Climate data user study / Methodology supplement

Overview

Welcome to our methodology supplement. Here, you'll find in-depth information about how we approached and conducted our research. This supplement covers our research approach and user groups, information about our first phase of research (user interviews), and information about our second phase of research (prototype testing).

Research approach and user groups

During a workshop we held in January 2016, we brainstormed a list of potential user groups to study and selected three user groups to focus on: municipal government analysts, science translators, and private-sector planners.

Municipal government analysts are people in municipal government who use data about climate change to inform planning decisions.

- Municipal analysts actively search for the data they need to adapt to and mitigate climate change.
- They are potential users of the PReP platform.
- They might be city planners, water board managers, fire marshals, social services directors, or others responsible for making municipal-level decisions for city, local, tribal, and other non-state governments.
- They may be the ones making decisions based on the data they found, or they may simply inform those who do.

Science translators are experts who try to convey actionable climate-change data and information to municipal governments.

- Science translators supply the data and knowledge that certain climate tools use and repackage for public consumption.
- They could be extension agents, academics, members of NGOs, consultants or particularly sophisticated municipal government staff.
- They also often participate in regional or national consortiums about climate-change science, where they exchange ideas with other scientists.

Private-sector planners are folks who use climate-change data to make decisions for their companies or organizations.

- Private-sector planners may interact with municipal government analysts for data and advice, among other things.
- They may work in many industries– we spoke to those in agriculture, water, or energy.
- They're involved in making company decisions based on climate-change data.

Why only three groups?

As much as we would have liked to interview people from all of the user groups we identified, the constraints under which we were working required us to limit our focus to these three. That said, we hope our research inspires similar research with other relevant user groups.

Why these groups?

Our goal was to speak with people who would best help us answer our research questions, which are detailed in the next section. According to workshop participants, municipal government analysts may be some of the foremost consumers of climate-change data. Speaking with science translators helped us understand not only what municipal government analysts want, but what they *should* want. Finally, private-sector planners provided us important insight into how for-profit companies' and educational groups' needs differ from those of government agencies.

Phase 1: user interviews

Our first phase of research, sponsored by NASA, consisted of user interviews, which we kept relatively unstructured.

Research questions

Speaking broadly, our interviews sought to answer these five questions:

1. **What is the context in which local actors recognize the need to plan for climate change?** What are their current circumstances? What are their overarching or longer-term goals?
2. **What do they *want*?** How would they like to use resources in planning? Who would they like to work with, and how would they communicate their progress?
3. **What do they *do*?** How do they use these or similar resources in planning? Who do they work with, and how do they communicate to progress their work? How comfortable are they working with raw data?
4. **What *should* they want and do?** Are these different from what they currently want and do? What resources, data, or other information should they be taking advantage of?
5. **How is the PReP platform matching user goals?** As it's currently being designed, is it enabling users to do what they want to do? Is it enabling users to do what they should do?

We used these five high-level questions to guide specific questions included in our interview scripts.

Participants

To answer these questions, we conducted interviews with 40 people in and around New York, Chicago, Seattle, Portland, San Francisco, and a rural location (reserved to preserve anonymity). 20 participants were municipal analysts, 10 were science translators and 10 were private sector planners. Municipal analysts had a variety of job titles, including “waste water treatment planner,” “resilience director,” “city planner,” “emergency management specialist” and “operational meteorologist.” Almost all the science translators worked for universities, although several worked for nonprofits or private sector companies. Several private sector planners focused on agriculture, while others were consultants for municipalities.

Recruitment

Colin MacArthur and Jeremy Canfield of 18F were responsible for recruiting our interview participants. Following our January 2016 workshop, Amy Luers of the Office of Science and Technology Policy connected us with several people she thought would be interested in speaking to us. (Ms. Luers is well established in the community of climate-change scientists and decision makers, and was happy to connect us with these colleagues.) In addition, we connected with relevant people in our professional networks. These individuals then introduced Colin and Jeremy to most of the remainder of our interview participants; they referred us to their colleagues, mentors, and friends, who in turn referred us to additional climate-change decision makers.

We contacted potential interviewees via email using a friendly, concise, templated message. When we received participant referrals, the referrer sent relevant contextual and scheduling information to the folks they were referring, and then put those people in contact with Colin and Jeremy.

Interview structure

Our interviews were comparatively unstructured. That is, though our team sought certain information from our interviewees, they also tried to structure each session more as a conversation to allow the people we spoke to to represent their situations and experiences as accurately as possible. Our goal was to capture people's processes, tactics, and honest feelings on finding useful climate-change data. By asking people direct questions, having them walk us through interim work-products and observing them in their work environments, we were able to construct a more complete picture of their data and science-translation needs.

We used the following protocol for our interviews:

- Before the sessions, we set participants' expectations. We let them know we'd be recording the conversation and that we wanted to see their workspace exactly as they use it. We also told participants we will not write your name on our interview notes, we will not label our recordings of our interview with your name and we keep the list of people we interviewed in a secure place where only team members can access it.
- Prior to the sessions, we emailed participants the consent form.
- During the sessions, we encouraged participants and remote observers to ask questions.
- At the end of the sessions, we thanked participants for their help and encouraged them to send follow-up questions.

Phase 2: prototype tests

Our second phase of research, sponsored by NOAA, consisted of several weeks of prototype testing. Our main goal for this research phase was to construct prototypes to test several broad hypotheses about how we could improve the climate data experience of municipal analysts, private- sector planners, and science translators.

18F's Design Method Cards define a prototype as "a rudimentary version, either static or functional, of something that exhibits both realistic form and function." In other words, a prototype is a rough representation of a tool or product that people can interact with.

Hypotheses

We tested three hypotheses:

1. **Integrated displays of data:** A tool that shows projected local climate change for different metrics — and that allows people to use this data alongside their own — may make decision making easier for municipal analysts.

2. **A science translation toolkit:** Offering templated language and interactive elements that appeal to broad audiences can make it easier for science translators to reach those audiences.

3. **Enhanced navigation between resources:** Resources that promote climate-change awareness should funnel people to resources that facilitate adaptation planning.

Why these three?

Our stakeholders and the participants in our kickoff and results workshop identified these as the most interesting hypotheses.

One additional hypothesis was not prioritized for testing during our workshop regarding facilitating peers and experts sharing knowledge in synchronous and asynchronous ways. We chose not to test this hypothesis because there is already ongoing work in this space.

Participants

We conducted usability tests of our prototypes with 20 users in New York, Chicago, Portland, and Seattle.

Recruitment

Our recruitment methods for phase 2 of our research were much the same as those we used during phase 1. We began by contacting analysts we knew or had already been in contact with, asking them if they'd like to participate. We also continued to snowball sample — that is, ask people we'd worked with for more referrals.

We contacted potential participants via email using recruiting templates similar to those we used during phase 1 of our research. When we received participant referrals, the referrer sent relevant contextual and scheduling information to the folks they were referring, and then put those people in contact with Colin and Jeremy.

Prototypes and tasks

To test these hypotheses, we built two prototypes: an integrated data display tool (for hypotheses 1 and 3) and a science translation toolkit (for hypothesis 2). We also conducted a card sort to both gather a list of resources which analysts access and understand how they might wish to do so (related to hypothesis 3).

Like our phase 1 interviews, our prototype tests were unstructured; although test administrators loosely followed a prepared script, they also remained open to the conversational detours each test facilitated. When test participants brought up subjects of interest, test administrators maintained the freedom to pursue these relevant lines of inquiry.

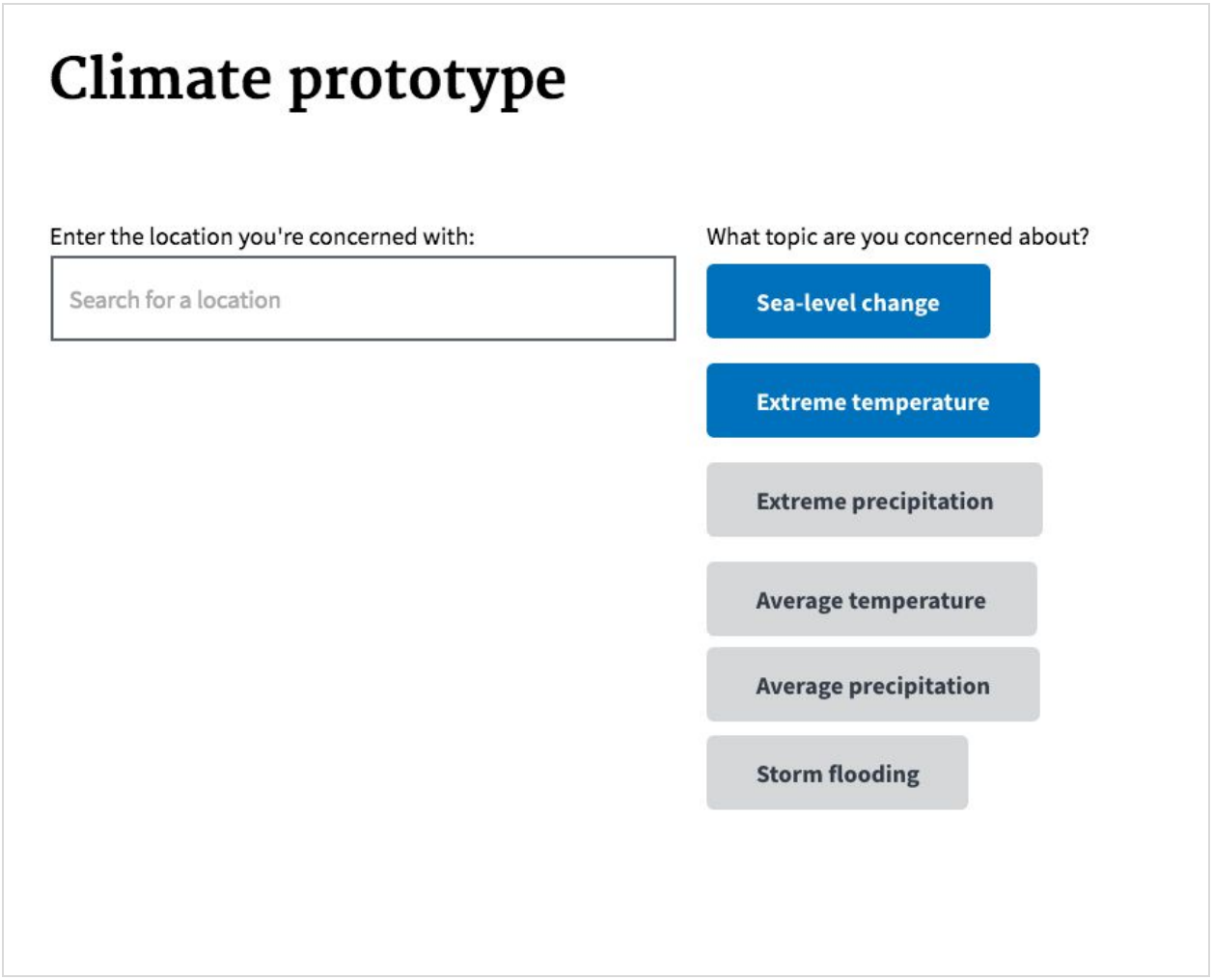
The protocol we followed for our prototype usability tests were very similar to those we followed for our interviews. To ensure the best possible results, we developed the following usability test protocol:

- Before the sessions, we provided participants with information about what to expect. We let them know that they'd need to have access to a computer connected to the network, and that we'd be observing them as they interacted with various tools.
- Prior to the sessions, we emailed participants the consent form.
- During the sessions, we encouraged participants and remote observers to ask questions. We avoided guiding participants in any particular direction or asking leading questions, but rather observed them as they navigated our prototypes.

- At the end of the sessions, we thanked participants for their help and encouraged them to send follow-up questions. Each test lasted approximately an hour and included three distinct sections:

Section 1: Integrated data displays.

We began by emailing participants a link to (and no contextual information about) our integrated-data-display tools. As participants navigated to and experimented with these tools, we observed their behavior and asked them about the general usefulness of the tools, the usefulness of specific features, and what changes to the tools participants might like to see.



First screen of integrated data prototype

Sea-level change

Start by selecting the location for which you'd like sea-level rise data:

Seattle, Washington

Then select an emissions scenario:

Status quo - high (8.5) | **Intermediate (4.5)** | **Lower (2.6)**

Submit

2010

The following three maps show projected sea-level increases for 2010. We aggregated these data from 40 trusted sources. Because different scientific models account for different impact factors, there's some variation among the data we draw on, which accounts for the variations in the maps. You can then download this data or upload your own to display it on the map.

1 ft. (high end)

This is the high-end projection. It features the most extreme increases in sea level.

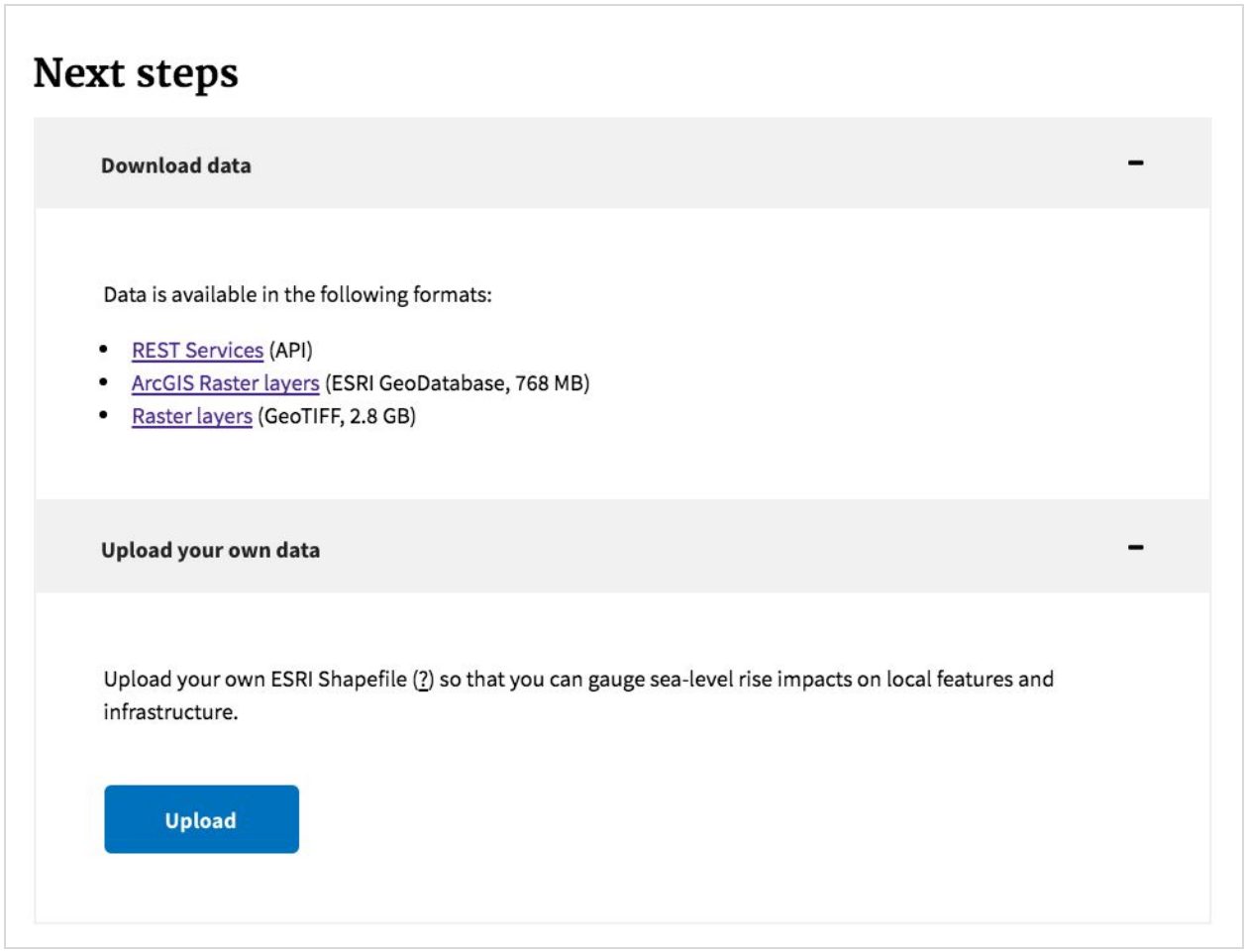
0 ft. (mid range)

This is the mid-range projection. It's more moderate, and may be useful to a broader number of people.

0 ft. (low end)

This is the low-end projection. It features the mildest increases in sea level and represents the lowest-impact situation of the three shown here.

Sea-level change screen, part 1



Sea-level change screen, part 2

Extreme temperatures

Start by selecting the location for which you'd like extreme temperature data:

Seattle, Washington

Then select an emissions scenario:

Status quo - high (8.5) | **Intermediate (4.5)** | **Lower (2.6)**

Submit

The graph below compares the low-end, mid-range, and high-end extreme temperature projections for 2018.

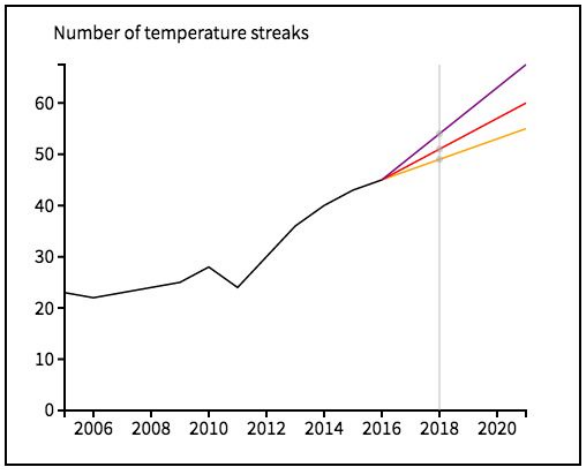
Each line on the graph represents the likely number of extreme temperature streaks predicted for a given year. Note that the low-end projection is indicated in orange, the mid-range projection is in red, and the high-end projection is in purple.

Change the specified year, temperature threshold, and consecutive days values in the appropriate fields below.

Year 2018

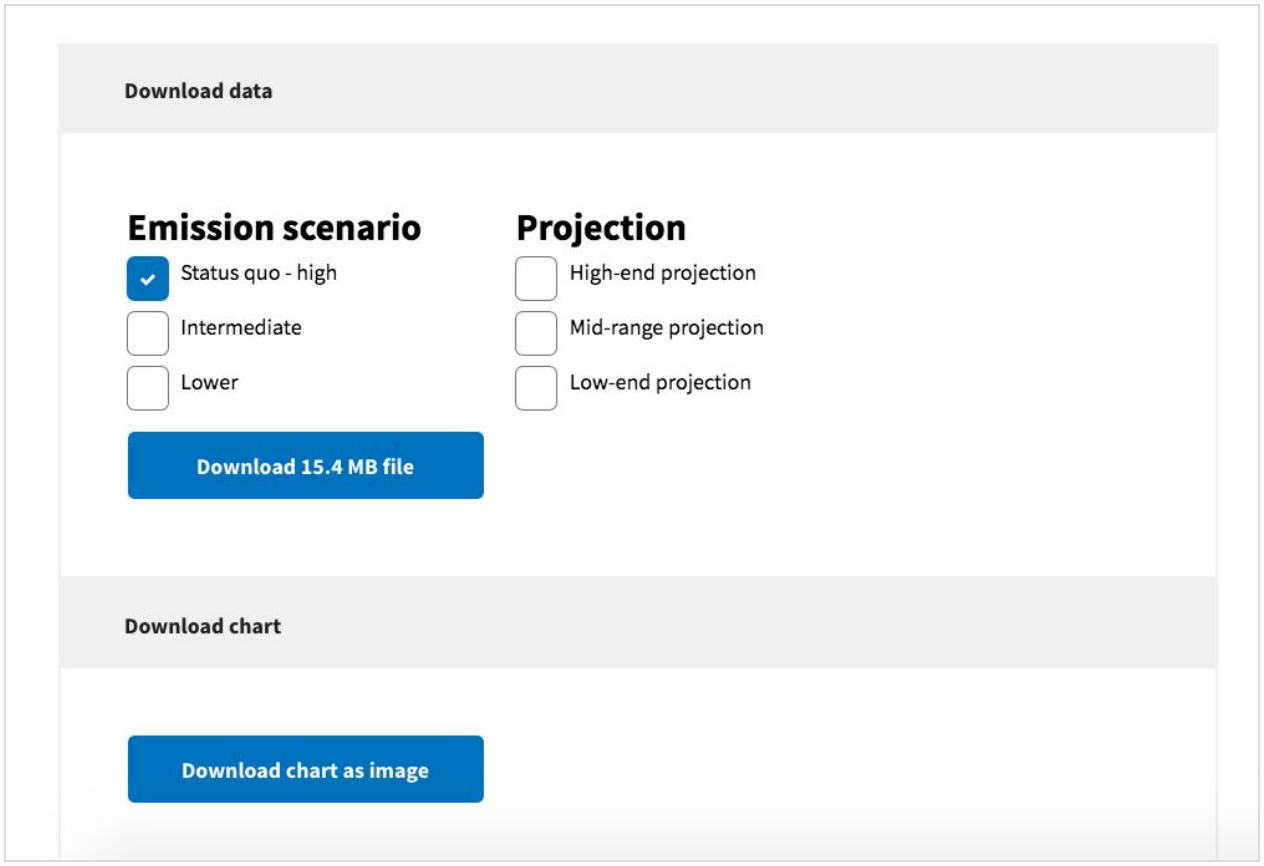
Above degrees (Fahrenheit) 90

Consecutive days 1



In 2018, Seattle, Washington may experience between 49 and 54 extreme-temperature streaks, with 51 streaks being the most likely number.

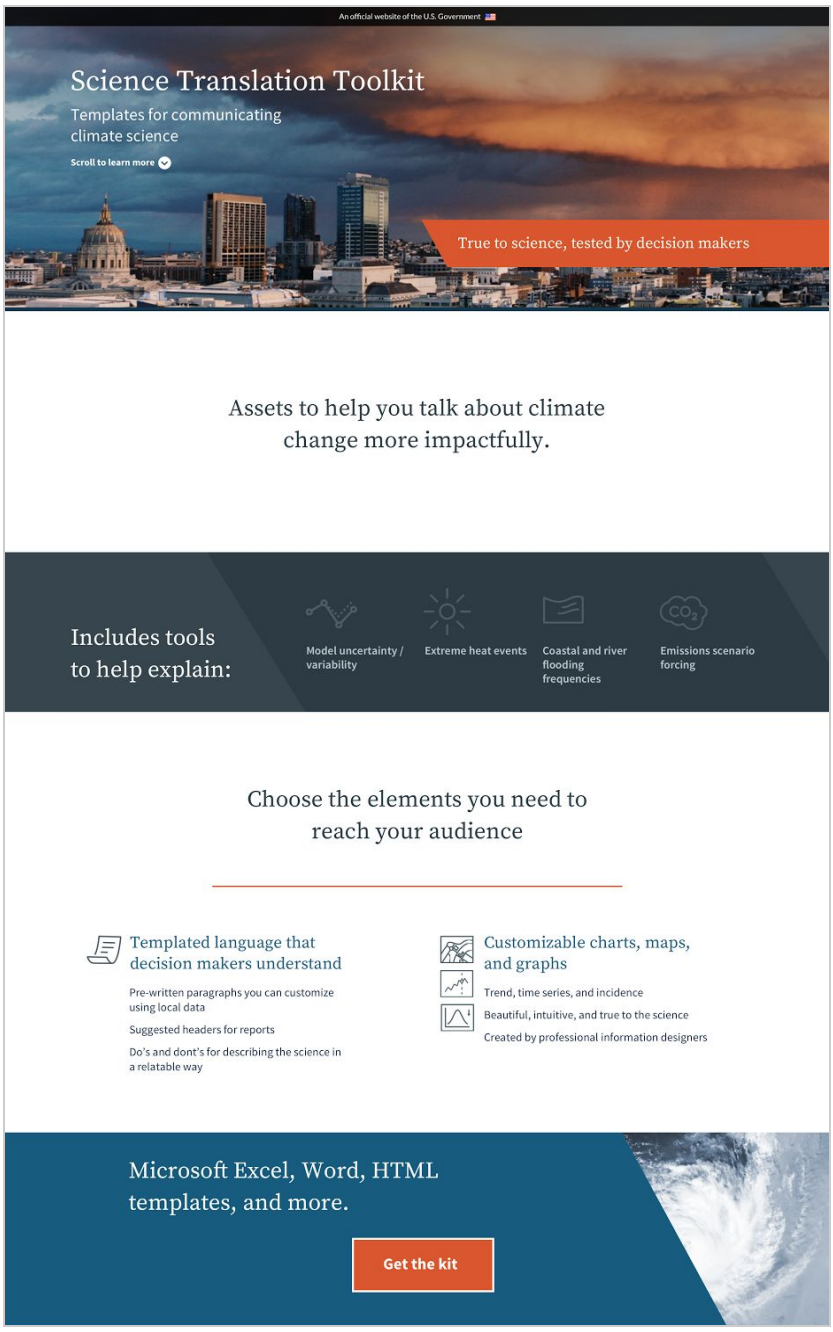
Extreme temperature screen, part 1



Extreme temperature screen, part 2

Section 2: Science translation toolkit

Finally, we introduced participants to our science translation toolkit: a single-page site describing assets people can use to discuss complex climate-change-related themes with non-technical audiences. While participants navigated the toolkit, we observed which features they spent the most time considering, and noted their questions and comments.



Science translation toolkit

Our usability tests of these prototypes helped us identify what was (and wasn't) working with the tools and identify features that would be important in future tools focused on making climate change data more accessible

Section 3: Card sort

Next, we asked participants to brainstorm the pieces of climate-change information that they reference — websites, reports, charts, graphics, people, articles, and anything else. We asked participants to list each item on a separate sticky note, and then (once they'd listed everything they could think of) organize the notes in groups that made sense to them.