"Mapping the Classical Islamic World"
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Google Earth Practicum: A Simple Mapping Solution

1 Starting up

- Download and install **Google Earth** from www.google.com/earth/.

2 Basic Geometry

Open **Google Earth** and try to create major objects, using the panel with icons .

- Placemark adds a single point (village, town, city, etc.);
- Polygon adds an area (lake, country, province, etc.);
- Path creates a line (river, road, borderline, etc.);
- Image Overlay allows one to "fit" any image on top of Earth's surface (e.g., you may want to try how a historical map fits onto the modern 3D globe).

3 Icons or KML?

Using the icons to add geographical information is convenient for some tasks, but may be quite cumbersome for some other. In the latter cases working directly with the KML-format may be a better option. KML is a version of XML, a flexible format where specific bits of information are wrapped in corresponding tags. KML allows you to get a better control over some parameters: for example, you can type in the exact coordinates, instead of trying to find them with your mouse. Each KML-record looks like the code that you see below.

```
<Placemark>
  <name>Plains of Sinjar</name>
  <Point>
    <coordinates>42.5,35.5,0</coordinates>
  </Point>
</Placemark>
```

Keep in mind that this is not a complete KML/XML format, but it is sufficient for drag-n-dropping into **Google Earth**. This simplified format should help you to understand the basic principles of how XML works. Most KML/XML files can be opened and edited in any text editor;[1] there are also special XML editors.[2]

Note that there are opening (for example, <`Placemark`>) and closing (for example, <`/Placemark`>) tags for each piece of information. This is how **Google Earth** knows how to parse this text and convert text information into proper instructions for mapping. `Placemark`, `polygon` and `path` differ only in the way of how their coordinates are provided: they have a different number of coordinate points and different wrapping tags that tell **Google Earth** how to interpret the geometry of an object.

- `Placemark` has only one set of coordinates, which are wrapped into the <`Point`> tags;
- `Path` may also have any number of coordinates as necessary to reflect the desired shape of a path; they are wrapped into the <`LineString`> tags;
- `Polygon` may have any number of coordinates necessary to reflect the desired shape of an area; since polygons has a more complex geometry than placemarks and paths, they are wrapped into a series of tags, such as <`outerBoundaryIs`>, <`LinearRing`>, etc.

4 Coordinates

Keep in mind that coordinates in the KML-format have three values (`longitude, latitude, altitude`) and they are given in *decimal* values, **not** degrees, min-

[1] If you are using Windows, the standard text editor is **Notepad**. Unfortunately, it does not display line breaks properly and when you open a KML file you are are not going to see code represented in a stuctured manner as in the example given above. There are other free options for windows: you can use **Gedit**, or **EditpadLite** (the latter also supports `regular expressions`).

[2] Such as, for example, **Oxygen XML Editor**, but it is not free.

utes and seconds; **N**orth and **E**ast are positive, while **S**outh and **W**est are negative. This means that you may need to convert degrees, minutes and seconds into decimal values, which can be done quickly with online converters (for example, @ fcc.gov, or www.satsig.net).

5 Using Simple KML

Download the sample KML-files from Trunk[3] and experiment with them: `Sample Placemark.kml`, `Sample Path.kml`, `Sample Polygon.kml`.

- Drag-n-drop each one of them into **Google Earth**. Since these are simplified KML records, there is no information on formatting (for example, neither icons nor colors are specified). These parameters can be modified in **Google Earth** by changing the `properties` of individual records or a group of records simultaneously.
- Open each of these sample files in a text editor and try to change parameters (only within the `<Name>` and `<coordinates>` tags). Save your changes as separate files. Drag-n-drop into **Google Earth** to see the results.
- You can save all your changes as KML files.[4] This will allow you to load your work back into **Google Earth** at any other time and on any other computer. Saving your work in KML, you can also backup your progress and share with your classmates.

6 Mapping task: The 7 climates

We have discussed that the Greeks divided the inhabited world into 7 climates; a number of Arab geographers accepted this division. Your task is to visualize these climates in **Google Earth**.

[3] `Resources` > `Practicum Files` > `Google Earth`.

[4] **Google Earth** may save your file as a KMZ file, which is a zipped version of KML. This format cannot be changed in a text editor. If you open the KML file that you saved, you will see that there is much more lines of code that you had before; this is because **Google Earth** saves *complete* KML files, not just single records with which you started, including all the visual modifications.

- Map the seven climates, but first consider whether it is more convenient to use icons or to work with the KML format directly.
- Use the coordinates from the following chart (the first climate starts at the equator):

Climata		Number of hours in longest day	THE ARAB SYSTEM al-Farghānī	al-Battānī	al-Bīrūnī
		16.25	50° 30'	missing	50° 25'
VII	Borysthenes (Dnieper River)	16	48° 55'	48° 53'	48° 52'
	48° 30'	15.75	47° 15'	47° 12'	47° 11'
VI	Hellespont (Dardanelles)	15.5	45° 24'	45° 22'	45° 22'
	43° 05'	15.25	43° 30'	43° 25'	43° 23'
V	Rome	15	41° 20'	41° 15'	41° 14'
	38° 35'	14.75	39°	38° 54'	38° 54'
IV	Rhodes	14.5	36° 24'	36° 22'	36° 21'
	33° 20'	14.25	33° 40'	33° 37'	33° 37'
III	Alexandria	14	30° 42'	30° 40'	30° 39'
	27° 10'	13.75	27° 30'	27° 28'	27° 28'
II	Syene (Aswan)	13.5	24° 06'	24° 05'	24° 04'
	20° 15'	13.25	20° 30'	20° 28'	20° 27'
I	Meroë	13	16° 40'	16° 39'	16° 39'
	12° 30'	12.75	missing	missing	12° 39'

- Do not forget to convert degrees, minutes, seconds into decimal values, if necessary, of course.

7 Mapping Task: al-Maʾmūn's Expedition.

The caliph sent an expedition to measure a degree of the meridian. Somewhere in the plains of Sinjār, the expedition split into two groups. One grouped moved one degree straight north, while another one moved one degree south. When they measured the distance that they traveled, one group had 56,5 miles, while another—57 miles. The caliph settled the issue in the middle: $56\frac{2}{3}$ miles. These were the Arab miles, not the miles that we use today; according to the Western scholars who studied this issue $56\frac{2}{3}$ equals either 111,814.67 meters (according to Nallino), or 111,792.0 meters (according to Schoy). Your task is to map al-Maʾmūn's expedition and find[5] the length of a degree of the meridian.

- Again, consider whether it is more convenient to use icons or to work with the KML format directly.

[5] **Google Earth** can show the length of a path in a number of formats (check "Measurments" tab in Properties of your KML object).

- Pick any spot in the Sinjār plains (you will need to find where these plains are; HINT: somewhere in Iraq).
- Draw the route of the 1st group (they traveled 1 degree north).
- Draw the route of the 2nd group (they traveled 1 degree south).
- What is the length of a degree of the meridian? (In our case, both lengths will be the same).
- Adjust visual properties to your liking and add pop-up comments that would provide necessary explanations.
- Save your map into a KML file.

8 Mapping task: Towns & Cities

Using coordinates from the chart below, map major cities and towns. For contrast, use coordinates of Ptolemy and those of one of the Arab geographers (Yāqūt, al-Khwārazmī, or al-Battānī). **NB:** All the coordinates are in the **n**orthern and **e**astern part of the globe.

	Yāqūt			Ptolemy		al-Khwārazmī		al-Battānī	
	Long.	*Lat.*	*Climate*	*Long.*	*Lat.*	*Long.*	*Lat.*	*Long.*	*Lat.*
Adana (Ἄδανα)	68° 15'	–	–	68° 15'	36° 50'	–	–	68° 15'	36° 50'
Greater Armenia (Khilāṭ)	78°	38° 20'	V	–	–	64° 50'	39° 50'	78°	39° 20' [Khilāṭ]
								77°	41° [Gr. Armenia]
Lesser Armenia (Tiflis/Tbilisi)	75° 50'	45°	–	–	–	–	–	–	–
Antioch (Ἀντιόχεια)	69°	35° 30'	IV	69°	35° 30'	61° 35'	34° 10'	69°	35° 30'
Ankara (Ἄγκυρα)	58°	49° 40'	–	62°	42°	58°	43°	–	–
Ahwaz (Σοῦσα)	84°	35° 04'	–	84°	35° 15'	75°	32°	83°	34°
Bukhara	87°	41°	V	–	–	87° 20'	37° 50'	[88°	34°?]
Barda	79° 30'	45°	VI	–	–	73°	43°	84°	42°
Cyrenaica (Barqa) (Βάρκη)	63°	33° 10'	III	49° 15'	30° 45'	43°	33° 45'	–	–
Baalbek (Ἡλιούπολις)	68° 20'	–	IV	68° 40'	33° 40'	–	–	68° 20'	33° 15'
Baghdad	75°	34°	IV	–	–	70°	33° 09'	80°	33° 09'
Balkh (Βάκτρα)	115°	37°	V	116°	41°	88° 35'	38° 40'	116°	41°
Beirut (Βηρυτός)	68° 45'	33° 20'	–	67° 30'	33° 40'	59° 30'	34°	69° 30'	33° 20'
Palmyra (Tadmur) (Πάλμυρα)	71° 30'	–	IV	71° 30'	34°	66°	35°	72°	34°
Tikrīt (Βίρθα)	98° 40'	37° 30'	–	78° 45'	36° 20'	–	–	–	–
Gurgan (Ὑρκανία)	86° 30'	40°	V	98° 50'	40°	80° 45'	38° 50'	95°	40°
Haran (Κάῤῥαι)	72° 30'	27° 30'	IV	73° 15'	36° 10'	65°	36° 40'	73°	36° 40'
Aleppo (Halab) (Βέροια)	69° 30'	35° 25'	IV	71° 20'	35°	63°	34° 30'	71°	34° 50'
Hulwan	71° 45'	34°	IV	–	–	71° 45'	34°	81°	35°
Homs (Ἔμισσα)	69°	34° 45'	IV	69° 40'	34°	61°	34°	69° 05'	–
Khiva (Khwārazm) (Ὠξείανα)	117° 30'	45°	VI	117° 30'	44° 20'	91° 50'	42° 10'	–	–
Raqqa (Νικηφόριον)	73° 06'	35° 20'	IV	73° 05'	35° 20'	66°	36°	73° 15'	36°
Rome (Rūmīya) (Ῥώμη)	35° 20'	41° 50'	V	36° 40'	41° 40'	35° 20'	41° 50'	36° 40'	41° 40'
Edessa (Ruha) (Ἔδεσσα)	72° 30'	37° 30'	IV	72° 30'	37° 30'	64°	36° 40'	72° 50'	37°
Rayy (Ῥάγαια)	85°	37° 36'	IV	98° 20'	34° 20'	75°	35° 45'	86°	36° 30'
Zaura	105°	39°	V	–	–	–	–	–	–
Syracuse (Συρακοῦσαι)	39° 18'	39°	V	39° 30'	37°	–	–	–	–
Salamiya	68° 20'	37° 05'	IV	–	–	62° 45'	33° 30'	69° 50'	34° 50'

FIG. 4.5. A COMPARISON OF SOME OF THE COORDINATES OF AL-KHWĀRAZMĪ, AL-BĀTTANĪ, AND THE *KITĀB AL-MALḤAMAH* (YĀQŪT) WITH THOSE OF PTOLEMY. The first column lists the coordinates from the *Kitāb al-malḥamah*, as given in the printed edition of Yāqut's *Muʿjam al-buldān*, and the climate where given. This is followed by the coordinates given by the other authors. After Ernst Honigmann, *Die sieben Klimata und die πόλεις ἐπίσημοι* (Heidelberg: Winter, 1929), 126–27.

- Again, first consider whether it is more convenient to use icons or to work with the KML format directly.
- Keep in mind that it may be convenient to use visual properties in order to distinctively visualize locations of different authors.
- How are the coordinates of different authors differ? How do these coordinates differ from modern coordinates? Can we find the *prime meridian* of the Arab authors?

9 Mapping task: Provinces of the Islamic World

Consult both al-Muqaddasī's medieval and Cornu's modern maps of the Islamic world. Combining your observations from both sources, try to visualize provinces of the Islamic world using **Google Earth**. Textual descriptions may also be helpful, so check al-Muqaddasī's "Best Divisions" (there are brief descriptions of each region at the beginning of each chapter), and The Encyclopaedia of Islam.

- Again, first consider whether it is more convenient to use icons or to work with the KML format directly.
- Add names of all provinces, and consider using different colors for different provinces, as well as different levels of transparency for polygons.
- Think of the problems that you run into working on this assignment.

10 Mapping task: al-Muqaddasī's Maps

. This task will involve using Image Overlay. The main goal is to overlay al-Muqaddasī's maps on the surface of Earth, using **Google Earth**. Consult Cornu's maps; comparing them with those of al-Muqaddasī will help you to orient each map more or less properly.

- For this particular task it is most convenient to use icons, although it may worth your while to take a look at the produced KML files as well.
- This is the task where collaboration will be very helpful. The names of even major cities and towns may not right a bell, since all are given in Arabic (e.g., you will not find Jerusalem, but Bayt al-Maqdis (or, al-Bayt

al-Muqaddas); not Damascus, but Dimashq, etc.). Consider creating a shared **Google Doc** (or a spreadsheet), where everybody could add modern English names of difficult places (Encyclopaedia of Islam, or simple *googling*, will help you find the answers).

- Think about how do al-Muqaddasī's maps fit into the modern vision of our planet. What do these old maps do and what they don't?