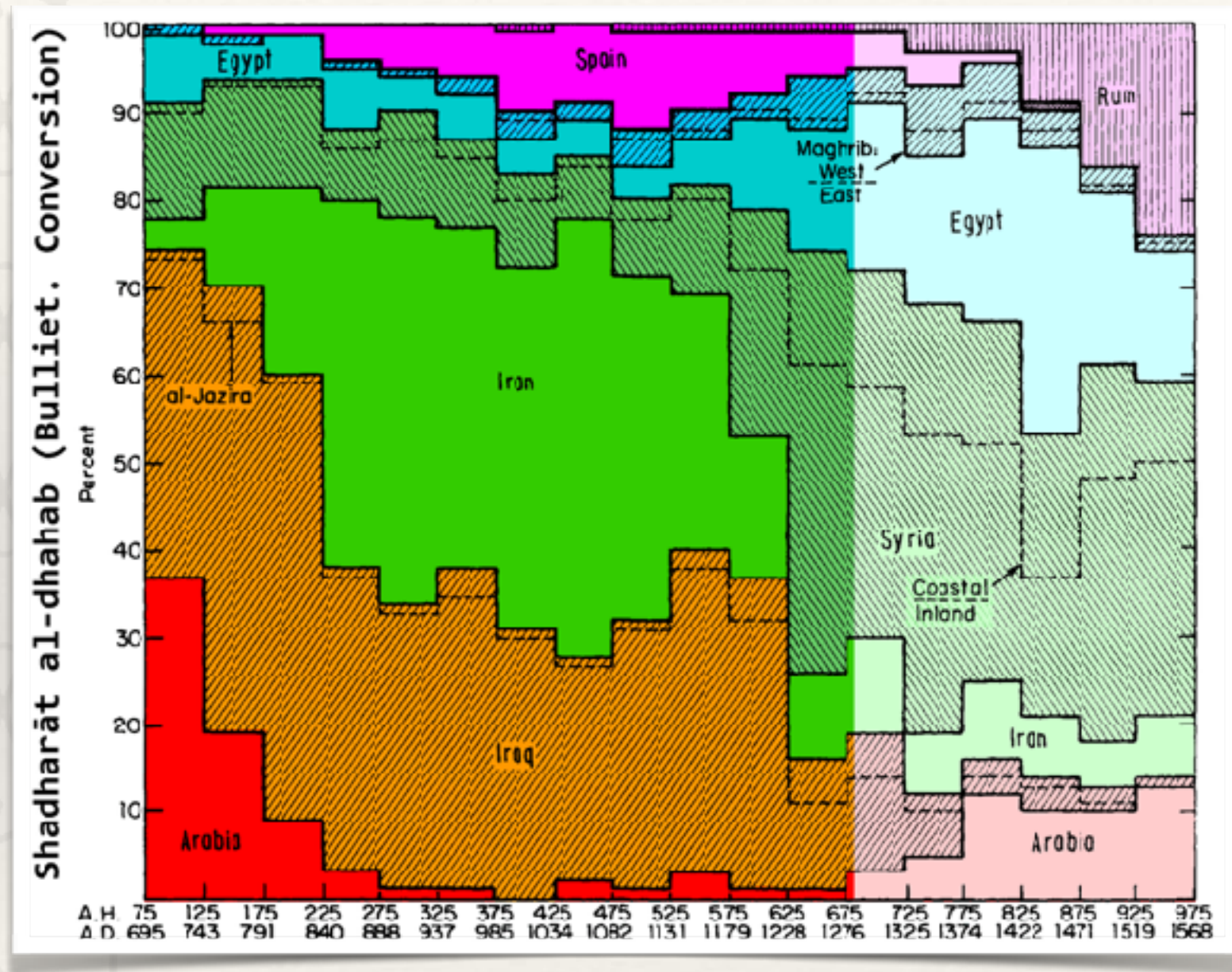
Geographical Coverage



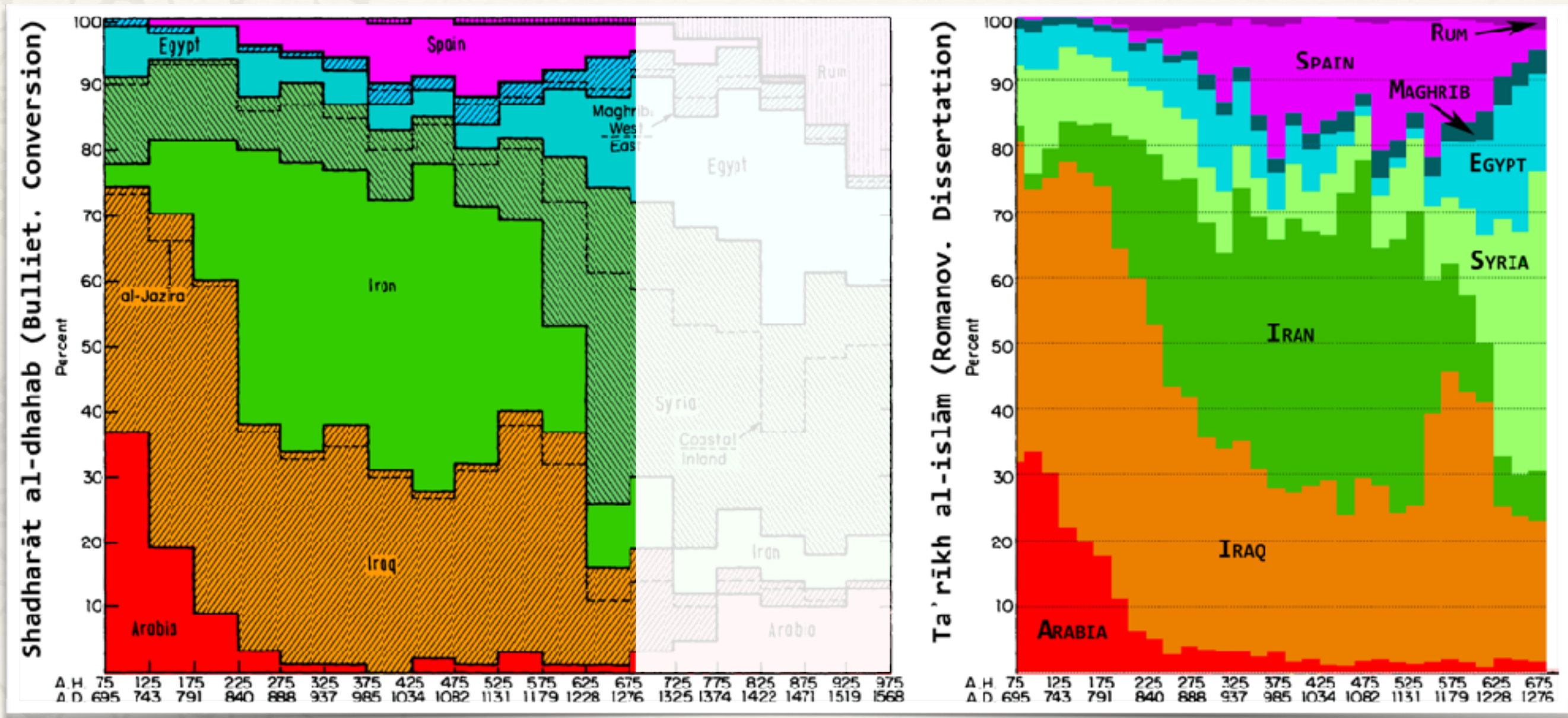
Geographical Coverage



Geo-Chronological Coverage: *Comparative Perspective*

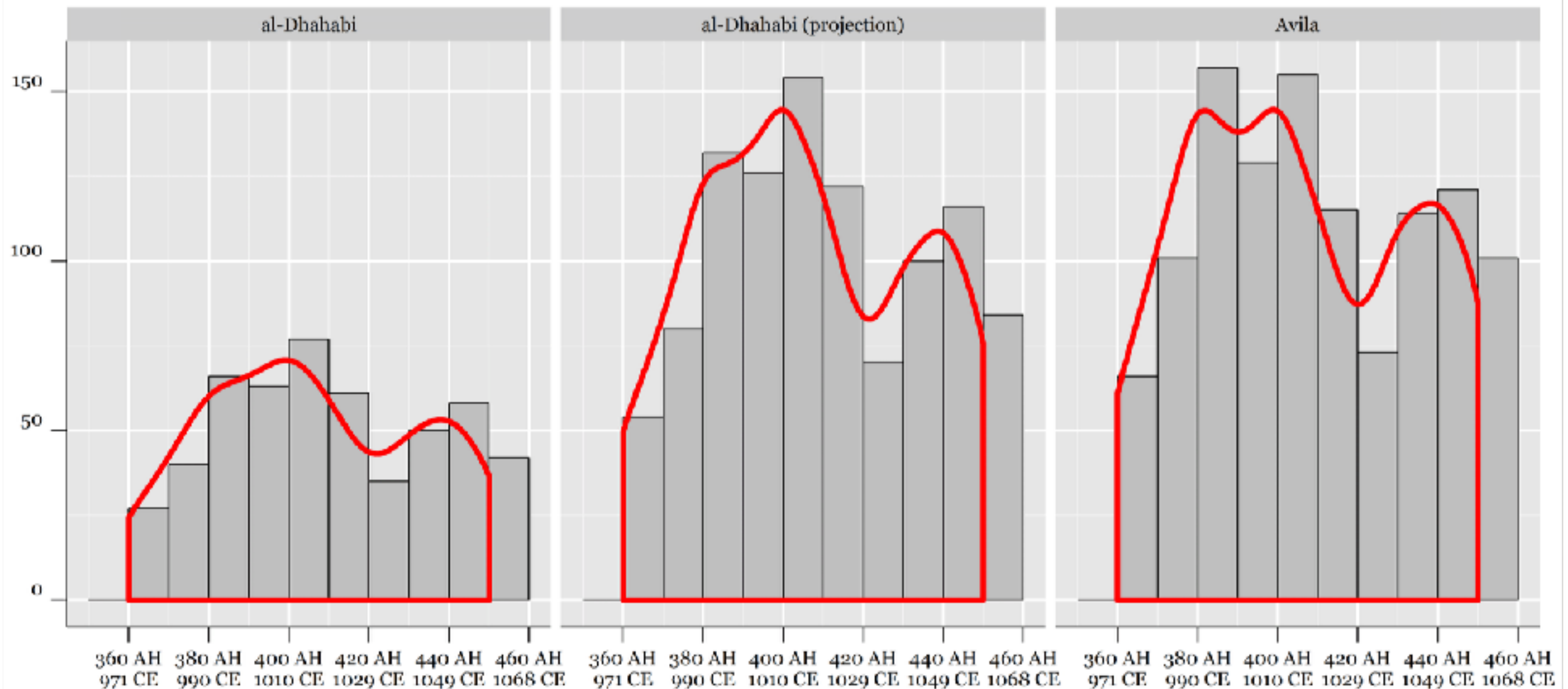


Geo-Chronological Coverage: *Comparative Perspective*

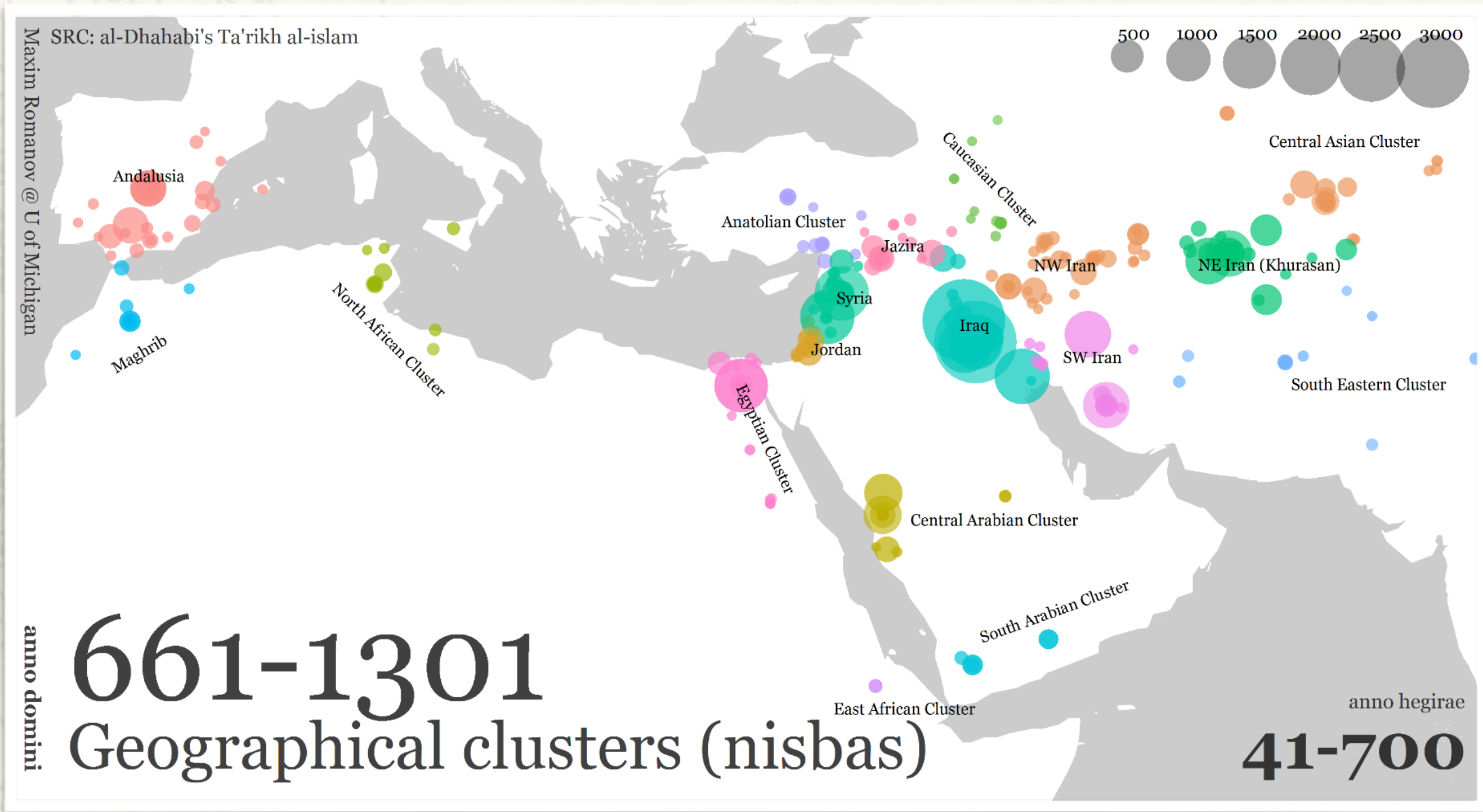


Geo-Chronological Coverage: *Comparative Perspective*

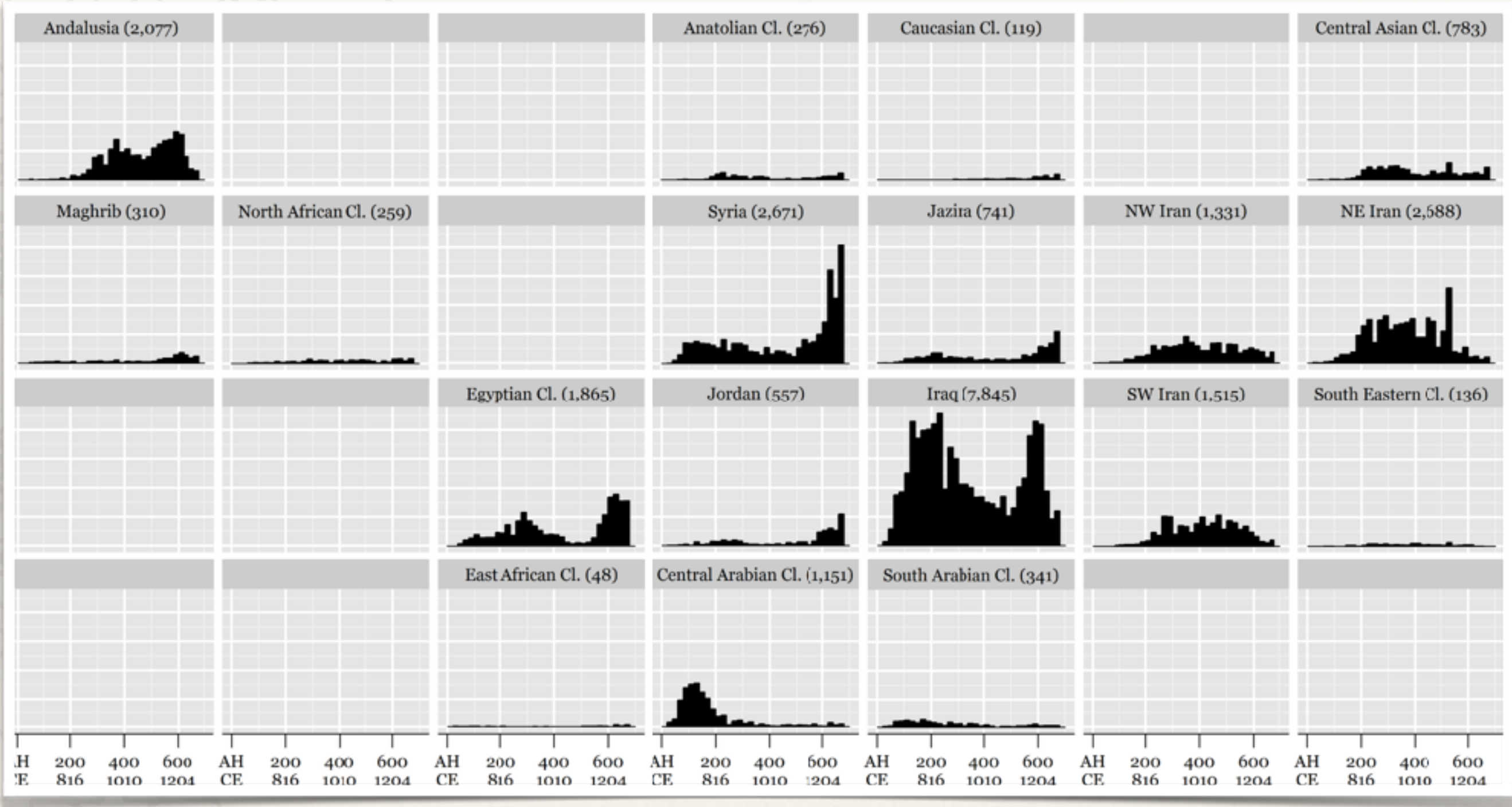
AH	370	380	390	400	410	420	430	440	450	460
in TI	42%	40%	42%	49%	49%	53%	49%	44%	48%	41%



Geographical Coverage



Geo-Chronological Coverage



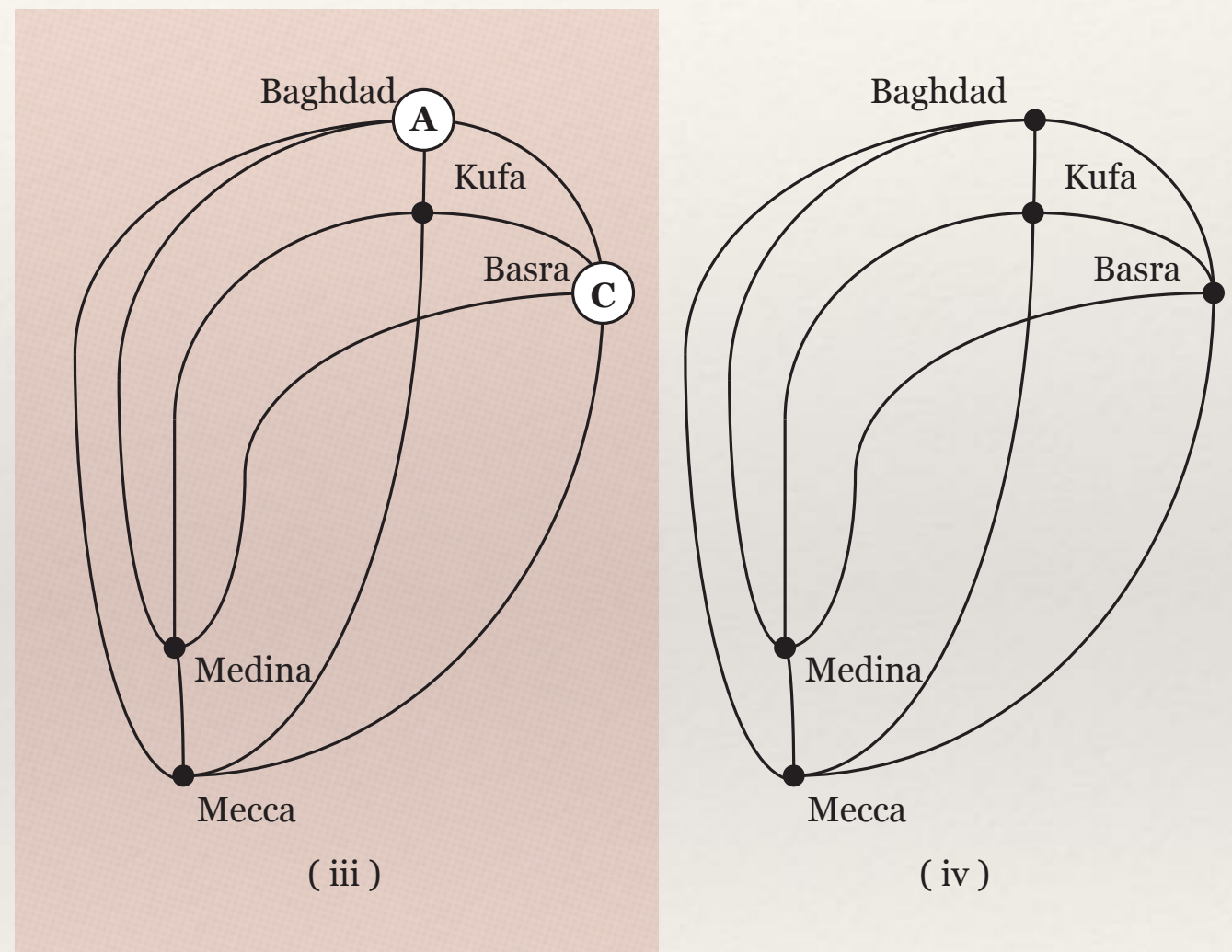
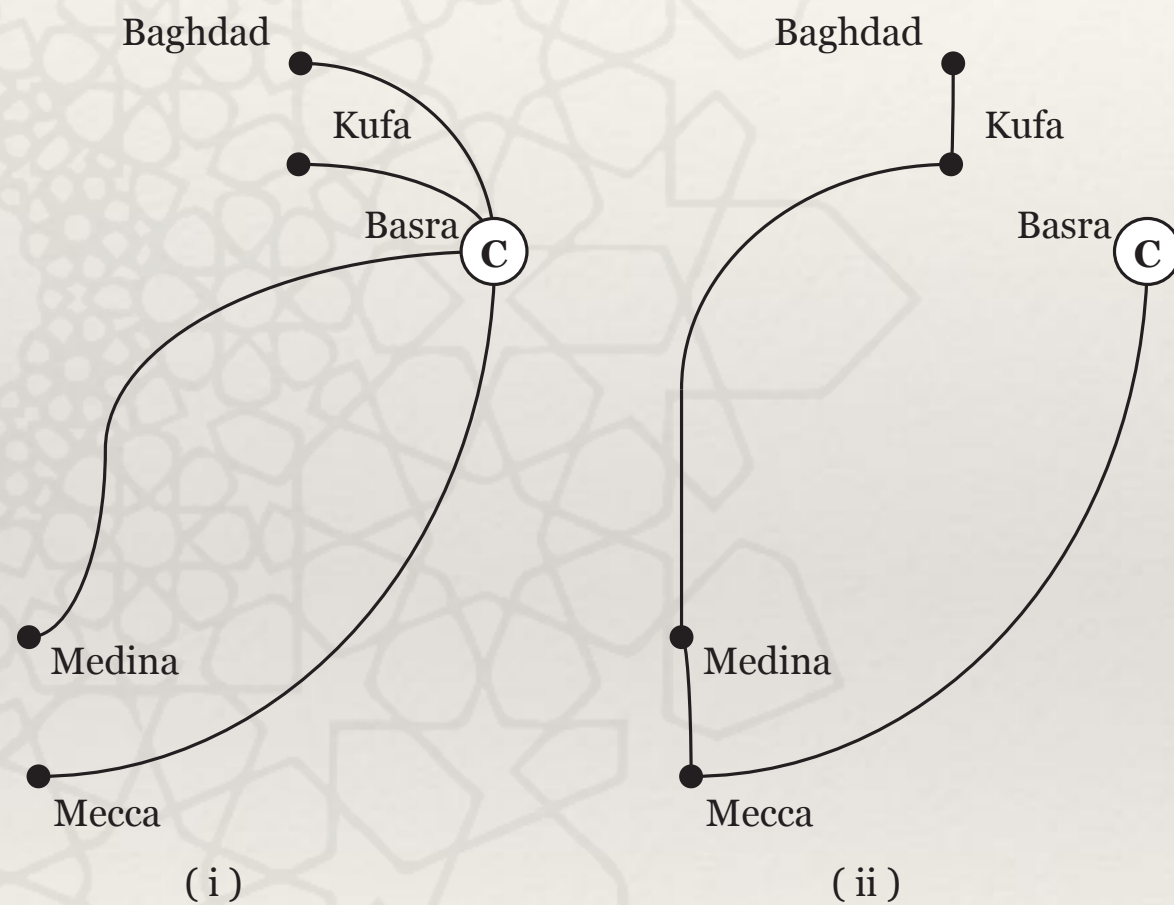
A decorative geometric pattern on the left side of the slide, consisting of overlapping, irregular polygons and lines in a light gray color, creating a complex, crystalline structure.

Social Geography: The Core

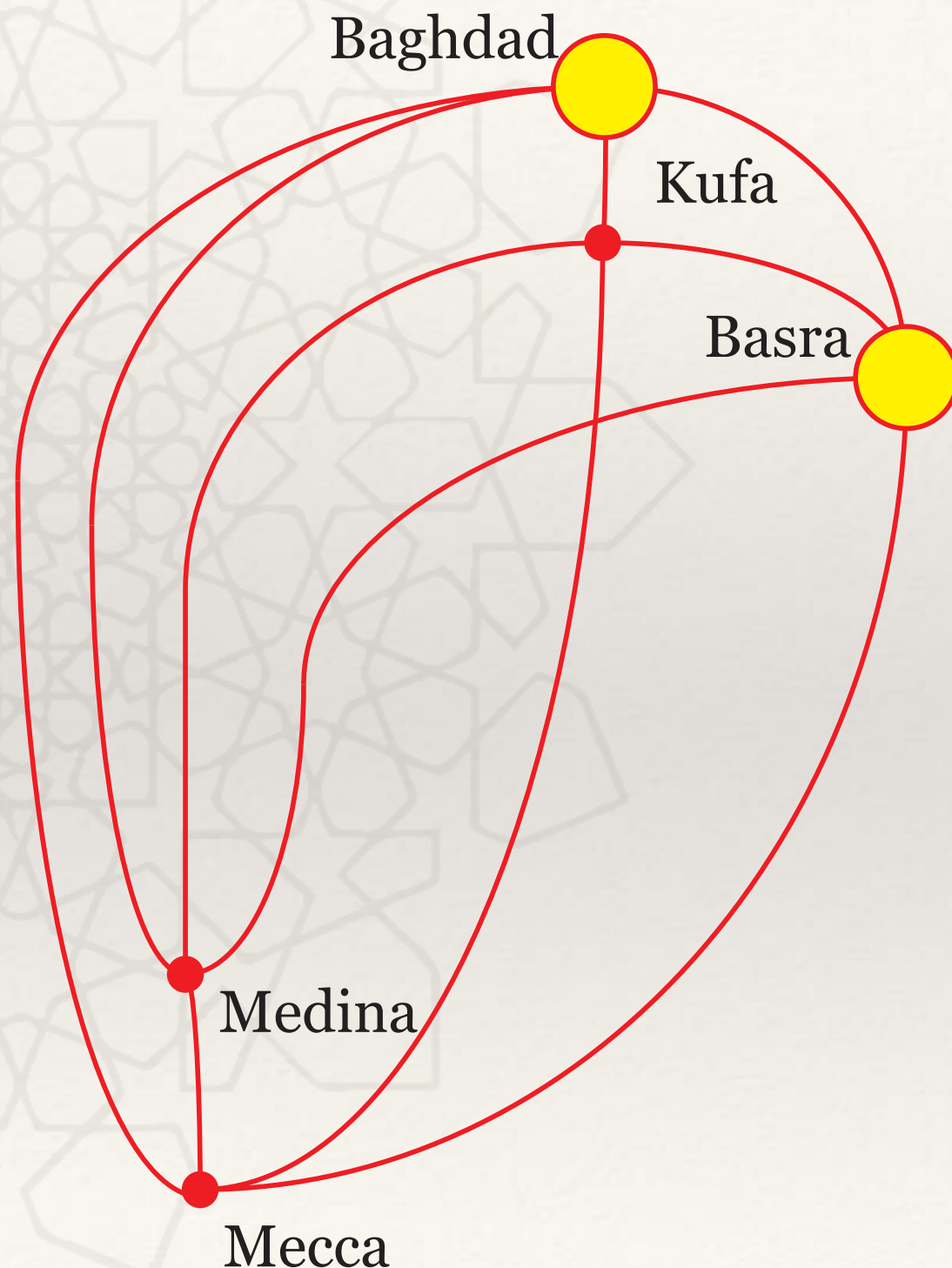
Modeling the Core



Modeling Geographical Connections

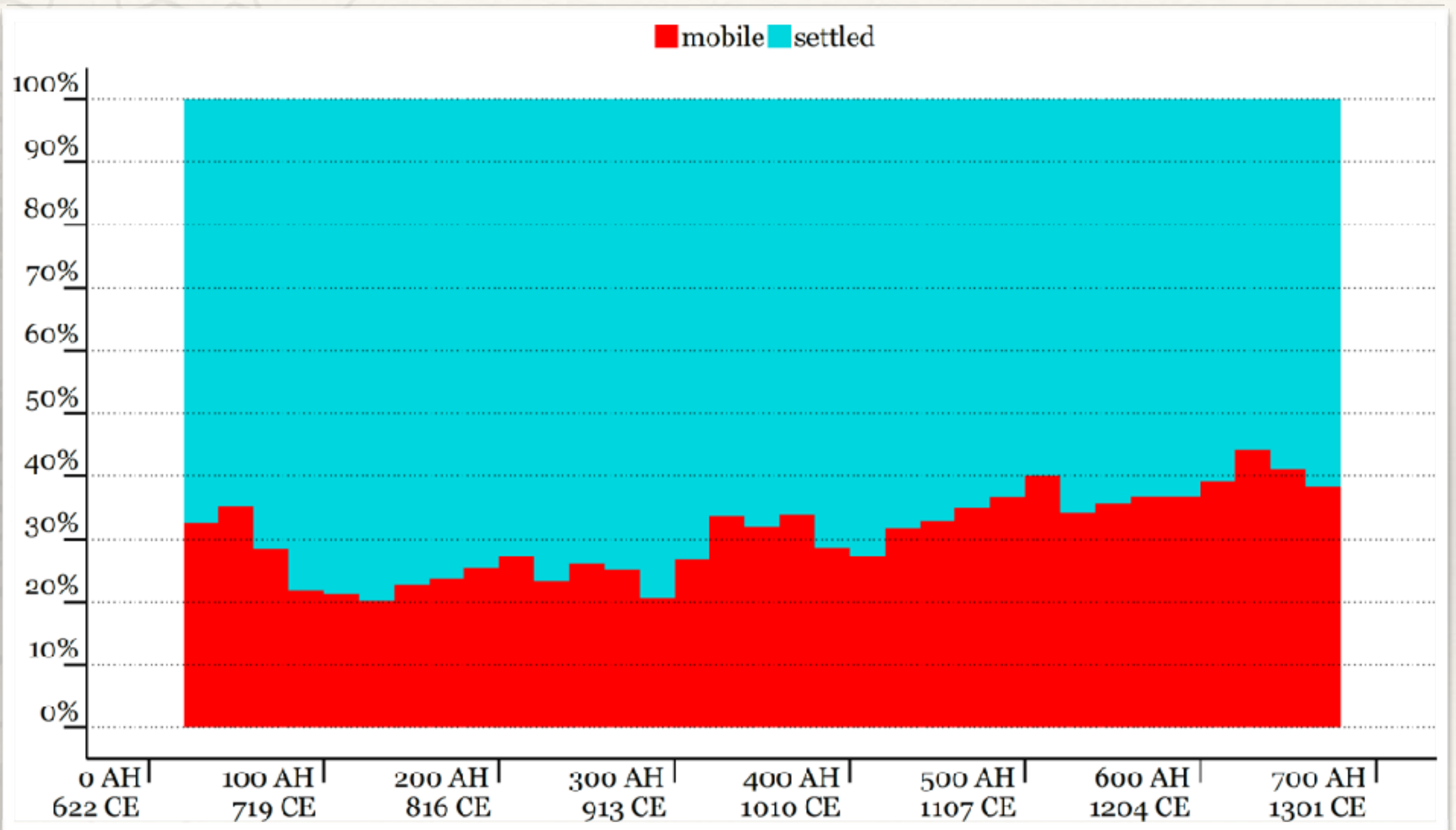


Modeling Geographical Connections



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

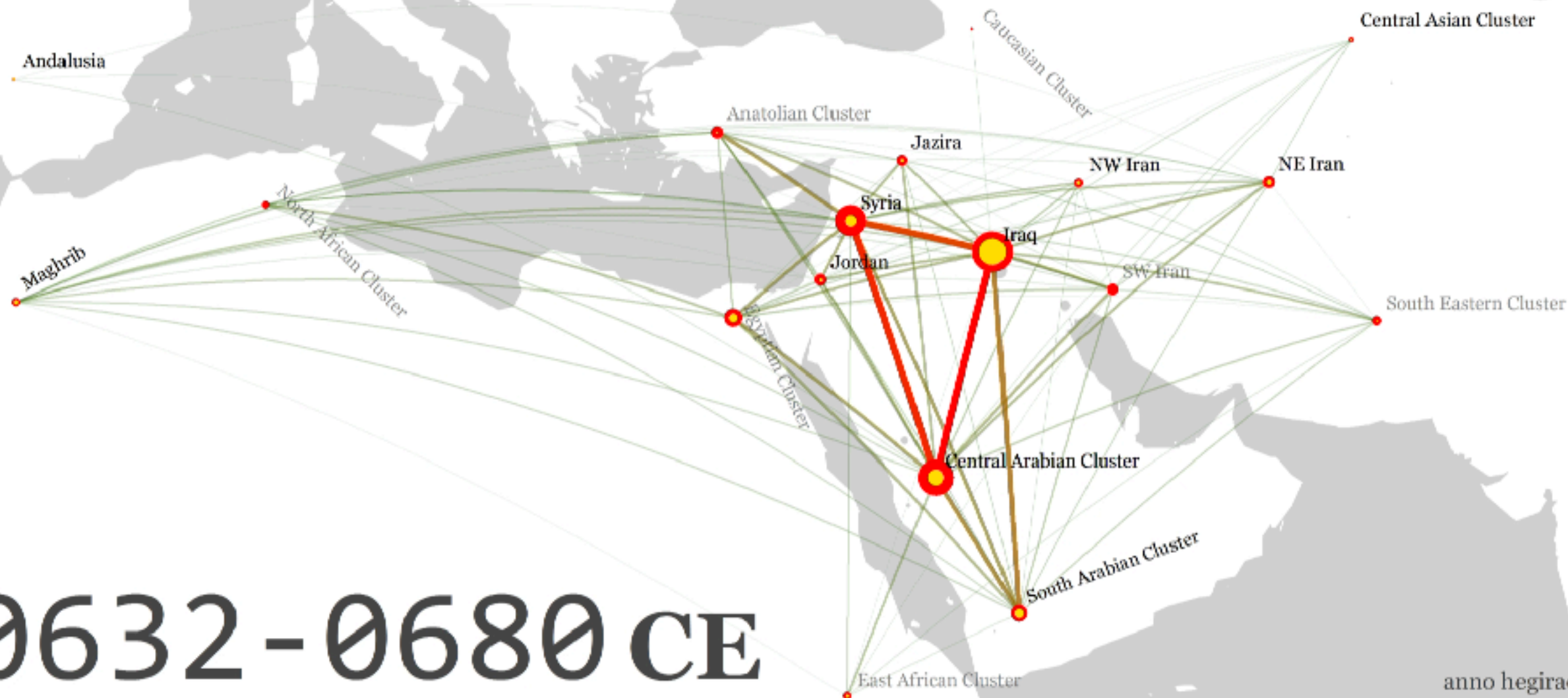
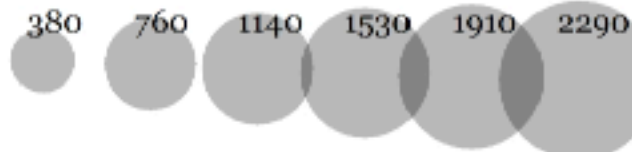
Transregional Mobility



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

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

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

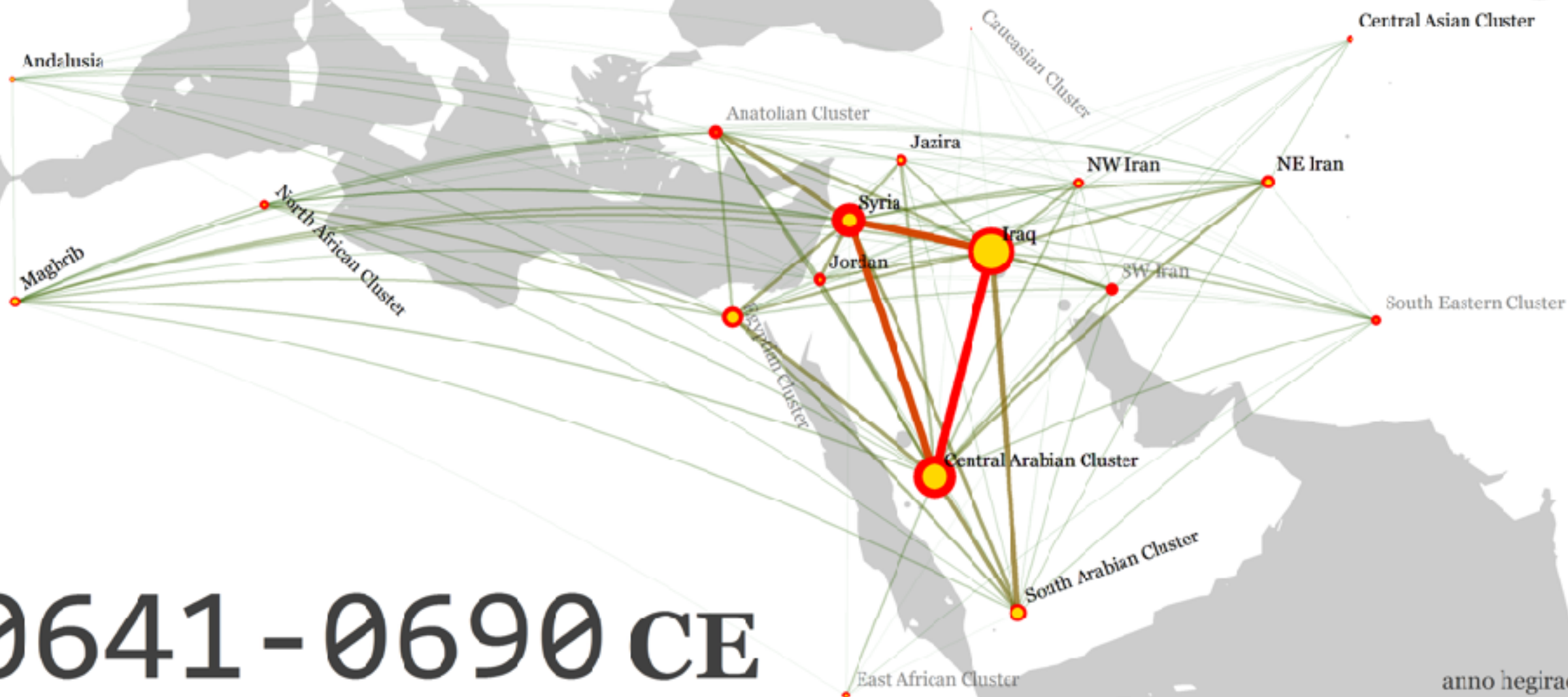
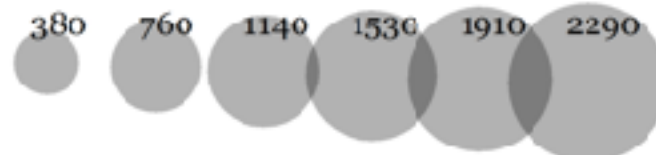


0632-0680 CE
Islamic World Changing

010-060

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

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

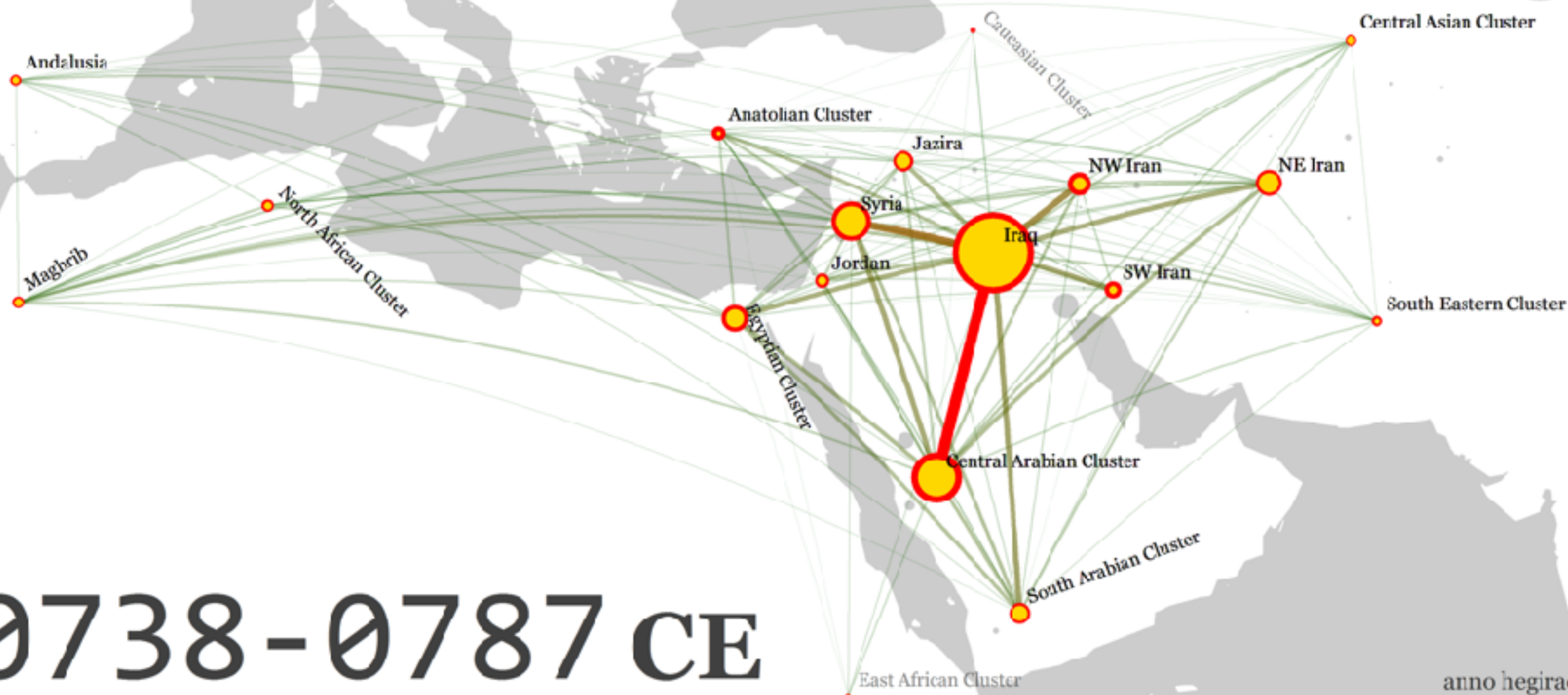


0641-0690 CE
Islamic World Changing

020-070

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

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

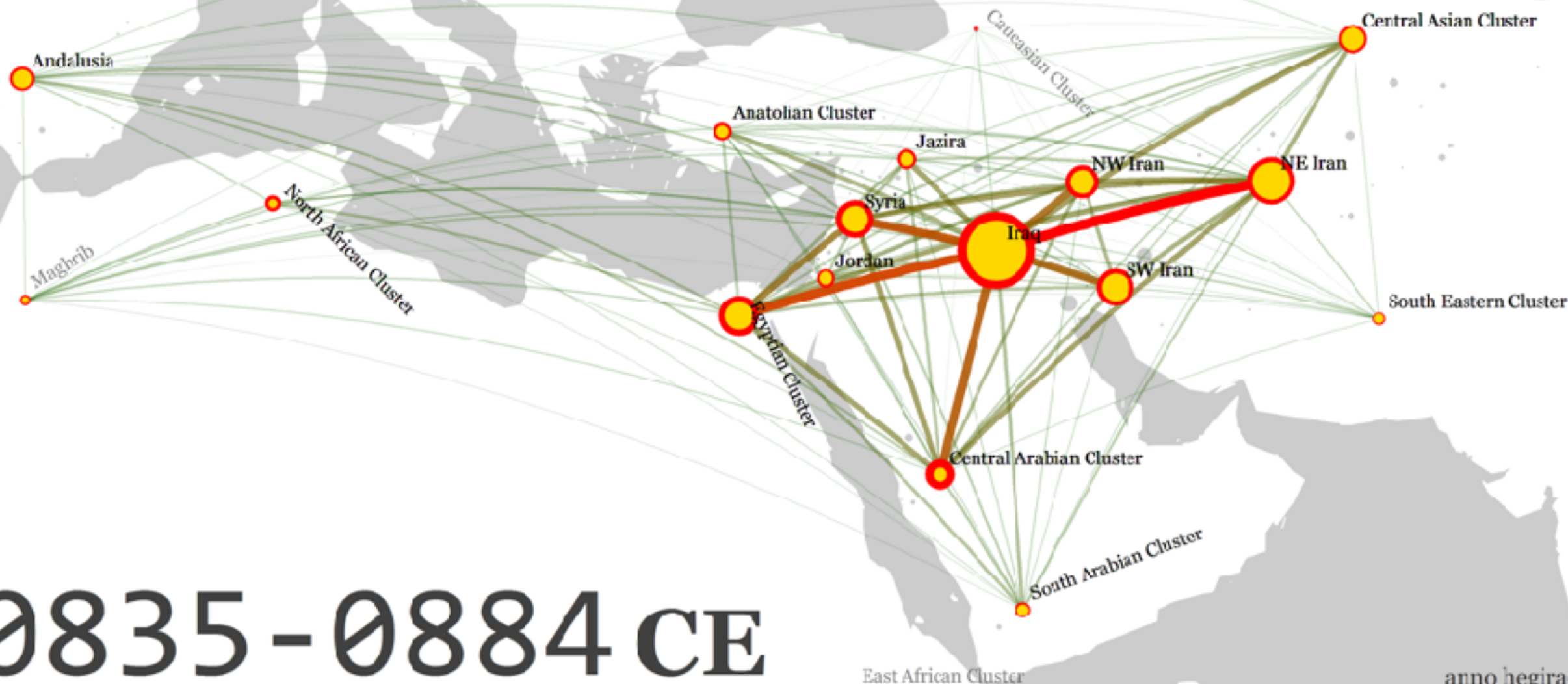


0738-0787 CE
Islamic World Changing

120-170

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

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

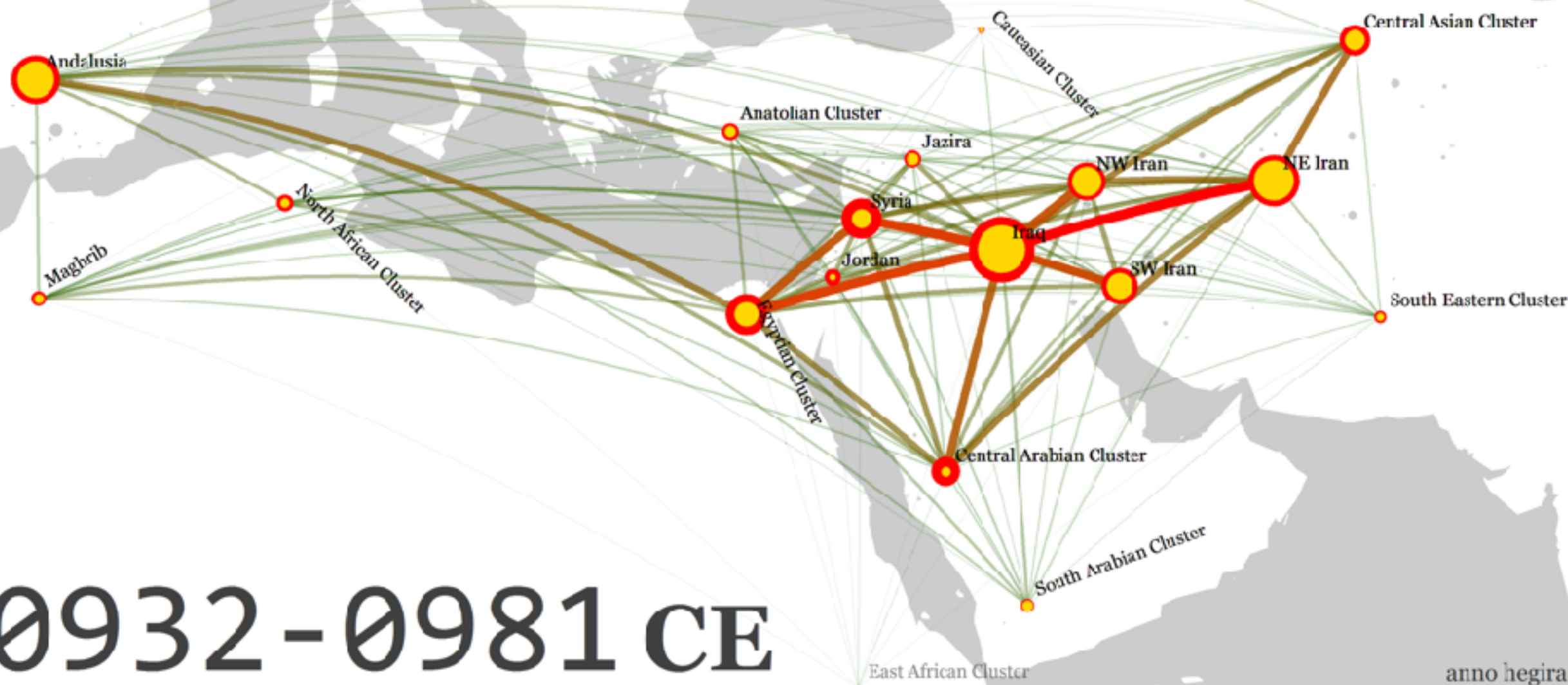


0835 - 0884 CE
Islamic World Changing

220 - 270

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

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

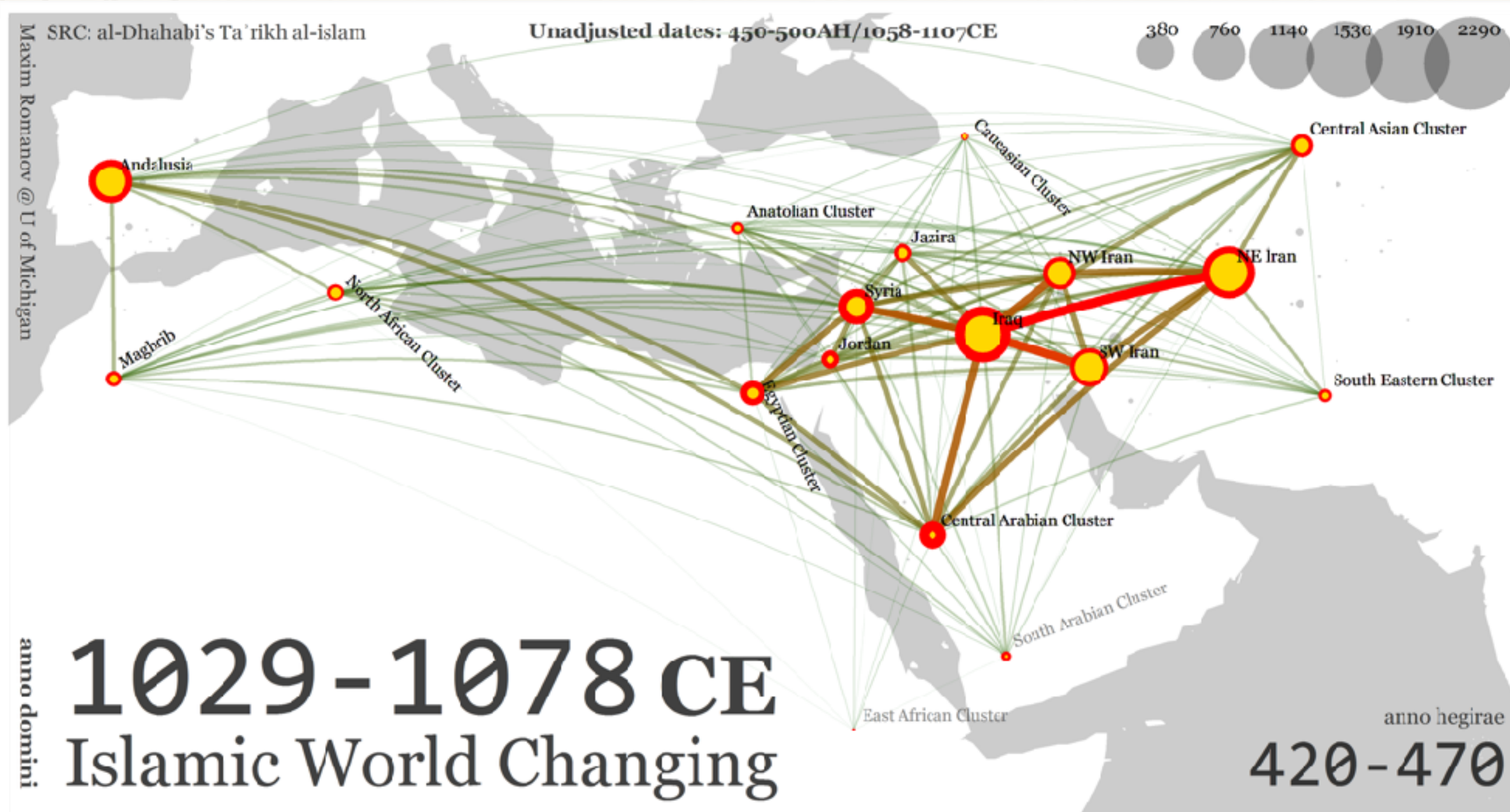
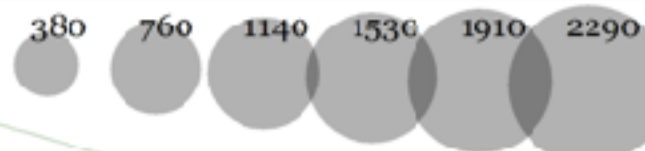


0932-0981 CE
Islamic World Changing

320-370

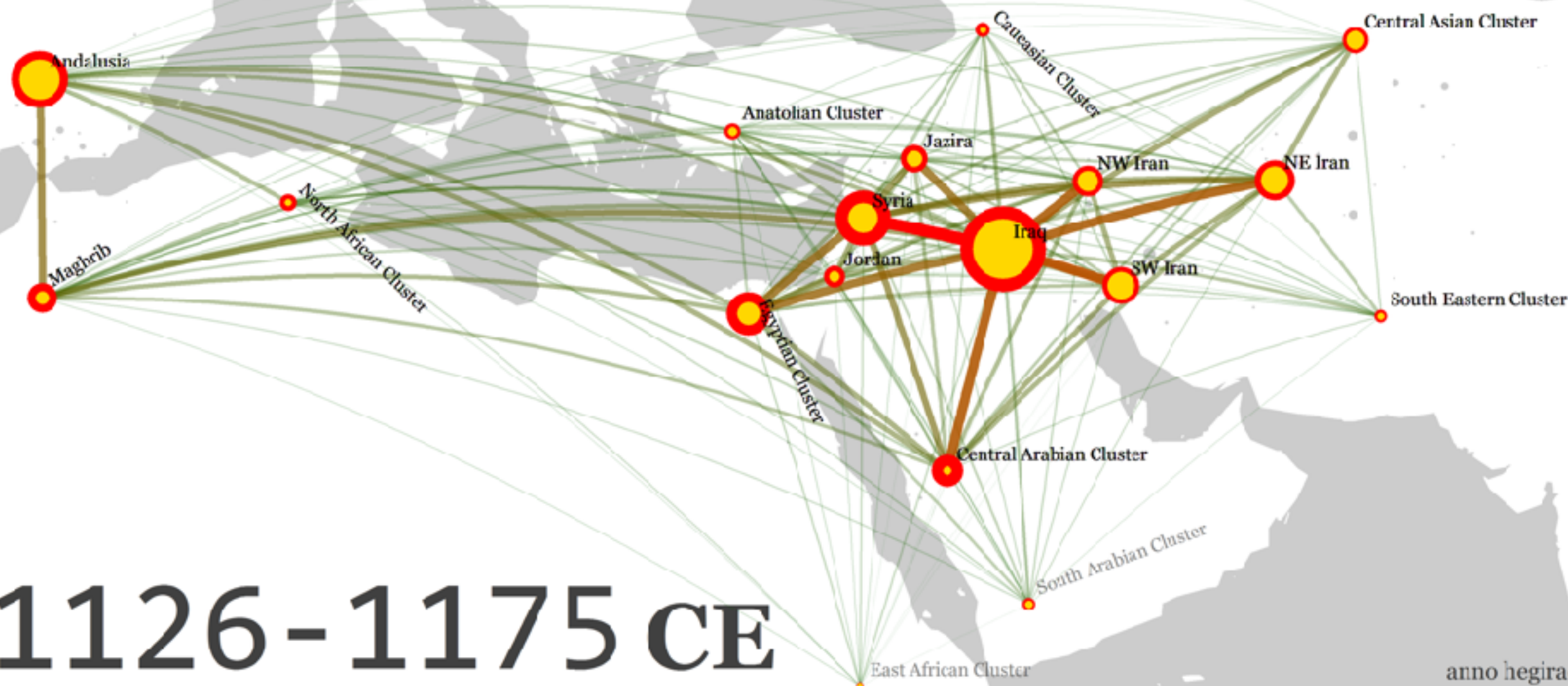
SRC: al-Dhahabi's Ta'rikh al-islam

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



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

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

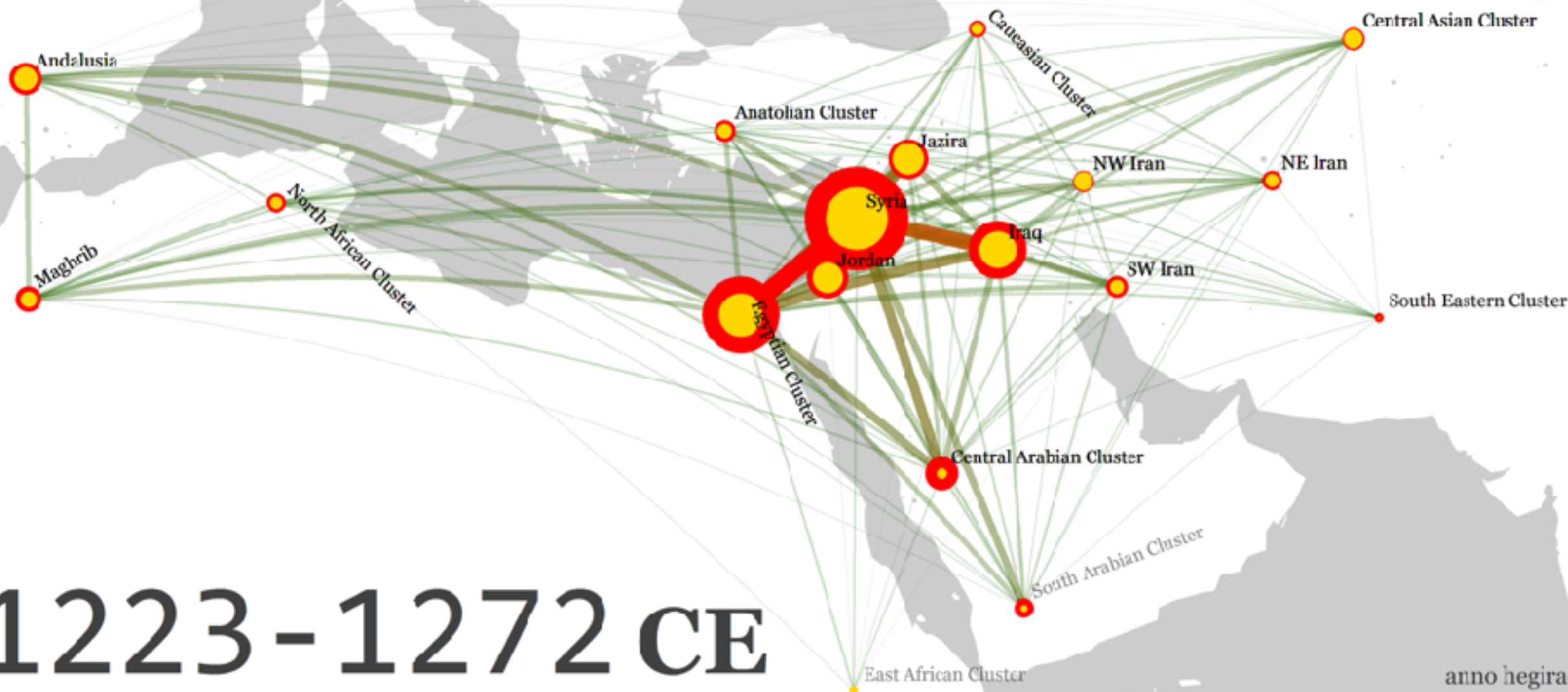
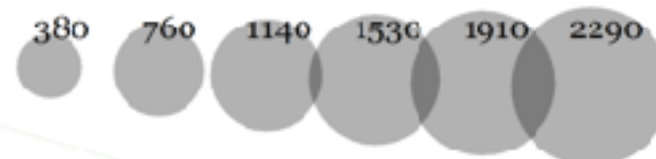


1126-1175 CE
Islamic World Changing

520-570

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

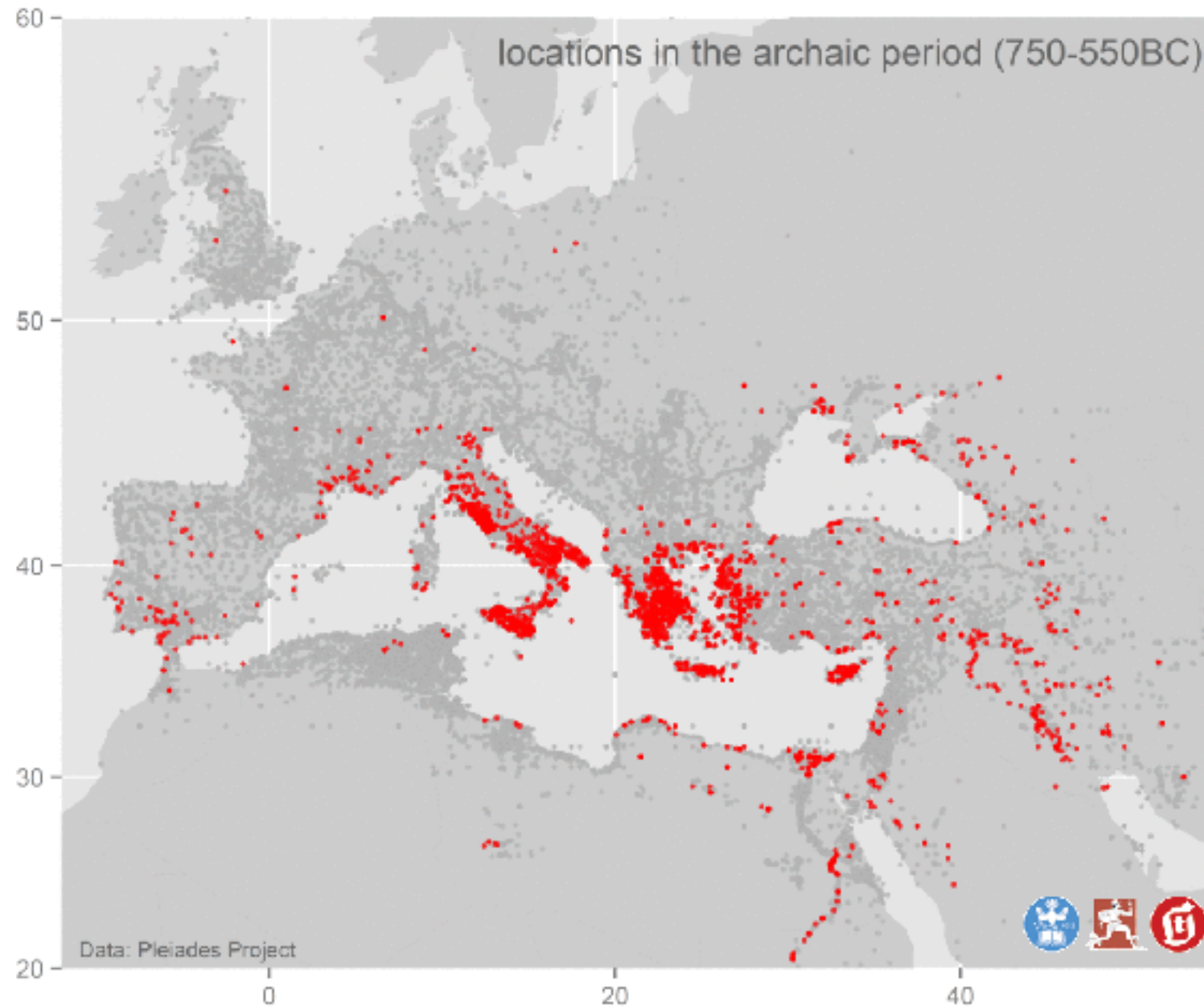
Unadjusted dates: 650-700AH/1252-1301CE



1223-1272 CE
Islamic World Changing

620-670

For the Seminar



<https://alraqmiyyat.github.io/2015/04-02.html> :: <http://tinyurl.com/dh-geo-ul>