Prediction: Week 6

analysis of outdoor **Navigation Exercise**

Surprise Guest: Dr. Sara Schechner,
David P. Wheatland Curator of the
Collection of Historical Scientific Instruments,
Harvard University.

Your “Marching Orders”

analysis of outdoor **Navigation Exercise**

Navigating Harvard Yard

Submit Assignment

Due Mar 3 by 11:59pm **Points** 75 **Submitting** a website url or a file upload **Attempts** 0
Allowed Attempts 1

Each of you has been paired with one [illegible]nt, as shown on this spreadsheet .

When you are done, to submit this Assignment, here on Canvas, each student should:

1. fill in coordinate information from your outdoor exercise, after its conclusion, at this survey link. **Upload a screenshot** of the "thank you" page you'll see when that's done
2. **upload a photograph** of the building nearest to your End point as explained on your worksheet (make sure your on-campus partner shares that photo with the off-campus partner right after you finish working together). If Canvas gives you any trouble with the upload, it is fine to include the photograph in your Prediction Journal.
3. **in your Prediction Journal, enter 1 paragraph** worth of text describing any challenges you and your partner faced WHILE navigating together, **and 1 paragraph** musing on how those challenges, or other factors, may have affected the uncertainty in your final result. Please **submit the URL** of your journal as evidence that you've added these paragraphs.

This whole assignment should take 1/2 an hour or less of walking around (physically or virtually), and then 30-40 minutes to complete the uploads and Journal entry.

To carry out this assignment, the person "on the ground" in Harvard Yard, will need a **smartphone** or tablet that can run **Google Maps.** That *same* device (or another) can be used for the video chat with your partner. You will **ONLY** use Google maps briefly, three times, to determine GPS lat/long positions. **Please do NOT use Google Maps, or any other computational or mechanical tools, to estimate distances and angles**. If you feel at all tempted to "cheat" by using these devices, then please only let the remote member of your team do the distance and angle estimation. We have clever ways of knowing if you use measuring devices or electronics, so please don't--analyzing the class's collective navigations will be less fun if you do.

Instructions for finding your latitude and longitude using Google Maps

To retrieve your latitude & longitude from Google Maps on your smart phone, follow these steps:

1. Open Google Maps;
2. Tap the symbol (usually a compass arrow) to show your current location;
3. Wait a few seconds to let the phone's gps improve accuracy (you'll see the "error circle" minimize);
4. Press & hold at your current position to "drop a pin" at your location;
5. Swipe up to see the detailed information about your pin--and you will see a screen that looks like this:

PREDICTIONX

Navigating Harvard Yard

GenEd 1112 Navigation Exercise: BLUE

You are in a **group** named after the color of the “paper” upon which these instructions are “printed.” *(You may want to print out this sheet for quick & easy note-taking, but it’s not required.)*

Start at the BACK DOOR of Harvard Hall. *For reference, this photo shows the **FRONT** side of Harvard Hall, the BACK Door, your starting point, is on the OTHER side.*

Using the instructions in the table below, and NOTHING ELSE, you are going to walk **from your starting point to A, to B, to the “End” point.**

You can use any cooperation strategies you devise to navigate together as a team, but do NOT use your smartphone, computer, or any other modern measuring devices to “navigate.”
When (and only when!) you reach point A, then point B, and finally your End point, you need to record your latitude and longitude in the chart below. *To speed things up, stay warm, and increase accuracy, you may want to take screenshots of GPS location information on your phone, and transfer information to the survey when indoors.*

At your final End point, after you conclude your pair’s video chat, the on-campus partner should **take a photograph of whatever Harvard building is nearest your End point, and share that photo with your partner.**

Where you wound up

Blue 1.jpeg

Blue 2.jpeg

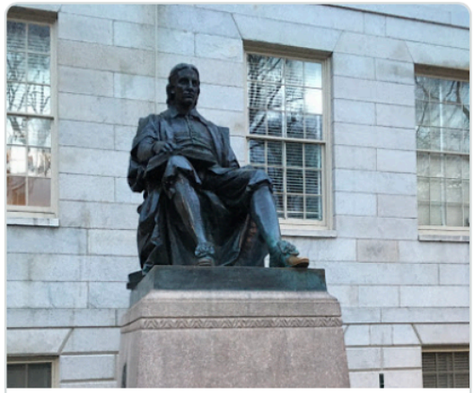
Blue 3.JPG

Green 1.jpg

Green 2.JPG

Green 3.jpeg

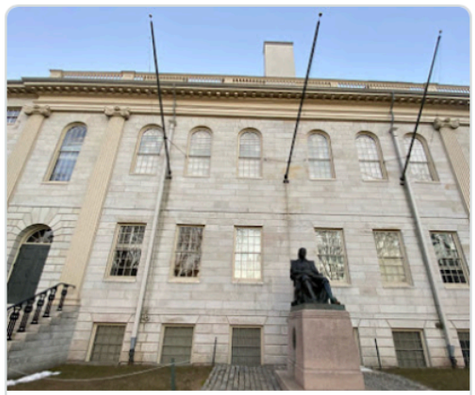
Orange 1.JPG



Orange 2.JPG

Pink 1.jpeg

Pink 2.jpeg



Pink 3.jpeg

Yellow 1.jpeg

Yellow 2.jpg

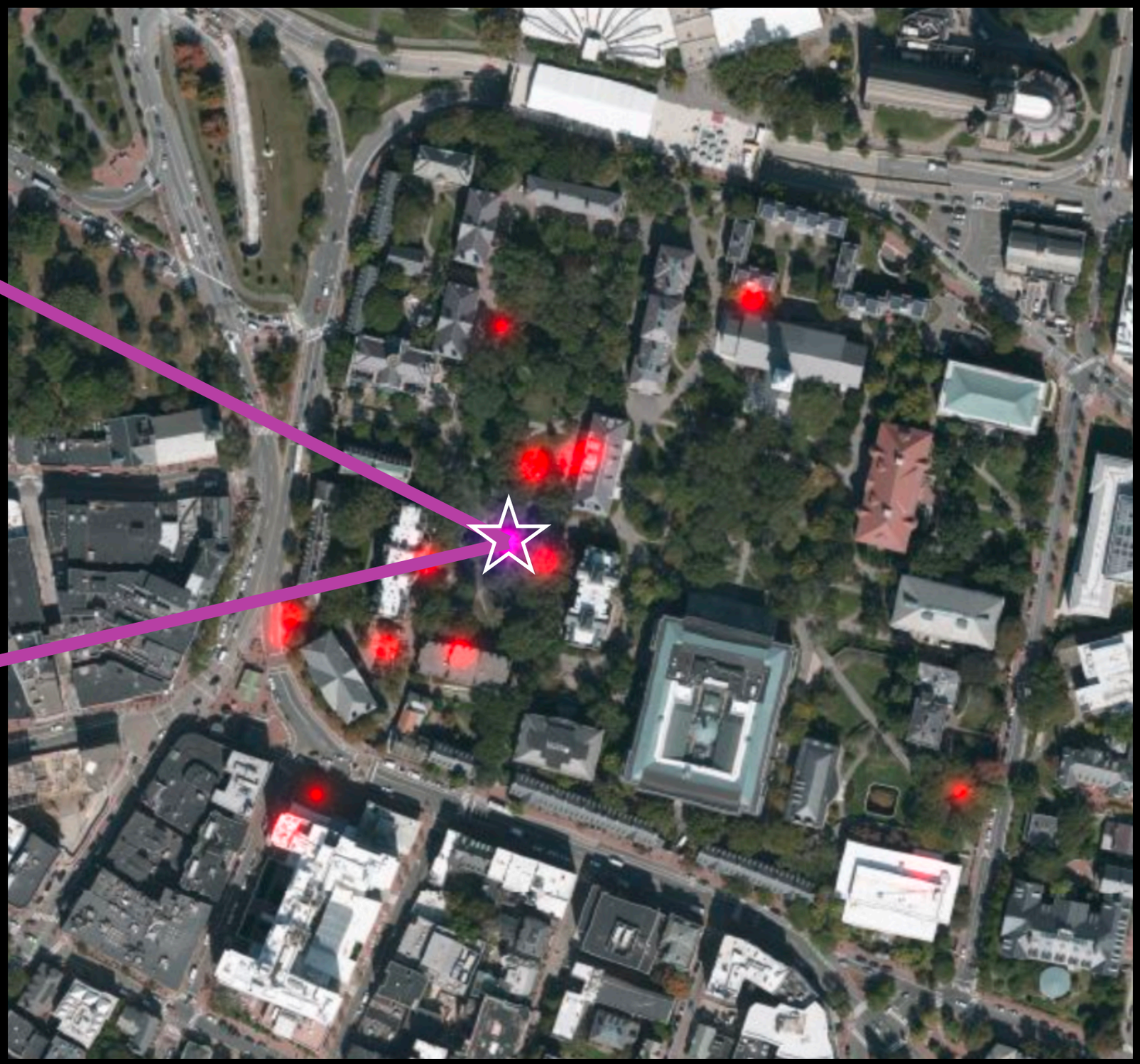
Yellow 3.jpeg

The winning team!

Where you wound up

Jaida Wilson
(on-campus)

Jordan Lee
(remote)



The winning team!

Jaida Wilson
(on-campus)

Jordan Lee
(remote)

and their Prize…

Not a foot?

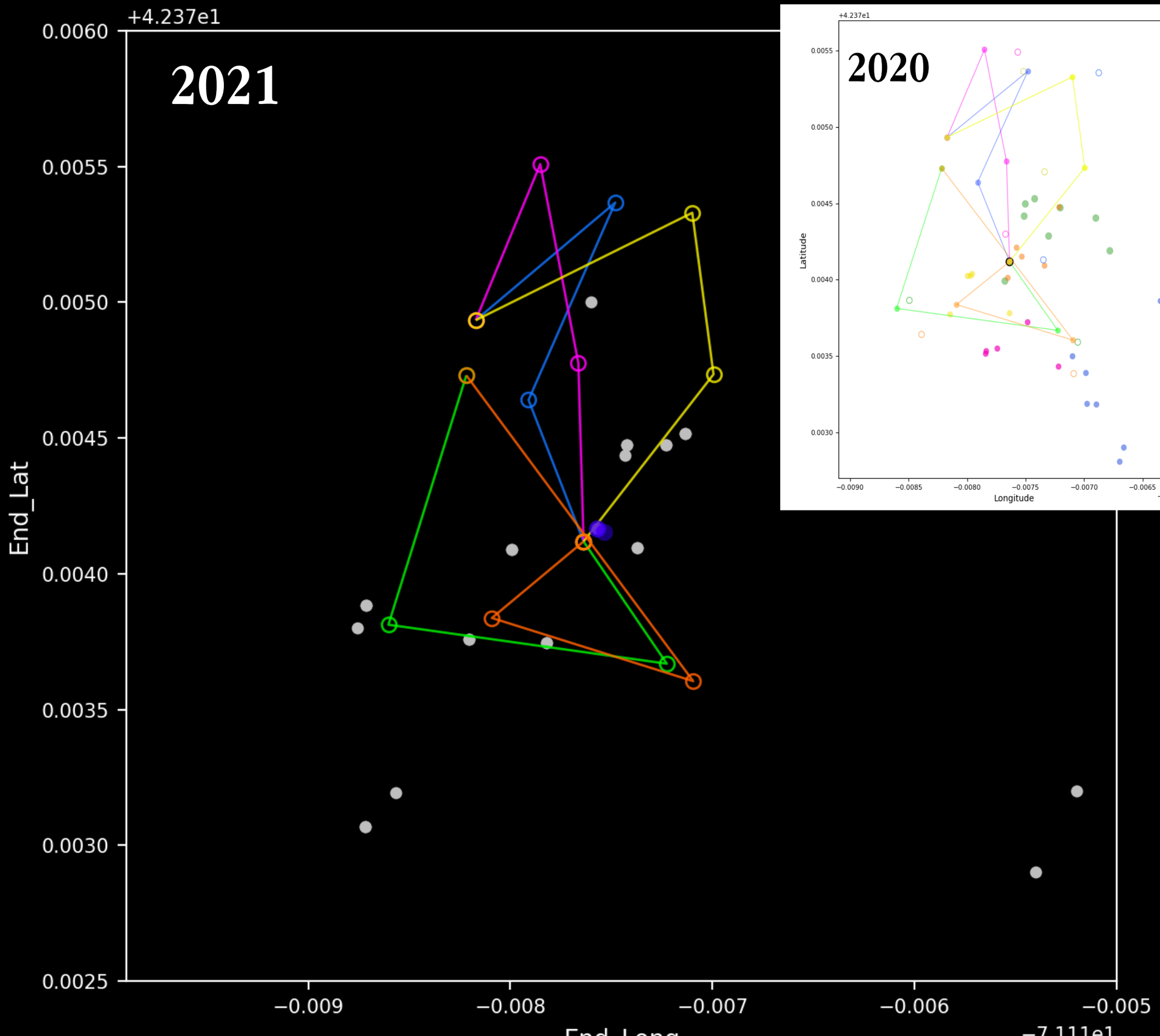
A foot?

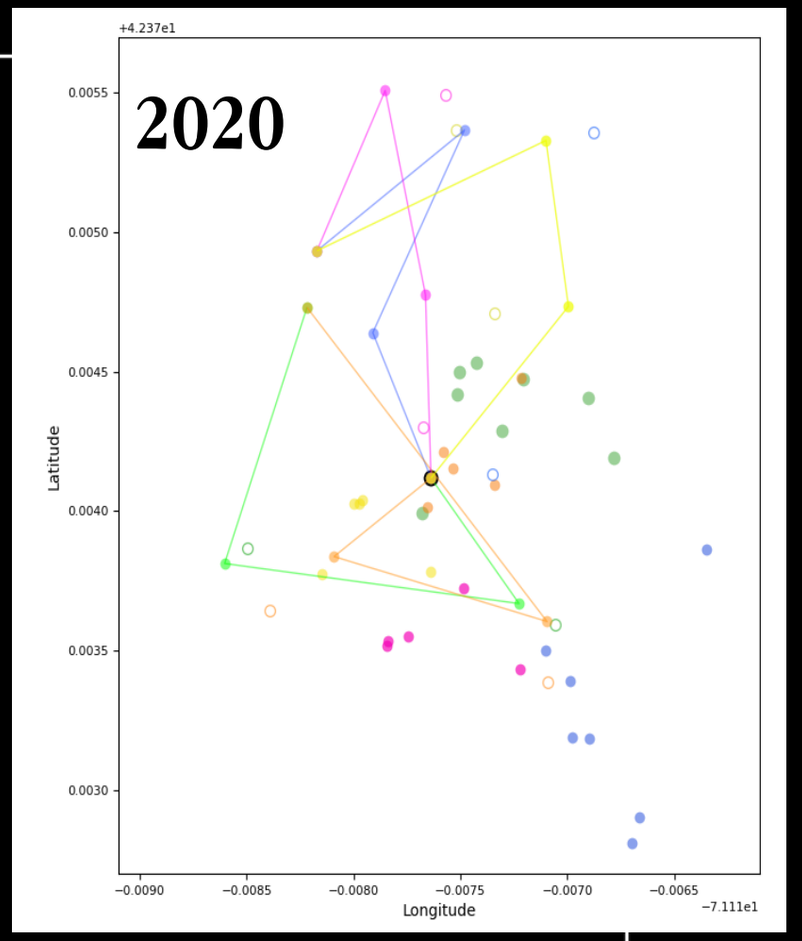
Questions to consider

1. Overall accuracy
    1.1. What factors effect it?
    1.2. How well do people gauge confidence?
2. Pair accuracy
    2.1. What factors effect it?
    2.2. How much does it vary, pair to pair?
3. Systematic effects
    3.1. What do you notice?
4. How would you estimate the accuracy of this kind of “dead reckoning”?
5. How do space and time interact in estimating accuracies here?

Harvard Hall Front Door
Harvard Hall Front Door
Point B BLUE
Point B PINK
Point B YELLOW
2020: slides; 2021: live “glue” demo
Common End Point
Common End Point
Common End Point
Common End Point
Point A GREEN
Point B ORANGE
Point B GREEN
Point A ORANGE

0.0045
0.0040
0.0035
0.0030
Latitude
−0.0090
−0.0085
−0.0080
−0.0075
−0.0070
−0.0065
−7.111e1
Longitude


+4.237e1
2021
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
End_Lat
−0.009
−0.008
−0.007
−0.006
−0.005
End_Long
−7.111e1


+4.237e1
2020
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0.0050
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0.0040
0.0035
0.0030
Latitude
−0.0090
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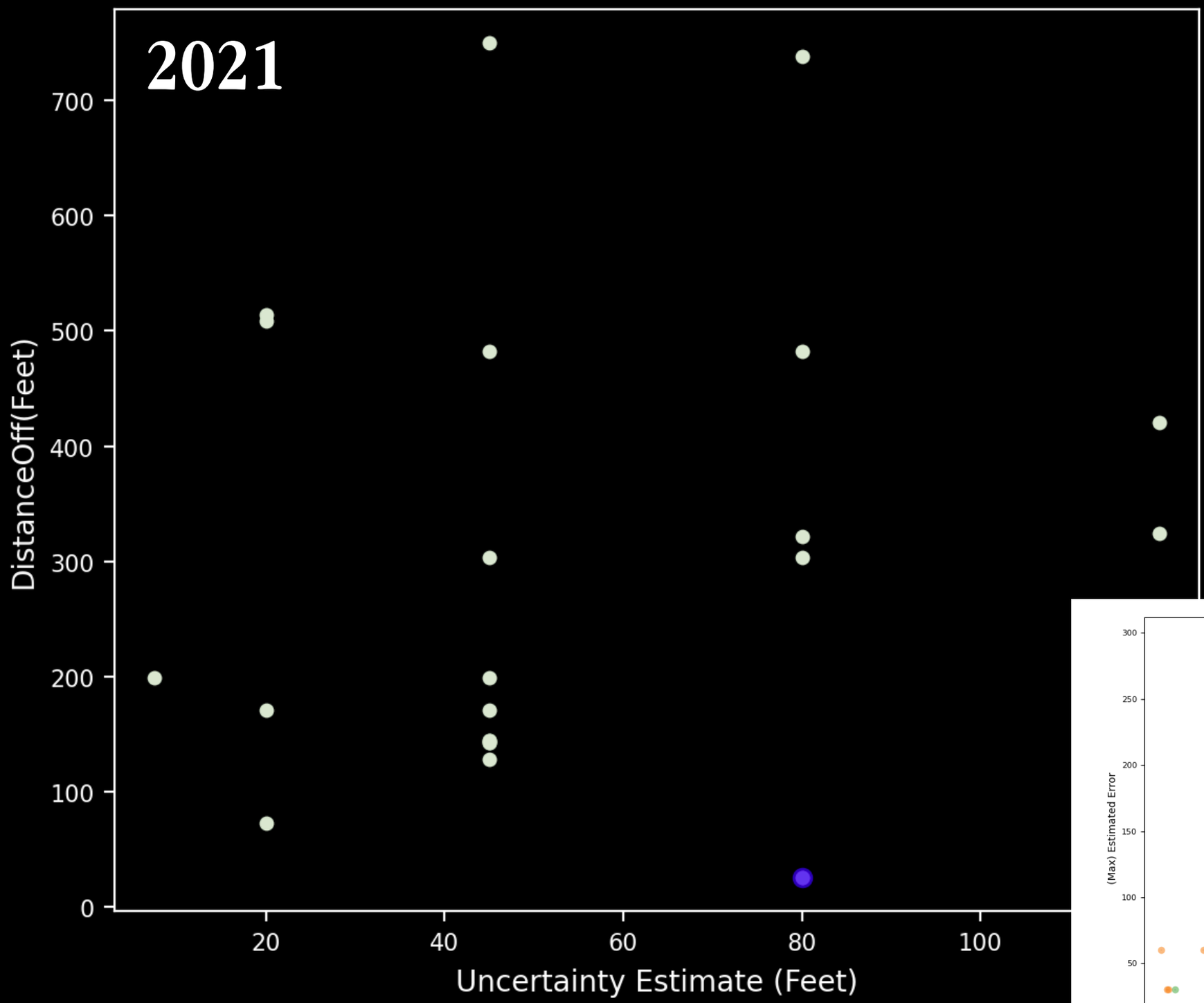
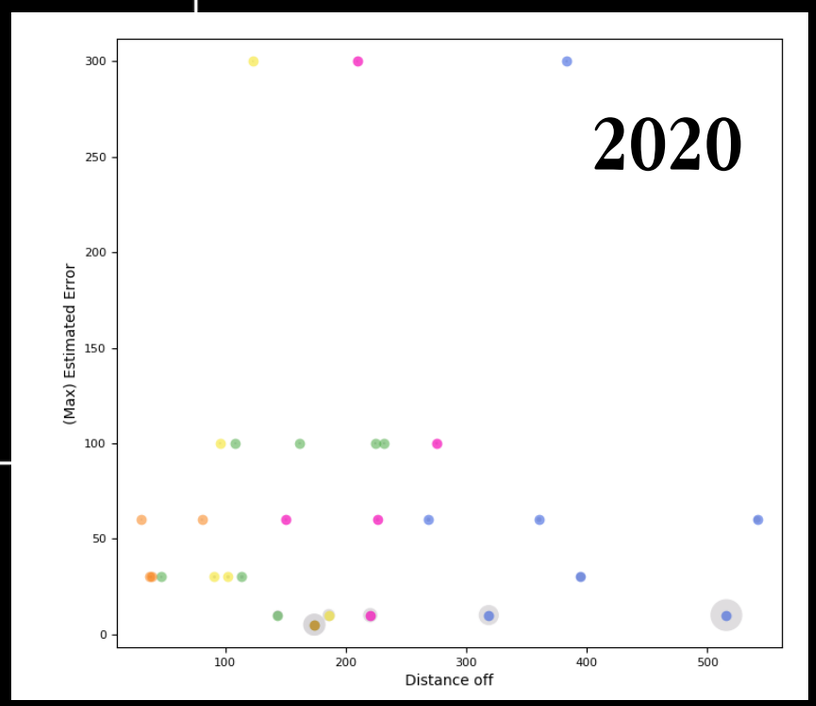
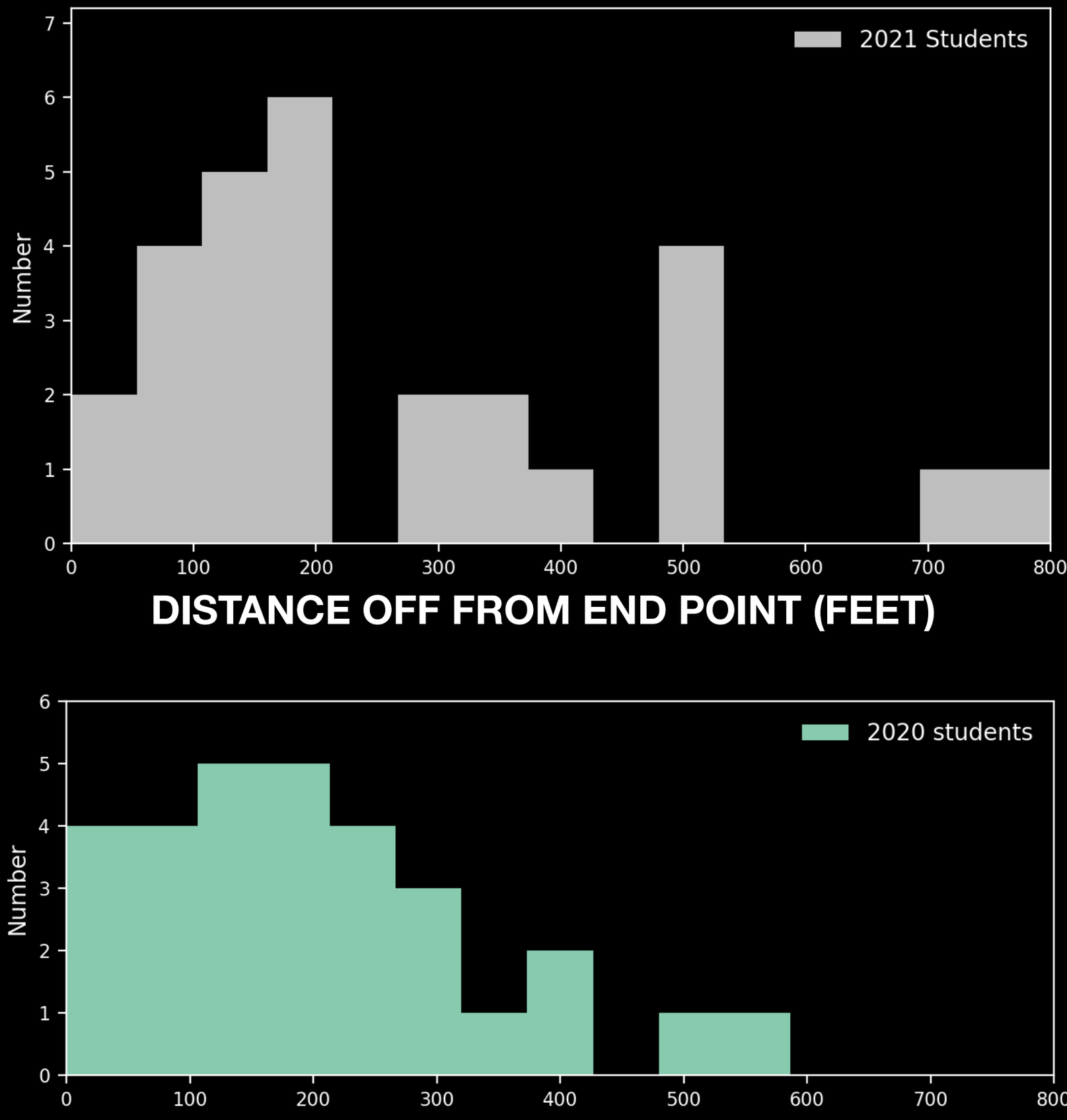
−0.0080
−0.0075
−0.0070
−0.0065
Longitude
−7.111e1

Students are VERY overconfident, in general





Level of Uncertainty appears to be REPEATABLE!?

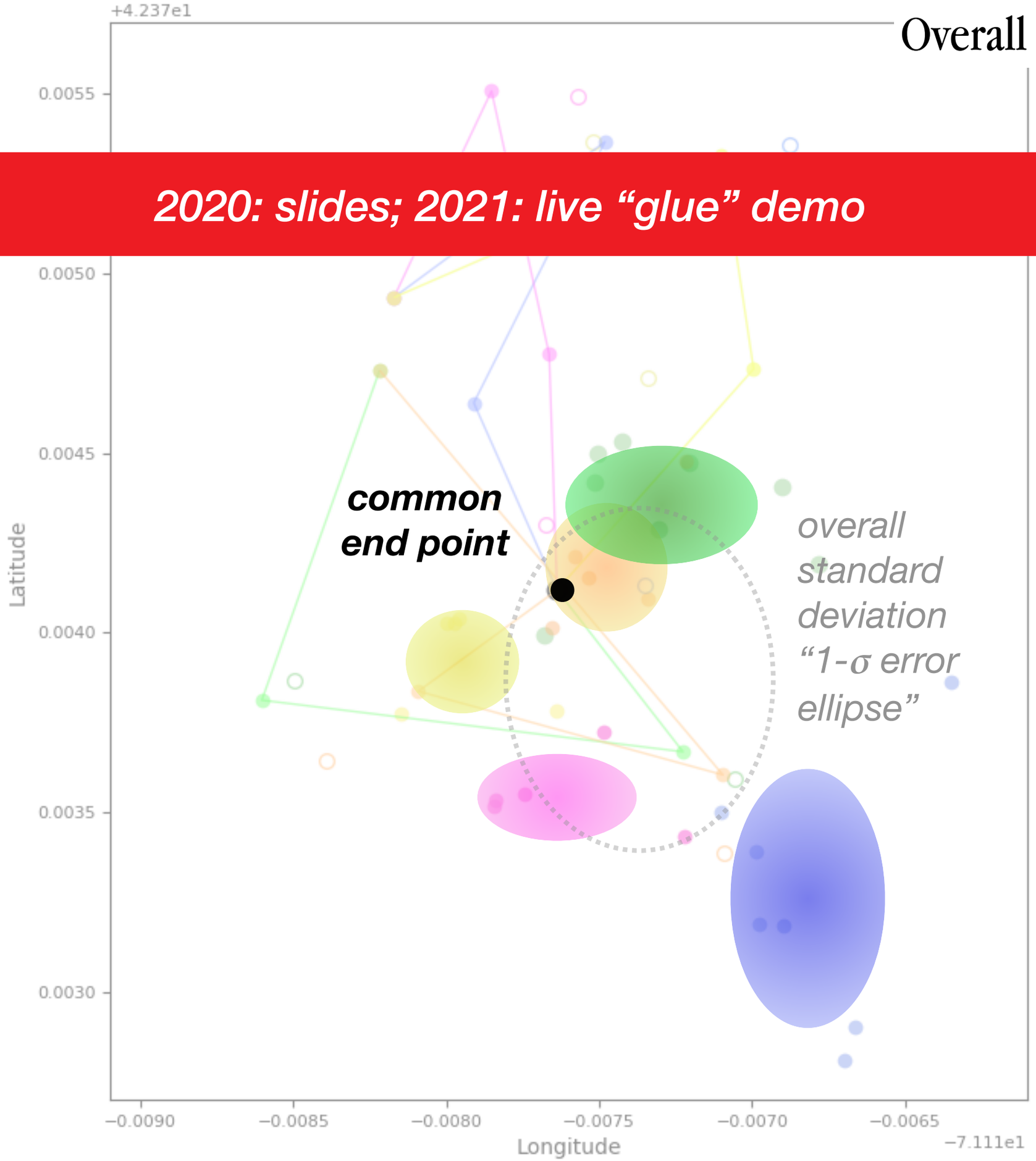


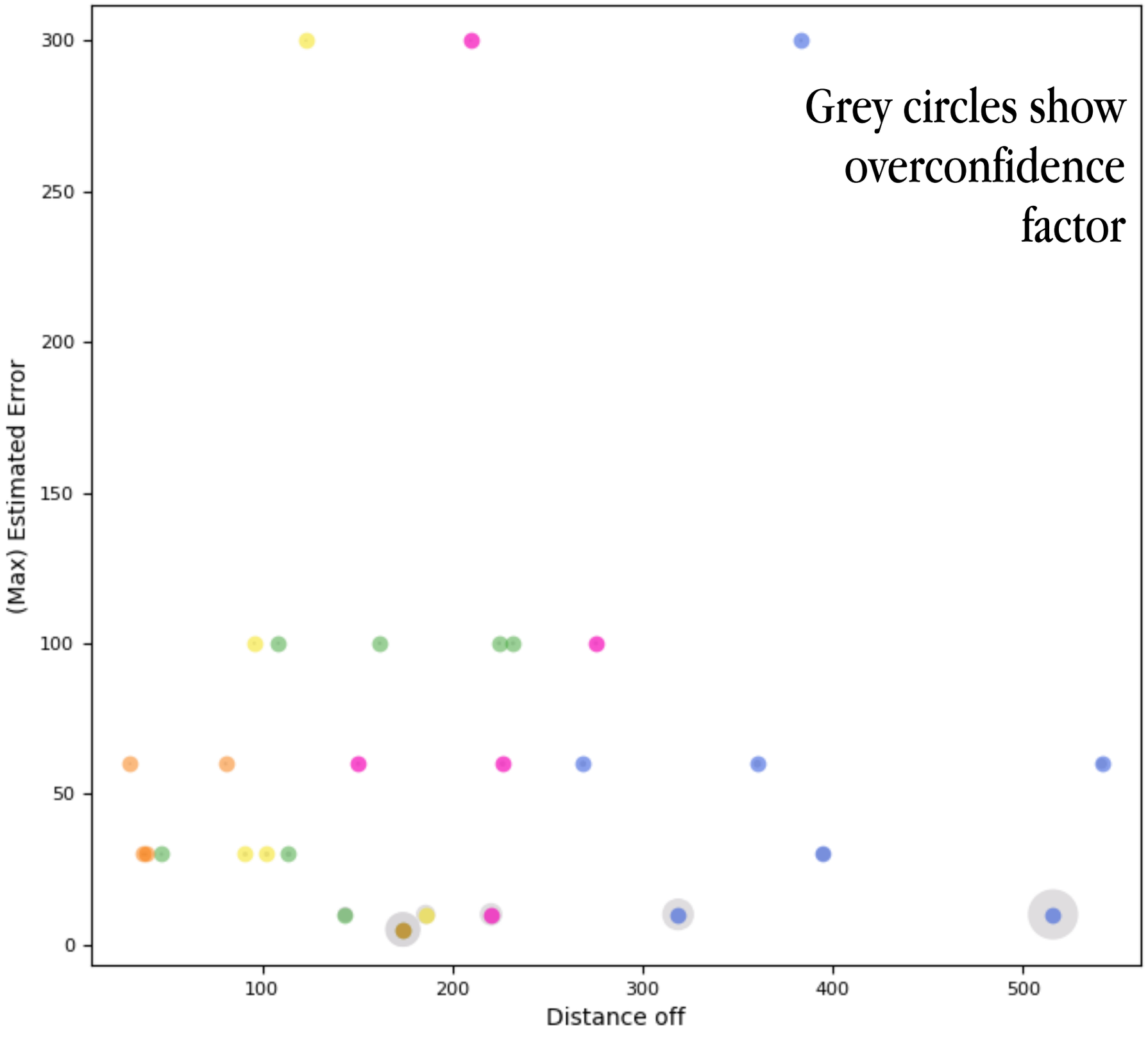
DISTANCE OFF FROM END POINT (FEET)

glue
multidimensional data exploration
glueviz.org

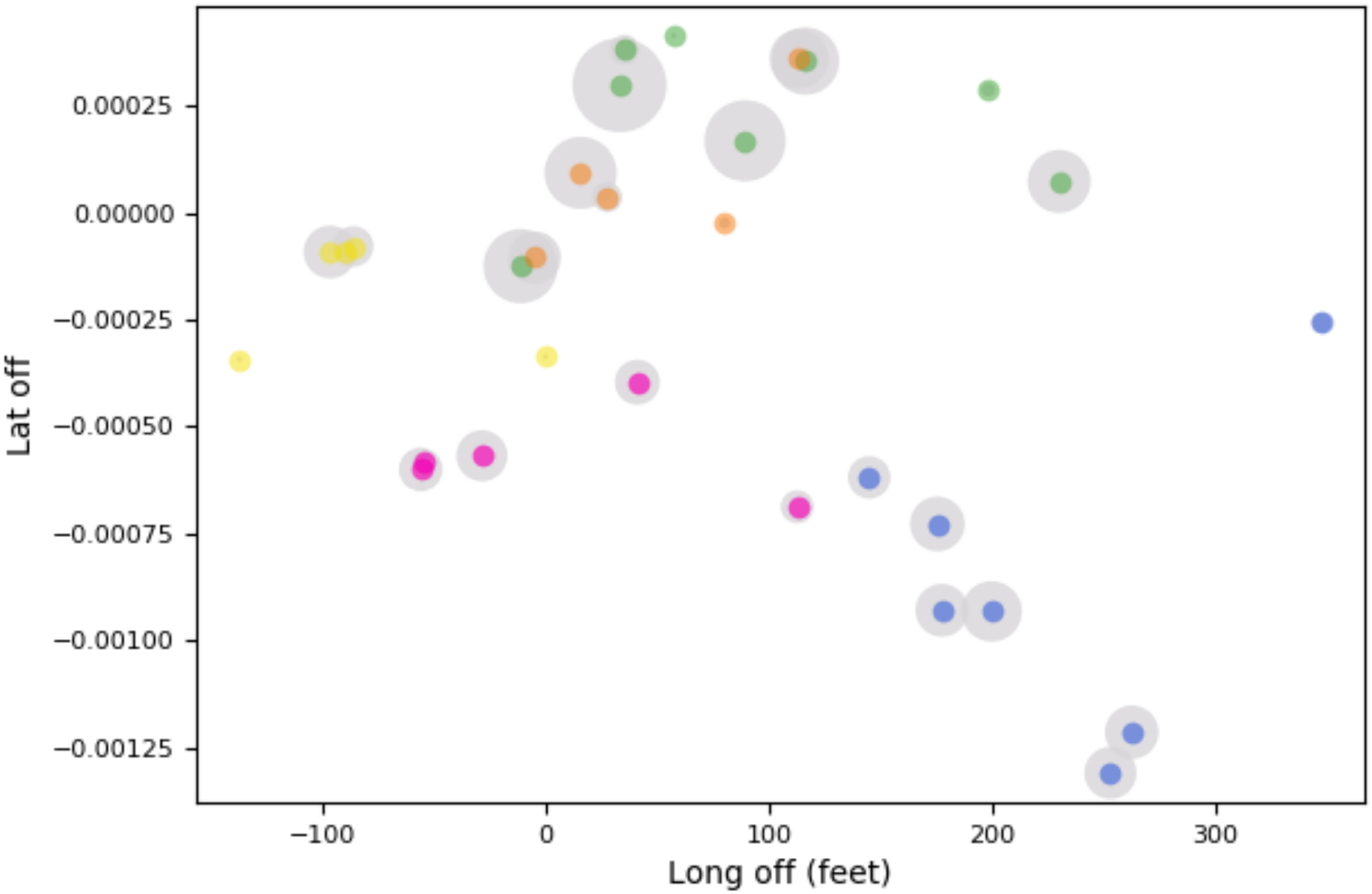
Overall accuracy

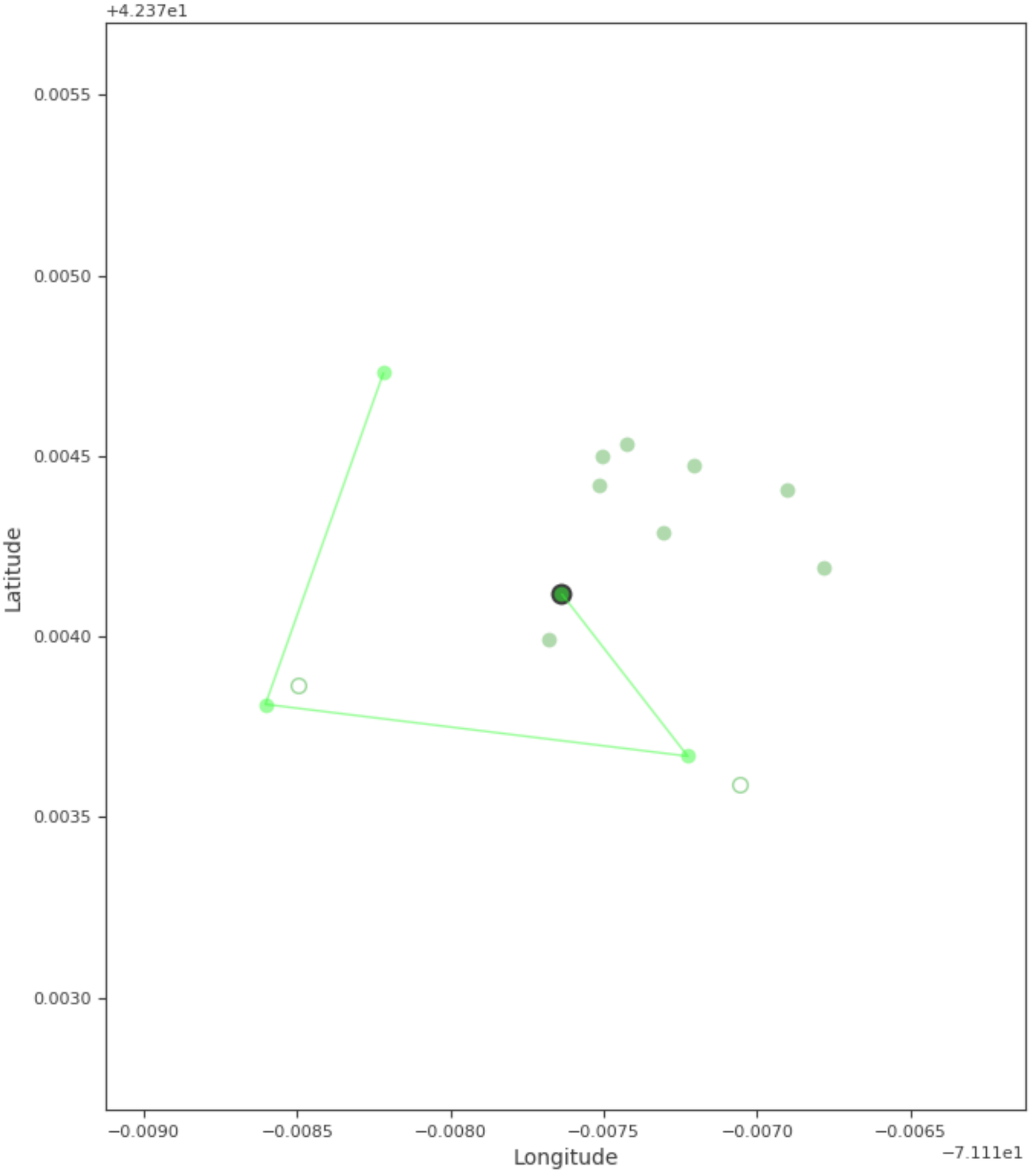
2020: slides; 2021: live “glue” demo




Grey circles show
overconfidence
factor
(Max) Estimated Error
Distance off
300
250
200
150
100
50
0
100
200
300
400
500

Grey circles show time since first data entry

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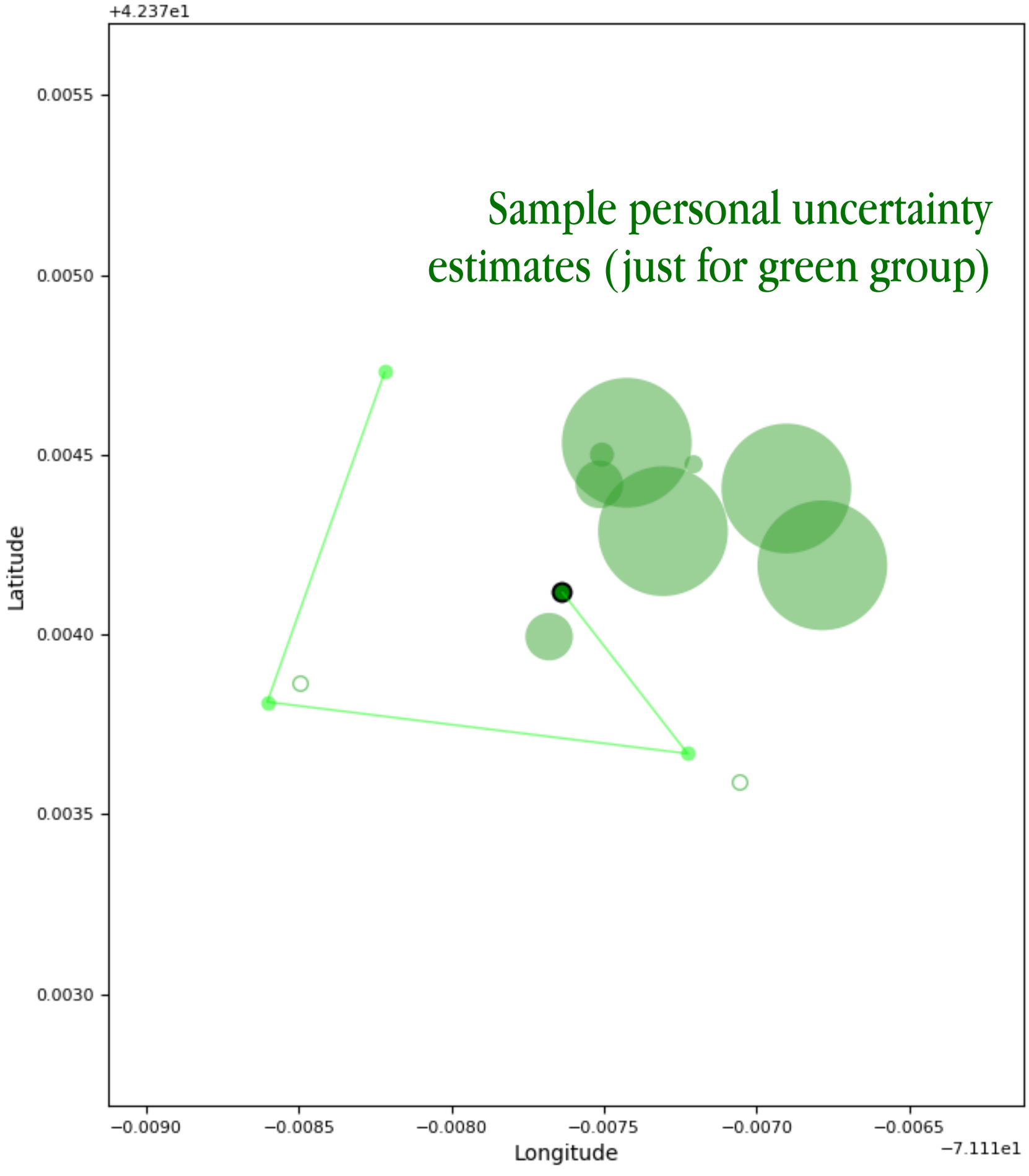
−0.0065
−7.111e1
Longitude


+4.237e1
0.0055
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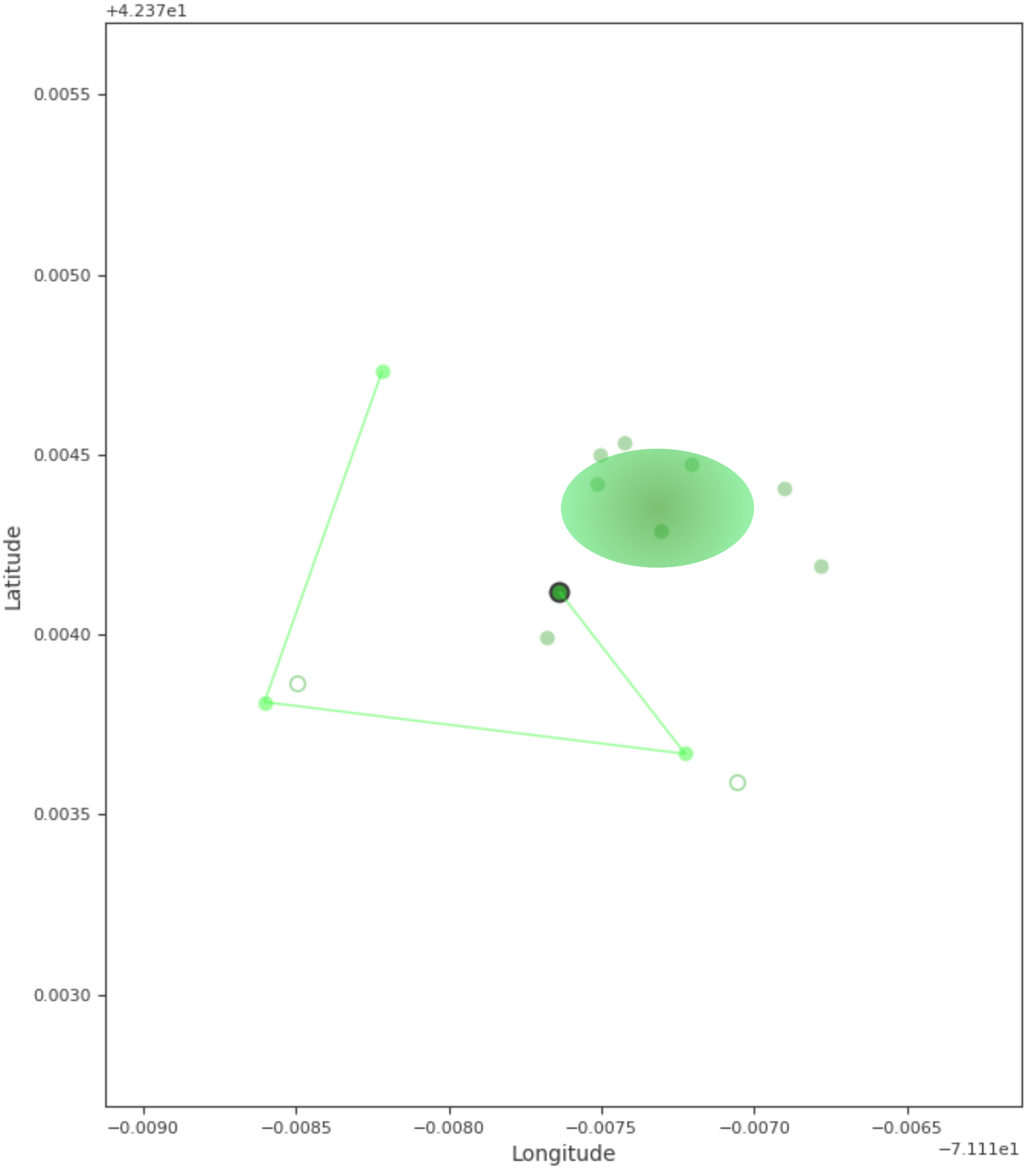
0.0030
Latitude
Sample personal uncertainty estimates (just for green group)
−0.0090
−0.0085
−0.0080
−0.0075
−0.0070
−0.0065
−7.111e1
Longitude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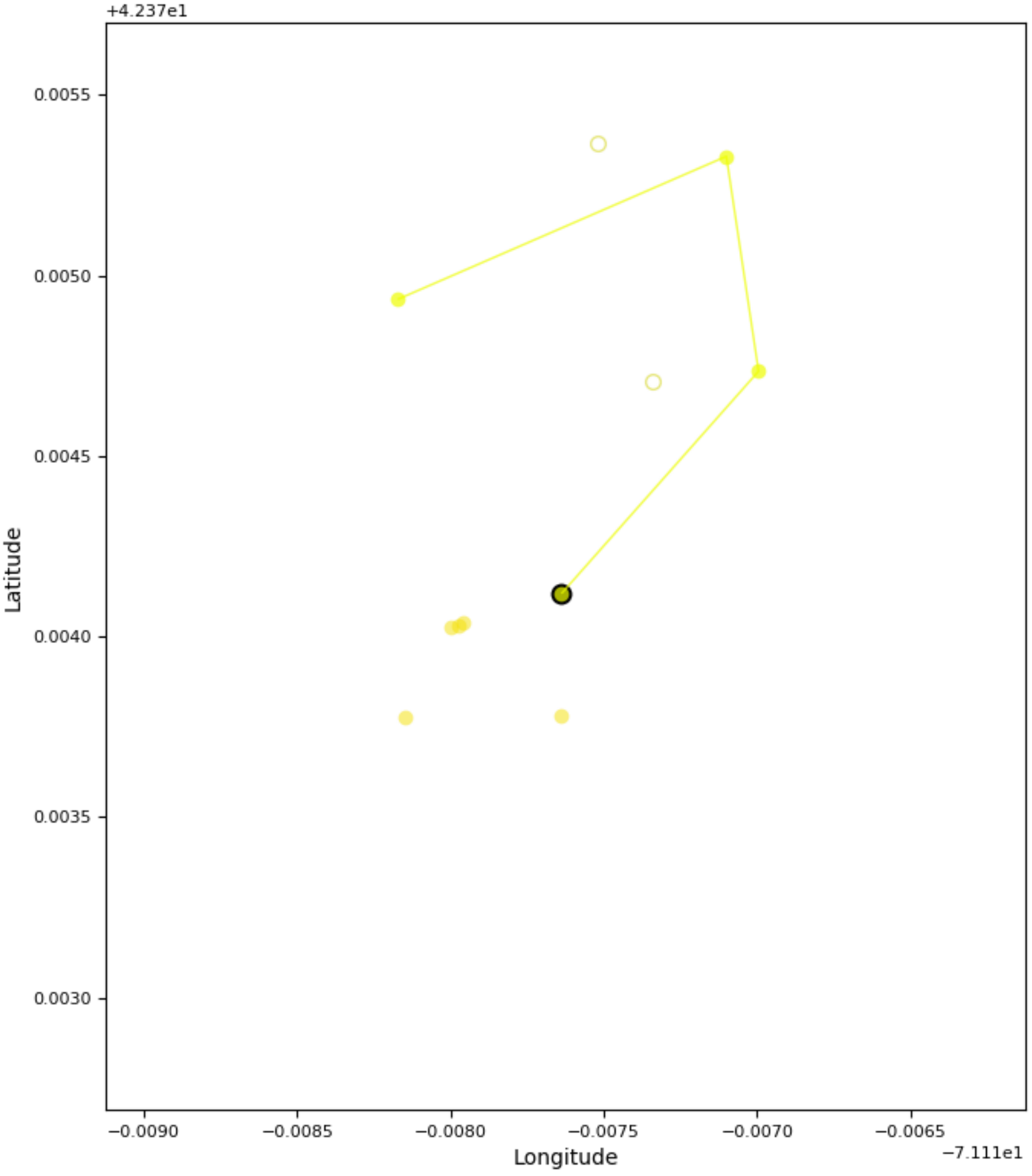
Longitude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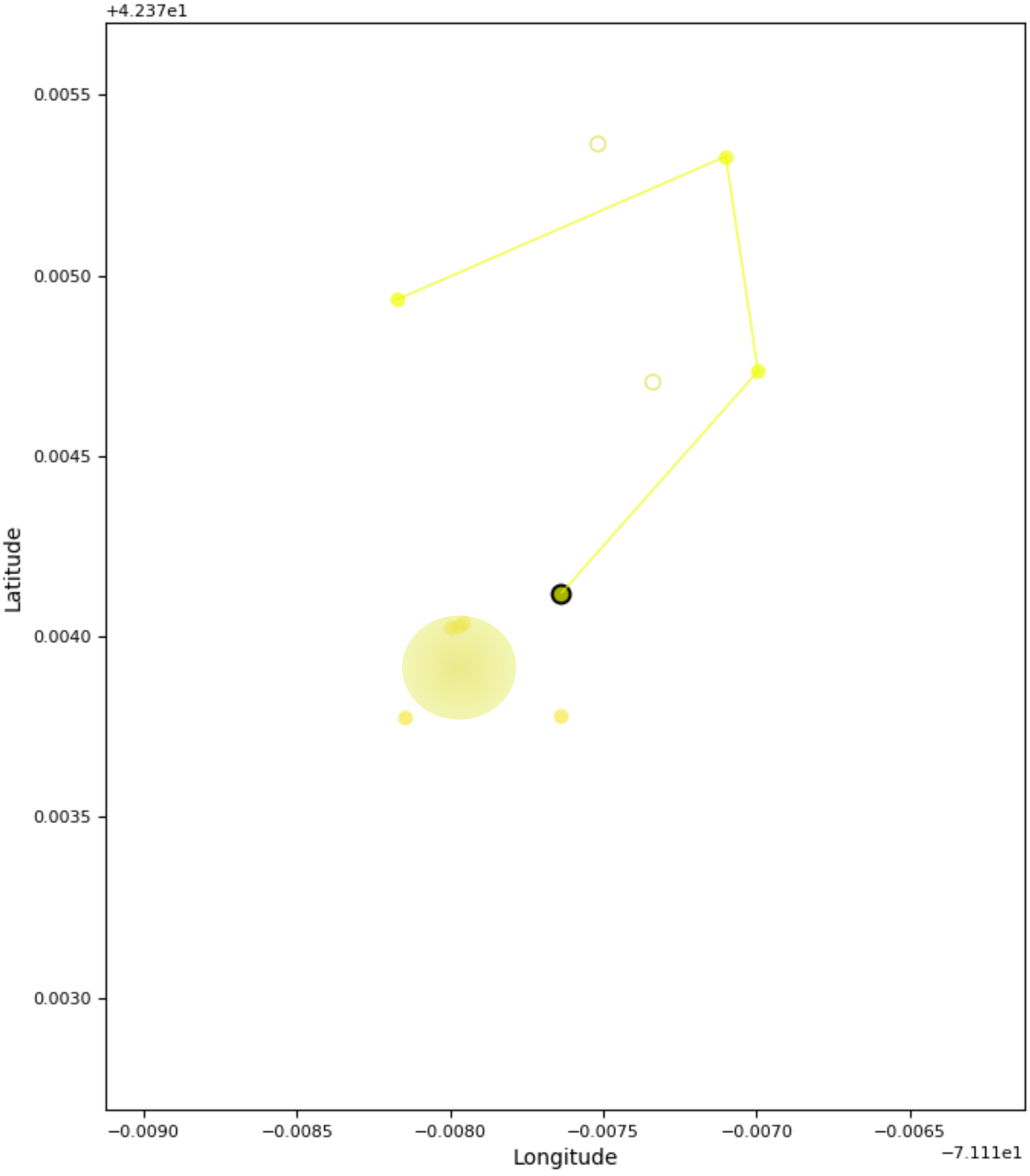
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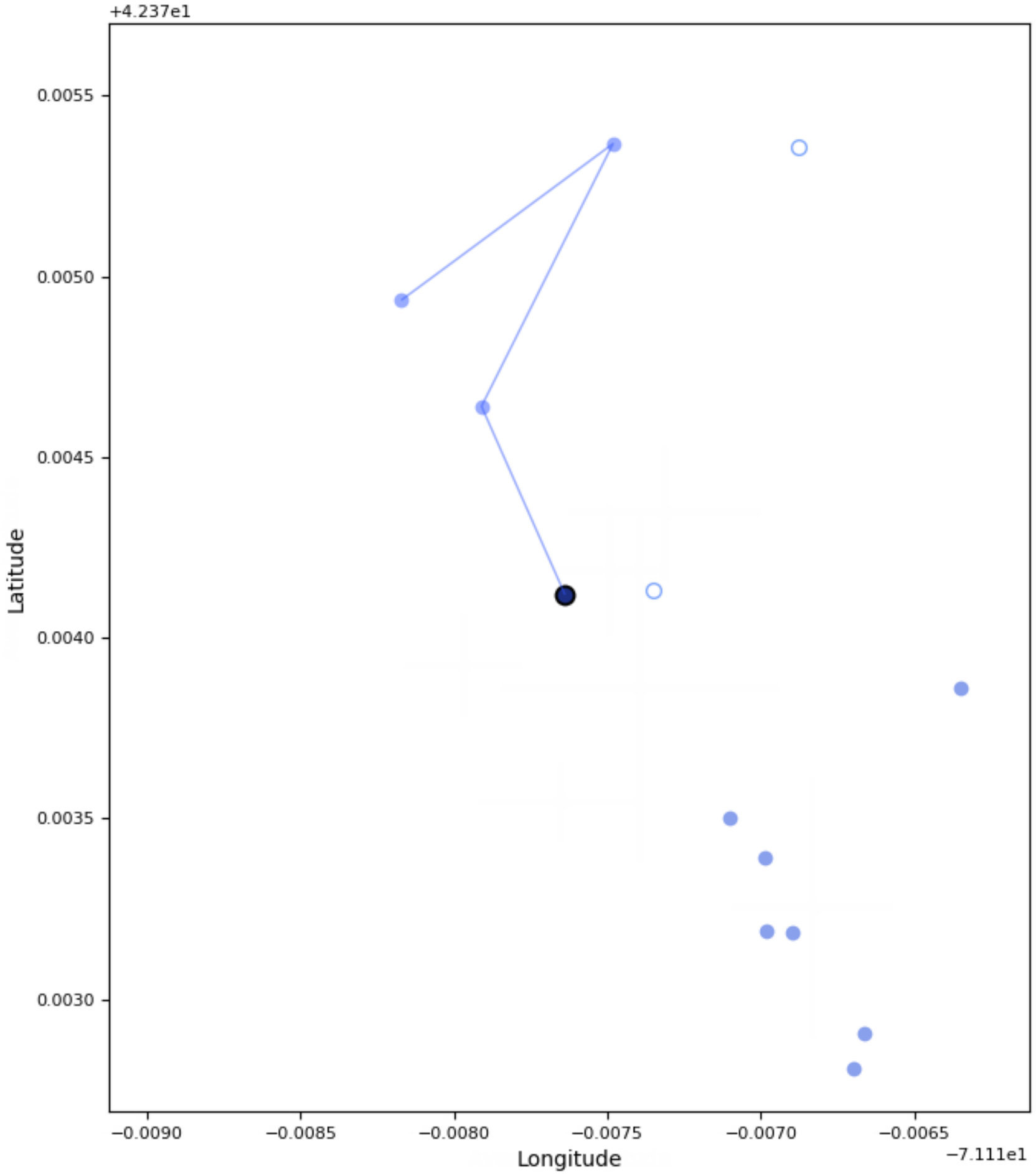
Longitude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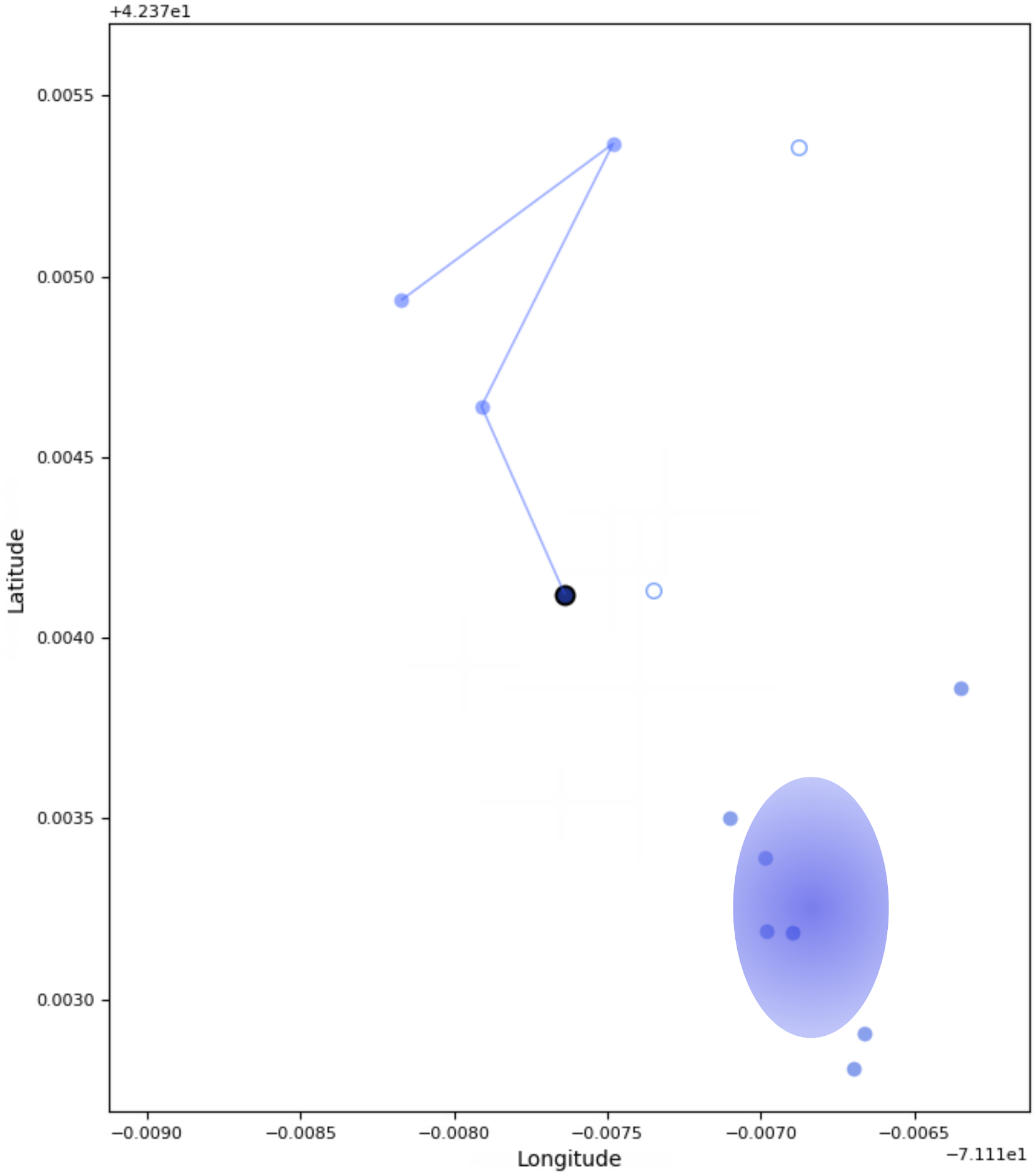
Longitude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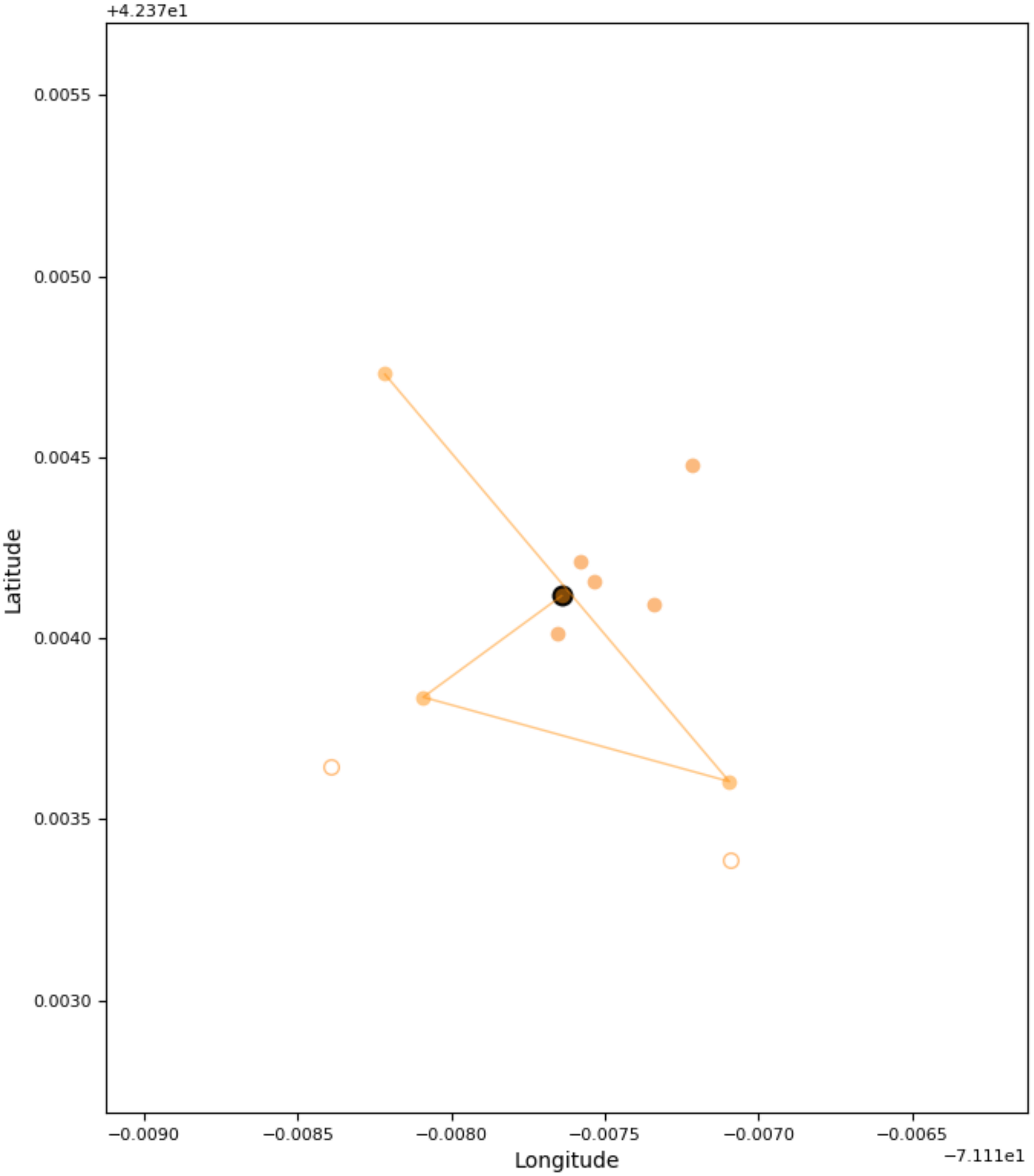
Longitude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Longitude
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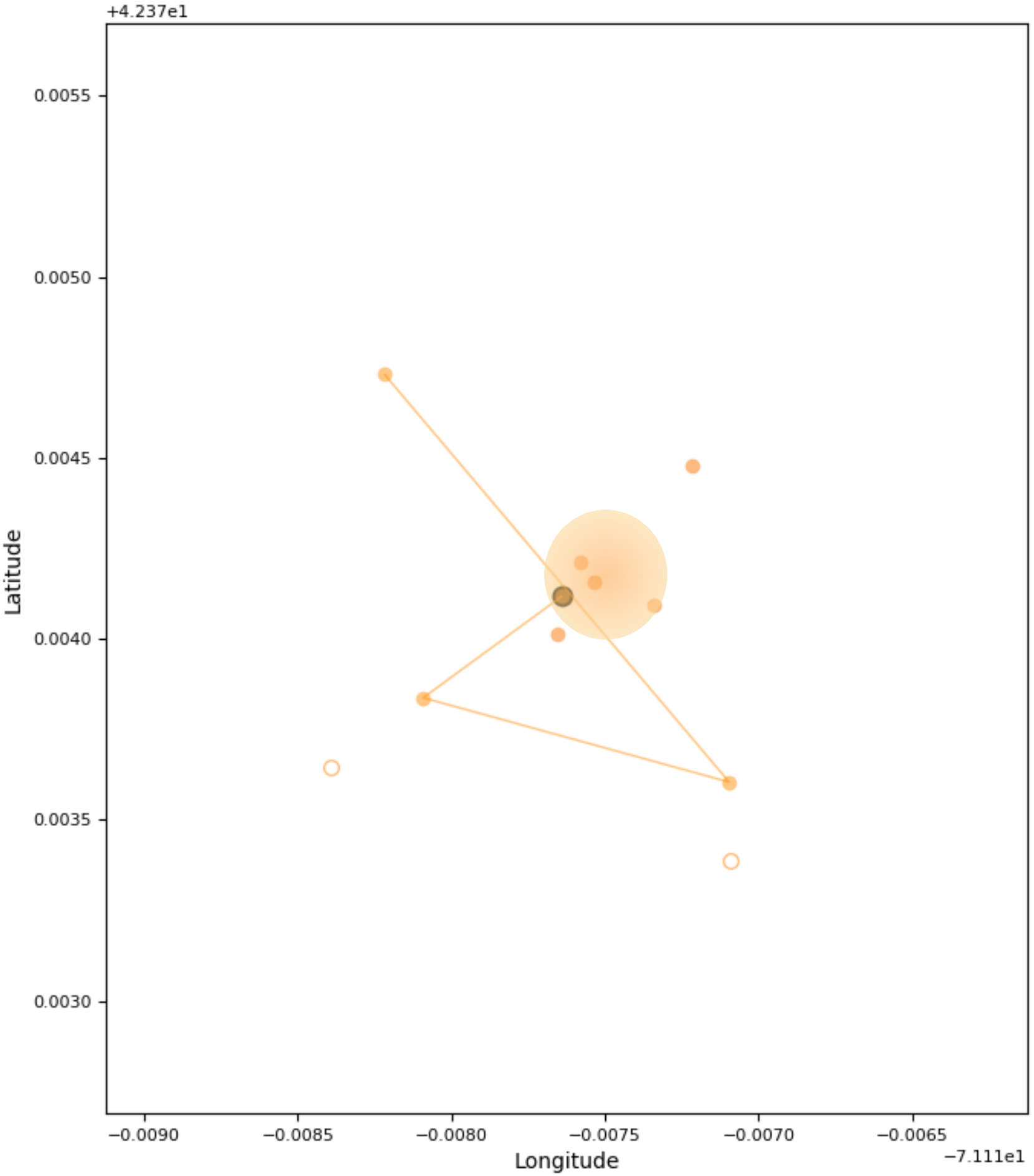
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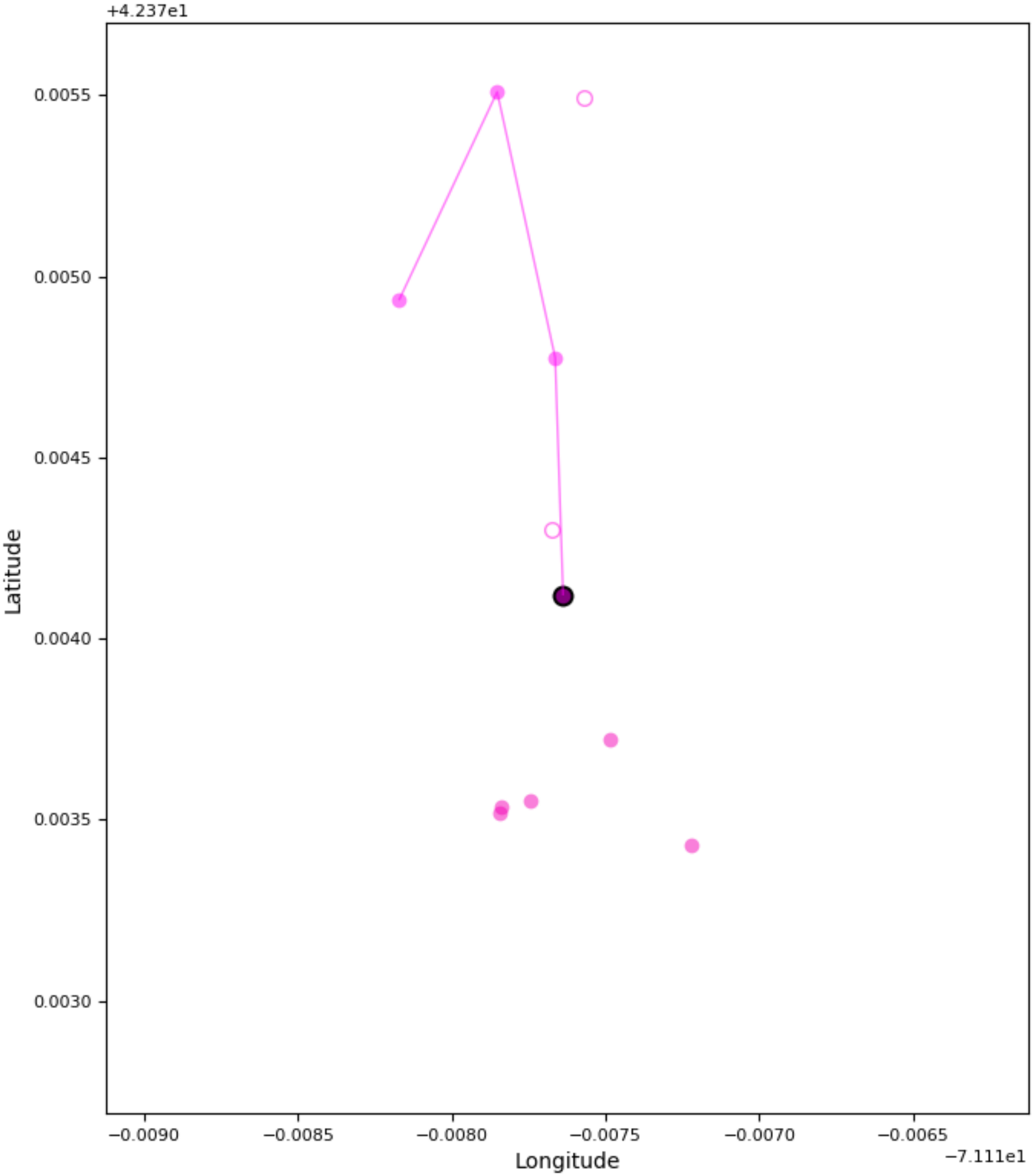
Longitude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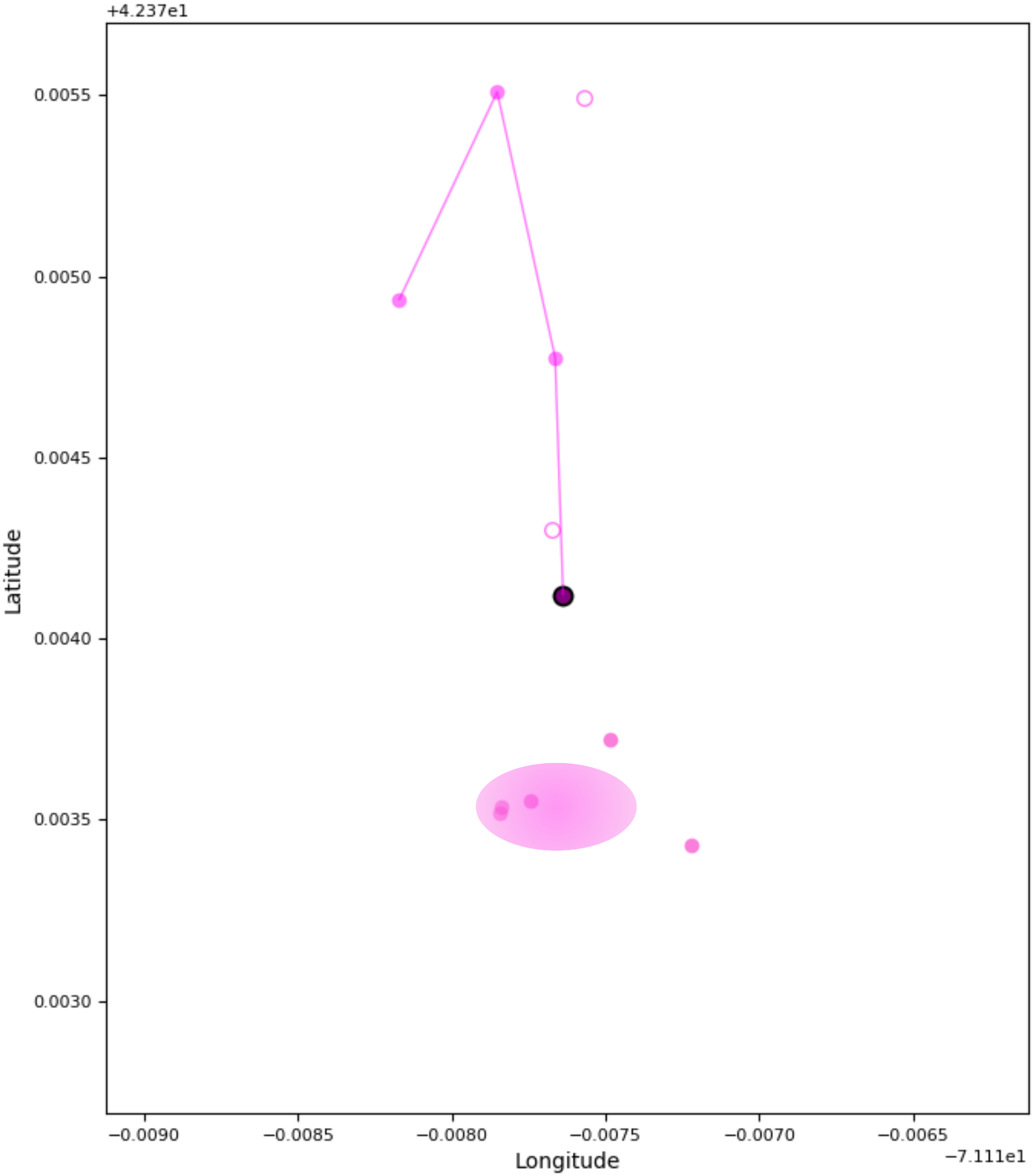
Longitude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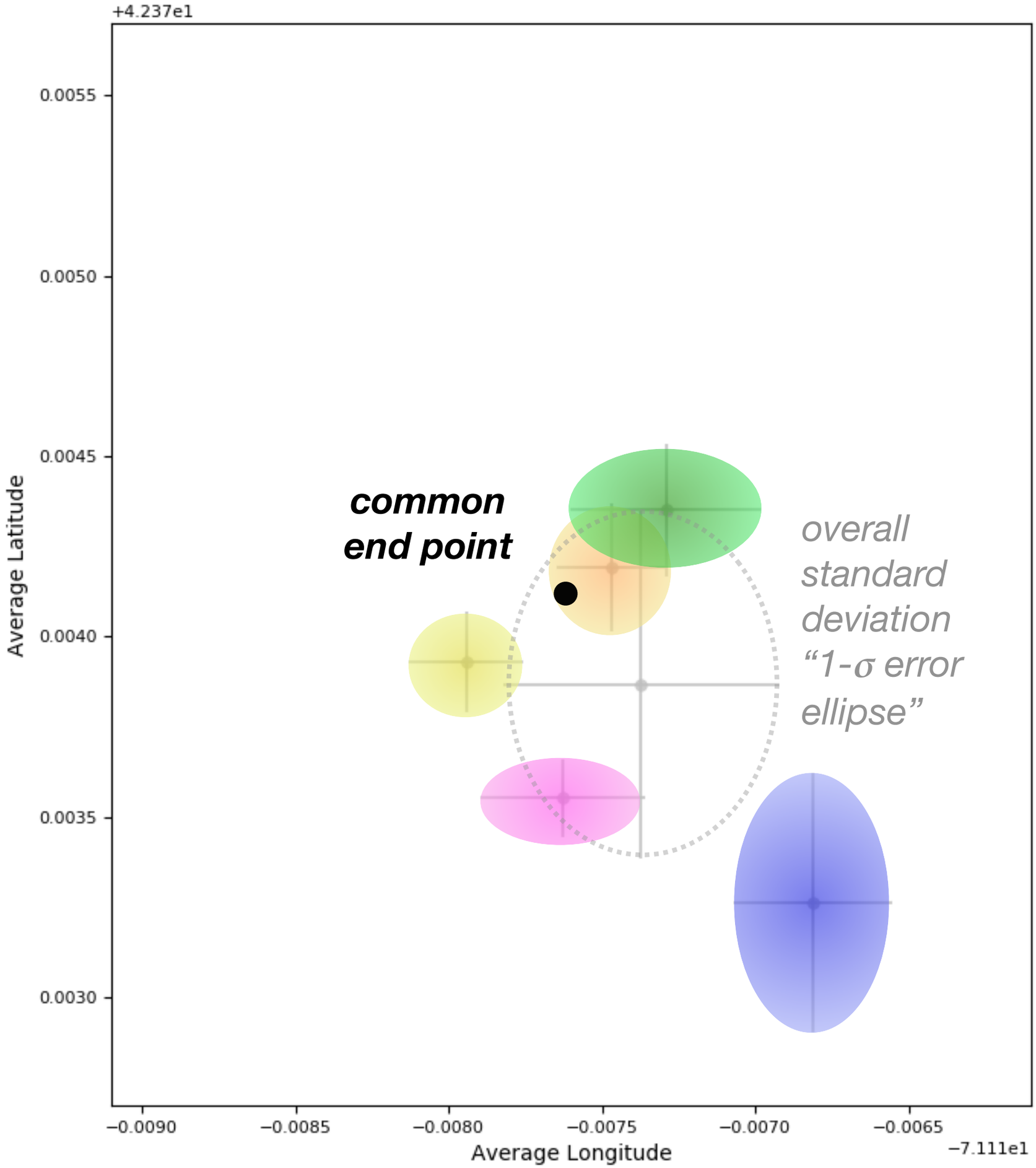
Longitude


+4.237e1
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
Average Latitude
common
end point
overall
standard
deviation
“1-σ error
ellipse”
−0.0090
−0.0085
−0.0080
−0.0075
−0.0070
−0.0065
−7.111e1
Average Longitude

Discussion

1. Overall accuracy
    1.1. What factors effect it?
    1.2. How well do people gauge confidence?
2. Pair accuracy
    2.1. What factors effect it?
    2.2. How much does it vary, pair to pair?
3. Systematic effects
    3.1. What do you notice?
4. How would you estimate the accuracy of this kind of “dead reckoning”?
5. How do space and time interact in estimating accuracies here?

You can take notes in the “Zoom Breakouts” Google Doc at tinyurl.com/nav-discussion-gened1112

Prediction: Week 6

analysis of outdoor **Navigation Exercise**

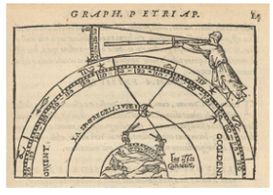
Surprise Guest: Dr. Sara Schechner,
David P. Wheatland Curator of the
Collection of Historical Scientific Instruments,
Harvard University.

HarvardX: SOC1.longx

PredictionX: Lost Without Longitude

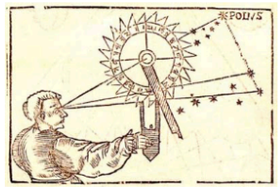
1. What is Navigation?

Short page of text that clearly defines what "navigation" is.



2. Latitude and Longitude

Definition and explanation of *latitude* and *longitude*, with two WorldWide Telescope videos that clearly visualize these concepts.

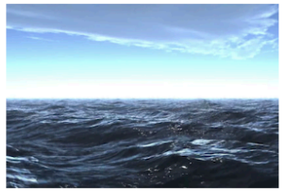


3. Navigation as Prediction

In-depth text that explains the relationship between navigation and prediction, including explaining the concepts of uncertainty, position, direction, speed, and time.

4. The Longituze Prize and GPS

Overview of the original Longitude Prize, the clock that won the Prize, and its impact on today.



5. Help, I'm Lost!

Introduction to navigational methods, including a 9 minute video narrated by Professor Goodman.

6. Finding Your Way at Sea

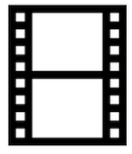
Clickable flowchart that demonstrates how to find your way if lost at sea. Includes extensive descriptions, expert interviews, and WorldWide Telescope videos.

7. Assessments

Ten multiple choice questions to test your knowledge on the key teaching points of the course.

8. Tools of the Navigator

Main menu page for the fourteen standalone Tools of the Navigator pages, organized into six categories: math, speed, astronomy & angles, timekeeping, direction, and maps.

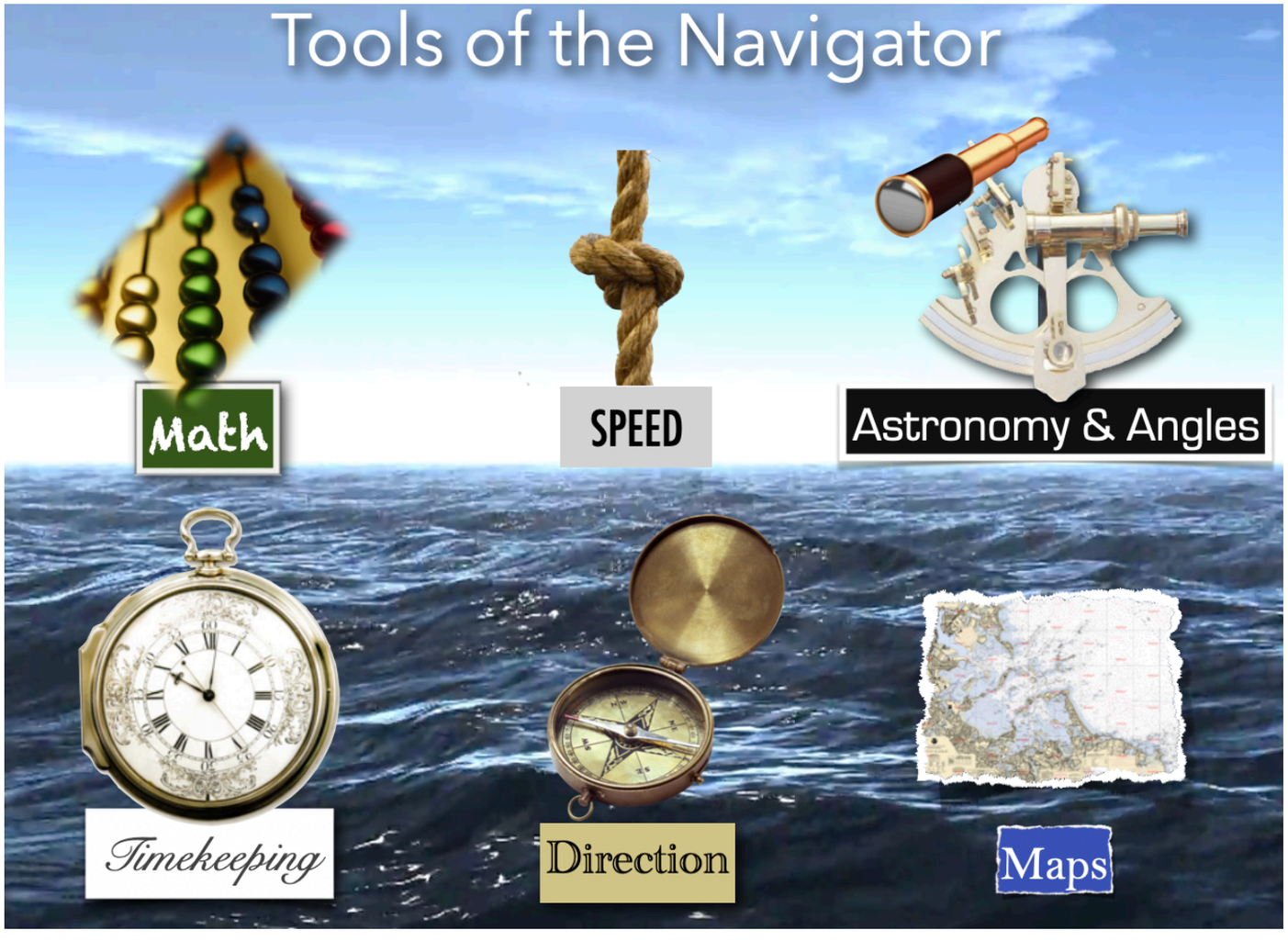


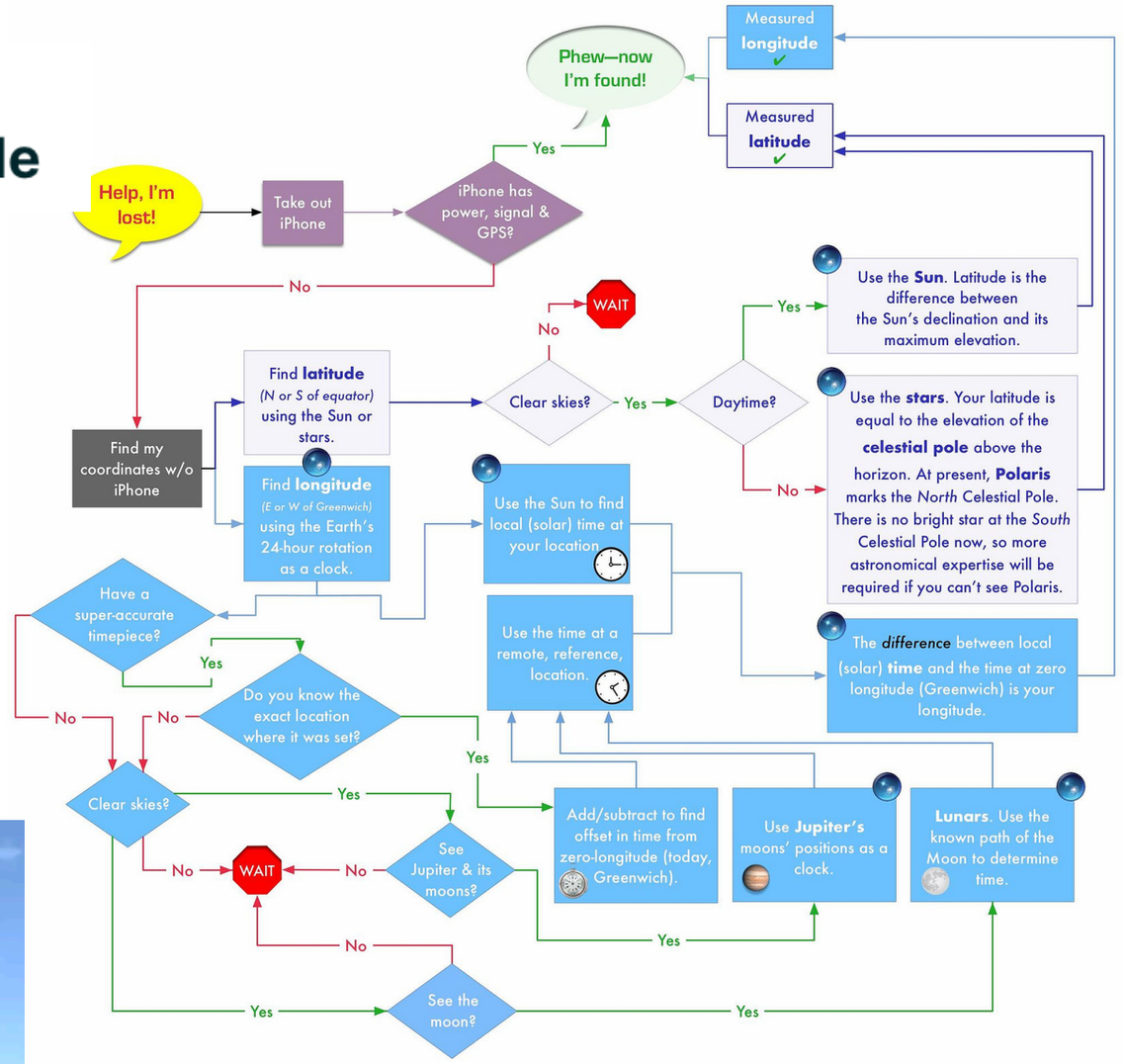
9. Videos

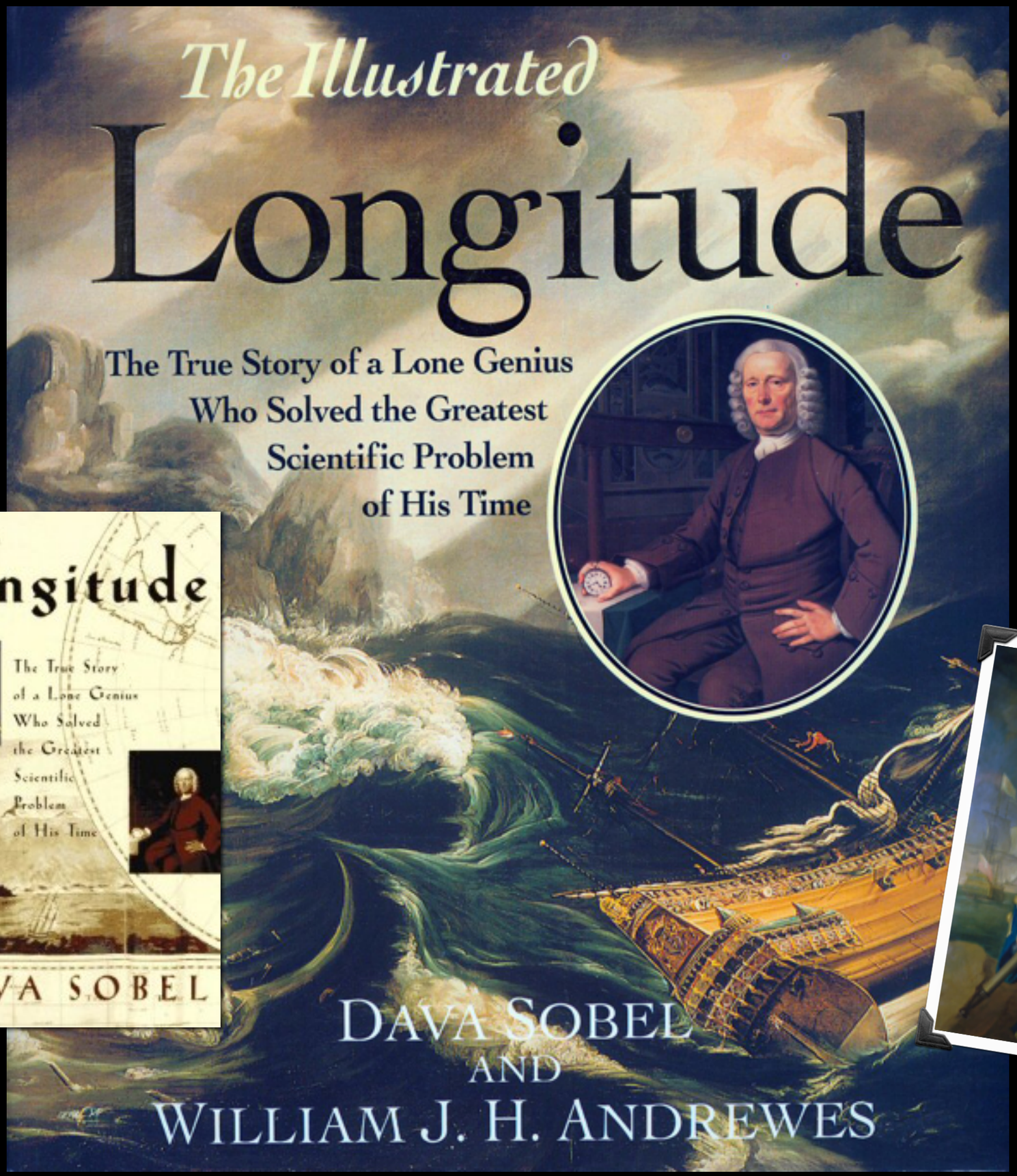
Listing page for the course's 24 videos (note that each of these videos is also accessible through links in the course text).

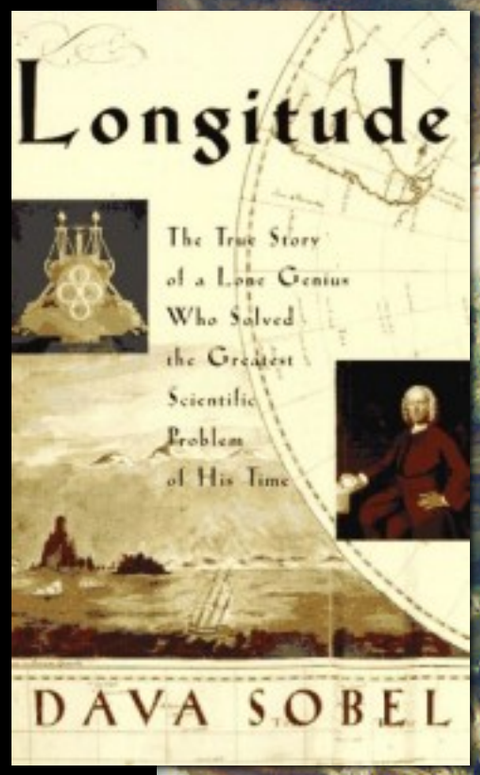
HarvardX: SOC1.longx

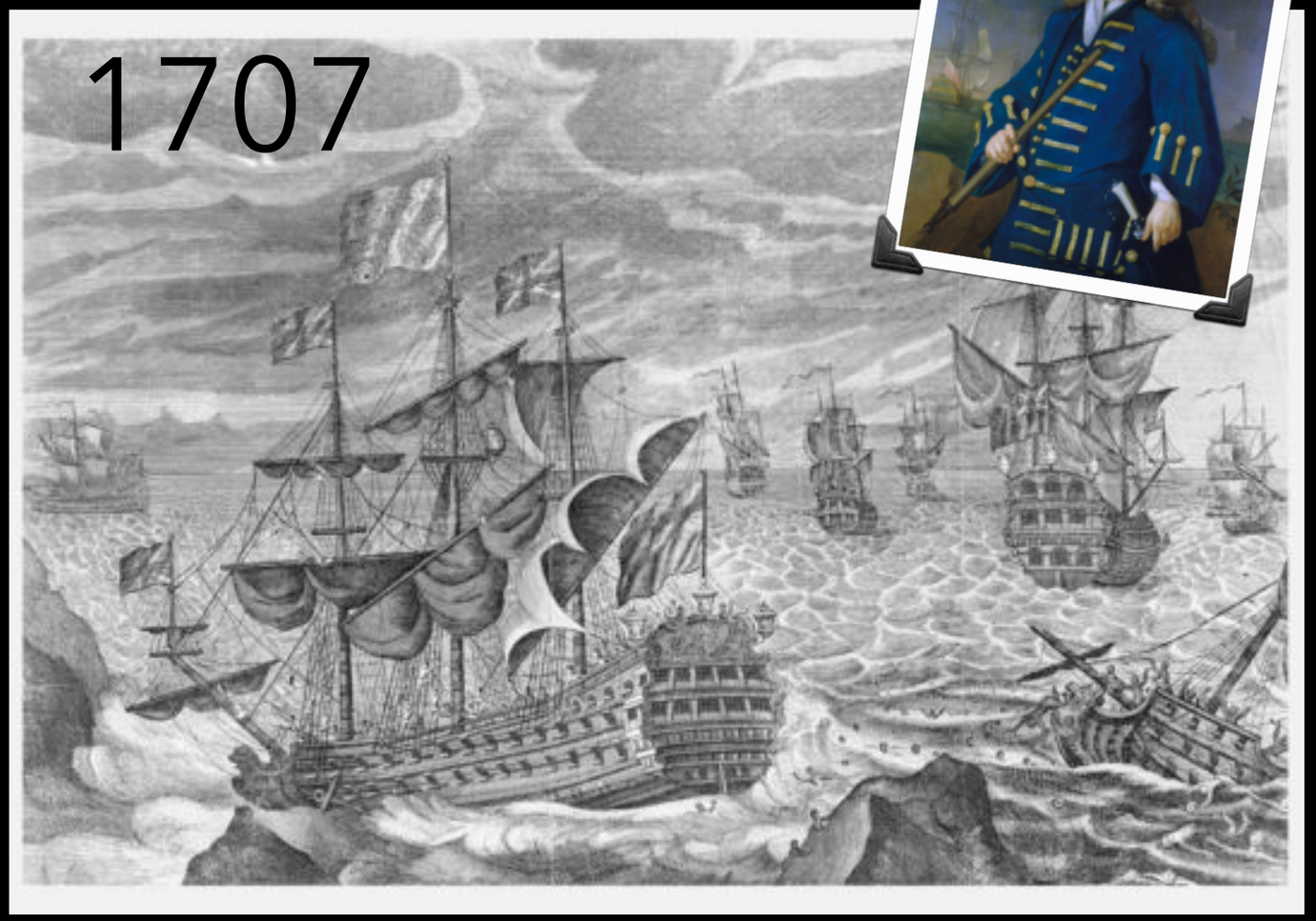
PredictionX: Lost Without Longitude





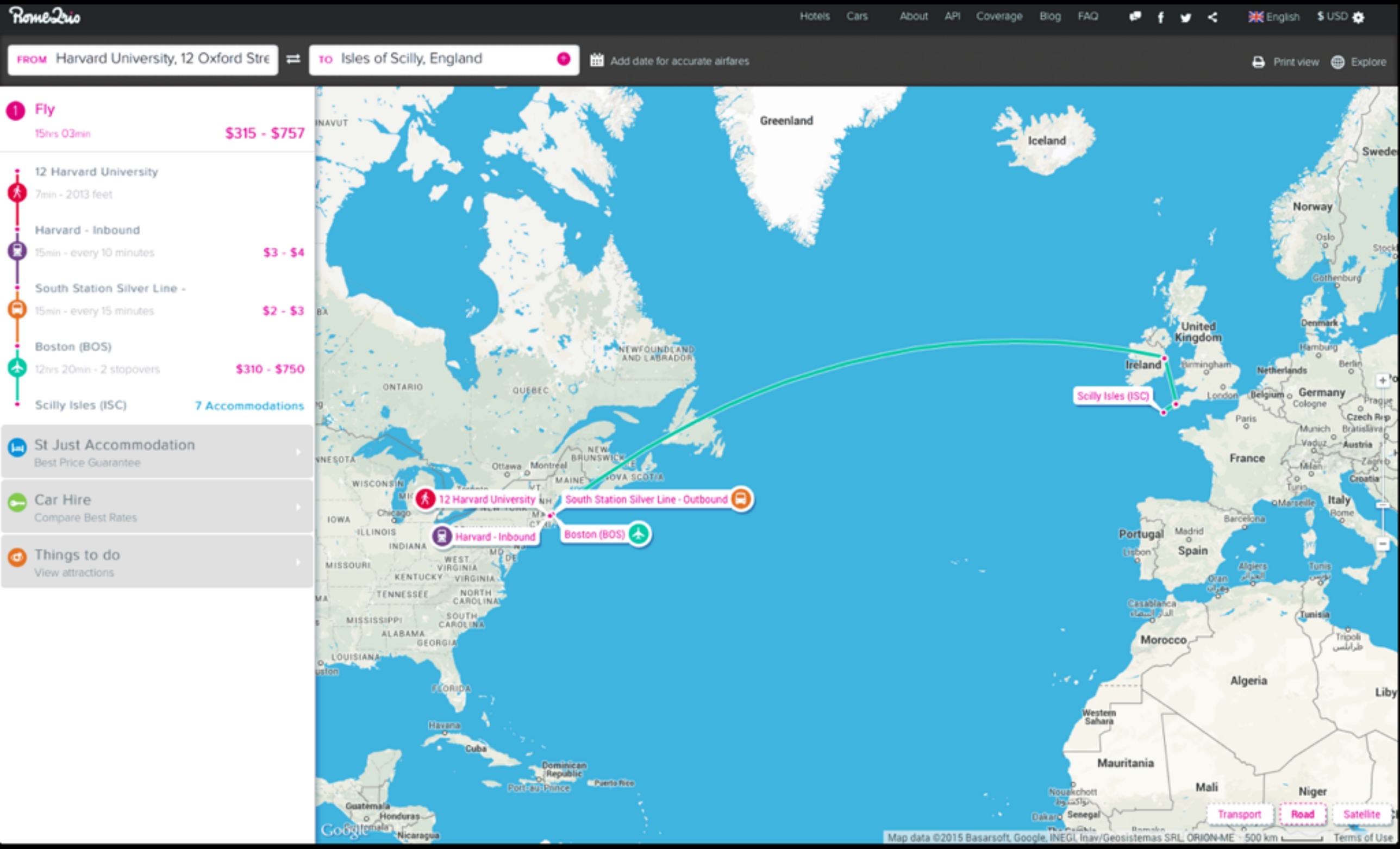

The Illustrated
Longitude
The True Story of a Lone Genius
Who Solved the Greatest
Scientific Problem
of His Time
DAVA SOBEL
AND
WILLIAM J. H. ANDREWES


Longitude
The True Story
of a Lone Genius
Who Solved
the Greatest
Scientific
Problem
of His Time
DAVA SOBEL


1707

T-Mobile 4G 10:07 AM 38%
Personal Hotspot: 1 Connection
Isles of Scilly
Bryher
Tresco
Tresco
2007
St. Mary's
Isles of Scilly Heritage Coast
Hugh Town
Google
Isles of Scilly
Isles of Scilly, United Kingdom
Route

Technology takes us There



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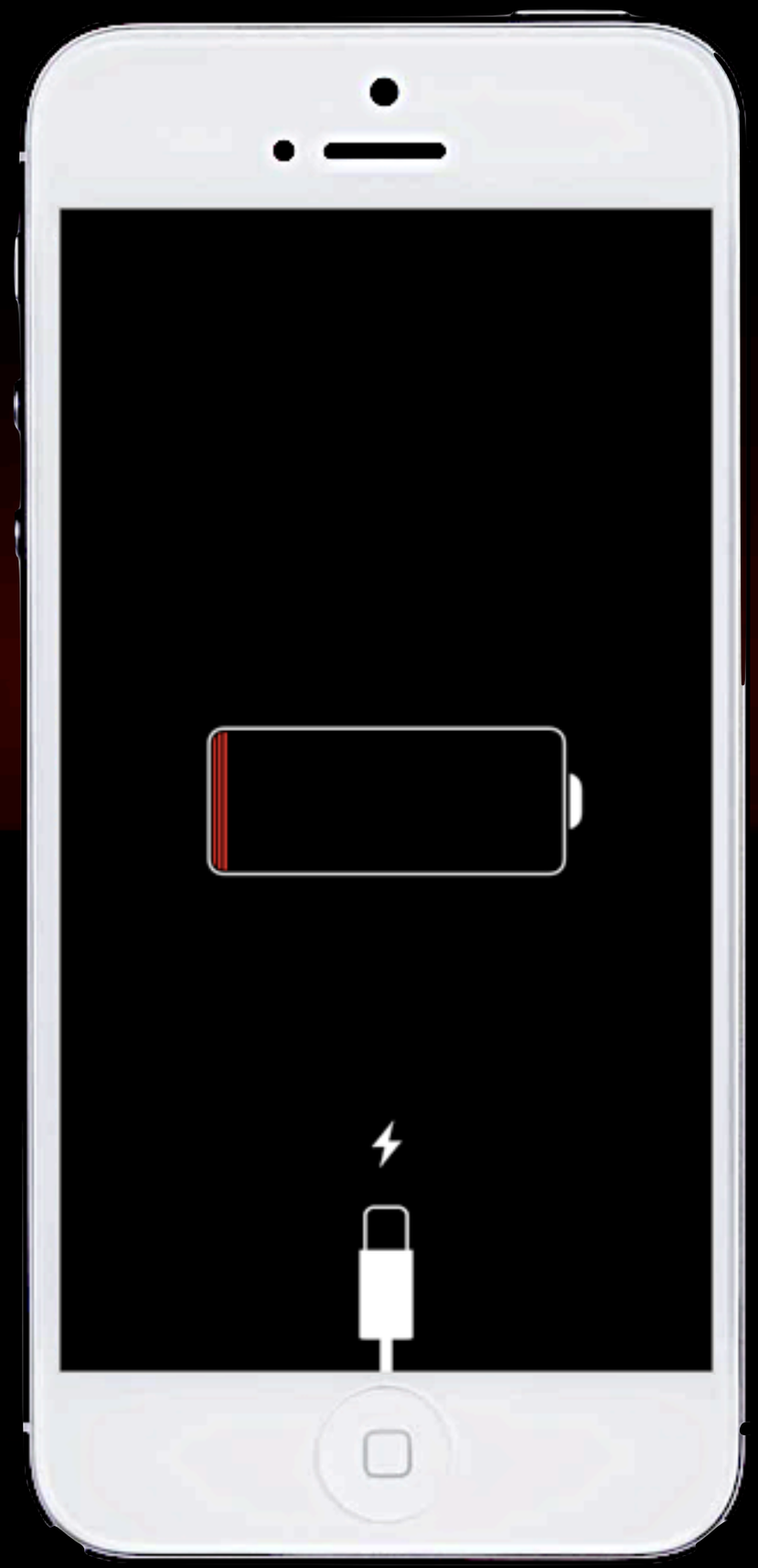
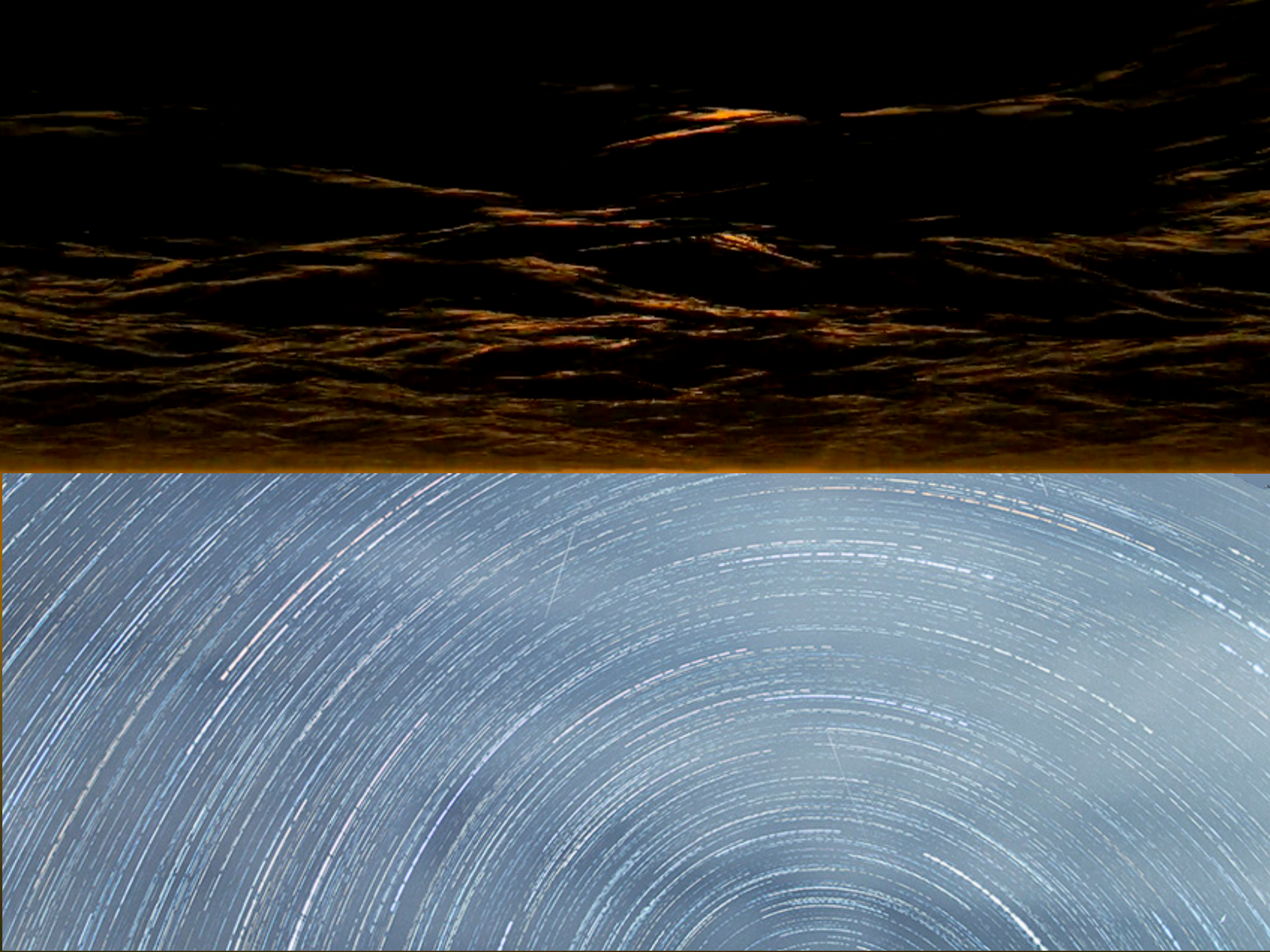


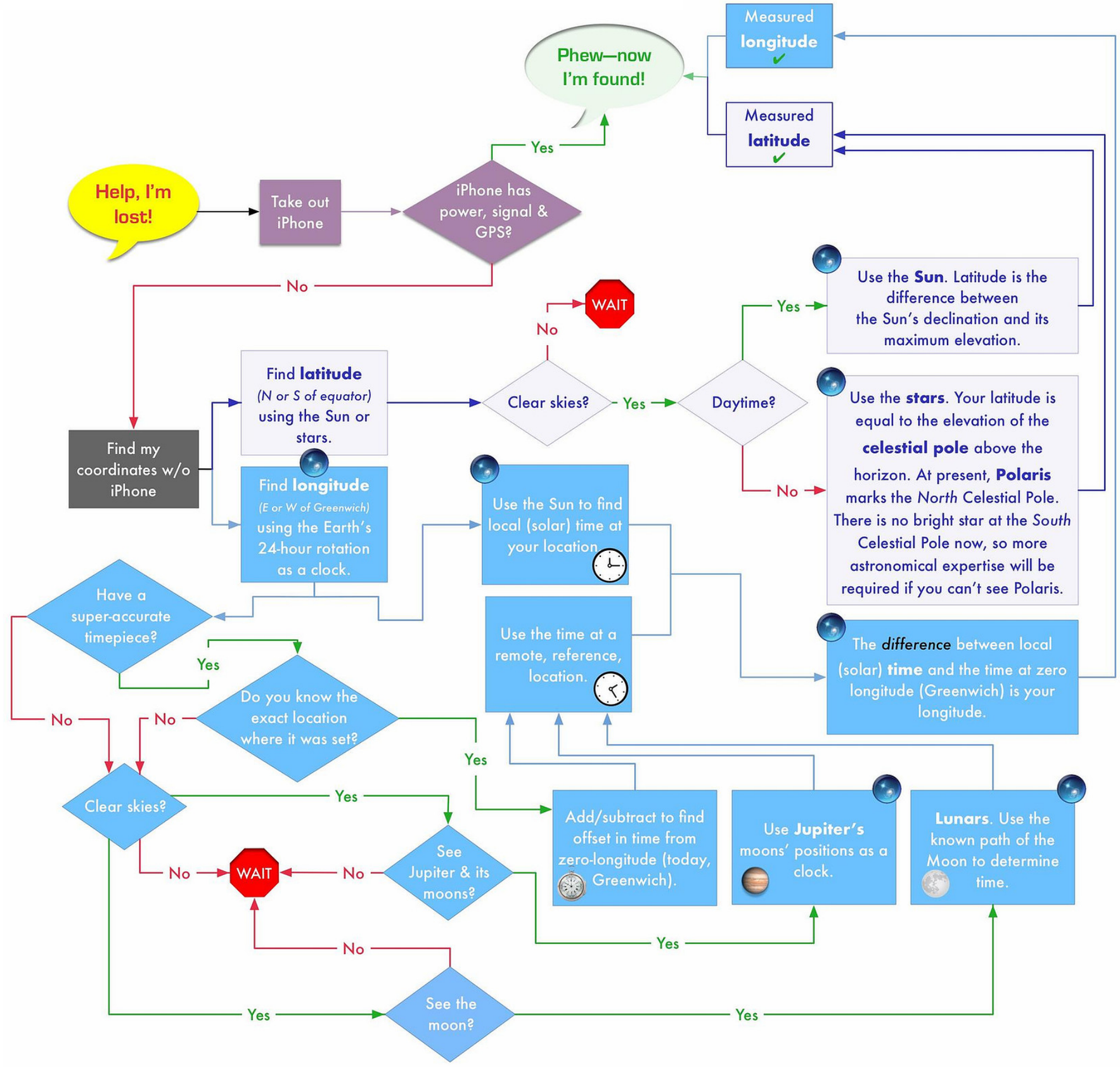
Skymarks

Landmarks

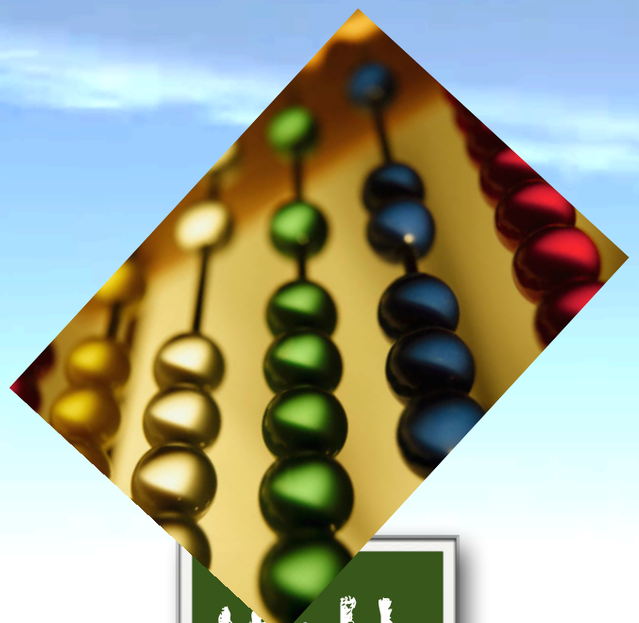


HarvardX: SOC1.longx

PredictionX: Lost Without Longitude



Tools of the Navigator

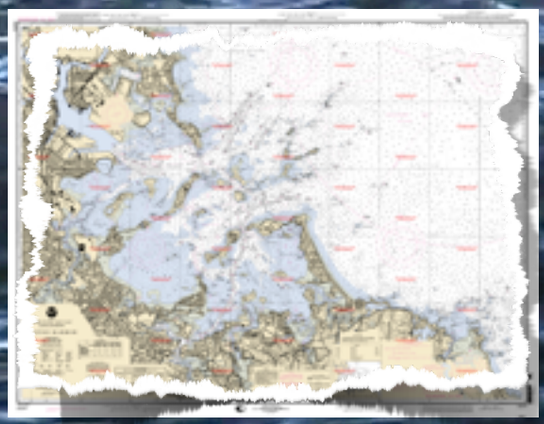


SPEED

Astronomy & Angles

Timekeeping

Direction



Maps

How *sure* am I about where I am?

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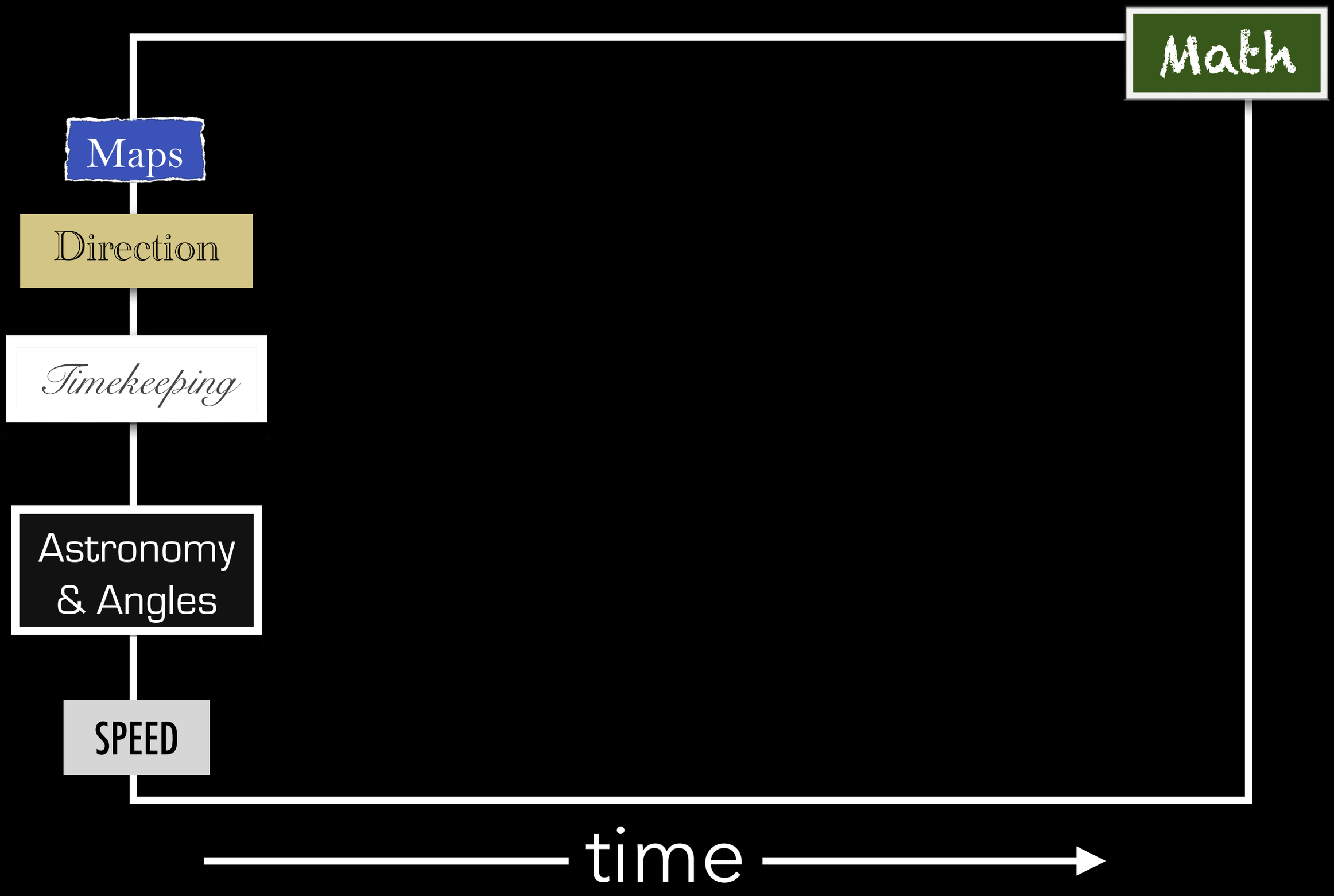

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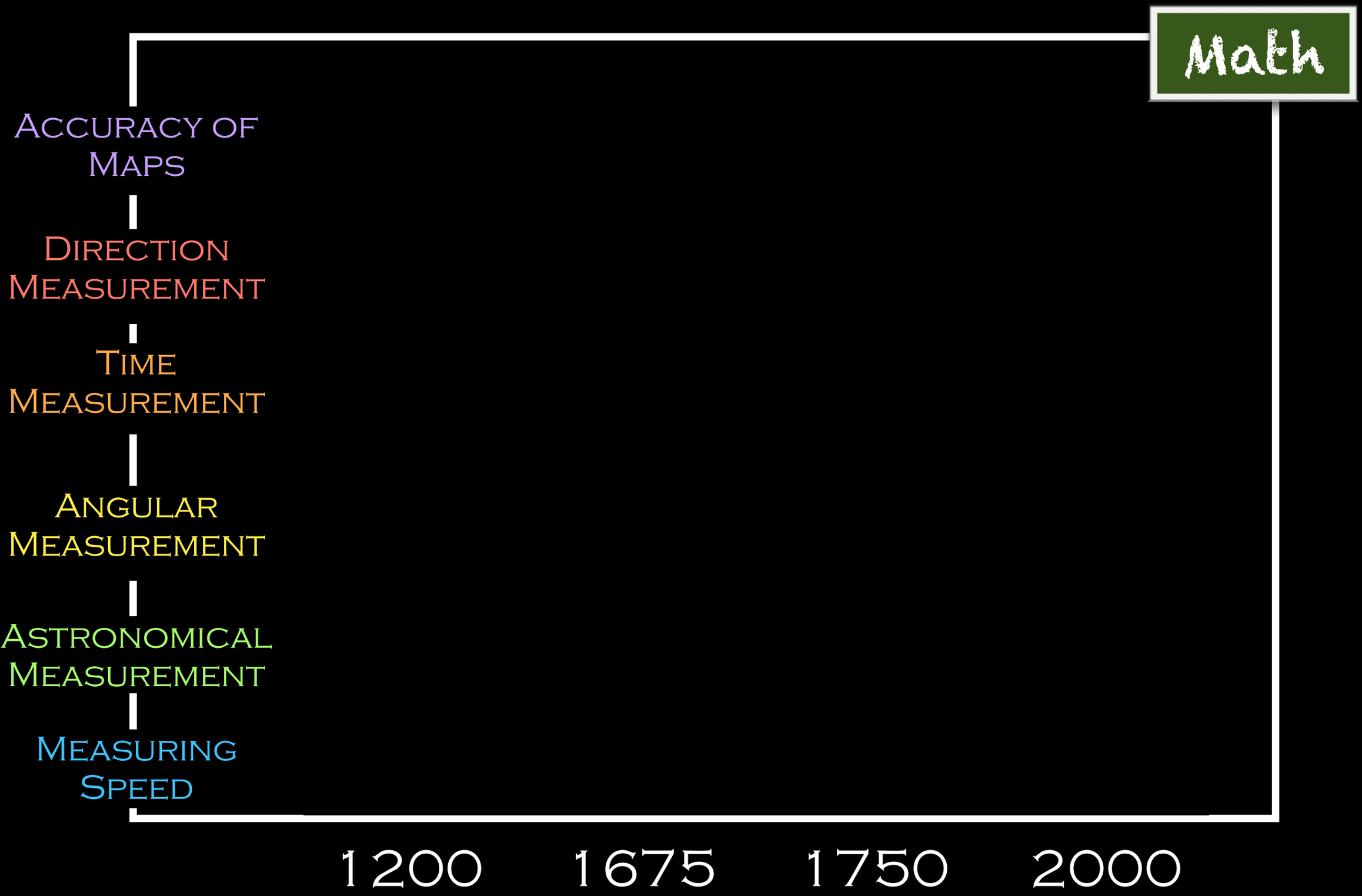


How *sure* am I about where I am?

Math

Accuracy of Maps

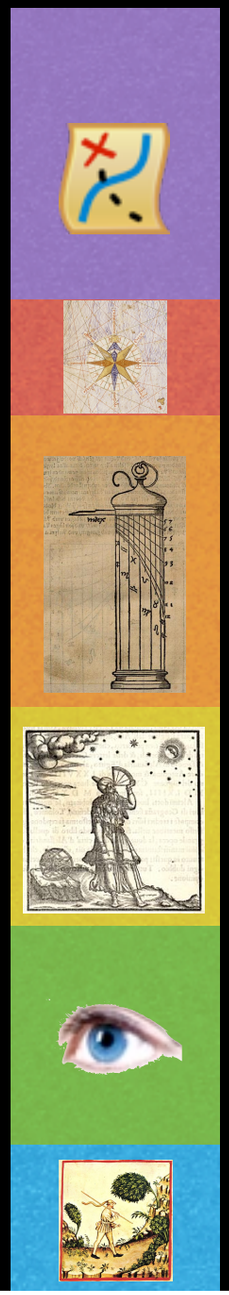
Direction Measurement

Time Measurement

Angular Measurement

Astronomical Measurement

Measuring Speed



1200 1675 1750 2000

How *sure* am I about where I am?

Math

Accuracy of Maps

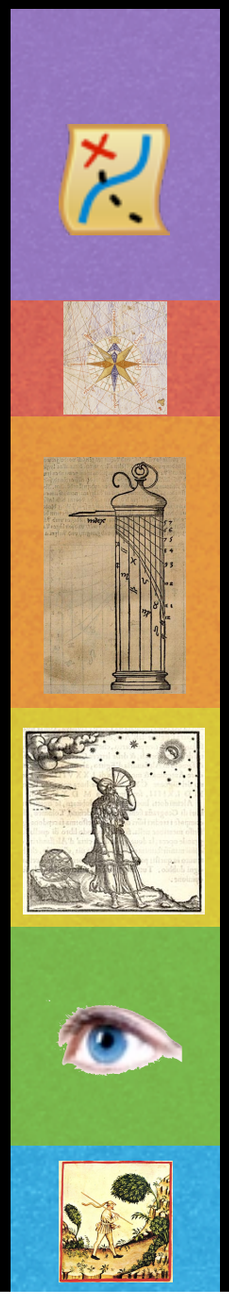
Direction Measurement

Time Measurement

Angular Measurement

Astronomical Measurement

Measuring Speed



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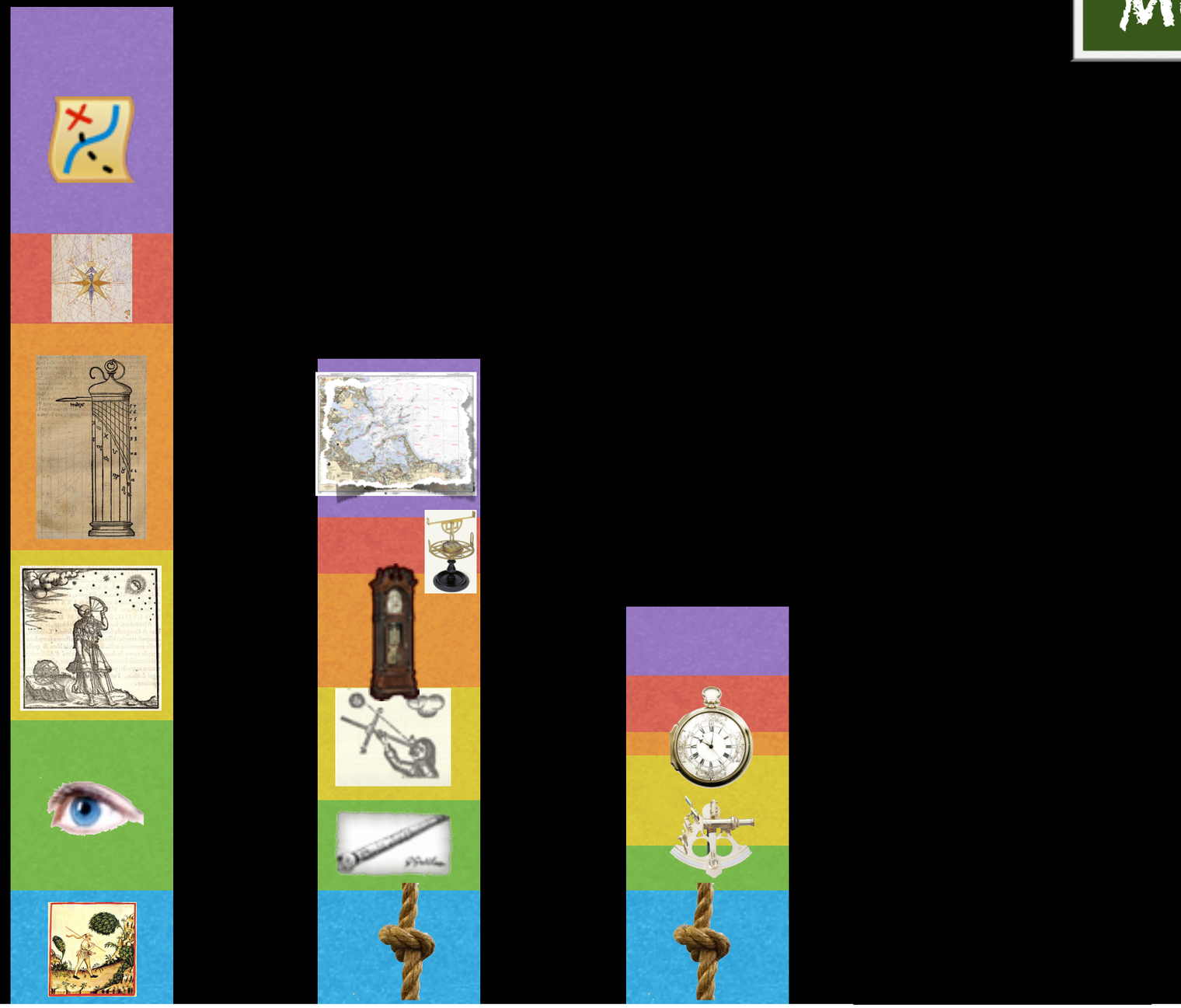

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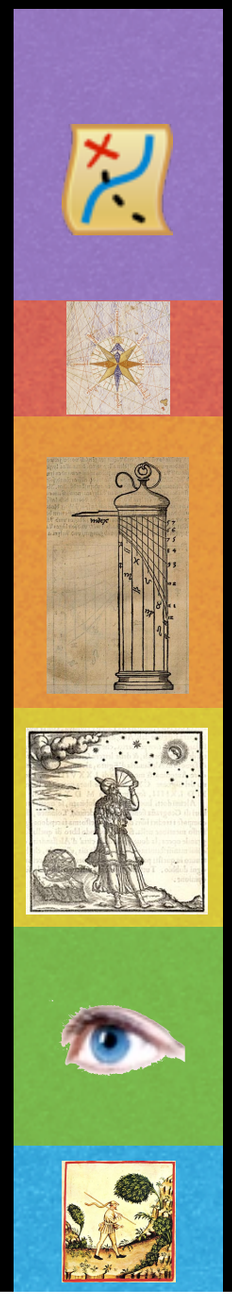

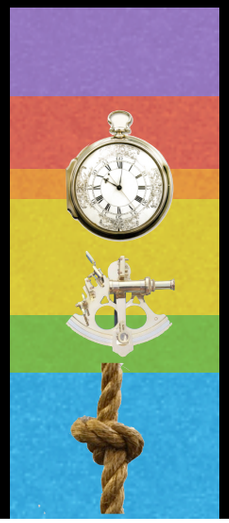

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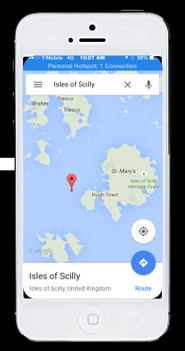
NOW