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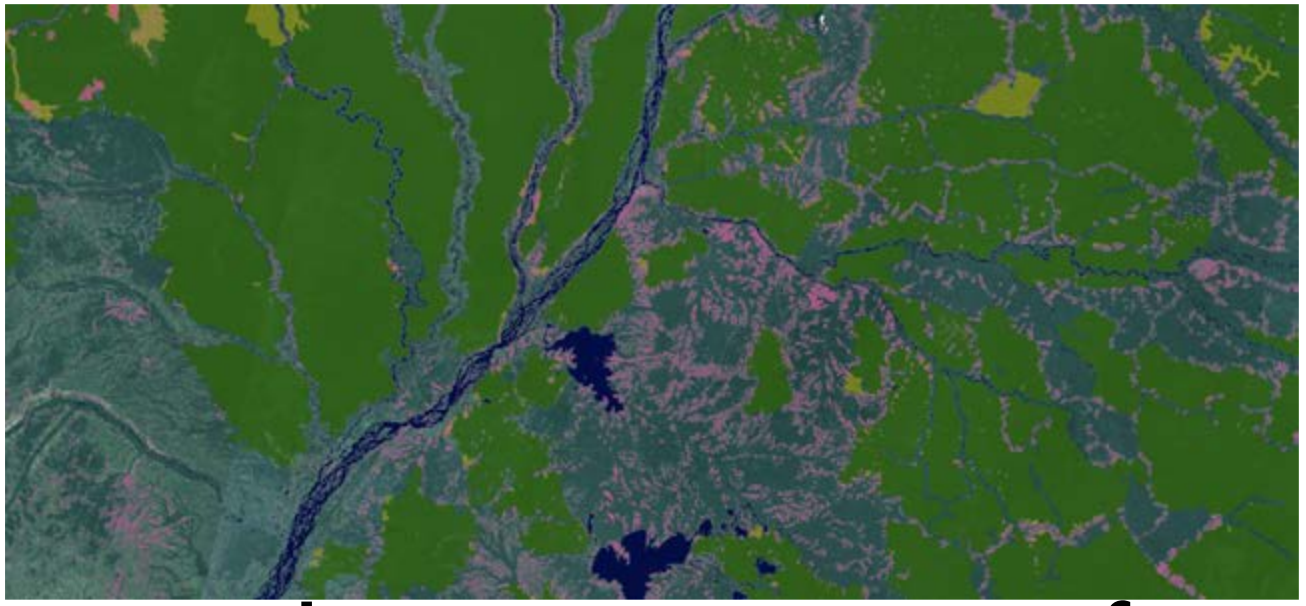

Risk communication of zoonotic spillover

Initial lessons from a satellite-based forecasting platform

IMED 2018; malloy.65@osu.edu

The challenge of index case prediction

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"Whatever the trajectory of the present outbreak over the coming months, the question of how to prevent future EVD outbreaks remains depressingly open."

~Derek Gatherer
Journal of General Virology, May 2018

Project goals – a moonshot

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Our "moonshot": automated, real-time monitoring of known environmental and social drivers of spillover for key zoonotic pathogens

Project goals - a moonshot

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Our "moonshot": automated, real-time monitoring of known environmental and social drivers of spillover for key zoonotic pathogens

How are we approaching this problem?

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Our goals:

- Automated, real-time monitoring of major drivers of spillover
- Support existing surveillance systems that operate pre- and post-event
- Improve understanding of spillover phenomenon as it can be observed at various scales

Why remote sensing?

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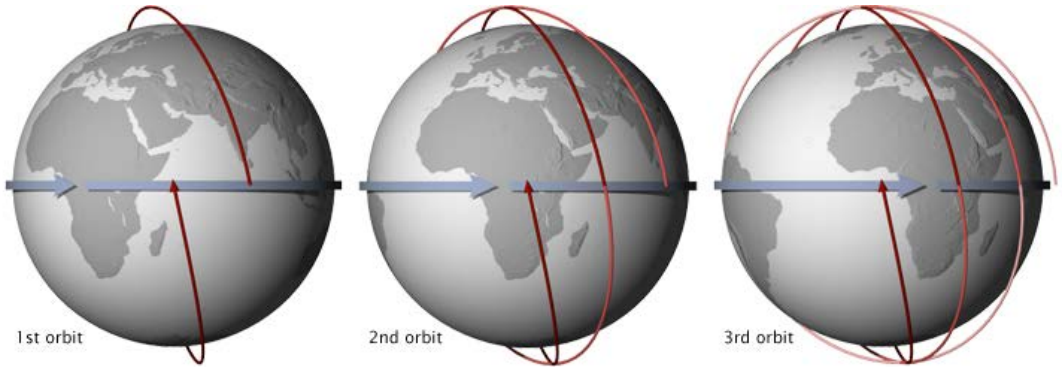

- Continuous coverage
- Low cost
- Parity across borders
- Possible to "tip and cue" between systems

Original goal

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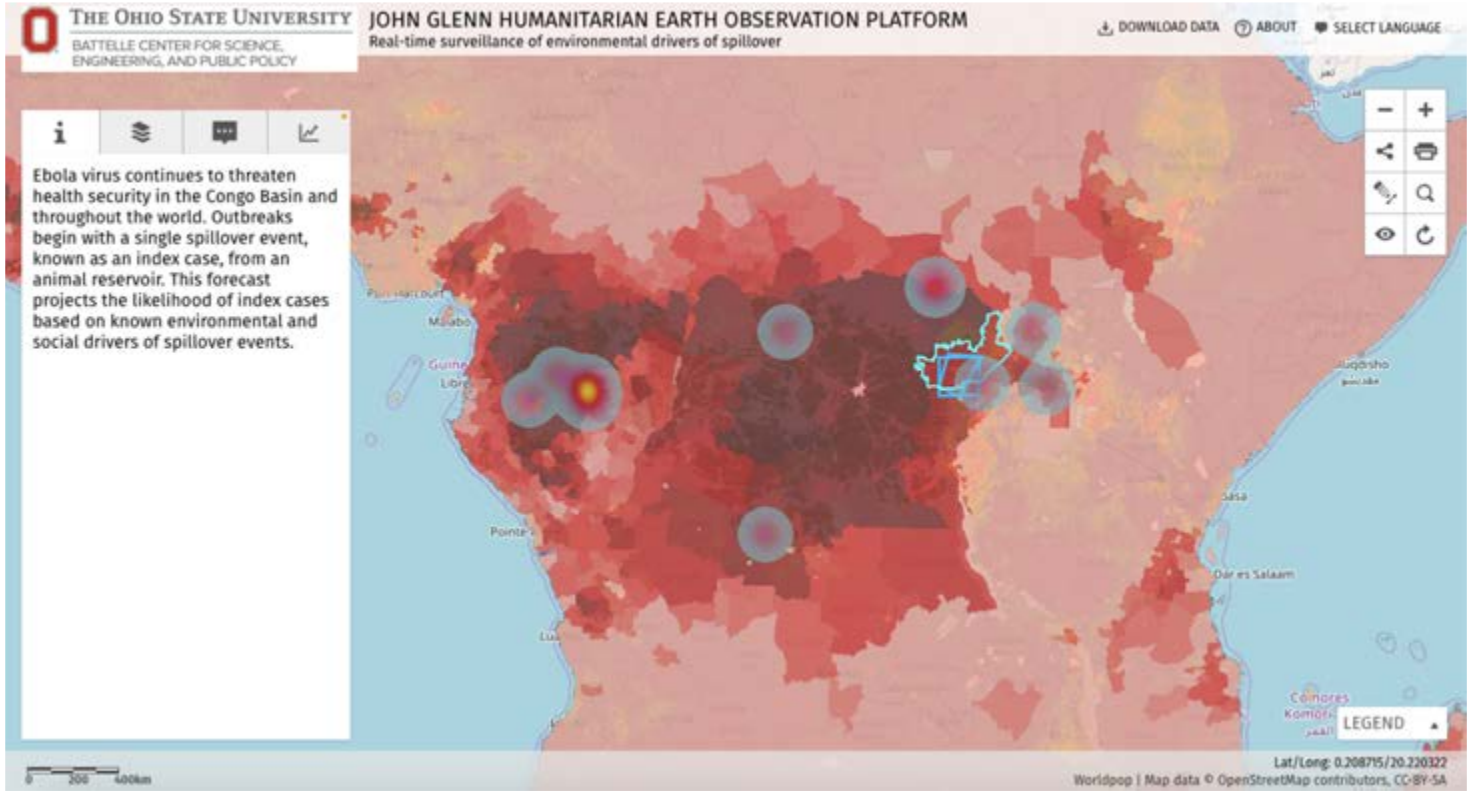
Generate user-friendly spillover forecasts that update in real time



Key takeaways from alpha testing

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- model inputs should be transparent

Model components should be transparent

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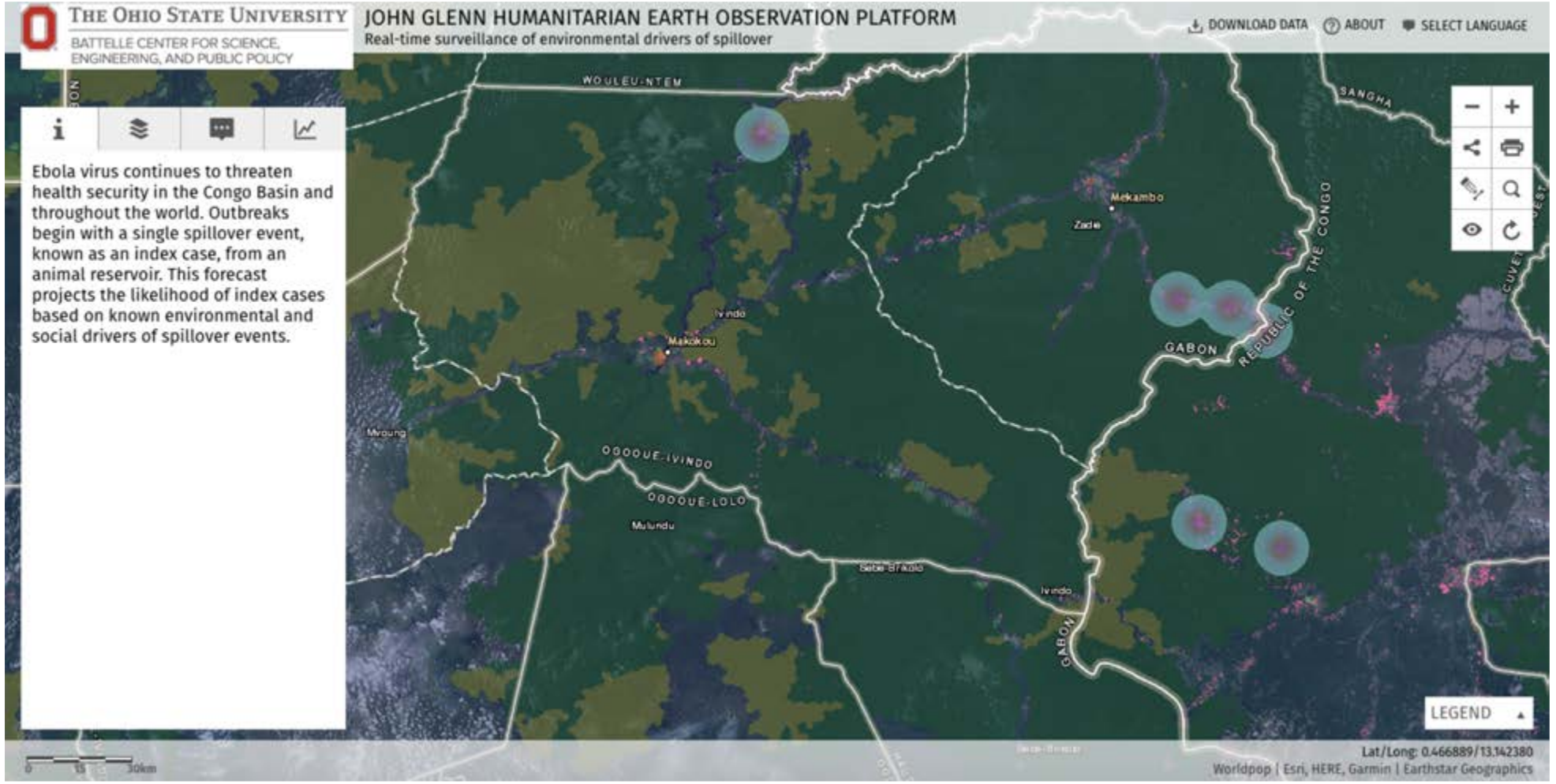

Key takeaways from alpha testing

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- model components should be transparent
- **delineate data layers**

Delineate data layers

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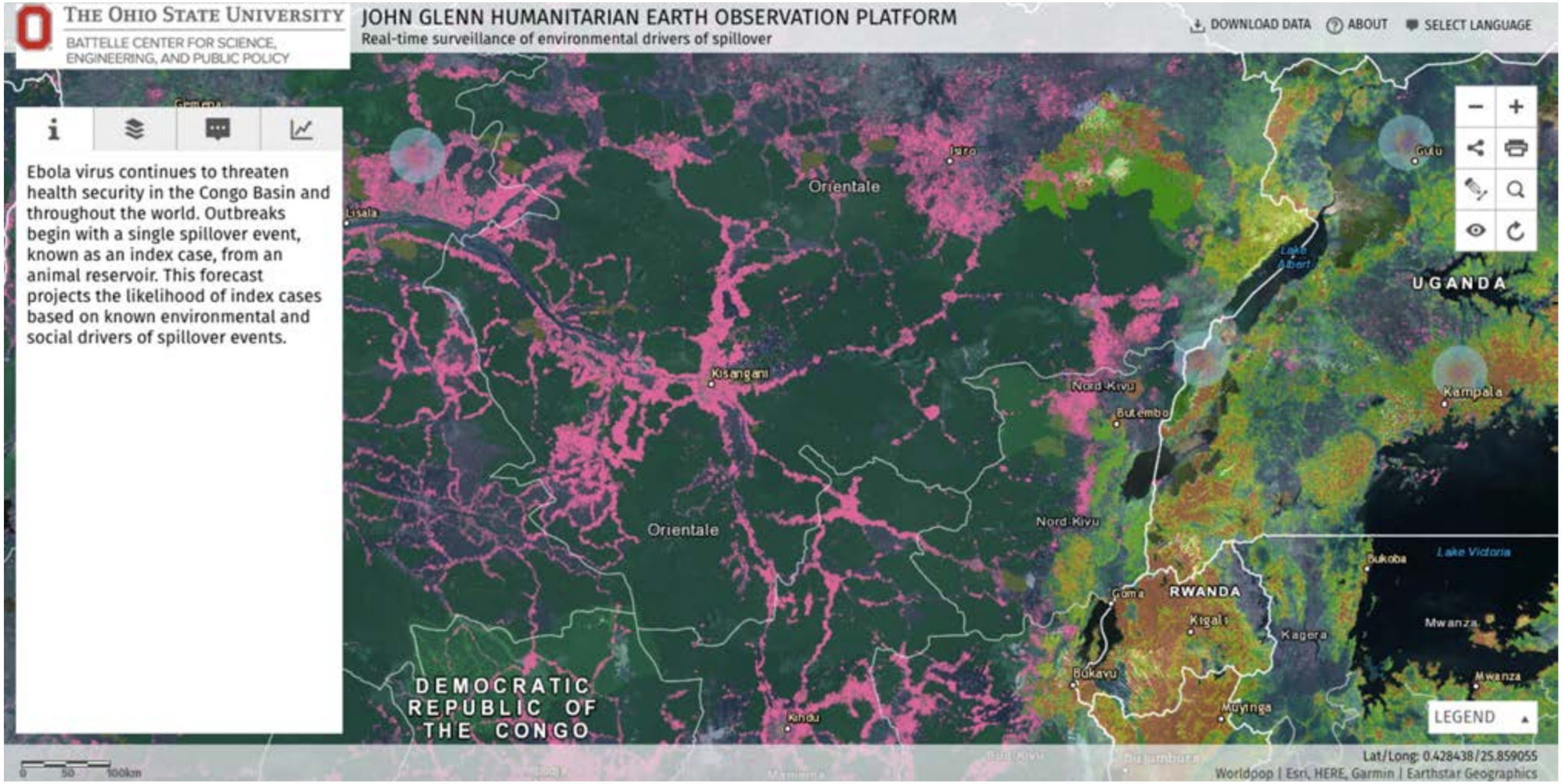

Key takeaways from alpha testing

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- model components should be transparent
- delineate data layers
- **allow individualized analysis**

Allow individualized analysis

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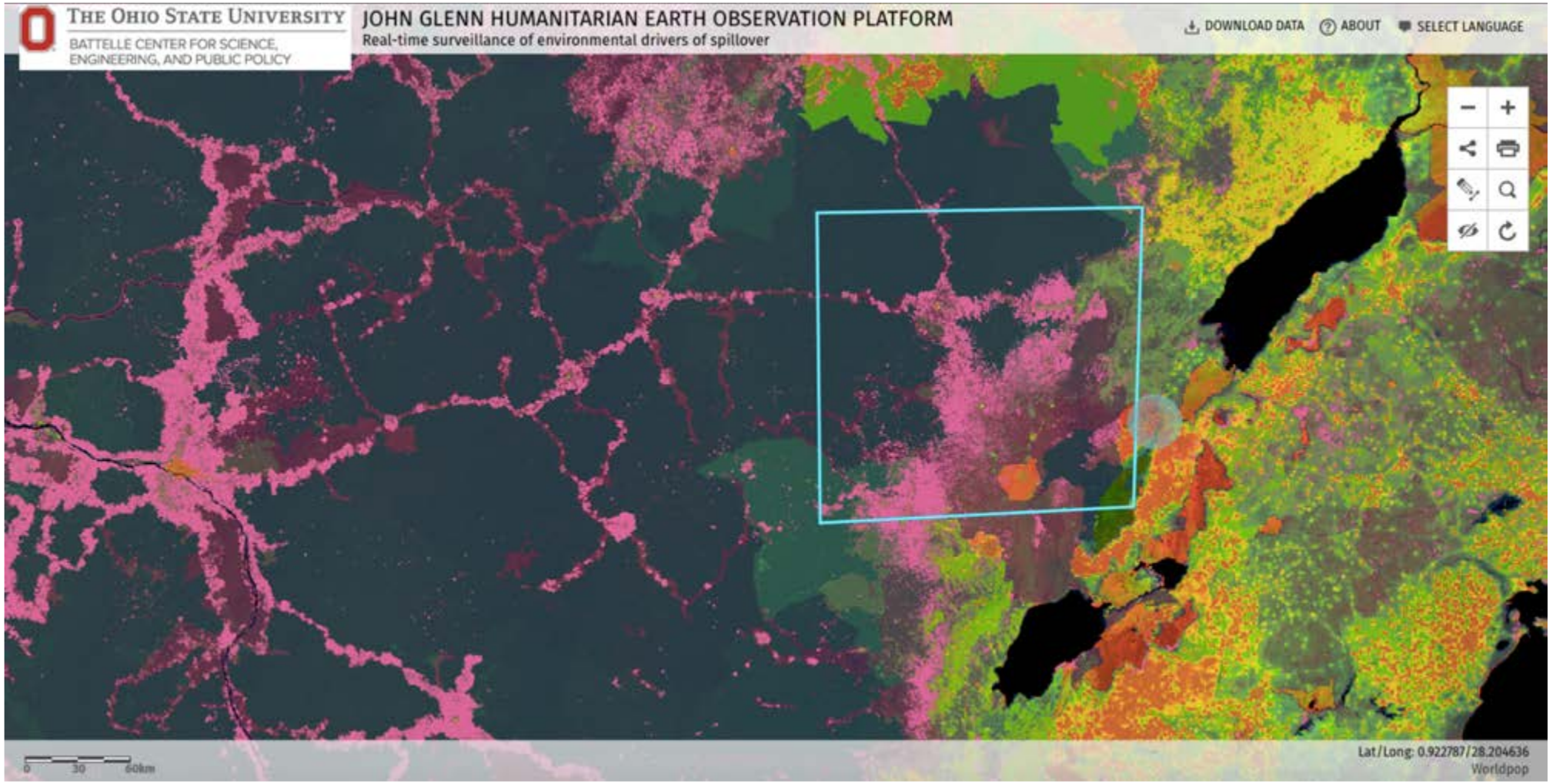

Allow individualized analysis

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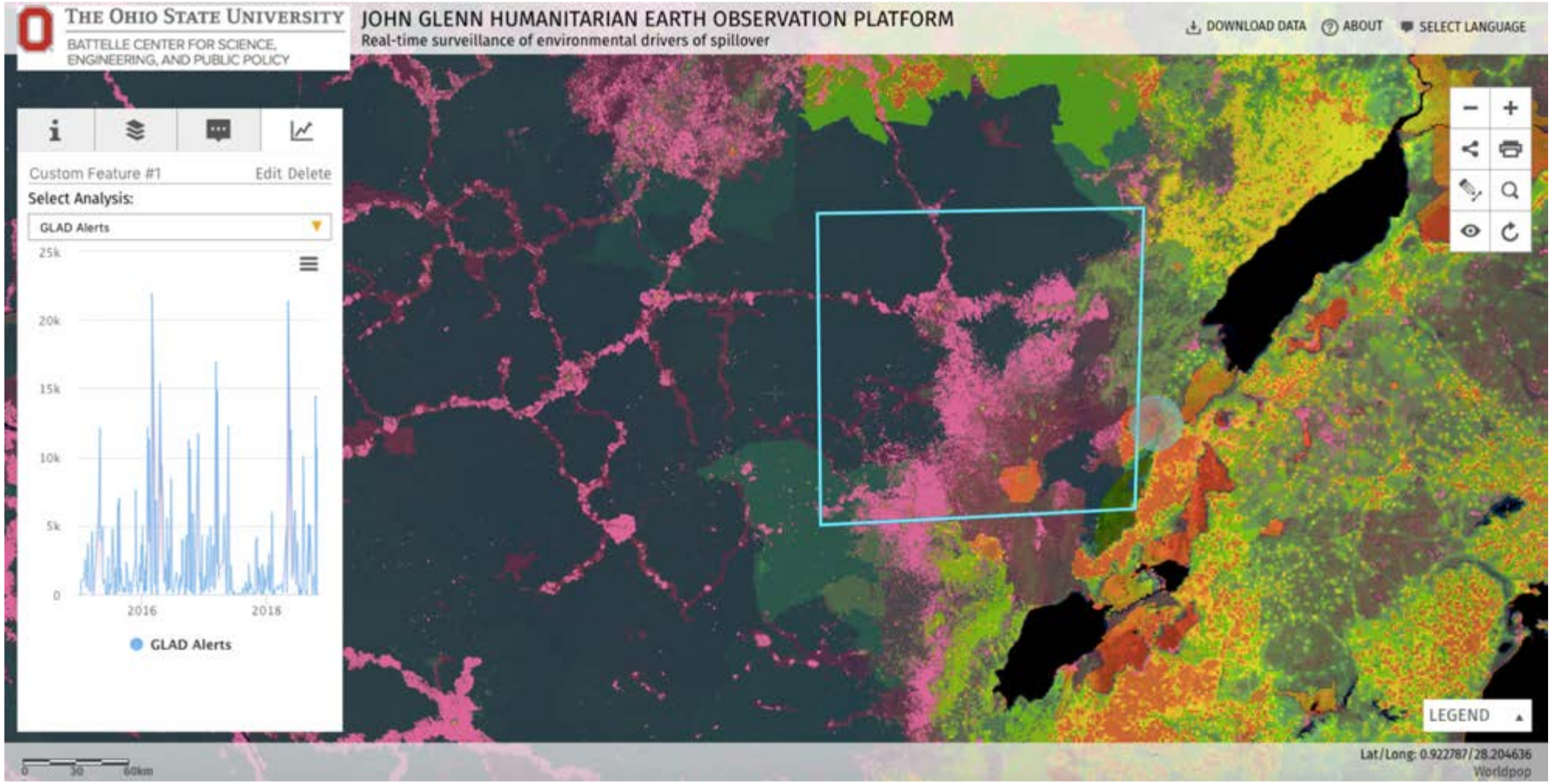

Key takeaways from alpha testing

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- model components should be transparent
- delineate data layers
- allow individualized analysis
- **include expert commentary**

Include expert commentary

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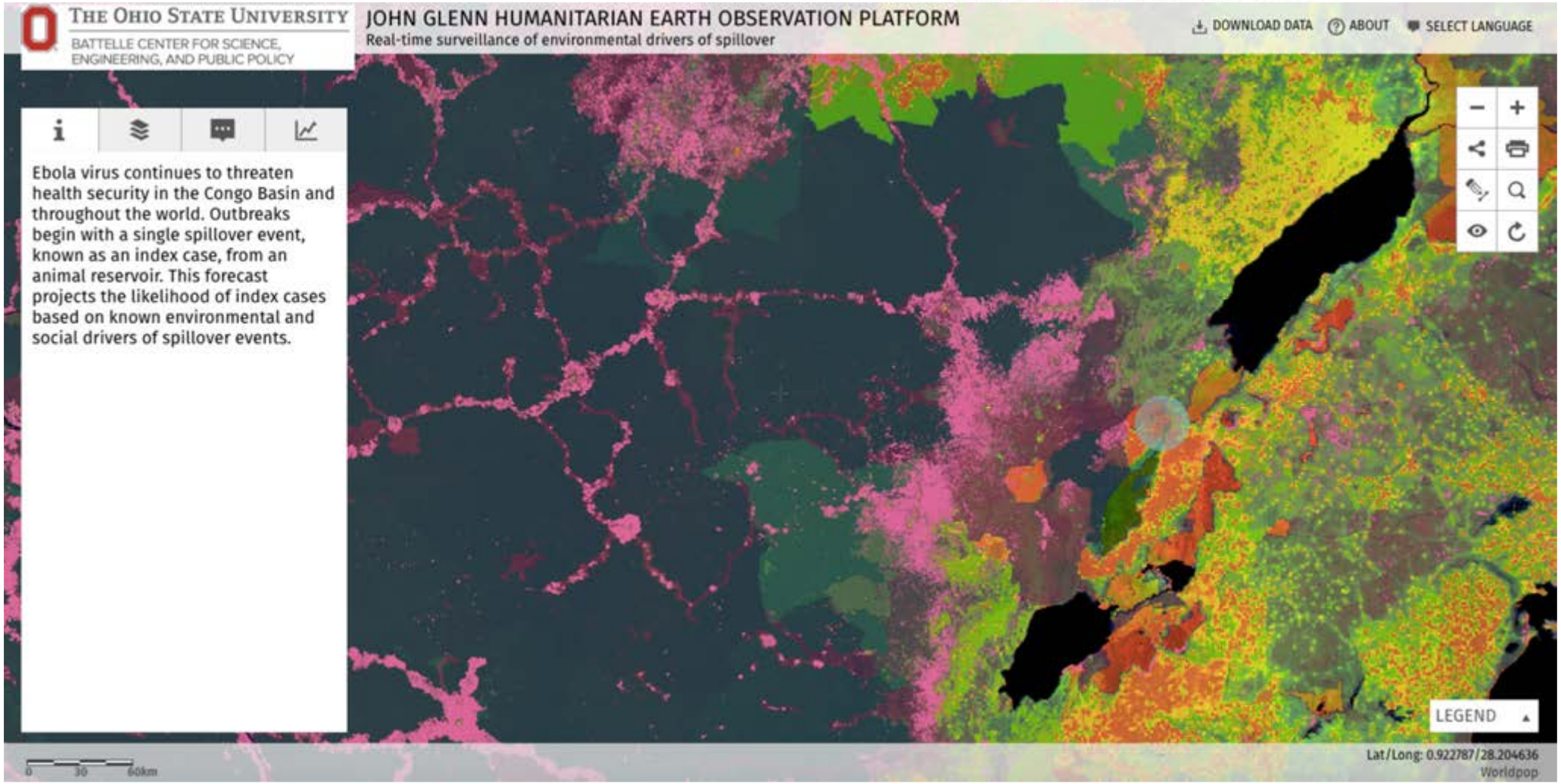

"Tip-and-cue": alerts provide areas of interest for closer examination

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Image 40h. Data: RapidEye/Planet, Digital Globe (Nextview)

- High spatial resolution classification
- Example: 3-5m, 24-hour coverage
- Differentiate between agriculture, human migration, infrastructure change

Problems with a simple forecast

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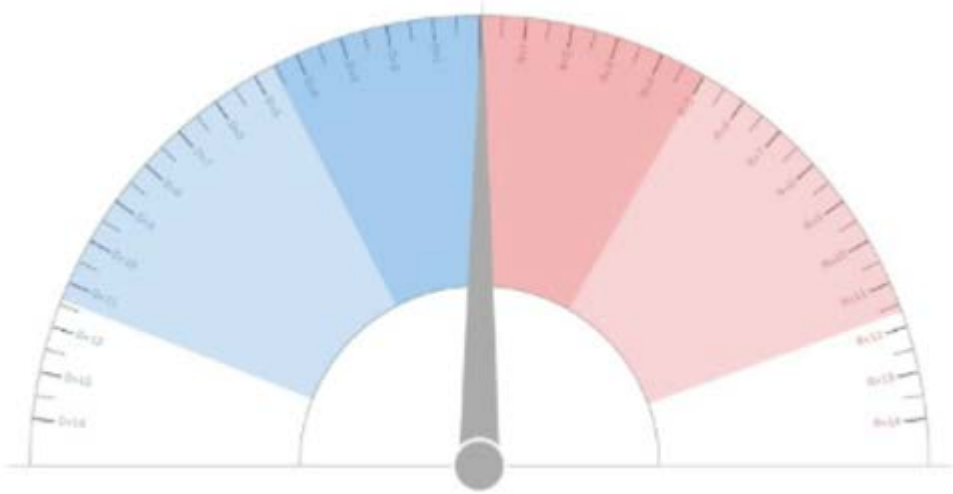

New York Times election forecast, 2016

Transparency and empowerment

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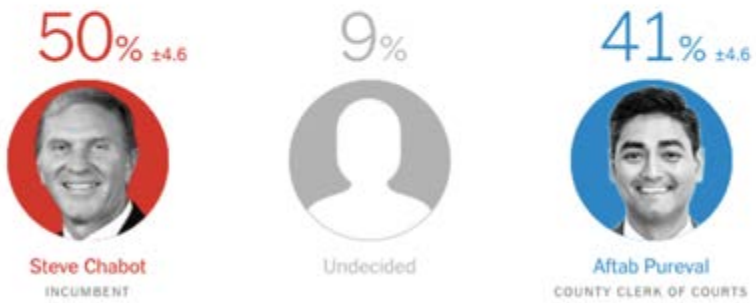
We polled voters in Ohio's 1st Congressional District.

This poll was conducted from Sept. 27 to Oct. 1.

Can a longtime incumbent hold a gerrymandered district? We made **46,661** calls, and **503** people spoke to us.

Steve Chabot, the Republican candidate, leads our poll.



Our poll is a good result for Republicans. It's just one poll, though.

Transparency and empowerment

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We po[illegible] Ohio's 1st Congr

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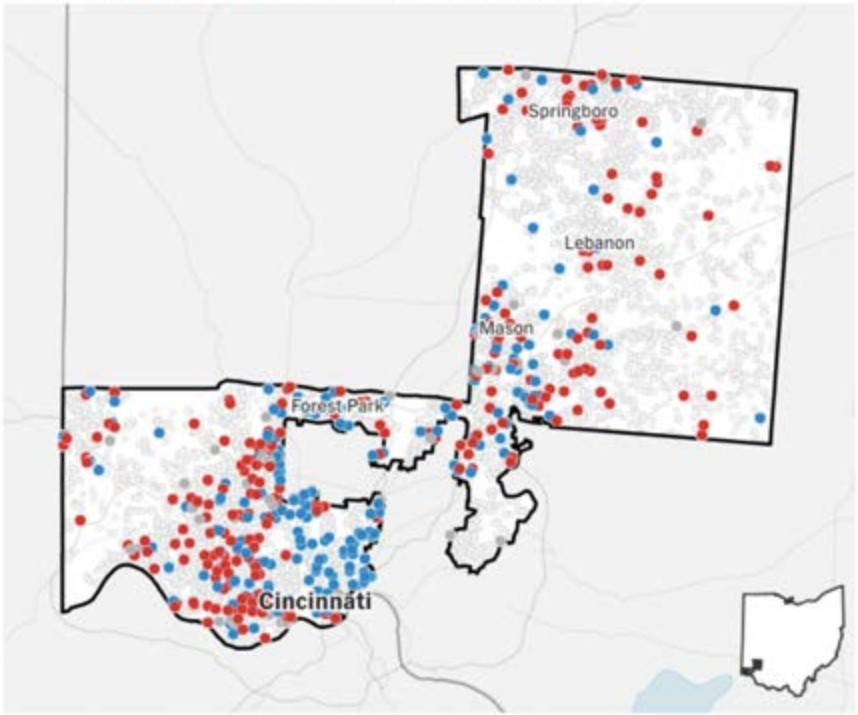
Our poll is a g

Where we called:

Each dot shows one of the 46,661 calls we made.

Vote choice: ● Dem. ● Rep. ● Don't know ○ Didn't answer



To preserve privacy, exact addresses have been concealed. The locations shown here are approximate.

Transparency and empowerment

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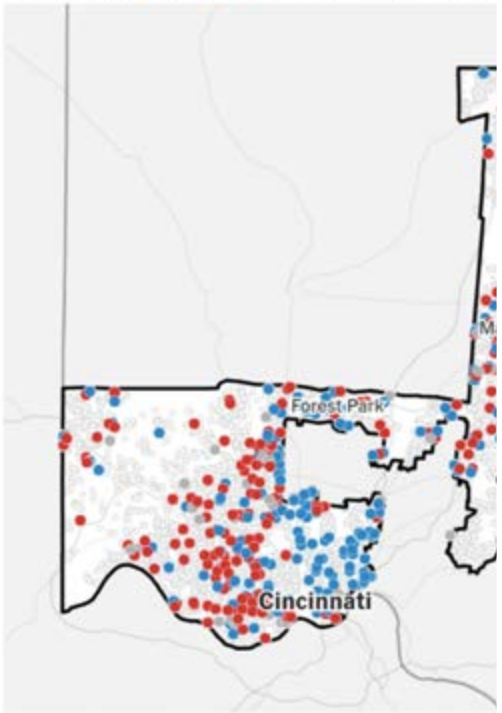

To preserve privacy, exact addresses have been concealed. The locations

The types of people we reached

Even if we got turnout exactly right, the margin of error wouldn't capture all of the error in a poll. The simplest version assumes we have a perfect random sample of the voting population. We do not.

People who respond to surveys are almost always too old, too white, too educated and too politically engaged to accurately represent everyone.

How successful we were in reaching different kinds of voters

	CALLED	INTER-VIEWED	SUCCESS RATE	OUR RESPONSES	GOAL
18 to 29	5,116	32	1 in 160	6%	10%
30 to 64	22,295	317	1 in 70	63%	59%
65 and older	7,022	154	1 in 46	31%	30%
Male	16,193	228	1 in 71	45%	47%
Female	18,255	275	1 in 66	55%	53%
White	24,928	360	1 in 69	72%	71%
Nonwhite	6,522	106	1 in 62	21%	20%
Cell	22,980	267	1 in 86	53%	—
Landline	11,468	236	1 in 49	47%	—

Based on administrative records. Some characteristics are missing or incorrect. Many voters are called multiple times.

Transparency and empowerment

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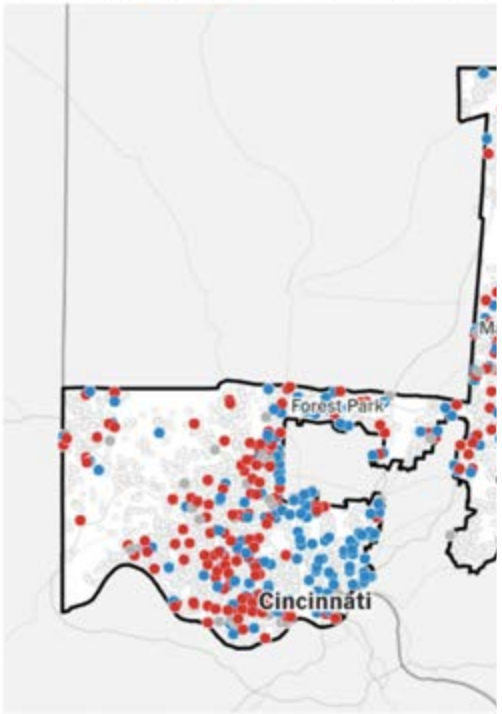

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What different types of voters said

Voters nationwide are deeply divided along demographic lines. Our poll suggests divisions too. But don't overinterpret these tables. Results among subgroups may not be representative or reliable. Be especially careful with **groups with fewer than 100 respondents, shown here in stripes.**

		DEM.	REP.	UND.
Gender	Female n = 275 / 53% of voters	47%	44%	9%
	Male 228 / 47%	34%	57%	9%
Age	18 to 29 n = 30 / 7% of voters	38%	53%	9%
	30 to 44 88 / 19%	48%	42%	10%
	45 to 64 231 / 43%	44%	49%	7%
	65 and older 154 / 31%	32%	56%	11%
Race	White n = 382 / 76% of voters	33%	58%	8%
	Black 77 / 15%	80%	13%	7%
	Hispanic 10 / 2%	26%	54%	20%
	Asian 6 / 1%	67%	—	33%
	Other 13 / 2%	33%	61%	6%

Next steps

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- **Technical goals:**
  - Incorporate hyperspectral (DESIS) and animal migration (ICARUS) data from the ISS

- **User community goals:**
  - Beta testing - contact us to sign up!
  - Incorporate competitive, open model system

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Thank you! Questions?

Team: Sam Malloy (Malloy.65@osu.edu);
Battelle Center for Science, Engineering and Public Policy; Infectious Diseases Institute, Ohio State University