How do spherical and flat displays compare on enjoyment and understanding of Earth science concepts?

Initial exploratory study: April, 2014 – December, 2014

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Refined pre-study: October, 2015 - ongoing

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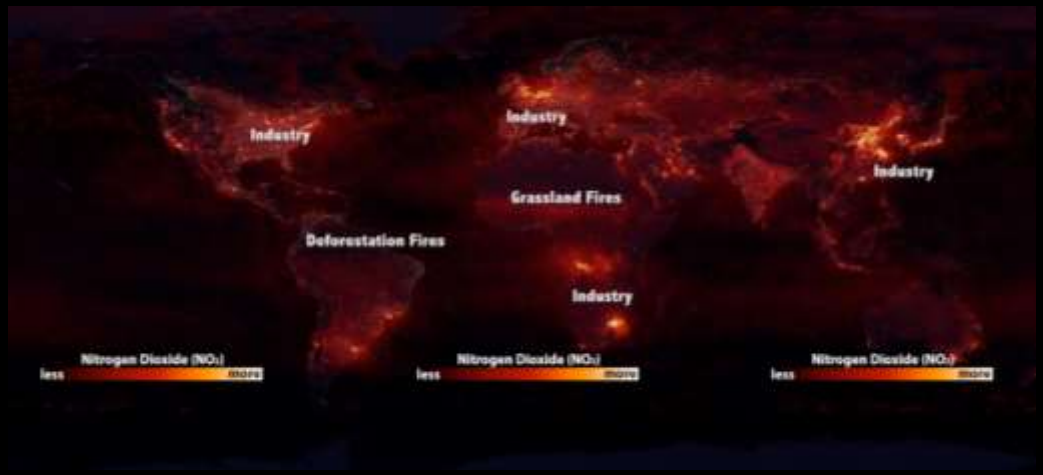
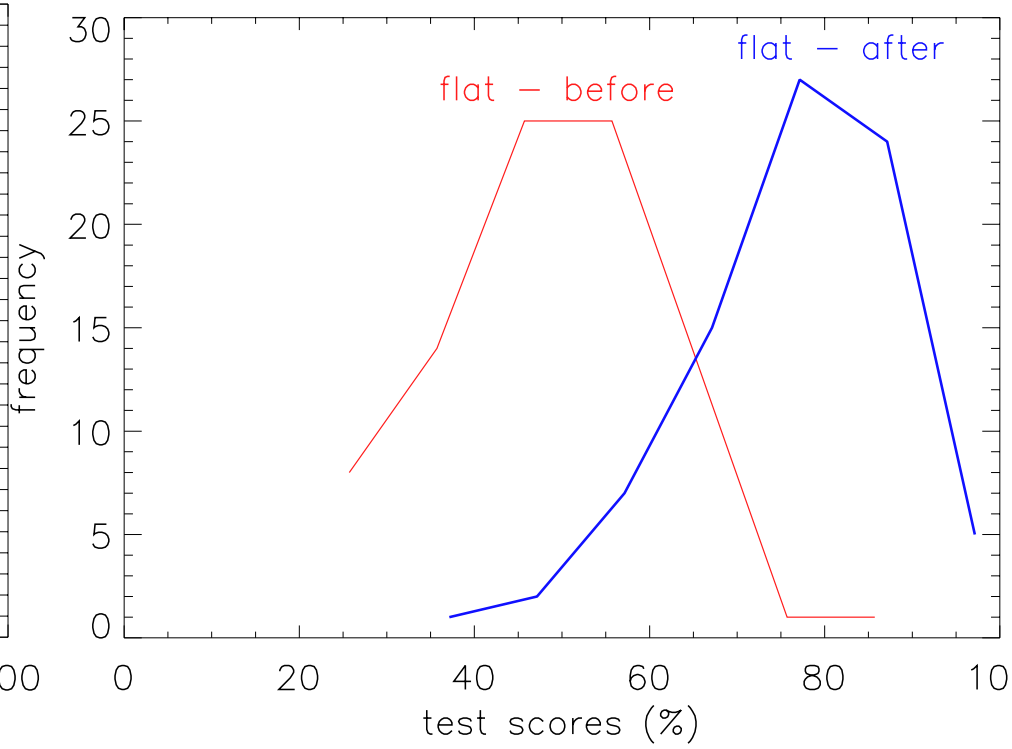
Initial exploratory study of 160 fifth grade students tested knowledge gain and retention by each method



Half the group saw a live Sphere show at the Maryland Science Center

Half the group saw the same live show on a flat screen in their classroom

Both sphere and flat screen groups had 26% gain after the show. Differences due to venue, time constraints, fluency

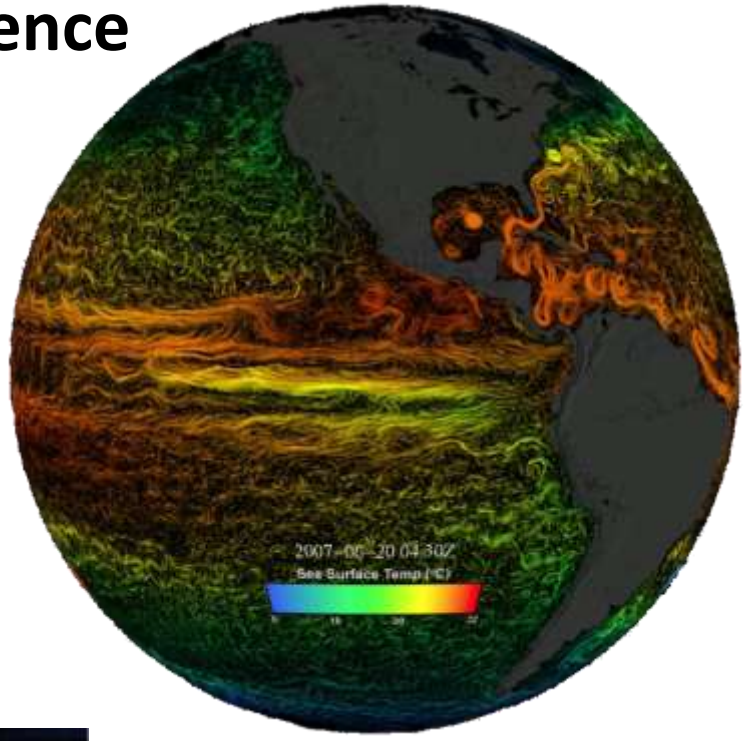


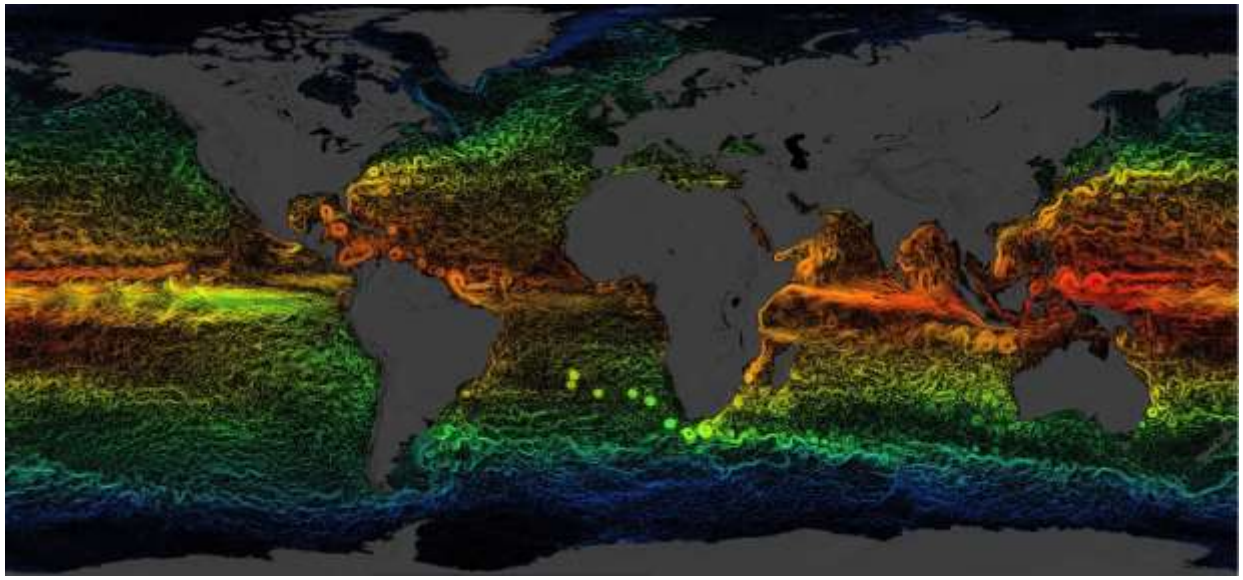
No statistically significant *quantitative* difference.

***Qualitative* comments about Sphere expressed more excitement**

Refined pre-study of 90 tenth grade students tested affect and content gain of Earth system science

Half the group saw a live Sphere show at the NASA Goddard Visitor Center





Half saw the same show on a flat screen at the NASA Goddard Visitor Center

Survey developed to test multiple dimensions: presentation overall, learning satisfaction, grasp of material

	Strongly disagree		Neutral		Strongly agree	
	-2	-1	0	+1	+2	Not sure
Overall, the presentation was...						
Engaging	-2	-1	0	+1	+2	Not sure
Entertaining	-2	-1	0	+1	+2	Not sure
Hard to understand	-2	-1	0	+1	+2	Not sure
Informative	-2	-1	0	+1	+2	Not sure
Objective and factual	-2	-1	0	+1	+2	Not sure

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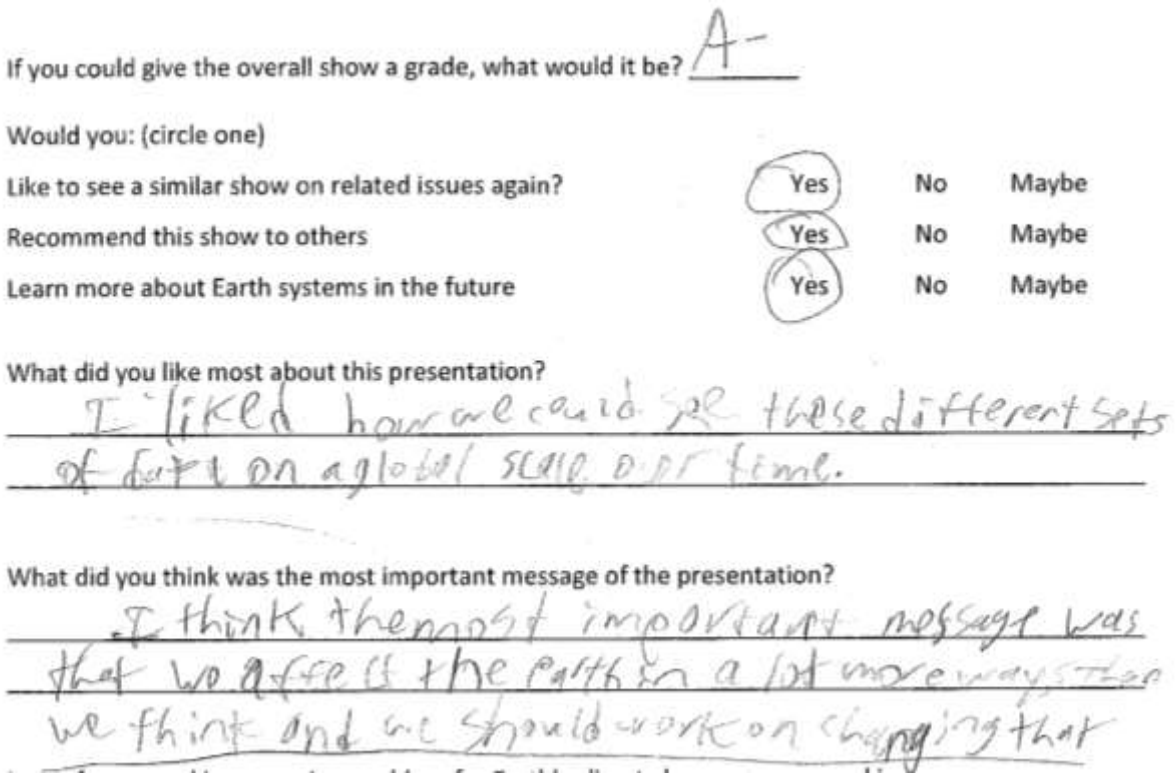
Informative	-2	-1	0	+1	+2	Not sure
Objective and factual	-2	-1	0	+1	+2	Not sure

Mean score SOS: 1.36
Mean score flat: 0.98
t-value: 0.004

Similar sections rate presenter, content of the show, and visuals

Presenter	Mean score SOS: 1.27 Mean score flat: 1.09 t-value: 0.2358
Content of the show	Mean score SOS: 1.30 Mean score flat: 1.03 t-value: 0.120
Visuals	**Mean score SOS: 1.65** **Mean score flat: 1.31** **t-value: 0.011**

Learning satisfaction was quantified by student grading and the liklihood of recommending it or wanting to see it again



If you could give the overall show a grade, what would it be? A-

Would you: (circle one)

Like to see a similar show on related issues again?	(Yes)	No	Maybe
Recommend this show to others	(Yes)	No	Maybe
Learn more about Earth systems in the future	(Yes)	No	Maybe

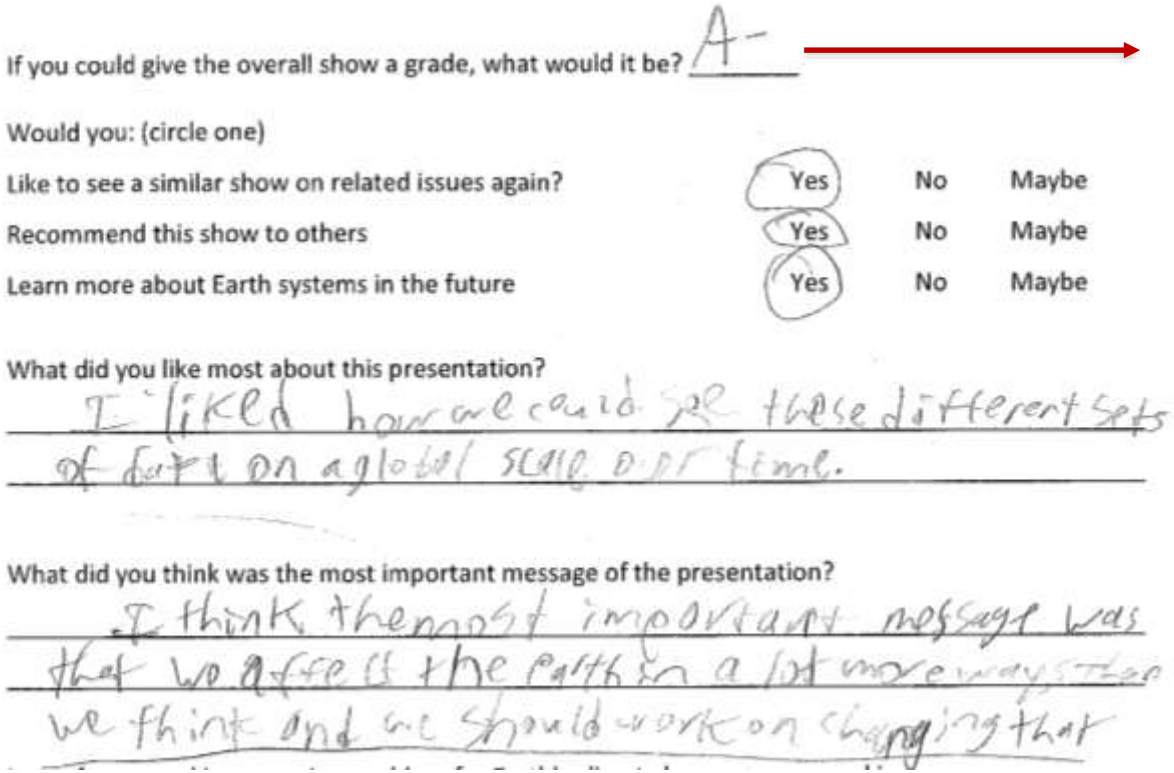
What did you like most about this presentation?

I liked how we could see these different sets of data on a global scale over time.

What did you think was the most important message of the presentation?

I think the most important message was that we affect the earth in a lot more ways than we think and we should work on changing that

Learning satisfaction was quantified by student grading and the liklihood of recommending it or wanting to see it again



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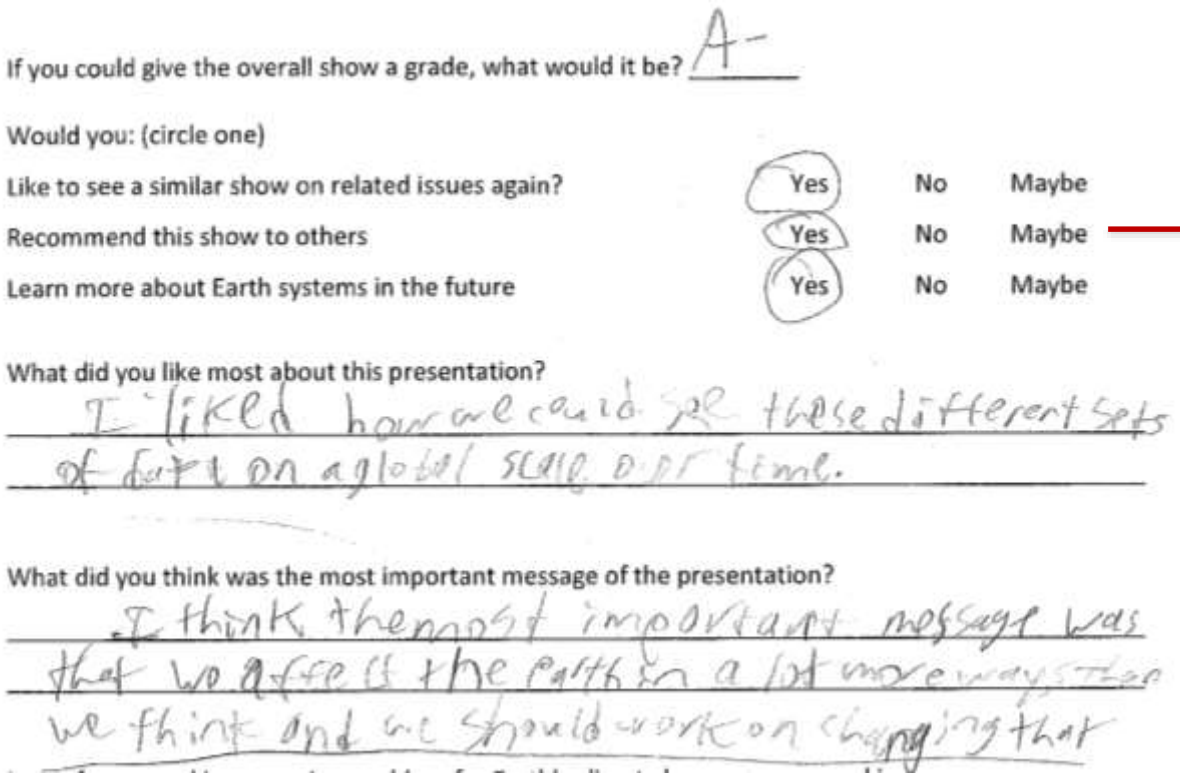
Mean score SOS: 89.3%
Mean score Flat: 83.8%
t-value: 0.010

Learning satisfaction was quantified by student grading and the likelihood of recommending or wanting to see it again



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Recommend this show to others	(Yes)	No	Maybe
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What did you think was the most important message of the presentation?

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SOS: 87%

Flat screen: 79%

Analysis of qualitative comments is ongoing.

Grasp of material was tested through questions of Earth system science concepts presented

Loss of snow and ice cover is a problem for Earth's climate because snow and ice

a) reflect solar radiation back to space

b) contribute to groundwater

c) provide a habitat for polar bears and penguins

The seasonal cycle in carbon dioxide follows the growing season of which hemisphere?

a) Northern Hemisphere b) Southern Hemisphere

The ocean moves heat from the equator toward the poles. When surface water cools, sinks and forms deep water in the North Atlantic, approximately how long will it be before it returns to the surface?

a) 1 year b) 10 years c) 100 years d) 1000 years

El Niño is a periodic phenomenon that happens along the equator in the Pacific roughly every five years and causes the fisheries off of South America to collapse. This happens because:

a) Currents carry the phytoplankton and fish away from the equator

b) Upwelling stops and there is no source of nutrients to feed the marine food web

c) A sudden overpopulation of seabirds eat the fish

SOS group: 73%

Flat screen group: 63%

Science On a Sphere outperformed flat display on all criteria, significantly so for presentation quality, visuals, understanding gain.

Differences due to different groups?

Low differences in scores for presenter and content familiarity indicate no.

Pre-study warrants further testing different populations.