

State of the Map 2022 in Florence Italy

YouthMappers: A Hybrid Movement Design for the OpenStreetMap Community of Communities

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**ASU® Knowledge Exchange
for Resilience**
Arizona State University





Premises

- More study needed on cultural and organizational aspects of spatial data production and use in OSM
- OpenStreetMap is a community of communities (Solís 2016; Brovelli et al. 2019)
- YouthMappers lends itself as an interesting design framework (hybrid) and set of experiences (movement-like) to provide insights on some cultural and organizational aspects of open mapping



Knowledge & Implications

Who are YouthMappers? What do they do? How do they map? How do YouthMappers navigate different aims within different spaces of action?

- Brief design case (hybrid)
- Overall performance (movement)
- Consider **3 hypotheses** (myths?)

- What do these characteristics mean for OSM broadly?
- What lessons does this provide for higher education globally?
- What insight does this offer for other communities within the OSM ecosystem?



Knowledge

Who are YouthMappers? What do they do? How do they map? How do YouthMappers navigate different aims within different spaces of action?

- Brief design case (hybrid)
- Overall performance (movement)
- **Consider 3 hypotheses** (myths?)



OpenStreetMap Community

“community of communities”



concept
2014

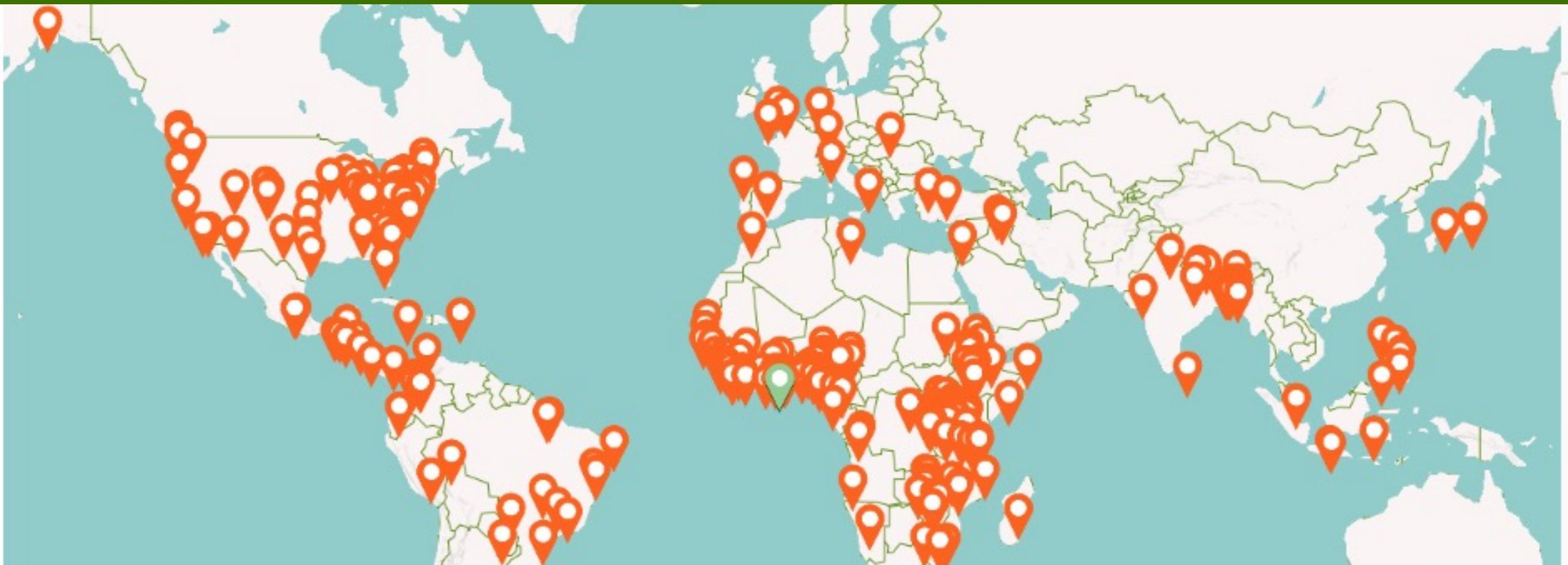
launched
2015



youth mappers

Global consortium of student-led
faculty-mentored campus-based
chapters creating and using open
maps for humanitarian and
development action

~5,000 students on **324** university campuses in **67** countries





79%
majoritarian
nations

45%
women

Regional Ambassadors: leaders helping the community grow and thrive

40
ambassadors





USAID
FROM THE AMERICAN PEOPLE

TEXAS TECH UNIVERSITY

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

Arizona State University

West Virginia University.



Mapillary



MISSING MAPS

MAXAR
TECHNOLOGIES

**MEDECINS
SANS FRONTIERES**



GFDRR
Global Facility for Disaster Reduction and Recovery

 OSGeo

**CROWD2MAP
TANZANIA**
Putting rural
Tanzania on the map
crowd2map.org



MAP GIVE

**Radiant Earth
Foundation**
EARTH IMAGERY FOR IMPACT

**German
Red
Cross**

**The
National
Map**
Your Source for Topographic Information

Microsoft

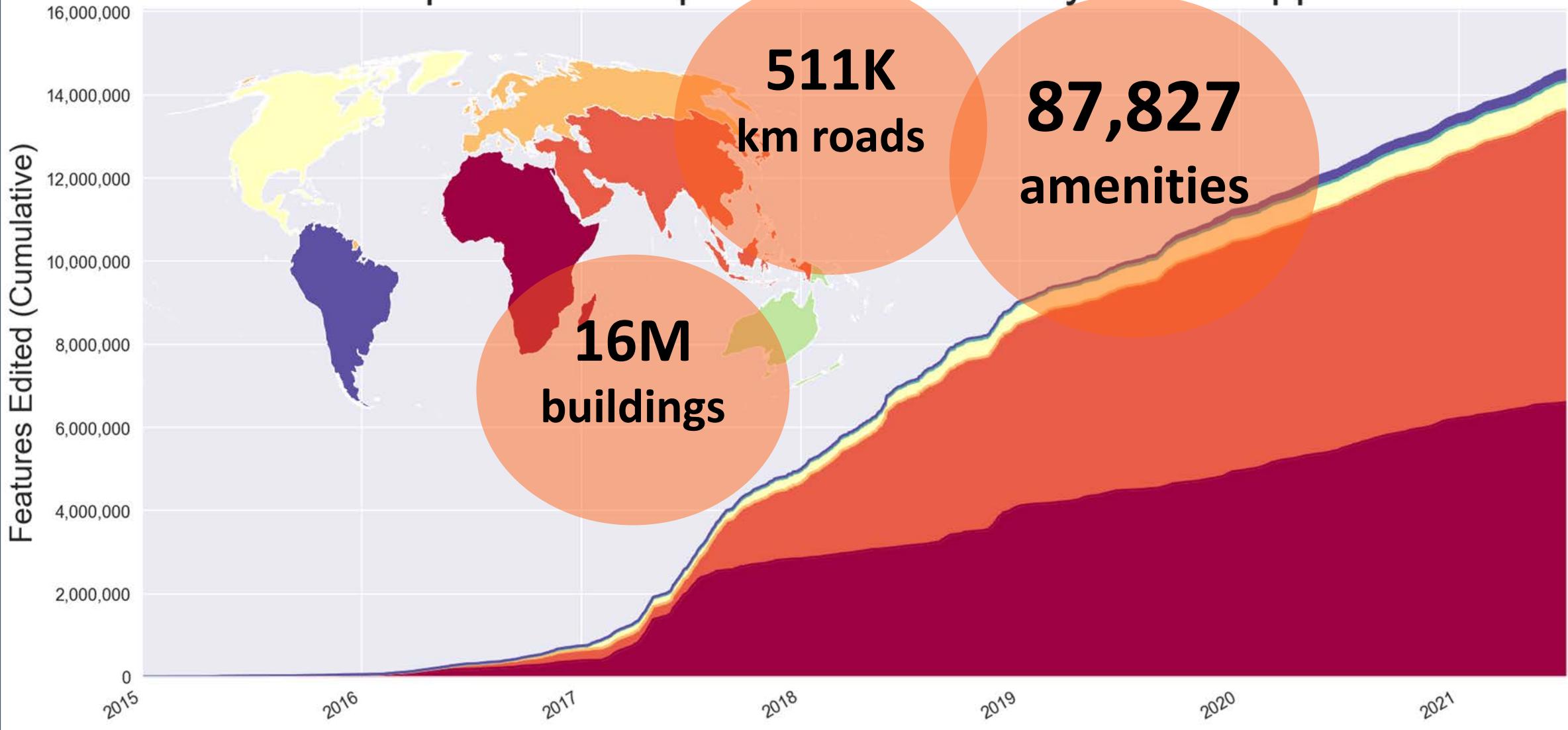
HEXAGON

CRITIGEN

**American
Red Cross**



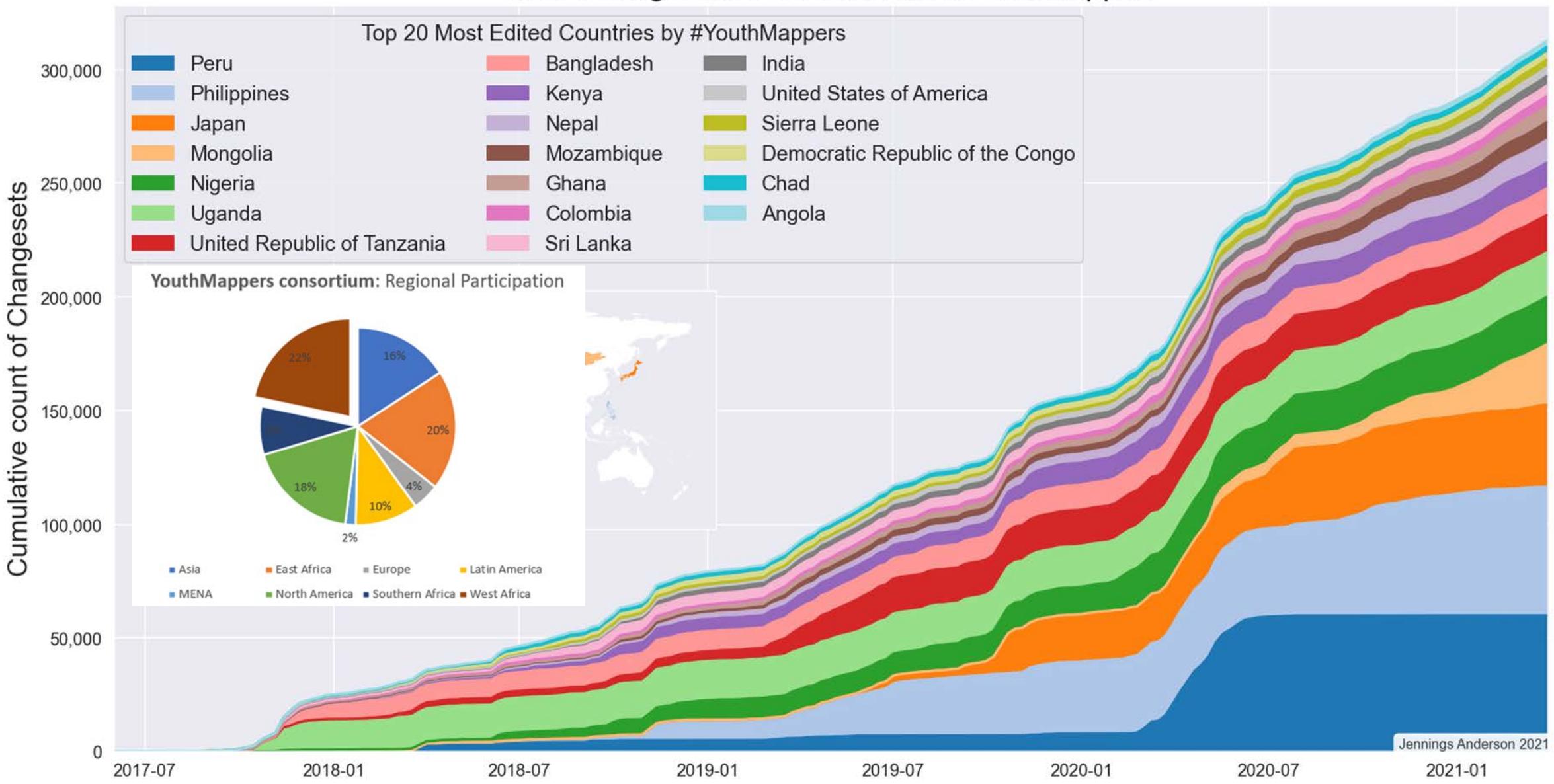
All OpenStreetMap Features Edited by YouthMappers



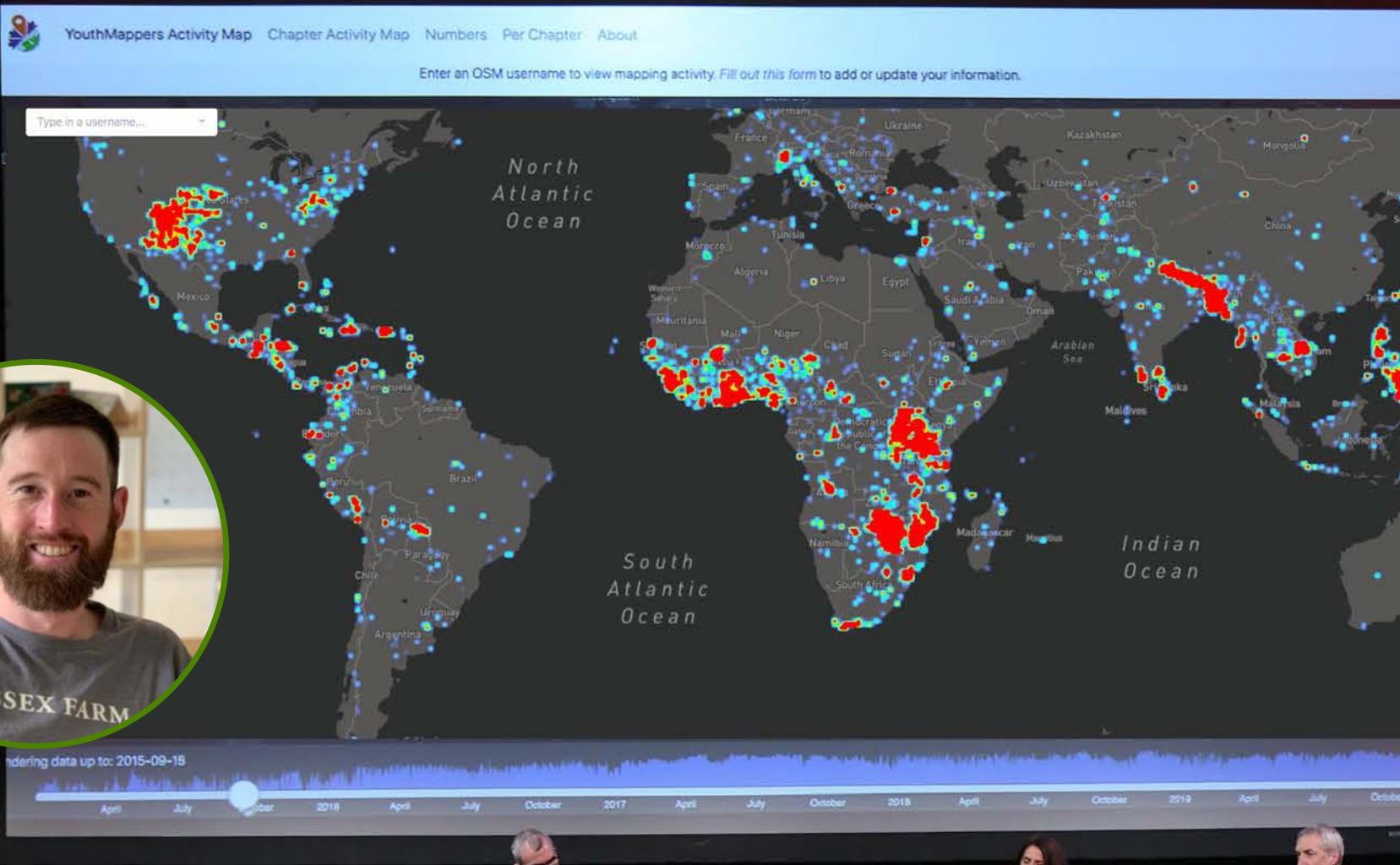
Credit: Jennings Anderson for YouthMappers © 2021



Total Changesets over time with #YouthMappers



Credit: Jennings Anderson for YouthMappers © 2021



activity.youthmappers.org



Digitizing Features like buildings and roads, adding **Attributes** like labels and addresses, coordinating **Validation**

The screenshot shows the OpenStreetMap editor interface. At the top, there's a toolbar with icons for zooming, a search bar containing "openstreetmap.org", and menu items like "Edit", "History", "Export", "GPS Traces", "User Diaries", "Copyright", and "Help". Below the toolbar is a large orange circle containing text. Inside this circle, there's a smaller circular inset showing a portrait of a smiling man with a beard. To the right of the inset, the text reads "88+" followed by "campaigns validated". Further down in the same circle, the text "331 trained validators" is displayed. The main editor area shows a satellite map of a rural landscape with a red polygon drawn over a cluster of buildings. A tool bar above the map includes options for "Point", "Line", "Area", and "Save".

88+
campaigns
validated

331
trained
validators



YouthMappers Academy



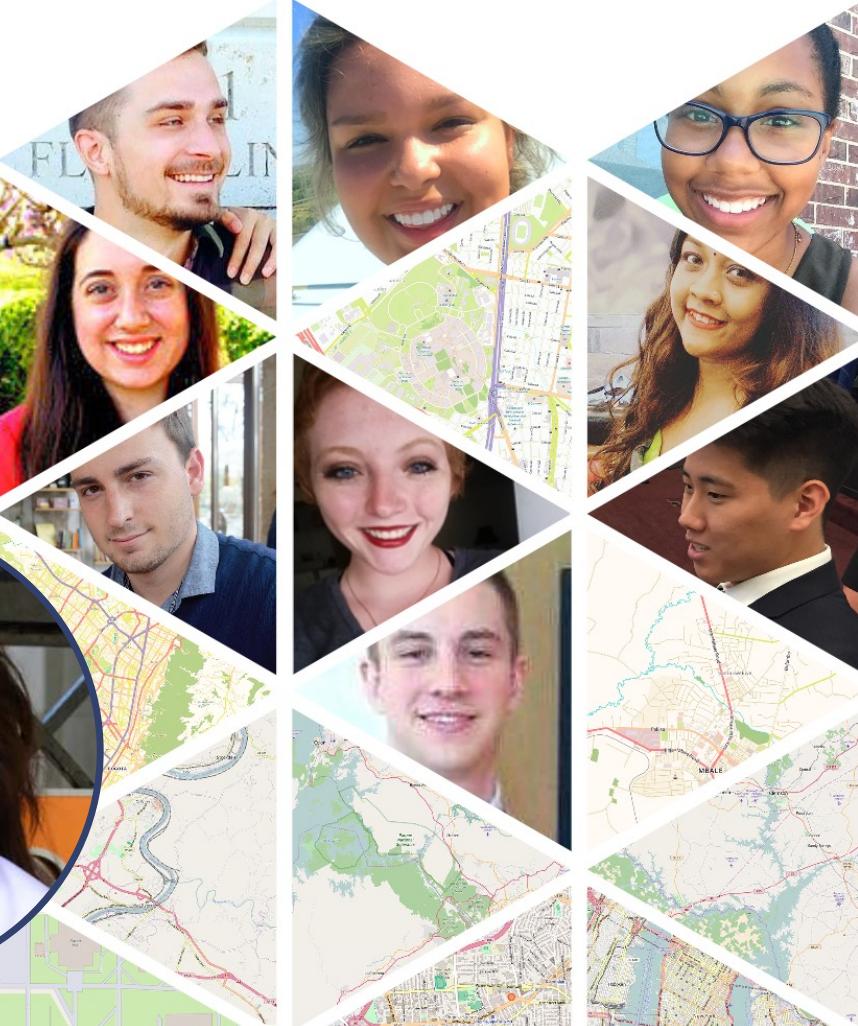
399
badges
awarded

20
geospatial
competencies

12
courses
offered



Communications & Recognition



Not taking data for granted

September 16, 2016 | Taylor Zevanov, Douglas Ssebagala, and Paul Uithol



On July 25th Uganda's Humanitarian OpenStreetMap team and YouthMappers in Uganda completed a week-long pre-assessment trip in Karamoja. The effort mobilized local youth to gather much needed data on the under-mapped region of Karamoja. Despite a high concentration of...

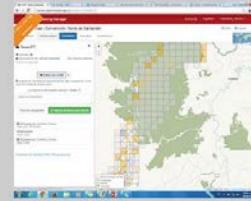
[Read More](#)

In Colombia, students win and the country wins

September 2, 2016 | Patricia Solis and Humberto Yances

Three dozen students across five universities in Colombia joined forces to map tertiary roads in their country. It was a friendly competition, where [winning teams](#) received mapping tools and the top two mappers earned a trip to a project site for more training in...

[Read More](#)



Far beyond the textbooks

September 1, 2016 | Halle Miller



The world is not as big as I once thought it was. What is officially known as the distance decay effect, has made Africa right around the corner from my High School in Plano Texas. This phenomenon can be credited to the widespread innovation of open GIS software, and t...

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the country wins](#)
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Thousand Words](#)
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Mapping](#)
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July 2016 (4)

June 2016 (4)

May 2016 (1)

57 webinars



7,314 followers



Virtual Internships



USAID | GEOCENTER
FROM THE AMERICAN PEOPLE



Everywhere She Maps

The collage includes:

- A portrait of a woman with glasses, framed by a green circle.
- An aerial view of a modern urban residential complex.
- A large orange circle containing the text "15 Interns hired".
- A large orange circle containing the text "44 chapters majority female".
- A red background with horizontal lines and a metal structure, containing the text "SECURITY IMPROVES" and "Read More".
- A green background with palm trees, containing the text "LIVES ARE SAVED" and "Read More".
- A dark background showing a power line silhouette, containing the text "POWER IS GENERATED" and "Read More".
- A yellow background with a field of tall grass, containing the text "PROSPERITY RISES" and "Read More".
- A blue background with a modern glass building, containing the text "INNOVATION HAPPENS" and "Read More".



Research & Fieldwork Grants



13
fieldwork
grants



Disaster Preparedness, Food Security, Refugee Settlements,
Illegal Mining, Flooding Mitigation, Disease Prevention



Leadership Fellowships



**118
fellows**

SPRINGER NATURE



**Open Mapping towards SDGs:
Voices of YouthMappers on
Community Engaged Scholarship**



Edited by Patricia Solis and Marcela Zeballos

68
co-authors

25
countries



Mapping with our communities





Mapping with our communities





we don't
just build
maps.

we build
mappers.

youth mappers

Table 18.1 Dimensions of characterizing OpenStreetMap as a community of communities

Sector-based categories	Modality of engagement	Social-based categories
<p>Nonprofit/civil society</p> <ul style="list-style-type: none"> • Humanitarian Sector (e.g., International Federation of Red Cross/Red Crescent) • Local nonprofit entities <p>Education/Academic Sector</p> <ul style="list-style-type: none"> • K-12 teachers • University students/faculty <p>Government/Public Sector</p> <ul style="list-style-type: none"> • Local municipalities (e.g., World Bank's Open Cities) • State /Regional governance (e.g., Transport planning entities) • National agencies • Multinational (e.g., World Bank's Open Cities) <p>Private Industry/For-Profit or Commercial Sector^a</p> <ul style="list-style-type: none"> • Information Technology and Services • Computer/GIS Software (e.g., MapBox, • Internet Companies (including Social Media) • Use-Driven (e.g., Restaurants, Construction, Retail, Health Care) 	<p>Data contributors</p> <ul style="list-style-type: none"> • Local mapping (e.g., Craftmappers) • Local and remote (e.g., YouthMappers) • Remote mapping • Dataset uploading (e.g., road networks) <p>Providers of Map-based Services or Value Added to OSM^b</p> <ul style="list-style-type: none"> • General (e.g., Geofabrik, OpenTopoMap) • Functional Providers <ul style="list-style-type: none"> – <i>Edit/Compare</i> (e.g., <i>OSMCompare</i>) – <i>Live/real-time edits</i> (e.g., <i>Show me the way</i>) – <i>Quality Assurance</i> (e.g., <i>Keep Right, Osmose</i>) – <i>Export</i> (e.g., <i>Walking Papers, Field Papers</i>) – <i>3D Rendering</i> (e.g., <i>OSM Buildings</i>) – <i>Routing</i> (e.g., <i>OpenTripPlanner</i>) – <i>Interaction</i> (e.g., <i>Wikipedia overlay</i>) – <i>Services</i> (e.g., <i>OSMNames, OSM Landuse, OpenFireMap</i>) • Thematic Providers <ul style="list-style-type: none"> – <i>Biking, geocaching, hiking, sport</i> – <i>Art, history, archaeology, monuments</i> – <i>Public Transport</i> – <i>Other</i> • Educational (e.g., TeachOSM, LearnOSM) <p>Consumers^c</p> <ul style="list-style-type: none"> • As Base Maps (e.g., Facebook, Wikipedia, Weather.com, Snapchat) • As Data (e.g., Pokémon Go) • As Media (e.g., films and TV)^d 	<p>Purpose-driven (e.g., Humanitarian OpenStreetMap Team)</p> <p>Identity-focused (e.g., GeoChicas)</p> <p>Place-based (e.g., Tanzania Development Trust)</p>

Huadong Guo
Michael F. Goodchild
Alessandro Annoni *Editors*

Manual of Digital Earth

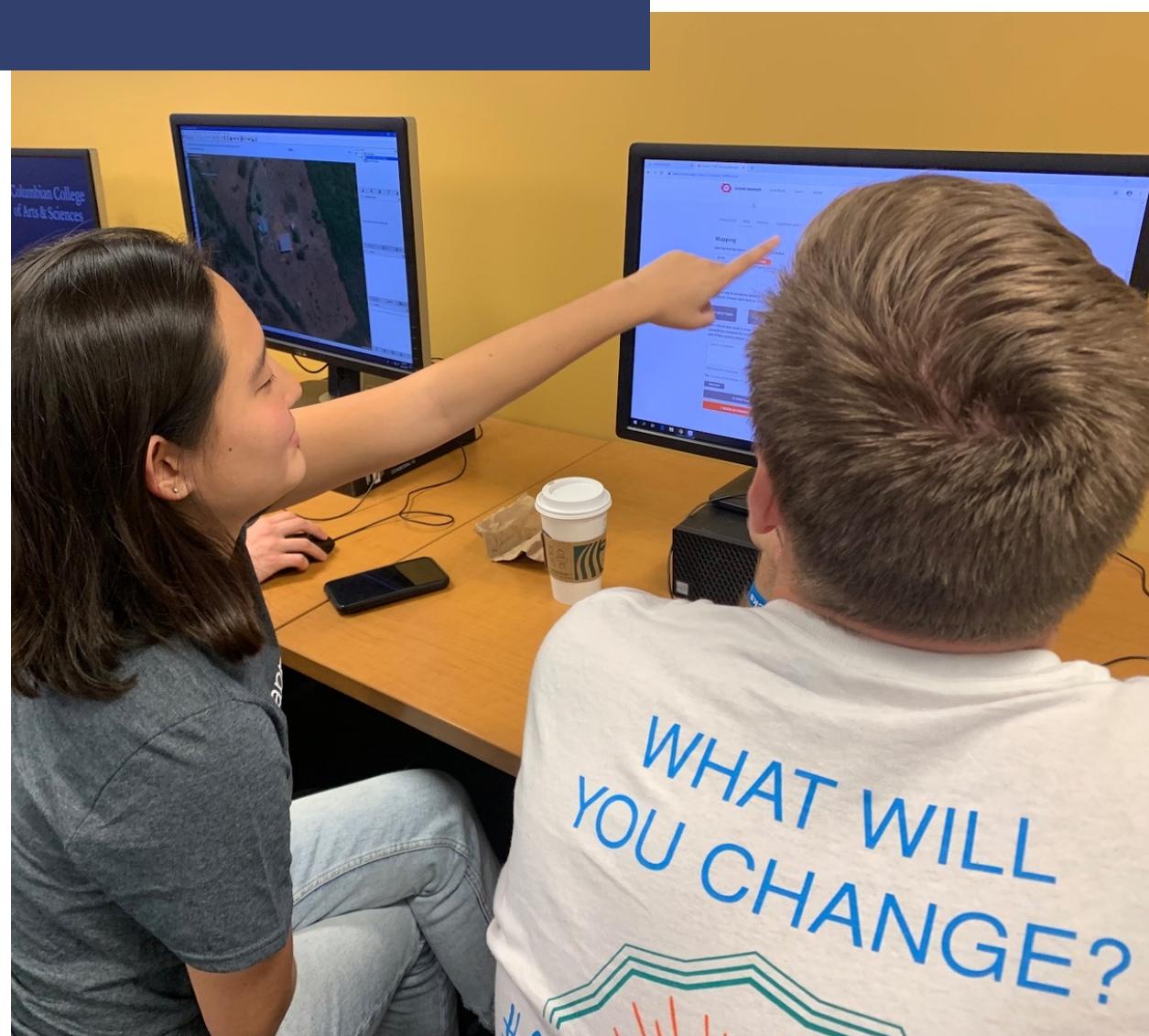
Brovelli, Maria Antonia, Marisa Ponte, Sven Shade, and Patricia Solís. 2019. Citizen Science in Support of Digital Earth. In *Manual of Digital Earth*, International Society for Digital Earth. Springer, Singapore, pp. 593-622.



Within a Context of Higher Education

Academia has spent 21st Century re-evaluating itself as place for learning within global economic realities

- Embrace redefinition (AACU, 2007; Care et al. 2018; Trilling & Fadel, 2012; NAS, 2006)
- Skepticism of meeting contradictory aims (UNESCO, 2015)
- Rejection of underlying ideology (Baltodano, 2012)





Changes within Higher Education

Relevant institutional transformations (Solís et al., 2021)

- Rethink objectives, pedagogy, assessment (Dede 2007) to promote neither a “process-free content nor a content-devoid process,” frameworks to authentically generate knowledge-based “understandings” where skills are learned through “performance”
- Heaney and Rojas (2014) note emergence of multiscalar, hybrid organizations that span intersectional identities at individual and collective scales
- Soja (1996) defines “third space” as a “way of understanding and acting to change the spatiality of human life” to encompass dualisms
- Soja (1996) also synthesizes contributions from post-colonial majoritarian scholars like Said and Bhabha to eschew “digital colonialism” (McCusker 2022)
- ... resonates with motto to “**define our world by mapping it**”



Digital humanitarians for the Sustainable Development Goals: YouthMappers as a hybrid movement

Patricia Solís , Sushil Rajagopalan , Lily Villa , Maliha Binte Mohiuddin , Ebenezer Boateng , Stellamaris Wavamunno Nakacwa & María Fernanda Peña Valencia

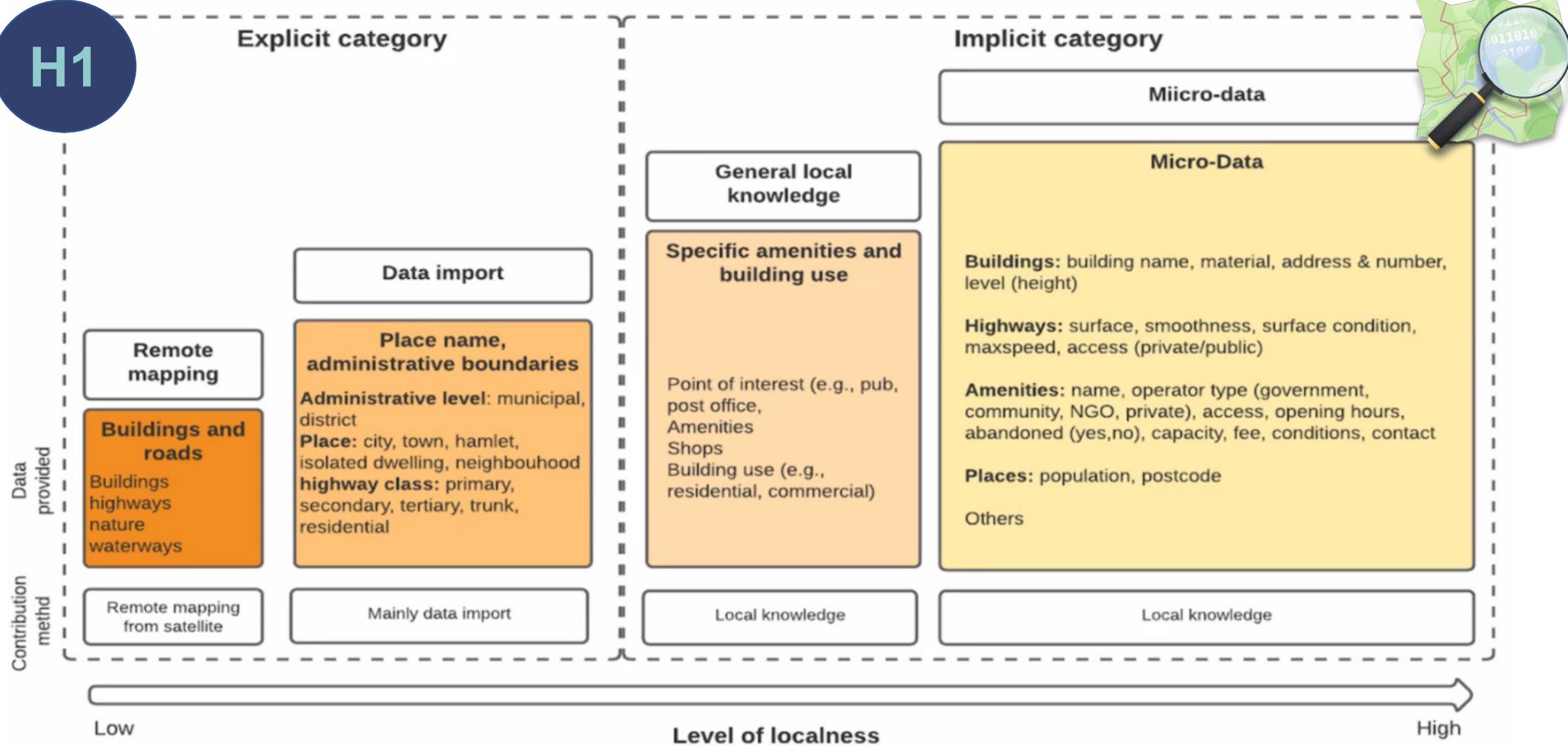




Hypotheses testing (mythbusting?)

- **H1: (Action-of-Performance)** Participating youth either map only locally or remotely, but not both
- **H2: (Hybrid-Roles)** Participating youth cannot simultaneously pursue personal aims to prepare themselves for the workforce and to express their identities as global citizens
- **H3: (Movement-Minded)** Participating youth cannot articulate the impacts/benefits of actions undertaken for broader communities or society through their work with OSM, nor identify the roles/contributions of youth action in this work for the common good.

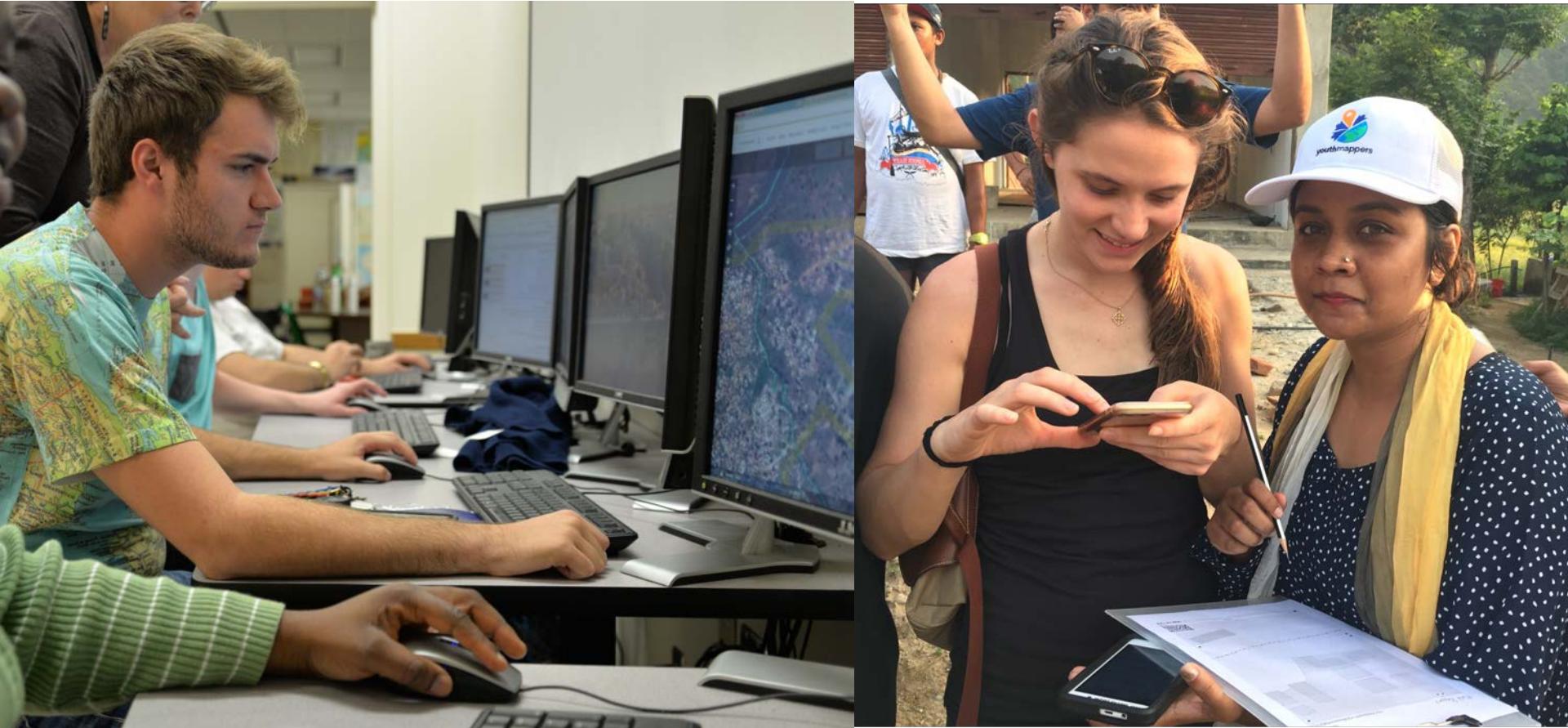
H1



Source: Owusu, Herfort, & Lautenbach, 2021

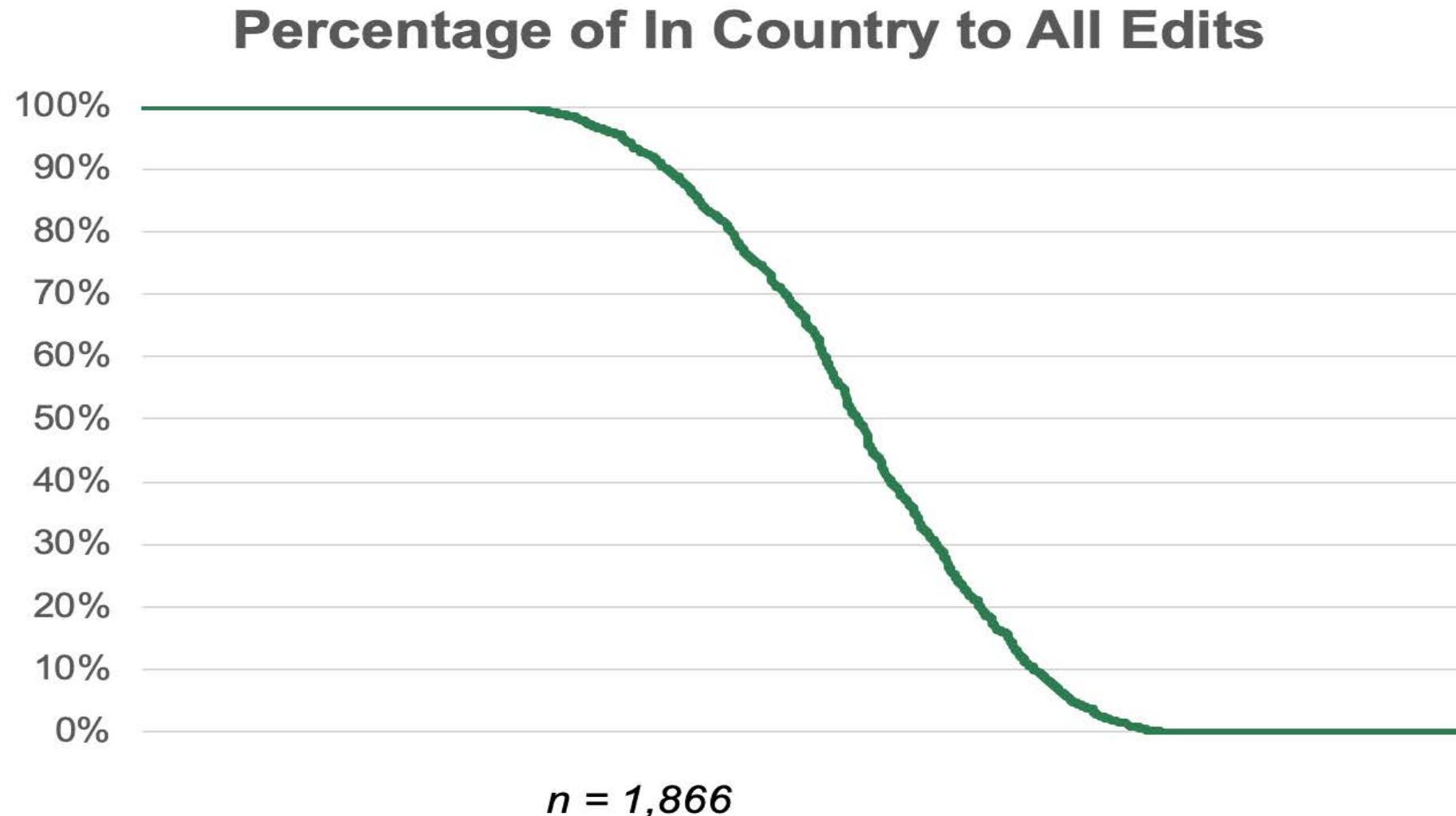
H1

Remote (explicit) and Local (implicit) mapping



H1

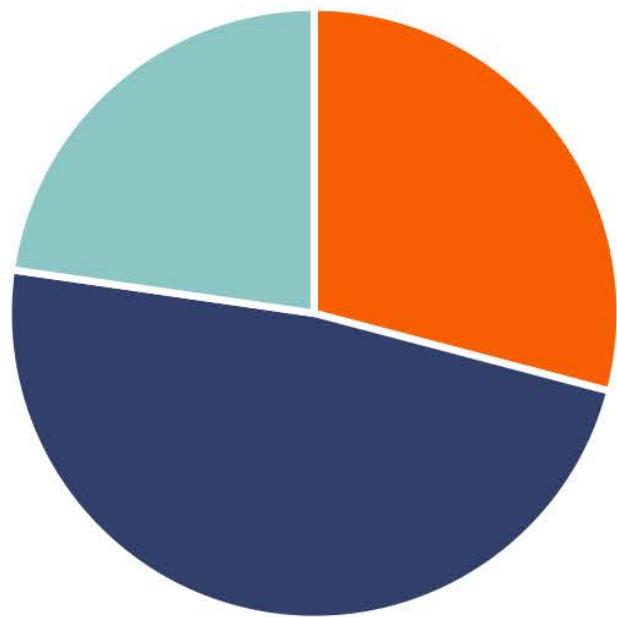
(Action-of-Performance) Participating youth either map only locally or remotely, but not both



H1

(Action-of-Performance) Participating youth either map only locally or remotely, but not both

Number of Mappers by Tendency to Edit



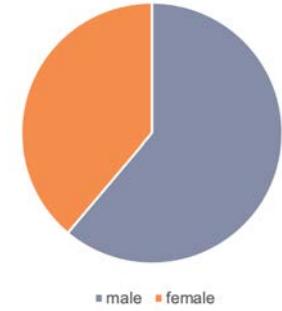
Edit Output of Mappers by Tendency



H1

(Action-of-Performance) Participating youth either map only locally or remotely, but not both

Estimated Participation, by Gender



Percent of Edits that are In-Country relative to total Edits, by gender category, by feature

N				All Gender Known	Difference (M-F)	Total YouthMappers OSM Username Dataset
	Female n=200	Male n=297	Outliers* n=8	n=505		n=766
Buildings	65.64%	52.55%	67.18%	55.13%	-13.09%	60.40%
Highways	44.90%	58.05%	61.26%	54.76%	13.15%	56.60%
Amenities	92.00%	91.06%	92.64%	91.23%	-0.94%	94.90%
All Features	69.62%	54.03%	67.95%	57.56%	-15.59%	61.90%

* z-score above 3.0, effectively edits >250K

(Hybrid-Roles) Participating youth cannot simultaneously prepare themselves for the workforce and express their identities as global citizens

Table 8. Frequency of Affective Utterances by Individual and Group in YouthMappers Blogs by Gender.

Locus of Positive Affect	All Blogs (N = 82)		
	Females (N = 137)	Males (N = 133)	Did not Provide (N = 32)
	40 (29%)	37 (28%)	3 (9%)
Individual	97 (71%)	96 (72%)	29 (91%)
Group			



Table 9. Frequency of Affective Utterances by Individual and Group in YouthMappers Blogs by Region.

Locus of Positive Affect	United States ^a (N = 26)		International (N = 56)		
			African	Asian	South American
	(N = 80)	(N = 139)	(N = 57)	(N = 20)	
Individual	22 (27.5%)	32 (23%)	19 (33%)	7 (35%)	
Group	58 (72.5%)	107 (77%)	38 (67%)	13 (65%)	

^a The one European student was added to the United States data set.



(Hybrid-Roles) Participating youth cannot simultaneously prepare themselves for the workforce and express their identities as global citizens

Table 1. Likert-scaled responses to self-reflection statements, all and by gender.

Statement	All respondents (N = 205)	Female (n = 64)	Male (n = 141)	Difference of Means by Gender	t-test
Being a good citizen	3.68 (.58) 96.09%	3.71 (.49) 98.42%	3.66 (.62) 94.78%	.05	.59
Social responsibility; giving back	3.71 (.53) 97.55%	3.79 (.45) 98.41%	3.67 (.56) 97.16%	.12	1.73
Finding a well-paying job	3.25 (.74) 84.65%	3.24 (.82) 82.26%	3.25 (.73) 85.71%	-.01	-.07
Finding a rewarding job	3.42 (.71) 90.10%	3.44 (.67) 90.17%	3.01 (.73) 90.07%	.33	.35
Living a well-rounded, happy life	3.65 (.58) 95.57%	3.63 (.52) 98.39%	3.65 (.61) 94.33%	-.02	-.26

Mean Score (standard deviation); *Percentage of respondents rating extremely or very important*

Responses are 4 = extremely important, 3 = very important, 2 = somewhat important, 1 = not important.

* $p < 0.05$

** $p < 0.01$

(Hybrid-Roles) Participating youth cannot simultaneously prepare themselves for the workforce and express their identities as global citizens

Table 2. Likert-scaled responses to self-reflection statements, by region.

Statement	Global South (n = 185)	Global North (n = 20)	Mean difference	t-test
Being a good citizen	3.72 (.51)	3.29 (.96)	.43	2.04
Social responsibility; giving back	3.72 (.48)	3.52 (.56)	.20	1.10
Finding a well-paying job	3.23 (.75)	3.29 (.85)	-.05	-.27
Finding a rewarding job	3.38 (.71)	3.71 (.64)	-.33	-2.07*
Living a well-rounded, happy life	3.63 (.59)	3.71 (.56)	-.08	-.60

Responses are 4 = extremely important, 3 = very important, 2 = somewhat important, 1 = not important.

* $p < 0.05$

** $p < 0.01$



Students doing these YouthMappers activities say they were able, as a direct result of their chapter participation, to:



Attend a national or international conference

Serve in an unpaid internship

Receive a paid internship

Obtain a job offer

MALE	FEMALE	ACTIVITIES ▾	46%	13%	24%	5%
83%	80%	Attended or organized a Mapathon	46%	13%	24%	5%
78%	88%	Received training	47%	17%	20%	6%
28%	27%	Initiated a local chapter-led project	47%	18%	23%	5%
70%	48%	Conducted field mapping	48%	17%	26%	6%
55%	53%	Recruited new members to their chapter or for a new chapter	50%	16%	22%	5%
59%	30%	Taught local community members how to use open mapping	48%	15%	25%	8%
18%	16%	Took college curriculum with humanitarian mapping	51%	11%	26%	9%
17%	9%	Completed a formal university course dedicated to humanitarian mapping	55%	6%	29%	13%
33%	28%	Conducted online exchange with another chapter	53%	14%	24%	10%
28%	17%	Performed outreach to local secondary, middle or primary schools	57%	11%	21%	4%
57%	55%	Served as an officer or leader of their local YouthMappers chapter	51%	14%	26%	6%
28%	23%	Participated in an in-person exchange with another chapter	63%	20%	29%	8%
14%	13%	Served as a mapping intern	63%	29%	25%	11%
23%	31%	Received a YouthMappers Leadership or Research Fellowship	76%	16%	30%	4%

(Movement-Minded) Participating youth cannot articulate the impacts/benefits of their actions



Table 5. Likert-scaled responses to impact, by region.

Statement	Global South (n = 185)	Global North (n = 20)	Mean difference	t-test
I know how mapping could impact my local community	4.77 (.485)	4.43 (.598)	.339	2.509**
I am aware of ways that I could raise awareness about my involvement in this program in my local community	4.43 (.645)	4.05 (1.117)	.385	1.549
I know how explain benefits of science to society	4.46 (.618)	4.33 (.577)	.128	.905

Responses are 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree.

* $p < 0.05$

** $p < 0.01$

(Movement-Minded) Participating youth cannot articulate the impacts/benefits of their actions



Table 7. Likert-scaled responses to SDG statements, total and by gender

Statement	All Respondents (N=205)	Female (n=64)	Male (n=141)	Mean difference	t-test	Global South (n=185)	Global North (n=20)	Mean difference	t-test
I am familiar with all of the 17 Sustainable Development Goals (SDGs) adopted by United Nations	4.38 (.85)	4.52 (.69)	4.32 (.91)	.19	1.50	4.47 (.76)	3.62 (1.16)	.856	4.57**
I believe SDG knowledge and awareness helps fulfill responsibilities to be a global citizen	4.63 (.60)	4.61 (.59)	4.64 (.60)	-.03	-.32	4.69 (.53)	4.10 (.83)	.59	3.21**
I believe YouthMappers has helped in enhancing my knowledge and awareness of SDGs	4.42 (.83)	4.43 (.67)	4.41 (.90)	.02	.19	4.50 (.76)	3.71 (1.05)	.79	4.26**
I understand the important role youth play in promoting and attaining SDGs	4.60 (.60)	4.63 (.58)	4.60 (.61)	.03	.43	4.68 (.55)	4.00 (.71)	.68	5.23**
I can confidently explain the contributions of youth mapping activities to attainment of SDGs	4.36 (.84)	4.28 (.72)	4.40 (.89)	-.12	-.91	4.49 (.70)	3.33 (1.15)	1.15	4.48**

Responses are 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree.

* $p<0.05$

** $p<0.01$

H3

(Movement-Minded) Participating youth cannot articulate the impacts/benefits of their actions

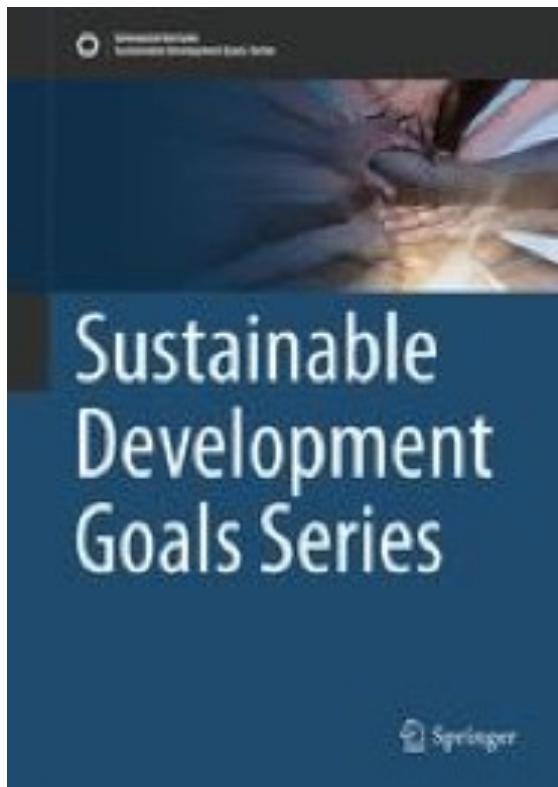
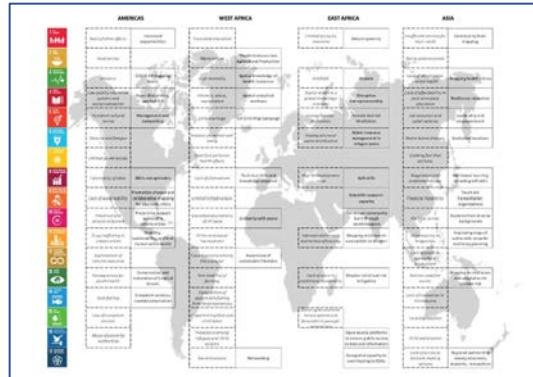
Table 9. Likert-scaled responses to SDG statements, by length of time participating in YouthMappers

Statement	Length of time of participation						Results of ANOVA	
	0 - 1 Year (n=76)		1 - 2 Years (n=51)		2 years or more (n=78)		F-Value	F-Prob
	Mean	(SD)	Mean	(SD)	Mean	(SD)		
I am familiar with all of the 17 Sustainable Development Goals (SDGs) adopted by United Nations	4.36	(0.972)	4.42	(0.906)	4.47	(0.683)	1.227	0.295
I believe SDG knowledge and awareness helps fulfill responsibilities to be a global citizen	4.52	(0.67)	4.70	(0.544)	4.67	(0.553)	1.693	0.187
I believe YouthMappers has helped in enhancing my knowledge and awareness of SDGs	4.35	(0.754)	4.54	(0.813)	4.51	(0.702)	1.289	0.278
I understand the important role youth play in promoting and attaining SDGs	4.47	(0.684)	4.70	(0.505)	4.70	(0.542)	3.612	0.029*
I can confidently explain the contributions of youth mapping activities to attainment of SDGs	4.10	(0.965)	4.54	(0.706)	4.54	(0.807)	7.075	0.001**

Responses are 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree.

* $p < 0.05$

** $p < 0.01$





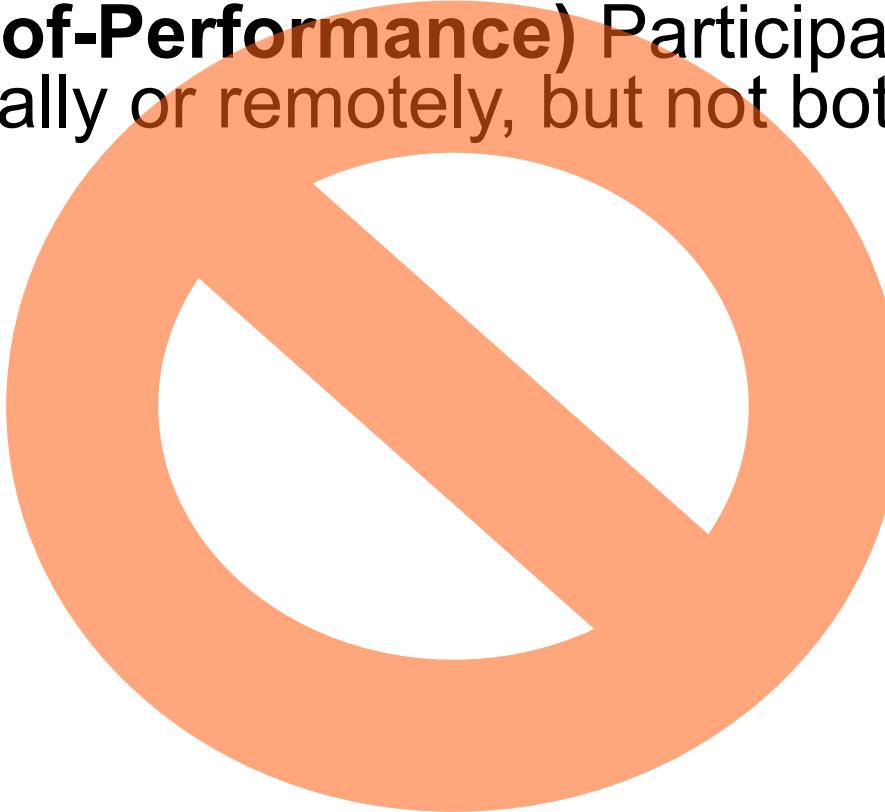
Implications

- What do these characteristics mean for OSM broadly?
- What lessons does this provide for higher education globally?
- What insight does this offer for other communities within the OSM ecosystem?



Hypotheses rejected (myths busted)

- H1: **(Action-of-Performance)** Participating youth either map only locally or remotely, but not both





Life is a team sport.

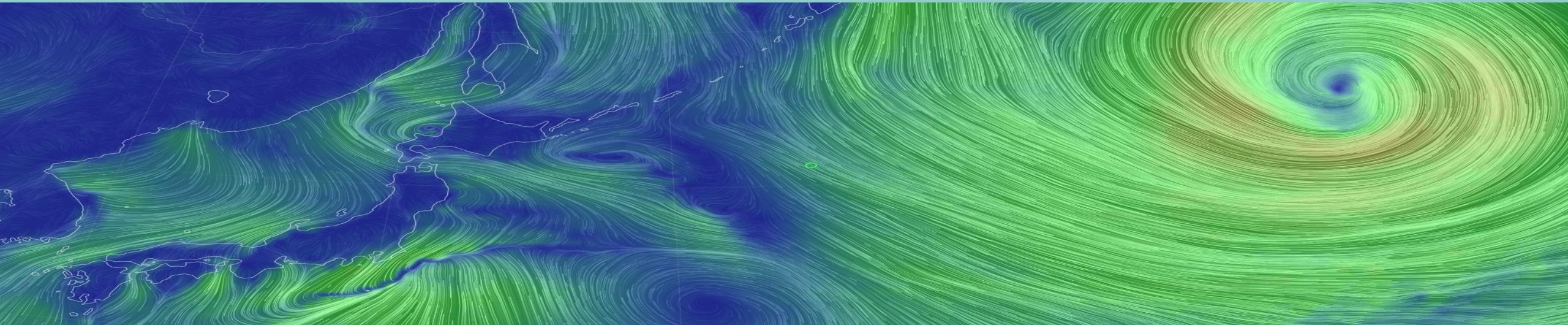
...and so is OpenStreetMap.



Hypotheses rejected (myths busted)

- **H1: (Action-of-Performance)** Participating youth either map only locally or remotely, but not both
- **H2: (Hybrid-Roles)** Participating youth cannot simultaneously pursue personal aims to prepare themselves for the workforce and to express their identities as global citizens

Create a third space.

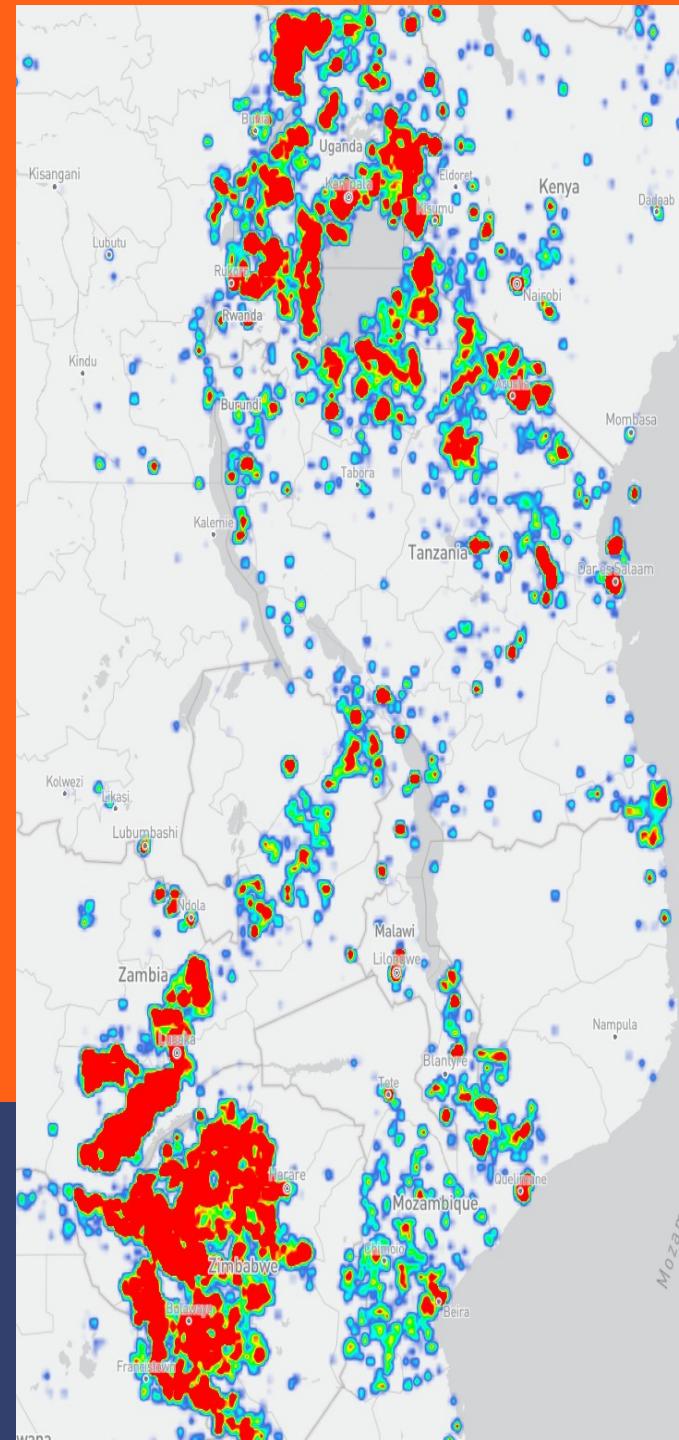




Hypotheses rejected (myths busted)

- **H1: (Action-of-Performance)** Participating youth either map only locally or remotely, but not both
- **H2: (Hybrid-Roles)** Participating youth cannot simultaneously pursue personal aims to prepare themselves for the workforce and to express their identities as global citizens
- **H3: (Movement-Minded)** Participating youth cannot articulate the impacts/benefits of actions undertaken for broader communities or society through their work with OSM, nor identify the roles/contributions of youth action in this work for the common good.

Be a good ancestor.



Thank You!

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