

Comparing in-person and virtual modes of a 4-year museum-based geoscience outreach program

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Check out recordings of virtual pop-ups on Youtube



Plain Language Summary

Over a 4-year period from 2018 to 2022, two graduate students in the Earth and Planetary Science department at UC Santa Cruz partnered with the Santa Cruz Museum of Natural History (annual attendance ~ 14 000) as volunteer Earth Scientists.

Here we evaluate this outreach effort and offer insights into in-person and virtual museum-based Earth Science education.

Synthesis In-person vs. virtual outreach efforts present unique opportunities and challenges.

In-person events

- > experientially rich
- > easily tailored to audience interests, background knowledge
- > reach a limited number of people
- > difficult to evaluate quantitatively

Virtual events

- > more rigid in topic and scope
- > only a limited glimpse into audience experience
- > reach a wider audience
- > difficult to evaluate qualitatively

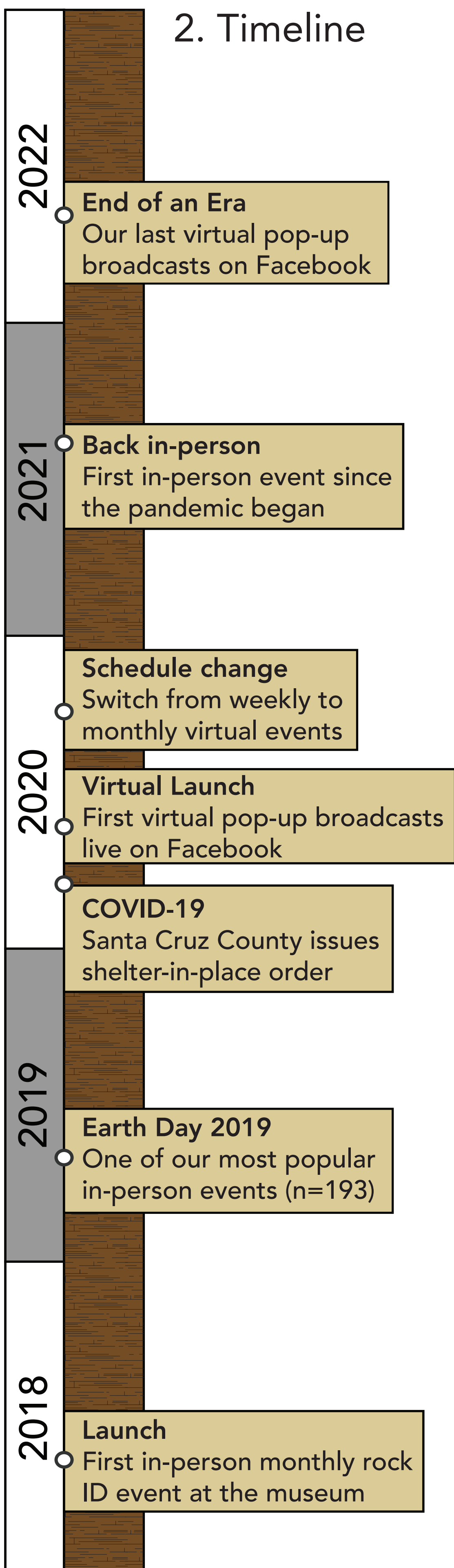
Museum infrastructure and community insight were crucial for both in-person and virtual modes

1. Outreach Program Overview



	In-Person	Virtual
Initiatives	<ul style="list-style-type: none"> Monthly pop-ups with rock ID and intro to a geology concept Specialist interpreters at community events Classroom/camp presentations 	<ul style="list-style-type: none"> Virtual presentations on a specific Earth Science topic Blog on local geologic history and landscapes
Evaluation	<ul style="list-style-type: none"> Museum attendance records Anecdotal feedback/impressions 	<ul style="list-style-type: none"> Facebook and Youtube statistics Audience surveys
Mutual Benefit	<p>Museum: Recurring events; geology expertise</p> <p>Gavin & Graham: Teaching & program development experience</p>	<p>Museum: Long-term content; "pandemic" programming</p> <p>Gavin & Graham: Virtual teaching experience and portfolio</p>
Goals	<ol style="list-style-type: none"> 1 Accessible and relevant Earth Science education 2 Encourage people to recognize their existing familiarity with Earth Science through observation of the natural world 3 Build a connection between the museum and university scientists 	

2. Timeline



3. Qualitative Observations: implementing the program & describing engagement

Content & Outcomes

Science identity
Presenting visitors with the opportunity to observe local geology helped them cultivate their own science identity, within and beyond geoscience

Importance of place
Local geologic history and processes routinely elicited excitement and engagement [e.g. 1]

Museum perspective
Straightforward topics aimed at the local audience (e.g. Santa Cruz Formations) are easiest to share as an ongoing resource relevant for the community

Comparing Modes

Quality & Quantity

In-person pop-ups offer fewer but personalized & in-depth interactions. Virtual programs and interpretation at busy events offer many cursory interactions

Adaptability

More structured virtual lectures target a narrower age range than in-person conversations, which were inherently flexible and tuned to the audience

Challenges

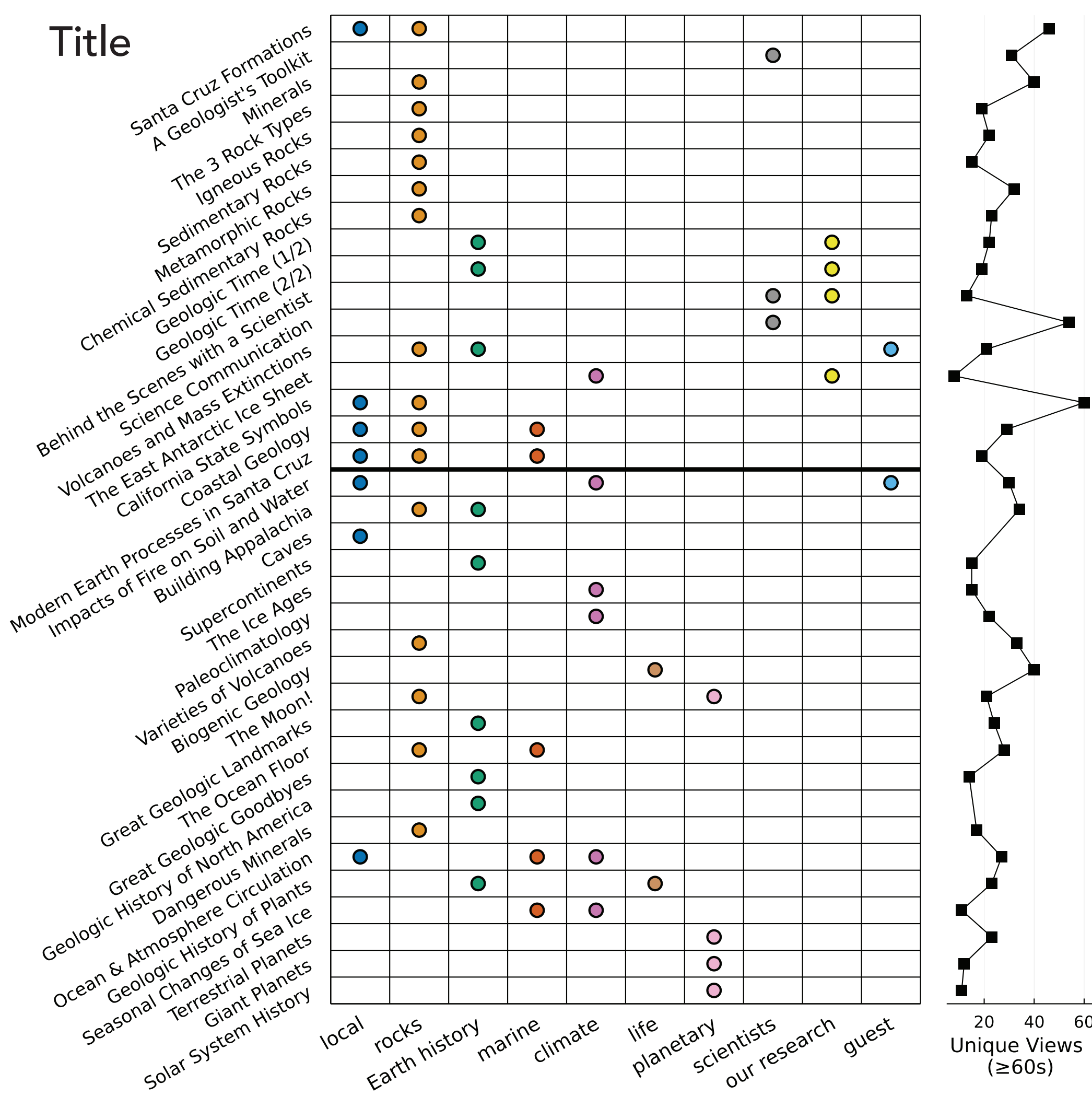
Data Collection

Broad qualitative goals at the outset lead to a lag in structured qualitative & quantitative data collection for evaluation [e.g. 2]

Institutional Barriers

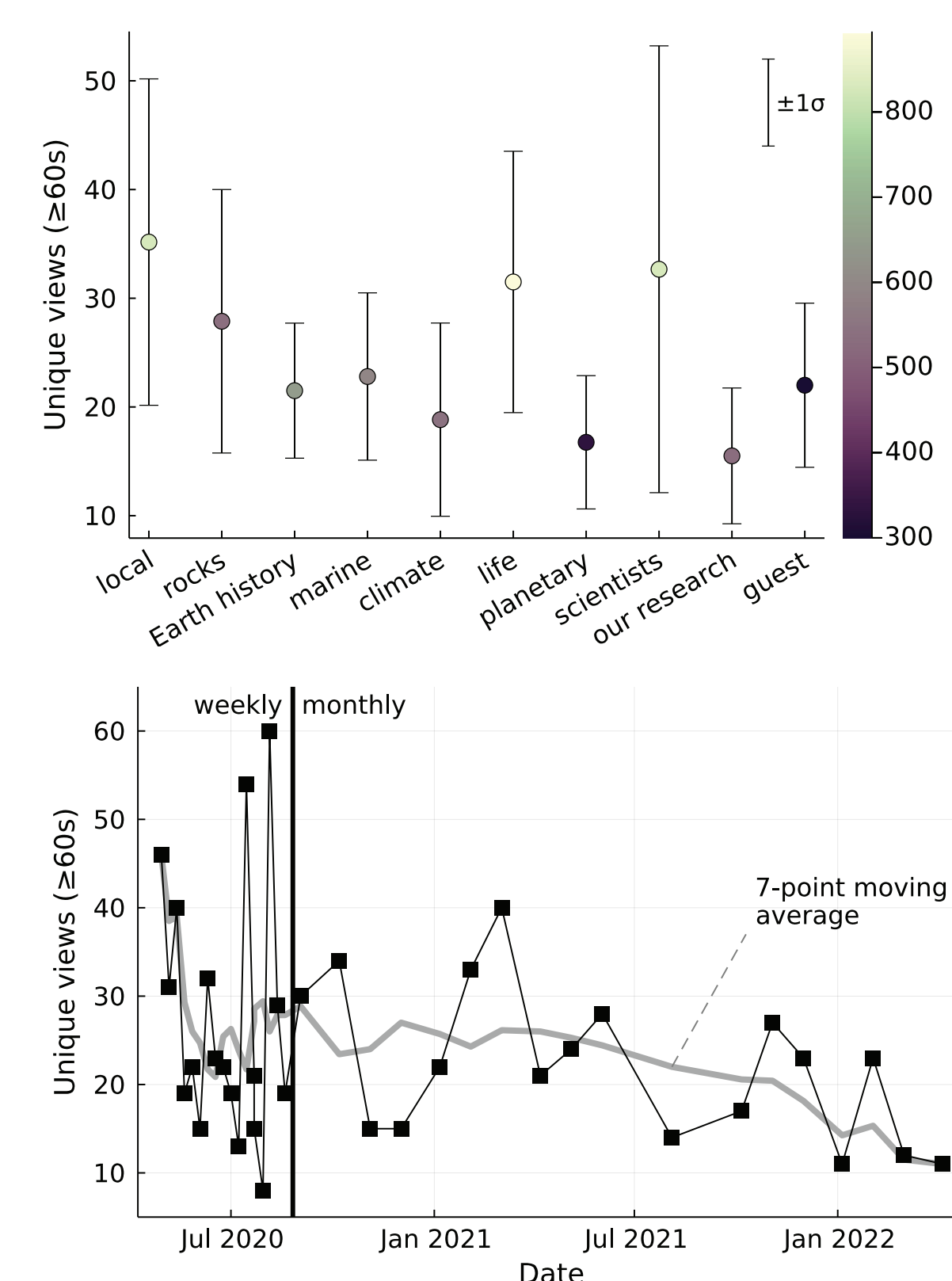
Graduate school research expectations presented a challenge in time management. Events held on weekends or 'vacation' time.

4. Virtual Pop-Ups: titles, topics, & themes



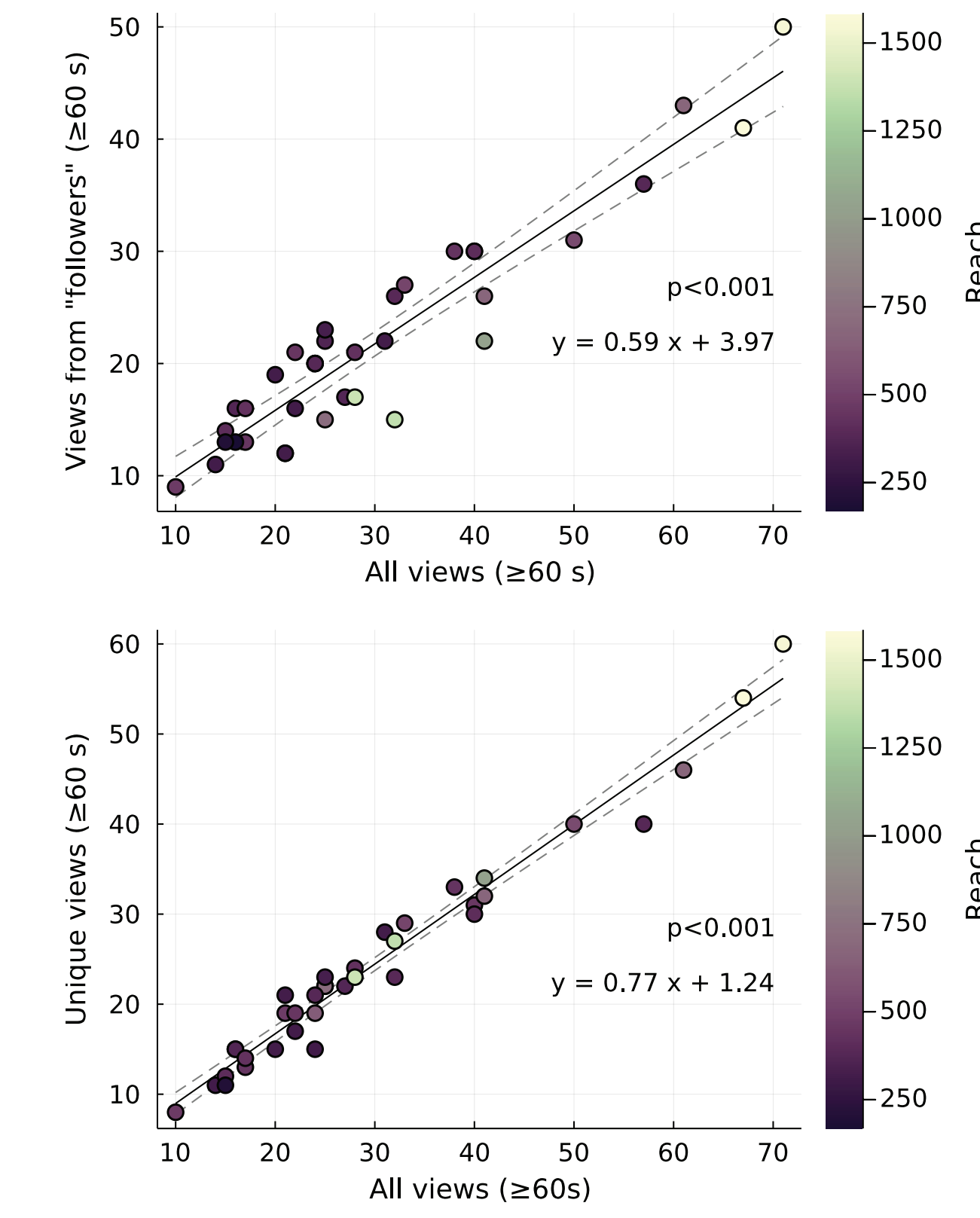
5. Quantitative Observations: measuring engagement

Locals only
Topics focusing on local Earth history & processes had the highest viewership



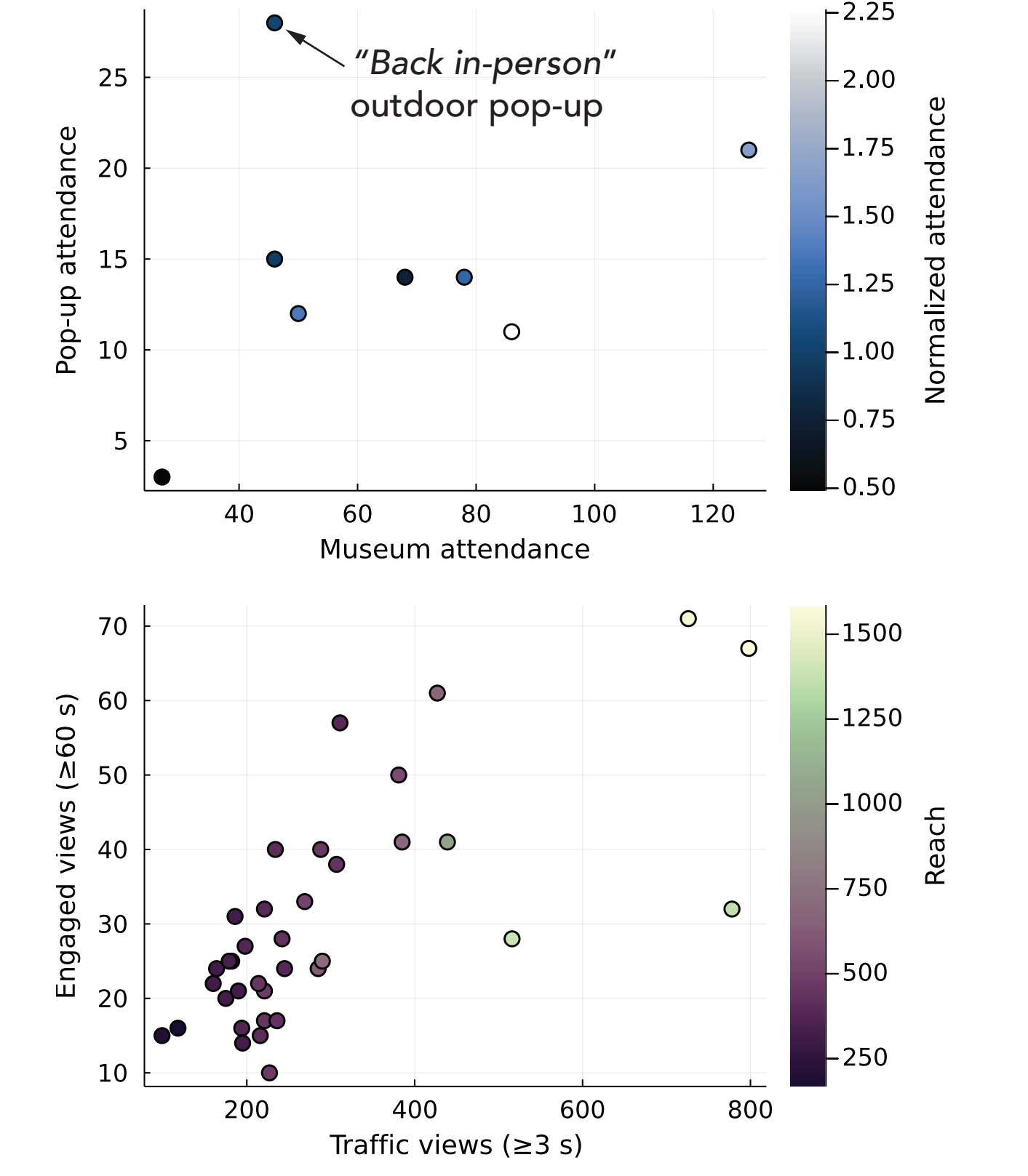
Waning impact
Viewership gradually declined over 2 years

Museum infrastructure is key
Most virtual viewership was tied to the museum (Facebook followers)



One & done
Videos were viewed only once ~80% of the time

Interaction scales with traffic
As more people pass by an in-person pop-up, more substantively engage with it.



We consider ≥60 s views "engaged" interactions, and 3-60 s views "traffic" interactions, which scale with "reach" (unique users that saw the video)

References
 [1] Semken, S., Freeman, C.B., 2008. *Science Education* 92, 1042–1057. <https://doi.org/10.1002/sce.20279>
 [2] St. John, K., McNeal, K.S., 2017. *Journal of Geoscience Education* 65, 363–372. <https://doi.org/10.5408/17-264.1>
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