Science on a Sphere
Thermodynamics: Currents Change
Formative Evaluation – First Draft of Movie

12/06/09

Initial Analysis

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THIS IS **NOT** A DEFINITIVE FINAL REPORT

FORMATIVE evaluation studies like this one often:

- **Are conducted quickly**, which may mean
  - small sample sizes
  - expedited analyses
  - brief reports
- **look at an earlier version** of the exhibit/program, which may mean
  - a focus on problems and solutions, rather than successes
  - a change in form or title of the final exhibit/program

Methods

Fifty visitors to SMM were recruited on the exhibit floor of the museum and asked to view the first draft of a seven-minute movie being developed for the Science on a Sphere exhibit. Visitors were brought into a small room, sat down and viewed the movie on a computer laptop. After watching the movie, visitors were asked a series of questions to assess their interest, enjoyment, and particular aspects of the movie. Visitors aged eight and above were eligible to be interviewed. Below are the results.

Results

Most of the visitors participating were unaware of the Science on a Sphere exhibit. Nearly three quarters of visitors (74%) who participated in the evaluation of the new SOS movie reported not previously visiting the SOS exhibit (Table 1).

Table 1: Previously Seen SOS Exhibit (n=50)

	Percent of Visitors
Yes	24%
No	74%
Don't Know	2%

Most visitors found the movie highly interesting. Over three quarters of visitors (76%) gave the highest rating for interest in the movie (Table 2). All but one visitor found the movie interesting.

Table 2: Visitor Interest in Movie (n=50)

	Percent of Visitors
I was so interested I want to see it when it's complete.	76%
I was interested, but I probably won't want to see it finished.	22%
I wasn't really interested.	0
I didn't find this interesting at all.	2%

Visitors ranked their enjoyment of the movie lower than their interest. One fifth of those surveyed (20%) found it highly enjoyable, and over a tenth (12%) reported that they did not really enjoy it (Table 3). The majority of visitors at over two thirds (68%) found the movie enjoyable.

Table 3: Visitor Enjoyment of Movie (n=50)

	Percent of Visitors
It was so enjoyable I'd encourage others to come see it when it's finished.	20%
It was enjoyable.	68%
I didn't really enjoy it.	12%
I didn't find this enjoyable at all.	0

Movie Main Point

Visitors were asked what they thought the main point of the movie was. Responses were coded into eight general categories. Half (50%) thought the main point of the movie was about Global Warming/Climate Change without a specific reference to human activity as part of that (Table 4), with a smaller number (16%) identifying Human Impact on Climate as the main point. About one third of those interviewed (32%) identified the temperature connection between the oceans, atmosphere and land as the main point of the movie. A small number (8%) simply identified Oceans or Ocean Currents as the main topic of the movie. Some visitors offered multiple responses coded into more than one category: however, Global Warming/Climate Change and Human Impact on Climate were not duplicated within a single visitor response.

Table 4: Visitor Interpretation of Main Point of Movie (n=50)

	Percent of Visitors*
Global Warming/Climate Change	50%
Ocean, Atmosphere, Land Temperature Connection	32%
Human Impact on Climate	14%
Ocean/Ocean Currents	8%
Energy/Heat/Temperature	8%

Weather/Weather Patterns	6%
Modeling/Predicting	4%
Other	6%

*Multiple responses possible so total exceeds 100.

Below are selected examples from the categories in the above table. A complete list of visitor responses can be found in the Appendix.

Global Warming/Climate Change

- The effects that global warming will produce.
- Teach us about global warming - the changes the earth is going through.
- It seemed like it was just trying to promote global warming theories.
- Global Warming - there was only a vague connection [with currents].

Ocean, Atmosphere, Land Temperature Connection

- Teaching us about how currents conduct heat throughout the world.
- About how currents are changing the temperatures that places have. One place can have a different temperature than a place next to it.
- Temperature of water affects how temperatures on Earth differ.
- To show the changes in the weather due to water currents being heated by the sun.

Human Impact on Climate

- Climate change due to our introducing gases into the atmosphere.
- Researching the effects of humans on the control of the earth's temperatures.
- How humans are changing the planet, the atmosphere.
- Temperature changes... and how we [humans] affect that.

Oceans/Ocean Currents

- Ben Franklin was smart. Gulf stream currents.
- The Gulf Stream and it's changing patterns.

Energy, Heat, Temperature

- How sun controls energy of everything else.
- Water and air temperatures.

Weather or Weather Patterns

- Weather changes.
- How the weather affects us.

Modeling or Predicting

- So you know what the earth is going to do.
- That we can predict temperatures now, but going forward we don't know, unless we get better models.

Movie Tone

Visitors were also asked what they thought about the tone of the movie. Responses were first coded into three response categories: a positive reaction, a neutral reaction, or a negative reaction. Two-thirds of visitors (66%) reacted positively to the tone of the movie, while 20% offered a negative reaction (Table 5).

Table 5: Visitor Reaction to Tone of Movie (n=50)

	Percent of Visitors
Like it/Positive Reaction	66%
Neutral Reaction	14%
Disliked it/Negative Reaction	20%

Visitor reactions to the tone of the movie were coded into ten different categories. Visitors reacting positively to the tone of the movie equally liked that it was a good mix of serious and fun (28%), that it was easily understandable and not too technical (28%), and that it was entertaining, upbeat, or flowed well (28%) (Table 6). A smaller number of those reacting positively to the tone (16%) thought the movie maintained a neutral tone throughout.

Of the ten visitors who reacted negatively to the tone of the movie, more than two thirds thought it was too slow or uninteresting (50%) or too serious (20%), while the remaining group (30%) felt the movie was disjointed or incomplete.

Table 6: Coded Response by Visitor Reaction to Movie Tone (n=41)

	Liked/ Positive Reaction (n=25)	Ok/ Neutral Reaction (n=6)	Disliked/ Negative Reaction (n=10)
Good mix of serious and fun	28%	0	0
Easily Understandable/Not too technical	28%	0	0
Entertaining/Upbeat/Good Flow	28%	0	0
Maintained Neutral Approach	16%	0	0
Slow, Uninteresting	0	17%	50%
Too serious	0	0	20%
Geared towards kids	0	17%	0
Not good for kids	0	17%	0
Disjointed, Incomplete	0	33%	30%
Instructional	0	17%	0

Movie Graphics

Visitors were asked what they thought of the graphic style of the movie. All 50 participants commented on the graphic style with some visitors commenting on more than one graphical image or aspect. An individual's comments might include both a positive and a negative comment. Overall, a total of 64 comments on the graphic style of the movie were coded. Of these 64 comments, nearly three quarters (72%) were positive (Table 7). Of the 50 visitors surveyed, almost all (92%) offered a positive comment on the movie graphics. Two tenths of visitors surveyed (20%) made a negative comment. A small number of visitors (6%) offered specific comments for changing particular of the movie graphics.

Table 7: Visitor Comments on Movie Graphics (n=50)

	Percent of Responses (n=64)	Percent of Visitors* (n=50)
Liked	72%	92%
Disliked	16%	20%
Neutral/Unsure	8%	10%
Had a suggestion for change	5%	6%

*Multiple responses possible so total exceeds 100.

Visitor comments were coded by type of graphic. The greatest number of comments was on graphics in general. Of the 24 visitors offering a comment on the graphics in general, over four fifths (83%) liked the graphics (Table 8). A small number (4%) offered a negative comment on graphics in general. Of the thirteen visitors who commented specifically on ocean and current graphics, all were positive. Fewer visitors liked the city people with nearly two thirds (60%) offering negative comments on the "pop up" people. Of the eight comments on the cartoon graphics (e.g. ships, letters) half (50%) liked them, while nearly two fifths (38%) disliked them.

Table 8: Visitor Comments on Movie Graphics by Category (percentages are by row) (n=50)

Graphic Category	Liked	Disliked	Neutral/ Unsure	Suggestion for Change
Graphics in General (n=24)	83%	4%	13%	0
Oceans and Currents (n=13)	100%	0	0	0
City People (n=10)	30%	50%	20%	0
Cartoons [Letters, Ships, Benjamin Franklin, etc.] (n=8)	50%	38%	13%	0
Real Images [Sunset, Ocean	100%	0	0	0

waves] (n=5)				
City Information (n=2)	50%	0	0	50%
Virtual Earth (n=2)	0	50%	0	50%

Below is a sampling of visitor comments on the graphic style of the movie. A complete list of visitor responses can be found in the appendix.

Graphics in General/Unspecified Graphics

Liked
- I thought it was very well done. Seamless without jumping too much. Done at a pace you can keep up with.
- It was a good mix to keep different age levels engaged, and different learning styles.
- I think it was good. Graphics made it interesting and easy to follow.

Disliked
- Could do better. Add more detail in the pictures.

Neutral/Unsure
- It was hard to see on the computer, but it was okay. Nothing really jumped out.
- Good, but bounces around a lot. Color-wise it bounces and is distracting. Seemed choppy.
- Geared toward children - it didn't bother me, but it seemed geared towards kids [the graphics].

Oceans and Currents

Liked
- I thought it was easy to follow especially at the end with currents above and below the water.
- I thought it wasn't bad for presenting that type of information, like changing the colors of the currents.
- I liked the current flow when the computer showed the icy currents and the warm water flowing for contrast.
- The best graphic was the underwater stream.

Pop Up/Regional People

Liked
- Liked it. Having different people from different regions, they stood out. Speaking in their own language was good.
- Good presentation, part where people were talking was fun - the Russian.

Disliked
- Very good except for the people doing the poses. Too posy.
- But people jumping up were kind of distracting.

Neutral or Unsure
- The people [popping up] were interesting sometimes, but the rest of the movie seemed more serious- the people kind of detracted from that.

Cartoons (Letters, Ships, Benjamin Franklin, etc.)

Liked
- I liked the cartoons. The Benjamin Franklin part was the best.
- I liked the Ben Franklin image. It was not completely a cartoon. I liked the realistic animated image.

Disliked
- Cartoons seemed low quality; thought presentation was ok.
- Purple frame w/ ship seemed odd. Too cartoonish, needs to match.

Real Images (Sunset, Ocean Waves, etc.)

Liked
- I liked that. I much prefer the actual photography to the graphics, the huge ocean waves, the sunset.
- Would love to see more organics, real life footage, don't like the technological pictures/graphics.

City Information

Liked
- I think that was rather good. I liked the city names with information next to them.

Suggestions for Change
- The graphics were okay. I think you need to leave the temperatures (city information) up longer. Maybe place the information at a more center point on the screen. Maybe put both graphics on the city temperatures, etc, up at the same time to compare.

Virtual Earth

Disliked
- The part where it explains the virtual Earth, maybe show the difference between the 1900's version and now.
- But a bad graphic was sectioning the world - didn't show change in Earth (turn red or anything).

Confusing Parts

Visitors were asked if there were any confusing parts in the movie, and if so, which parts. Nearly three quarters of visitors (70%) said there were no confusing parts (Table 9). One tenth of visitors (10%) thought that the flow of the movie was confusing. A few visitors identified computer modeling confusing (6%), current dynamics (6%), and city temperature variances (4%) difficult to understand.

Table 9: Visiting Thoughts on Confusing Parts of Movie (n=50)

	Percent of Visitors*
Not confusing	70%
Movie flow (Jumps around / feels disjointed)	10%
Computer Modeling	6%
Currents	6%

Yes, but unspecified	4%
Cities and Temperature Variances	4%
People Accents	2%

*Multiple responses possible so total exceeds 100.

Below is a sampling of visitor comments on confusing parts of the movie. A complete list can be found in the appendix

Movie Flow

- The whole point of the movie. I thought it was about gulf streams but then it went into global warming without much of a transition.
- Movie jumps. Suddenly underground rivers and didn't connect. Science logic skipped steps. Statements need to be clearer.
- It was kind of A.D.D. - all over the place. There was no flow. It was like writing a bunch of paragraphs with no transitions.

Computer Modeling

- It lost me talking about the computer modeling. Didn't seem very complete- the reason for explaining the modeling and how they are using it.
- The part (at the end) where they showed the globe and they were talking about future changes was unclear. I thought it should have changed. Somehow it stayed there too long.

Currents

- No, but maybe to a younger person- they might have a hard time understanding currents.
- Ben Franklin with red lines on the water.
- I didn't find anything confusing. Maybe the way the currents work could be made a little clearer.

Cities and Temperature Variances

- The beginning when they are doing the different cities. I did not quite get that.
- In middle- doesn't explain why different latitudes (Alaska and its counterpart) have different temperatures.

Visitors were then prompted suggest changes that would make the movie less confusing. All ten comments are listed below in their entirety. Visitor comments were split evenly between movie organization/flow and movie content (Table 10).

Table 10: Visitor Comments on Making Movie Less Confusing (n=10)

	Percent of Visitors
Organization/Flow	50%
Additional Content	50%

Below are all ten comments visitors offered when asked what they needed in order to make the movie less confusing.

- Bullets, the point of the movie, put in the beginning. Maybe data to show how the climate is being affected.
- Calgary/London- why so different weather at same latitude? Connections not clear.
- Alaska example. Talk about what a current is and history of a current before jumping into Franklin.
- When the people come out, I didn't have time to read the information (temperature, etc.) about the cities before it moved on.
- For the longest time I thought this was about global warming, but I never heard those words. Is it the same or different from global warming and how?
- Make a stratification of the layers/bands - just didn't think it was showing anything.
- It was not confusing in the end, but maybe more of a transition.
- Could have lingered on the image longer [city people].
- Should bring it back around at end - talk about London/places again. Just make the main point more clear at the beginning.
- Show the currents go by the cities you talk about, show the city names on the current graphics.

Computers and Climate Study

Visitors were asked to describe in their own words why scientists need computer models to study climate? Visitor responses were coded into 5 categories. The majority of visitors (52%) identified computers as used for predicting and simulating climates (Table 11). One fifth of visitors (20%) said computers were needed to do complex calculations, and a small number of visitors (6%) could not come up with an answer.

Table 11: Why Scientist Need Computer Models to Study Climate (n=50)

	Percent of Visitors*
Predictions/Simulations	52%
Computers can do complex calculations.	20%
Educating/Teaching tool	14%
Run experiments.	8%
Don't Know	6%

*Multiple responses possible so total exceeds 100.

Below is a sample of visitor responses. A complete list can be found in the appendix.

52% (26) Predictions/Simulations

- The models will help to project what is going to happen in the future. They can input data from what is currently happening.
- So they can determine weather patterns for the future, to check for storms and to see what is coming.
- Because the weather happens over such a large time scale. Modeling gives us foreknowledge to do something about it.
- Simulate cause and effect. Outcome--> action.

20% (10) Computers Can do Complex Calculations

- Probably because there is a lot of math. Computers do it much quicker and easier.

- It would take too long to compute by hand.
- Because they can't do it on their own - it's difficult.

Oceans and Climate

Visitors were asked to explain why the oceans are important in understanding climate? Responses were coded into six categories. Over one third (36%) identified the ocean as holding heat or energy (Table 12). Just under one third of visitors (32%) identified the ocean currents as integral in climate, and just over a quarter of visitors (26%) simply identified the oceans as integral in controlling the climate. A small number of visitors (6%) said that they did not know what role the oceans played in climate.

Table 12: Role of Oceans in Controlling Climate (n=50)

	Percent of Visitors*
Hold heat/energy	36%
Currents	32%
Control climate	26%
Cover most of earth/All interconnected	20%
Other	8%
Don't know	6%

*More than one response possible so total exceeds 100.

Below is a sample of visitor responses. A complete list can be found in the appendix.

Hold Heat/Energy

- Oceans heat most of the world. They hold just as much heat as the rest of the earth.
- Because the oceans hold the heat more than the atmosphere.
- This is one thing I learned from the movie: warm water on the surface can travel long distances and evaporate to make heat.
- It had a lot to do with the Gulf Stream and heat from the sun.

Currents

- Due to the effect of the ocean currents on the atmosphere and weather.
- Because of the currents. They carry a lot of heat to the colder areas.
- Because of the currents and different temperature of water moves around.
- Oceans have different temperatures from top to bottom. They bring warm water to cooler areas and cool water to warmer areas.

A Better Movie

Visitors were asked if there was anything else they would like to add that they thought would help make this a better movie? Responses were coded into five general categories. Just over a

fifth of visitors (21%) offered suggestions about organization or the flow of the movie (Table 13). The majority of visitors (58%) had no suggestions. A complete list of responses can be found in the appendix.

Table 13: A Better Movie (n=50)

	Percent of Visitors
Organization/Flow	21%
Tone	13%
More Detail	8%
More on Climate Change/Global Warming	6%
No/ No, with additional comments	58%

Visitor Demographics

Visitors were asked to rank their interest in science on a scale from one to ten. Two of the 50 visitors surveyed did not show their interest on the scale. Visitors ranked their interest in science ranging from a low of three to a high of ten. The majority of visitors (71%) are classified as having a high interest in science with a self-reported interest at eight or above (see Table 15).

Table 14: Visitor Interest in Science on a 1–10 Scale (n=48)

Level of Interest 1 (low) – 10 (high)	Percent
3	4%
6	10%
7	15%
8	25%
9	21%
10	25%

Table 15: Visitor Interest in Science Low/High (n=48)

Level of Interest	Percent
Low Interest (1-7)	29%
High Interest (8-10)	71%

Visitors surveyed ranged in age from eight to 70. Just over a fifth (22%) were under the age of 18, another two-fifths (38%) were adults 18 to 39 years old, with the remaining aged 40 and above.

Table 16: Visitor Age Range (n=49)

	Percent
8-12	12%
13-17	10%
18-21	4%
22-29	20%
30-39	14%
40-49	12%
50-59	16%
60-69	8%
70+	2%

Appendix

Open Ended Responses

Q4: What do you think is the main point of this movie? (n=50)

50% (25) Global Warming/Climate Change

- The effects that global warming will produce.
- Teach us about global warming - the changes the earth is going through.
- It seemed like it was just trying to promote global warming theories.
- It was, the main point was working towards global climate change and how to stop it.
- The emphasis on global warming and how we don't know exactly what is happening, how it is going to affect our world.
- They are setting the stage for the need to do things differently in terms of climate change.
- Global warming- the difference in weather patterns around the world.
- Things are changing. There are differences in temperatures across the world and with the changes in climate, it could affect us all.
- It was about global warming and how it can affect the currents. About how it might be like in a couple years.
- To show global warming effects.
- To introduce the concept that global warming isn't all our fault. More like why don't we investigate this more. It was keeping things neutral [which she liked]; however, I didn't learn that much.
- To educate people on how climate change affects the currents.
- Global warming, emphasis on it, it's what is happening.
- Global warming - how to fight global warming.
- Global warming.
- Global warming.
- You're going to, you want to study how global warming is going to affect the earth.
- To get people educated or interested in what is happening with our climate and earth; why it can be 90 degrees in September and 30 degrees the next day.
- Explaining climate change.
- The main point is the changes in the earth's oceans, atmosphere, and climate change. What is going to happen with the increased changes due to green house gases?
- Global warming and how it affects our atmosphere, temperature, and weather.
- Global Warming - there was only a vague connection [with currents].
- Also how global warming affects the ocean temperatures.
- And then leading into the affects of climate change.
- Global warming, scientists are keeping track of it [these things].

32% (16) Ocean, Atmosphere, Land Temperature Connection

- Teaching us about how currents conduct heat throughout the world.
- About how currents are changing the temperatures that places have. One place can have a different temperature than a place next to it.
- Temperature of water affects how temperatures on Earth differ.
- To show the changes in the weather due to water currents being heated by the sun.
- Currents in different oceans regulate temperature.
- Simply the effect of the Gulf Stream currents on the climate.
- Seems like it is explaining how the ocean currents work in terms of heating the planet.

- To show what affects the climate in different areas.
- That climate is affected by several factors, the atmosphere (the air), as well as the ocean.
- Atmosphere, ocean, currents - how they work.
- How the climate in the world, if you're the same distance from the equator, can have the same heat, temperature.
- Effect of the ocean on global weather.
- How the ocean affects the temperature of the earth. Why it can be different temperatures at different places the same distance from the equator.
- Talking about how ocean currents affect the climate.
- At the beginning I thought it was only about ocean currents and how they affect temperature.
- To teach about currents and how it affects global temperature.

14% (7) Human Impact on Climate

- Climate change due to our introducing gases into the atmosphere.
- Researching the effects of humans on the control of the earth's temperatures.
- How humans are changing the planet, the atmosphere.
- It is showing mainly that the climate is changing and due to human interaction the outcome is becoming unforeseeable.
- Greenhouse gases.
- Temperature changes… and how we [humans] affect that.
- And it goes into climate change, but not too deeply, maybe because it is so political.

8% (4) Oceans/Ocean Currents

- Ben Franklin was smart. Gulf stream currents.
- Didn't realize how it affected the ocean current.
- And how the currents affect the world.
- The Gulf Stream and it's changing patterns.

8% (4) Energy, Heat, Temperature

- How sun controls energy of everything else.
- Hot and cold - global atmosphere.
- Temperature changes across the globe.
- Water and air temperatures.

6% (3) Weather or Weather Patterns

- Weather changes.
- How the weather affects us.
- The earth and the climate [daughter answered and he agreed].

4% (2) Modeling or Predicting

- So you know what the earth is going to do.
- That we can predict temperatures now, but going forward we don't know, unless we get better models.

6% (3) Other

- Think there are so many things we don't understand.
- Don't really know. Interested because I'm studying climate change in school.
- Different regions and how you have to map them depending on where they are located.

Q5. What do you think of the tone of this movie?

66% (33) Like it/Positive Reaction

No additional Comments
- It was a good tone.
- Good. I'm studying this type of climate change stuff in school right now.
- Pretty good.
- I think it's pretty good.
- It's good.
- Good - it wasn't horrible.
- It's ok. [no response to prompting]
- Tone was good.

Good Mix of Serious and Fun
- Good combination. Some fun things, some serious.
- Good. Presented with enough serious and humorous parts to be balanced.
- Good. There were silly and serious parts; a good mixture.
- Good. It got the message across and it was lighthearted.
- Good mix of serious and humor.
- It was appropriate and consistent. The tone was light but it was a good place to use a higher density of humor, especially for kids, and with a lot of information.

Easily Understandable/Not too technical
- Really good. Nice and friendly with humor in there.
- Good. Enough variety in how it was presented more in layman terms, not a lot of scientific jargon.
- Upbeat. Relaxing. Not overly scientific or difficult to understand.
- I thought it was pretty clear. It would keep one's attention. Some of the concepts may be too advanced for children, but the pictures would keep their attention.
- It's good for anybody.
- Appropriate for younger age group - fast paced.
- Tone was educational. Adults and kids could understand it, not too technical.
- It's good. I liked the "it's raining in..." and the use of characters. It was easy to follow. If it were really technical, that would be bad. It was very interesting how the cities on the same level varied in temperature and why. I never realized that.

Entertaining, Upbeat, Good Flow
- It was more upbeat and happy. I liked it. Some of the people seemed a little corny, but it added to that upbeat tone.
- I think it is fine, but perhaps aimed at a younger audience than me. Putting a little extra energy in it keeps their attention fun and engaged.
- It feels very welcoming. If I was walking by I'd stop to see it. I liked the voices and people, the ships and the simulated people.
- Liked it. I thought the people, the pop ups, were entertaining. I thought they were random but it didn't make it bad.
- Very adequate, kept three and six year olds somewhat interested.
- It's good. The background music was good. Kept me interested.
- It's very good. It was done well. It felt very good and flowed very well. You might get native speakers to do the accents for the final production.

Maintained a Neutral Approach
- I thought it was good, not like a scare tactic, just making us aware of what is happening. I thought the presenter was good. The little people with comments were ok, but did not detract or add to it for me.
- It was nice, very educational, not seeming to pick sides. It was comedic. It should bring a smile to the face of people who know how Canadians talk. It would have been better to have a female do the female parts.
- Thought it was neutral and informative.
- I thought it was good. For a second, I thought it was going into the "Al Gore" thing but it came back very nicely. It maintained a neutral tone talking about the subject.

14% (7) Neutral Reaction

No Additional Comment
- I don't know. It was normal.

Slow/Not Interesting
- It was all right. It started slow. I don't think it would grab a kid's attention. For me it was fine. It was okay for me but it is not a great interest for me, the topic. But I thought it was slow to get going.

Geared Towards Kids
- Geared to kids. "Greenhouse glasses" needs to be fixed.

Not Good for Kids
- Good tone, would be more young adults and adults that would be interested. Not kids.

Disjointed/Incomplete
- I thought it was interesting, the narrator was fine. When the people popped up, maybe they can say their lines more slowly. Seemed a little quick.
- It started out differently than how it ended. It was fine, nothing remarkable.

Instructional
- Good. It's an instructional movie - has a professor sound to it.

20% (10) Disliked it/Negative Reaction

Slow/Not Interesting
- Narrator's voice could have been more appealing, the accents were kind of cheesy.
- After a while the voice and music all became the same tone- got really monotone toward the end.
- A little mundane, wasn't vivacious, seemed long. Humor was attempted but not funny.
- I think it is kind of, just a little dull. That is why I did not choose "a" for question 3. [On enjoyment.]
- Consistent with movies - there was a relief for kids. If the objective is to get to global warming, then there was way too much introduction - just get to the point.

Too Serious
- Too serious - little weird and little serious. I liked the funny parts better.
- It's on the serious side. I would like to see more pictures of animals. It would make it more engaging. I had a hard time picturing what I was seeing on a globe. The people were kind of stereotypical. Just leave them out.

Disjointed/Incomplete
- The first part was ok. It was more of a teaching experience. The latter part was, all of a sudden it was something about global climate change. My personal beliefs are a little different.
- It was pretty good. I had a little bit of trouble jumping from the science to the people. It took me a moment to figure out that the narrator was doing all the voices. It was a little distracting. I thought there is a girl but it is a male's voice.
- Hard to tell sometimes whether it was trying to be serious or silly. Seemed a little disjointed, needed more balance.

Q6. What do you think of the graphic style of the movie?

48% (24) Graphics in General/Unspecified Graphics

Liked
- All good, don't know how it will look on a sphere.
- Good, kind of funny.
- I liked it. Neat pictures and illustrations of what you were trying to point out.
- I liked it. I think it was simple enough that everyone could understand it.
- Graphics were pretty good.
- Good.
- Pretty good- too many things I liked.
- I thought it was very well done. Seamless without jumping too much. Done at a pace you can keep up with.
- They were fine. Nothing popped out at me.
- It was good. The other bits were good.
- It was a good mix to keep different age levels engaged, and different learning styles.
- Pretty good. Showed it well.
- Liked it.
- I think it was good. Graphics made it interesting and easy to follow.
- It's ok. I liked it.
- Liked it.
- Those were cool.
- It's cool.
- Good, liked it all.
- Good. All good.

Disliked
- Could do better. Add more detail in the pictures.

Neutral/Unsure
- It was hard to see on the computer, but it was okay. Nothing really jumped out.
- Good, but bounces around a lot. Color-wise it bounces and is distracting. Seemed choppy.
- Geared toward children - it didn't bother me, but it seemed geared towards kids [the graphics].

26% (13) Oceans and Currents

Liked
- I thought it was easy to follow especially at the end with currents above and below the water.
- I thought it wasn't bad for presenting that type of information, like changing the colors of the currents.
- I think it is fine. iStock is a great resource. For me the scenes of the oceans and seeing the power that is in the ocean.

- I liked the current flow when the computer showed the icy currents and the warm water flowing for contrast.
- I thought it was easy to follow. I liked the pictures of the streams [of hot and cold water currents].
- I really liked the ocean currents graphic. The red and blue made it very easy to visualize.
- That was good. Especially the cold currents and how they flow their own way.
- Fine. My daughter liked the ocean images.
- Liked the underwater rivers.
- I thought the visual modeling of the temperature gradient of the water was easily understood.
- I liked the climate visualizations. They were good.
- The computer graphics of the currents. It was simple, not too complicated.
- The best graphic was the underwater stream.

20% (10) City People

Liked
- Liked it. Having different people from different regions, they stood out. Speaking in their own language was good.
- Good presentation, part where people were talking was fun - the Russian.
- The kids popping out, but those were clever.

Disliked
- Very good except for the people doing the poses. Too poesy.9
- Kids popping out didn't fit with the background image.9
- Didn't like the people popping out- seemed incomplete somehow.9
- But people jumping up were kind of distracting.9
- People popping up was really distracting and accents were borderline offensive.9

Neutral or Unsure
- The people [popping up] were interesting sometimes, but the rest of the movie seemed more serious- the people kind of detracted from that.
- I wasn't sure about the people popping out. I got that they were from different parts of the world, but don't know if young people would get it.

16% (8) Cartoons (Letters, Ships, Benjamin Franklin, etc.)

Liked
- I liked the cartoons. The Benjamin Franklin part was the best.
- I liked the Ben Franklin image. It was not completely a cartoon. I liked the realistic animated image.
- From Ben Franklin…those were clever.
- I liked the letters when the ships were crossing the ocean.

Disliked
- Cartoons seemed low quality; thought presentation was ok.
- But some bits, the three ships or the Ben Franklin part, in comparison to the rest, it was quite basic.
- Purple frame w/ ship seemed odd. Too cartoonish, needs to match.

Suggestion for Change
- Real ships would be better than animated ones.

10% (5) Real Images (Sunset, Ocean Waves, etc.)

Liked
- No, they were good. Really liked when it had the sun at the beginning. Looked African.
- I liked that. I much prefer the actual photography to the graphics, the huge ocean waves, the sunset.
- Would love to see more organics, real life footage, don't like the technological pictures/graphics.
- Liked the real images better than the computer ones.
- I liked the shots of different parts of real nature.

4% (2) City Information

Liked
- I think that was rather good. I liked the city names with information next to them.

Suggestions for Change
- The graphics were okay. I think you need to leave the temperatures (city information) up longer. Maybe place the information at a more center point on the screen. Maybe put both graphics on the city temperatures, etc, up at the same time to compare.

4% (2) Virtual Earth

Disliked
- The part where it explains the virtual Earth, maybe show the difference between the 1900's version and now.
- But a bad graphic was sectioning the world - didn't show change in Earth (turn red or anything).

Q7. Are there parts that are confusing? If so, which parts?

70% (35) Not Confusing

- No (17)
- Not really. (2)
- To me it was fine.
- No, it was pretty straight forward
- I was able to understand it.
- Not really. I think it is good for teens and above.
- I wasn't confused anywhere.
- I don't really think so.
- I didn't think so.
- I don't think so.
- No. Not really.
- Not really - explained well.
- No. Very clear.
- No. It went slow enough to follow.
- No, not really.
- No, not really. I don't know if my mind was playing tricks on my but when they talked about gases, I think they said "glasses."
- No. Straight forward.
- I didn't see anything. No

4% (2) Yes, but Unspecified

- Yeah. One part they didn't explain what they were talking about. Don't remember which.
- [The 11-year old boy said there were confusing parts, but he couldn't remember which parts.]

10% (5) Movie Flow

- The whole point of the movie. I thought it was about gulf streams but then it went into global warming without much of a transition.
- Movie jumps. Suddenly underground rivers and didn't connect. Science logic skipped steps. Statements need to be clearer.
- Beginning- at different cities and then suddenly jumped into Franklin.
- I don't think I was confused at all. I do think it changed gears in the middle from how the ocean currents affect temperature to how people do.
- It was kind of A.D.D. - all over the place. There was no flow. It was like writing a bunch of paragraphs with no transitions.

6% (3) Computer Modeling

- It lost me talking about the computer modeling. Didn't seem very complete- the reason for explaining the modeling and how they are using it.
- The part (at the end) where they showed the globe and they were talking about future changes was unclear. I thought it should have changed. Somehow it stayed there too long.
- When introducing different layers of earth model, didn't explain the color changes. They didn't explain it.

6% (3) Currents

- No, but maybe to a younger person- they might have a hard time understanding currents.
- Ben Franklin with red lines on the water.
- I didn't find anything confusing. Maybe the way the currents work could be made a little clearer.

4% (2) Cities and Temperature Variances

- The beginning when they are doing the different cities. I did not quite get that.
- In middle- doesn't explain why different latitudes (Alaska and it's counterpart) have different temperatures.

2% (1) People Accents

- Parts where they were talking different languages.

Q7a: What else do you need to know in order to make it less confusing?

- Only if they could explain what I didn't understand.
- Bullets, the point of the movie, put in the beginning. Maybe data to show how the climate is being affected.
- I can't think of anything.
- Calgary/London- why so different weather at same latitude? Connections not clear.
- Alaska example. Talk about what a current is and history of a current before jumping into Franklin.
- Don't know what to add.
- When the people come out, I didn't have time to read the information (temperature, etc.) about the cities before it moved on.

- For the longest time I thought this was about global warming, but I never heard those words. Is it the same or different from global warming and how?
- Don't know.
- Make a stratification of the layers/bands - just didn't think it was showing anything.
- It was not confusing in the end, but maybe more of a transition.
- Could have lingered on the image longer.
- Should bring it back around at end - talk about London/places again. Just make the main point more clear at the beginning.
- Nothing.
- Show the currents go by the cities you talk about, show the city names on the current graphics.

Q8. In your own words, can you describe why scientists need computer models to study climate?

52% (26) Predictions/Simulations

- Because there is no other way to answer the questions about what's going to happen in the future.
- They need them because they want to find out how the climate is going to change. To know what's going to happen.
- The models will help to project what is going to happen in the future. They can input data from what is currently happening.
- So they can determine weather patterns for the future, to check for storms and to see what is coming.
- Because the weather happens over such a large time scale. Modeling gives us foreknowledge to do something about it.
- Simulate cause and effect. Outcome--> action.
- Because it can better predict what would happen and what we can do or need to do.
- Because climate is the essence, the base, temperature controls all. Scientists need models to forecast what will happen so we can make the proper adjustments to survive.
- Helps to simplify and project for future conditions.
- I guess you need computer models because we don't have enough measurements over a long enough time to make predictions. I guess if you have a model and can input certain data, you can project what different scenarios under different conditions will be.
- To see how it will affect our lives in the future.
- It is constantly changing need to be able to predict and with computer models you can take previous data with current changes and make predictions.
- Can't go back in time to see what it was like, and also to predict in the future
- So they can know what weather is in certain places. So they can predict [weather].
- Because things that humans are doing now in terms of affecting climate are new. We don't have past examples to compare it to.
- So they (scientist) can use the history of the past to make predictions about the future.
- Because it is the only way we have to simulate what might happen instead of waiting for it. It allows us to create different scenarios.
- So they can predict the future, and determine the impact of industries.
- If you could mathematically predict the weather, you could prepare better.
- To help them figure out what the weather is.
- Because they can feed all the information into it. They need the old information and the new information to break it down, what is going to happen.

- Because climate is unpredictable and ever changing due to country differences in their desire to curb behaviors. We want to know what is going to happen in the future so we need models.
- So they can be prepared, find out when weather like a storm is coming.
- It's advanced analysis - projections into the future. I didn't know that about Ben Franklin. That was interesting.
- They can input the currents, the temperatures, to allow a projection of what is to come. They can chart, predict and show different models, predictions.
- We are affecting earth and the climate around it so they can't use the past to predict changes in the future.

20% (10) Computers Can do Complex Calculations

- Probably because there is a lot of math. Computers do it much quicker and easier.
- It would take too long to compute by hand.
- Because they can't do it on their own - it's difficult.
- Without it, would take longer to do some of the things they need to do.
- Because there are so many different factors in each square. A computer can put all the factors together.
- Computers make life simple for everybody including scientists.
- Computers can really move research along quickly.
- So many things to take into account, so many variables, need something to keep them straight.
- Sure would make it a lot easier to get the big picture. Would have taken Ben Franklin a long time with taking temperatures and charting it.
- It's hard to do it in a realistic environment. Have to be able to create models over hundreds of years, not just the present.

14% (7) Educating/Teaching Tool

- It makes it easier to understand for non-scientists.
- No, I can't. Maybe it is easier to visualize.
- I don't think scientists need them. I think the climate is going to do what it is going to do. It might help them understand it.
- It [computers] breaks down the earth's surface into areas so it is easier to study.
- More of a teaching tool to explain to other people. I don't understand how the computer model works.
- Can't get the whole world at once, need to break it down to look at its parts.
- It is far easier if they have a model to create what you have on film. And it is much easier to show people like me what is happening than just talking about it.

8% (4) Run Experiments

- To see certain ways the wind moves. You can't really see the wind move, so a computer can generate it.
- Some things get in the way for things to study. Makes the earth with no pollution.
- Because you can't go under the ocean and follow them for very long in a submarine.
- Anything you can learn using a computer gives you more insight than you had before.

6% (3) Don't Know

- No.
- Probably not [couldn't come up with an answer]
- I don't know. Things are changing and they can't really use the past to predict the future.

Q9. Why are the oceans important in understanding climate?

36% (18) Hold Heat/Energy

- Oceans heat most of the world. They hold just as much heat as the rest of the earth.
- Because the oceans hold the heat more than the atmosphere.
- Hot layer and cold layer.
- Because of the fact that the heat from the sun warms the ocean.
- Because so much of the solar energy is stored there. It comes in and comes back out.
- They hold so much of earth's conditions.
- Because the sun heats the water.
- Because the oceans are the gas tank of the climate. They hold the energy.
- It [oceans] balances heat.
- Oceans have different temperatures from top to bottom.
- The oceans affect the temperature. They give off heat.
- They store energy. I didn't know that.
- They have a huge impact in regulating global temperature- like a huge heat pump.
- Because oceans store heat.
- They can hold so much energy in the water.
- They carry a lot of heat to the colder areas.
- This is one thing I learned from the movie: warm water on the surface can travel long distances and evaporate to make heat.
- Heat from the sun.

32% (12) Currents

- Due to the effect of the ocean currents on the atmosphere and weather.
- Because of the currents.
- Because of the currents and different temperature of water moves around.
- I didn't realize how much impact the ocean had in affecting our climate- the cold-water streams, warm on top and heating the air.
- The currents, they affect the climate.
- Because they change. The Gulf Stream makes areas warmer.
- Because of all the streams and river things that flow throughout the ocean.
- The tides and movement - they're what determine climate.
- This is one thing I learned from the movie: warm water on the surface can travel long distances and evaporate to make heat.
- It had a lot to do with the Gulf Stream.
- Just liked it showed there. That is what creates the Gulf Stream, the currents. If the oceans get too warm, it throws off the balance.
- Because of currents and how they affect temperature and atmosphere.
- And how it circulates and distributes heat.
- And without the currents, weather would not be as we know it today.
- They bring warm water to cooler areas and cool water to warmer areas.
- Because of the warm and cold currents.

26% (13) Control Climate

- They virtually control climate in whatever parts of the world that are near the oceans.
- All climates would be mixed up - hotter or colder and make for an unpleasant environment to live in.
- Oceans are what mediates everything - our climate, hot and cold.
- They are the controlling factor as far as hot and cold.

- Because they drastically change the environment on the land. They are warm when they should be cold.
- Because the bodies of water help regulate temperature change and the climate in general.
- How they react and ocean regulates temperature. Cycle is important.
- Because they play a large part of it, the heating and cooling of the ocean is integral in affecting temperature, winds and weather.
- Off the Oregon coast we have a dead zone because the waters have gotten too warm. Our climate is based on the amount of water in the ocean, and our rainfall is based on the temperature of the oceans.
- Because that's where our weather comes from: cold, heat, tsunamis.
- They [oceans] drive the climate.
- Oceans control much of the climate. They affect the climate a great deal.
- Determines what the climate of the country will be, if it's rainy or if it's warm.

20% (10) Cover Most of Earth's Surface/All Interconnected

- Any changes in Ocean temperatures - everything is all related. How we affect the environment affects the oceans. It's a big circle.
- Because so much of the earth is water and they were a much bigger factor than I knew.
- Oceans encompass two-thirds of the surface of the world. It's a huge influence.
- The oceans are 75%.
- Earth made up of mostly water- huge effects on environment.
- Because they are connected.
- Our oceans are our climate.
- Oceans are so much a percent of Earth, so if there's drastic change, it is going to affect everything else.
- Two thirds of the world is covered by the oceans.
- And the oceans make up so much of the earth.

8%(4) Other

- Temperature of rest of world. Ripple effect.
- Because people are trying to sail and they need to know what to do.
- When warm water stays on top and the cold goes to the bottom, it is similar to what is happening on land.
- Scientists can see what is going to happen, like in El Nino and other things.

6% (3) Don't Know

- Don't know.
- That was the hardest part to understand, the connection between atmosphere driven by oceans. That was the most vague to me.
- I don't know.

Q10. Is there anything else your would like to add that you think would help make this a better movie?

21% (10) Organization/Flow

- At the very beginning, so you have in your mind what you're going to get out of it, tell us where it is going.
- Summary- tie all points together. Kickoff- state topic.
- Also, seems chopped off at the end. It just kind of ends.

- I thought it needed something to kind of wrap it up more completely, bringing the beginning where the use of questions about why it is different temperature in different places, wrapping that all together.
- Primarily, the image/graphic of the earth after explaining creating a computer model, that image lingered too long without any changes.
- I think the introduction was a little long. It kind of repeated itself.
- Narrow the focus and make it more clear from the beginning.
- Just to get to the point more quickly. The underwater currents were interesting.
- Nothing I can think of. Towards the end, when they were talking about climate change, the image lingered for a long time, a globe I think, and I started to drift.
- Have little words on screen - have a box that pops up with tips [captions].

13% (6) Tone

- No, not really. Just improve accents.
- A more upbeat tone. The only humor part was put into the country people, but a little more upbeat put to the other parts too.
- Seemed all right, but not so many stereotypes.
- Thought the one image of the boat framed by "swirlys" did not fit. It seemed harsh.
- Make it more relatable to younger people- maybe a reference to Minnesota [she gave this example]: While you're ice-skating here in MN, kids in wherever are swimming.
- Add animals in their habitats - good for all kids. Can be changes in animal populations. It doesn't all have to be good and happy.

8% (4) More Detail

- I'd like to know a little more about the currents and patterns. Why do they sink? Etc.
- More detail on weather patterns.
- I was surprised that you only showed the currents from one ocean. You talk about heating the whole world but only focus on one ocean. It would be nice to see the world ocean currents.
- Show other models from history that we now know well, then compare it to computer model for climate.

6% (3) More on Climate Change/Human Impact

- More interesting to add more facts about climate changes. What happens if climate change were to occur?
- Maybe explain more about climate change, about emissions coming from cars and buildings. Maybe provide some information on the natural disasters already occurring.
- I think you can add a little more about how climate is changing with the one to two degree temperature change. It would be nice to have something along the lines of what we can do to help save the planet. That may be a good ending.

58% (28) No/No with additional comments

- No. (7)
- No, but with all the talk of climate change I don't see any recycling bins in this building.
- Nope.
- The movie was pretty good.
- Not really.
- No. They did a pretty good job.
- That's the hard part. I think you've done a really good job with it.

- No. Music good, graphics good.
- Nothing (2)
- No, not really. It was well done. Several minutes was a good amount of time to keep one's interest.
- No, I think you've done a good job.
- It's pretty good.
- I don't know. I'm not good at that.
- I can't think of any. A good job so far.
- I can't think of anything. It does not even feel seven minutes long. I think it would hold the attention of my age group. [F, 33]
- No. Thought it was good.
- Fact that it brought out significance of oceans was good. I didn't know about that.
- No, nothing.
- I don't think so.
- Found it enjoyable and entertaining. Would definitely want to see it finished.