



ALEXANDRA WARD

LOGBOOK

NOV 2019 - PRESENT

New 2020/21 Log starts on

pg. 22

Problem: too much greenhouse gases into the air which is causing climate change which is causing the earth to die and this is the only place we have to live.....that we know about.

Greenhouse gasses (

<https://www.allianz.com/en/press/extra/knowledge/environment/140912-fifteen-sources-of-greenhouse-gases.html>)

- Cars
- Planes
- Burning coal
- Warming our houses
- Power plants
- Deforestation
- Construction
- Office buildings
- Creation of iron, steel, cement, glass, ceramics
- Livestock
- Oil and gas production
- Agriculture soil
- Chemical and petrochemical industries
- Waste and waste water
- Carbon dioxide

Problem: Ocean temperatures rising.

How do we need to slow but hopefully stop the rising temperature of the ocean water?

Can we create a system to help cool the water down?

What are the impacts of the rising water?

- Animals
- Humans
- Water levels at the poles and around the world
- Ice burgers
- Does it affect overall air temperatures
- Is the water hotter in some places than others, does it need to be

Issues to consider: How to cool only in specific places

Is the water heating from above (air temp) or below (ocean temp/other forces)

Ideas for systems:

1. Having large fans along the ocean floor, each has a thermometer and a computer if the temp reads a certain temp the fan will be turned on or off.
2. Dropping ice from helicopters / strategic placement of ice
3. Liquid nitrogen
4. Use more electricity
- 5.
- 6.
- 7.

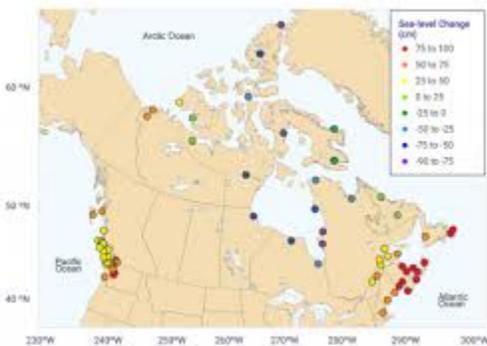
https://www.google.com/search?q=why+are+the+sea+levels+rising&rlz=1CAEAQE_enCA804&hl=en&tbm=isch&source=Inms&sa=X&ved=0ahU

<https://climate.nasa.gov/news/2680/new-study-finds-sea-level-rise-accelerating/>

<https://www.google.com/imgres?imgurl=https://i.pinimg.com/originals/4f/76/18/4f761820782a858460a05bbf88f951e1.jpg&imgrefurl=https://>

https://www.google.com/imgres?imgurl=https://coast.noaa.gov/data/digitalcoast/img/tools/slr_4.jpg&imgrefurl=https://coast.noaa.gov/digit

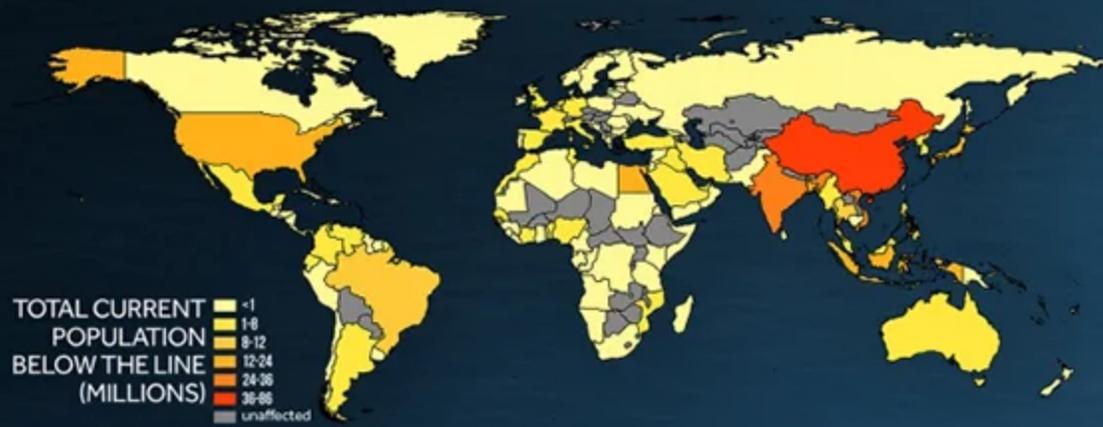
<https://www.canadiangeographic.ca/article/arctic-permafrost-thawing-heres-what-means-canadas-north-and-world>

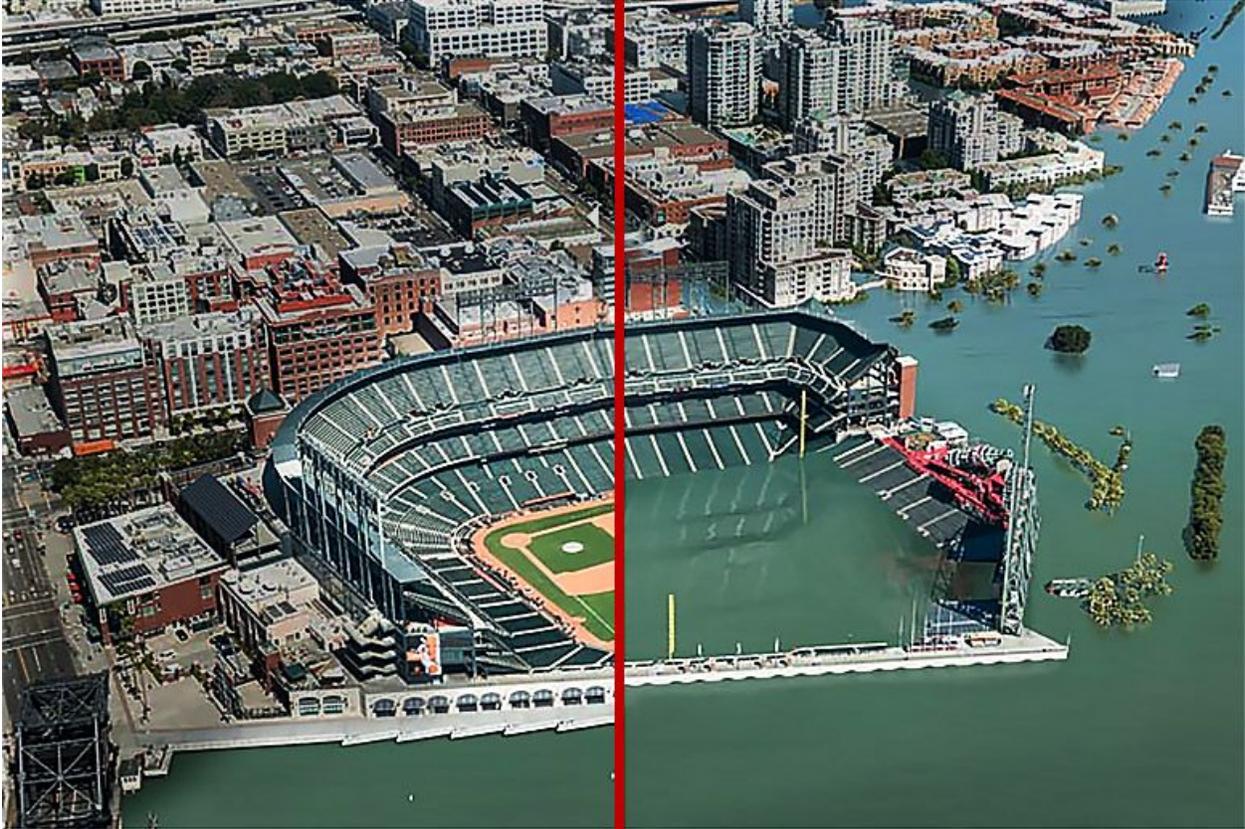


<https://vancouver.ca/green-vancouver/sea-level-rise.aspx>

6 METER SEA LEVEL RISE

Countries at Risk with 2°C of Warming





Nov 9

When you pour liquid nitrogen in water the liquid nitrogen liquid nitrogen turns to gas nitrogen. But if you let it sit for long enough the water will freeze.

<https://www.youtube.com/watch?v=BI5SI8eDmcY>

November 18, 2019

Clear insulation mite work but it would take some time. One thing i would like to make sure of is that the glaciers stay the look the same and I don't threaten animal habitats.

November 19 2019

Half of the world's citizens live in coastal cities . ice is white so it will reflect sunlight and if the ice melts then the earth will get hotter. Half the o2 you breath comes from plants in the ocean.

https://www.youtube.com/watch?v=b6CPsGanO_U

Nov 21 2019

Tank design:

materials=

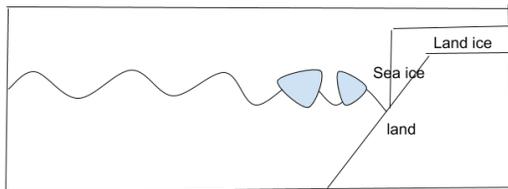
Walls - plegi glass at least one side for observation, other sides to be determined.

Land - to be built out of the same materials as walls of tank.

Water - tap water

Ice - to make sure ice stays the same for each experiment I will build a mold

ICe measuring mechanism - steel rods pre measured / dowling / ruler



Different experiments:

Control test

Fan test

Liquid nitrogen

Coolers/something inside ice

Dropping ice from aircraft
Clear insulator

No matter what we do there will always be a downside

Nov 25 2019

Water level is rising 1.7 millimeters per year but will speed up if we do not do anything
three percent of all water in the world is fresh and 70 percent of that freshwater is frozen.

insulator .

fans.

air dropping ice.

Liquid nitrogen.

Aerogel <https://www.youtube.com/watch?v=AeJ9q45PfD0>

Dec 7

10% of the world is covered in ice

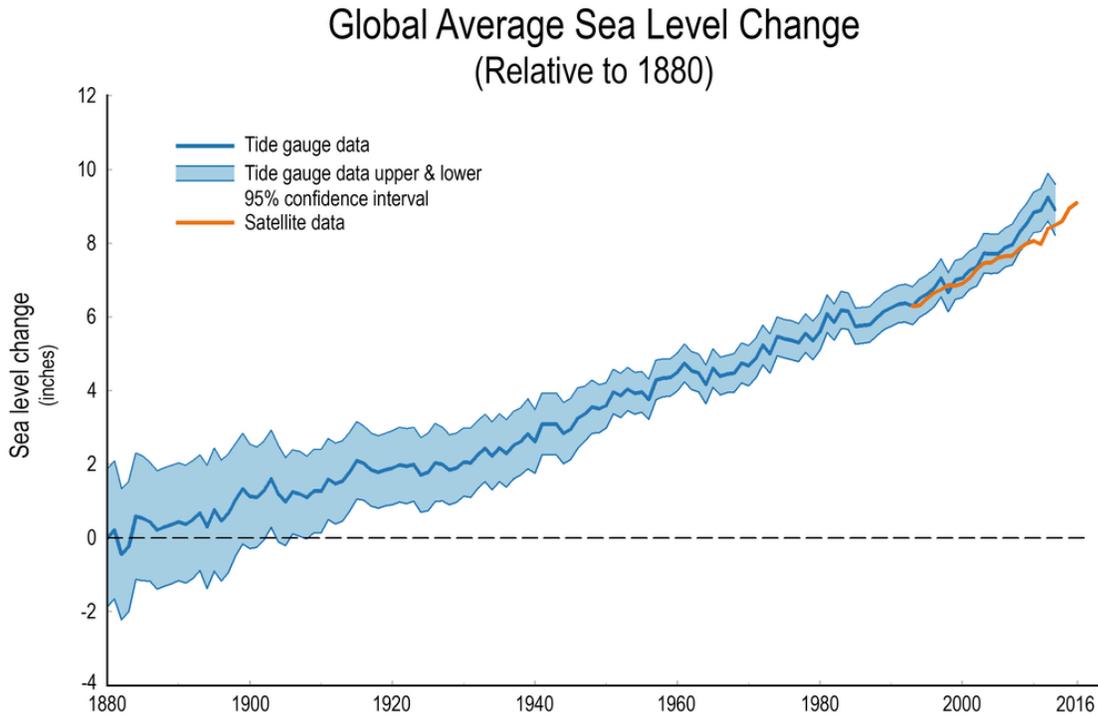
Dec 9 work on variables

Dec 16

<https://www.nationalgeographic.com/environment/global-warming/sea-level-rise/>

<https://www.globalchange.gov/browse/indicators/global-sea-level-rise>

Worked on background info.



Jan 1

Decided that I am going to focus on the land ice because that is what is making the sea levels rise. The tests that I am going to use in this experiment are dry ice, fake clouds and clouds.

Jan 3

Got dry ice, test containers, thermometers and hope to start going on experiment tomorrow. Did hypothesis.

Jan 4

I was trying to find the best way to test the dry ice and to make it sublimate faster you need water. My hypothesis is the dry ice will work the best the container well will use for containing the dry ice weighs 263 g we added 223 g of dry ice. I found it interesting that the outside temperature dropped as we added more water. For insulator we will use either saran wrap or tin foil. Dry ice is $-110\text{ }^{\circ}\text{C}$ and liquid nitrogen is $-321\text{ }^{\circ}\text{C}$

This graph shows the different temptress of areas around and in the test container we put 223 g dry ice in a yeti with a pop can inside.

time	inside	outside	tube	can	observations
10:00	21.9	22.4	21.9	na	started
10:10	21.5	22.6	22.6	10.8	na
10:20	21.0	22.4	22.3	10.2	na
With water added 10:22	17.9	22.4	2.0	9.5	Added water
10:24	18.0	22.3	2.1	9.5	Continuously adding water
10:27	15.5	22.2	-6.1	9.9	Continuously adding water
10:30	15.6	22.1	1.2	10.6	Continuously adding water
10:34	18.7	22.1	13.5	12.8	Continuously adding water
10:38	20.7	22.2	16.9	15.0	250 ml of water was added no more vapor coming from nozzle
10:48	21.6	22.2	21.4	14.3	Inside can is frozen

time	Outside	inside	top	observations
1:52	21.8	16.7	16.2	started
3:01	19.9	15.7	15.2	ended

Jan 6

I did not want to do fans on the ocean floor because it would not help cool ice. The liquid nitrogen won't work either because it was too hard and expensive to get.and no idea how to put a cooler inside the ice.

Jan 27

Worked on procedure

Feb 1

Made title=Title we can't all live on everest

Worked on materials, procedure, observations, and worked on preparing results.

Feb 2

Test 1 jan 11 2020

Date	time	dry ice temp	insulation	control temp	cloud temp	outside temp	observations
11-Jan 2020	8:38	7.2	15.2	13.9	14.9	21.6	start
11-Jan 2020	9:16	12.4	16.1	16.1		18.1	not very much melted
11-Jan 2020	9:47	13.8	17.2	17.2	14.5	18.9	not much has melted but the dry ice cooler changed
11-Jan 2020	10:23	14.8	17.9	17.5	14.6	118.9	
11-Jan 2020	10:57	14.2	17.2	17.1	13.9	18.9	not much has melted.
11-Jan 2020	11:31	14.6	17.3	17.6	14.3	19.1	
11-Jan 2020	12:05	14.3	17.1	17	13.7	18.8	the insulation isn't doing to well
11-Jan 2020	12:40	14.3	16.8	16.8	13.6	18.8	refeled dry ice
11-Jan 2020	1:18	13.3	17.2	17.1	13.6	18.8	the insulation appears to be doing worse than the control

							test
11-Jan 2020	1:51	13.9	17.4	17.3	14.4	18.6	
11-Jan 2020	2:21	13.8	16.9	16.9	13.9	18.4	all the experiment s have melted a bit.
11-Jan 2020	1:57	14.2	16.4	16.3	13.1	18.2	
11-Jan 2020	3:33	13.8	16.3	16.2	13.3	18	the incelation is almost melted.
11-Jan 2020	4:14	14.8	17	16.7	13.8	17.6	
11-Jan 2020	4:48	15.1	17	16.9	13.6	17.6	there are all pretty much melted.
11-Jan 2020	5:23	16.1	17.2	17.3	14.1	17.8	added more dry ice.
11-Jan 2020	5:58	12.7	16.8	16.7	14.3	17.9	when more dry ice was added the temperatur e dropped rapidly.
11-Jan 2020	6:31	13.7	17.3.	17.6	14.1	18.1	
11-Jan 2020	7:04	14.3	16.9	16.9	14.1	17.8	cloud has melted quite a bit.
11-Jan 2020	7:39	13.6	16.9	16.8	13.9	17.8	

results	1	2	3	4
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starting weight	9 lbs	9 lbs	9 lbsk	9lbs
finish weight minus water and with bucket	5.5lbs	5lbs	5.5 lbs	4.5 lbs
amount of water removed from bucket	1825 ml	1875 ml	1900 ml	2350 ml (condensation caught 225 ml)
weight of ice that was left over	1976 g	1850 g	1866 g	1540 g
sive of ice	10x12 3/4 in	10 1/2x12 in	10 3/8x11 3/4 in	10x11 3/8 in
melted ice that was left over	1950 ml	1800 ml	1875 ml	

TEST 2 jan 19 2020

date	time	dry ice temp	insulation	control temp	cloud temp	outside temp	observations
19-Jan-2020	8:17	13.7	16.1	14.1	13.1	22.5	outside temperature thermometer was moved and weight of bucket were not the same
19-Jan-2020	8:52	13.7	17.4	17.6	15.1	22.4	
19-Jan-2020	9:25	13	15.9	16.9	14.2	22.3	ice appears to have melted quite a bit.
19-Jan-2020	9:59	13.2	16.4	17.3	14.3	22.3	
19-Jan-2020	10:32	12.8	15.5	16.3	13.8	22	lots of ice appears to have melted but I can't see much water.
19-Jan-2020	11:03	13.1	15.9	16.6	13.4	22	

19-Jan-2020	11:37	13.5	17.3	18.2	14.6	22.2	ice is melting on a angel
19-Jan-2020	12:03	13.1	16.5	17.1	14.1	22.2	added more dry ice.
19-Jan-2020	12:37	13.2	17.6	18.3	14.8	22.2	
19-Jan-2020	1:15	15.7	17	17.4	14.3	22.2	ween you are standing near the thermometer it gets warmer.
19-Jan-2020	1:46	15.6	16.8	17.2	14.2	22.1	
19-Jan-2020	2:18	13.8	17.4	17.8	14.6	22.2	ice seems to be melting slower than the last test.
19-Jan-2020	2:54	14.1	16.9	17.2	14.1	22.1	
19-Jan-2020	3:26	14.2	17.1	17.4	14.1	22	the icelattoins is melting wered.
19-Jan-2020	3:59	13.2	17.1	17.3	13.9	21.9	
19-Jan-2020	4:30	13.8	17.1	17.3	14	21.9	dry ice hazent melted that much.
19-Jan-2020	5:02	14.4	18.1	18.4	14.2	21.9	
19-Jan-2020	5:36	15.2	18.3	18.9	14.6	21.9	refeled dry ice.
19-Jan-2020	6:11	15.3	17.3	17.8	14.5	21.9	
19-Jan-2020	6:41	12.9	17.2	17.8	14.5	22	insulation is doing better.
19-Jan-2020	7:15	13.3	17.6	18	14.3	22	

19-Jan-2020	7:41	14	18.5	19	14.8	22.1	
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results	1	2	3	4
starting weight	11 lbs	9.5 Lbs	9 lbs	9.5 Lbs
finish weight minus water and with bucket	8 lbs	6 lbs	6 lbs	5 lbs
amount of water removed from bucket	1830 ml	1810 ml	1800	2610
weight of ice that was left over	too heavy for scale to get accurate measurements	2229 g	2187 g	1632 g
size of ice	10 1/2 x 12 1/4	12 1/4 x 10 1/4 in	12 1/4 x 10 3/8 in	11 3/4 x 10 1/4 in
melted ice that was left over	3,000 ml	2,175	2125	
circumference of ice	23 in	22 1/8 in	22 1/4 in	21 3/4 in

Test 3

date	time	dry ice temp	insulation	control temp	cloud temp	outside temp	observations
25-Jan-2020	8:25	7.6	7.3	5.8	8.6	22.3	started today was warmer than the last two times we did the test.
25-Jan-2020	8:58	9.9	15.6	16.2	14.8	22.3	
25-Jan-2020	9:30	15.6	16.8	16.8	14.8	22.6	not much had melted
25-Jan-2020	10:1	11.1	17.9	17.3	14.9	22.8	
25-Jan-2020	10:35	13.1	18.5	17.5	15.1	23.1	dry ice has barely melted.

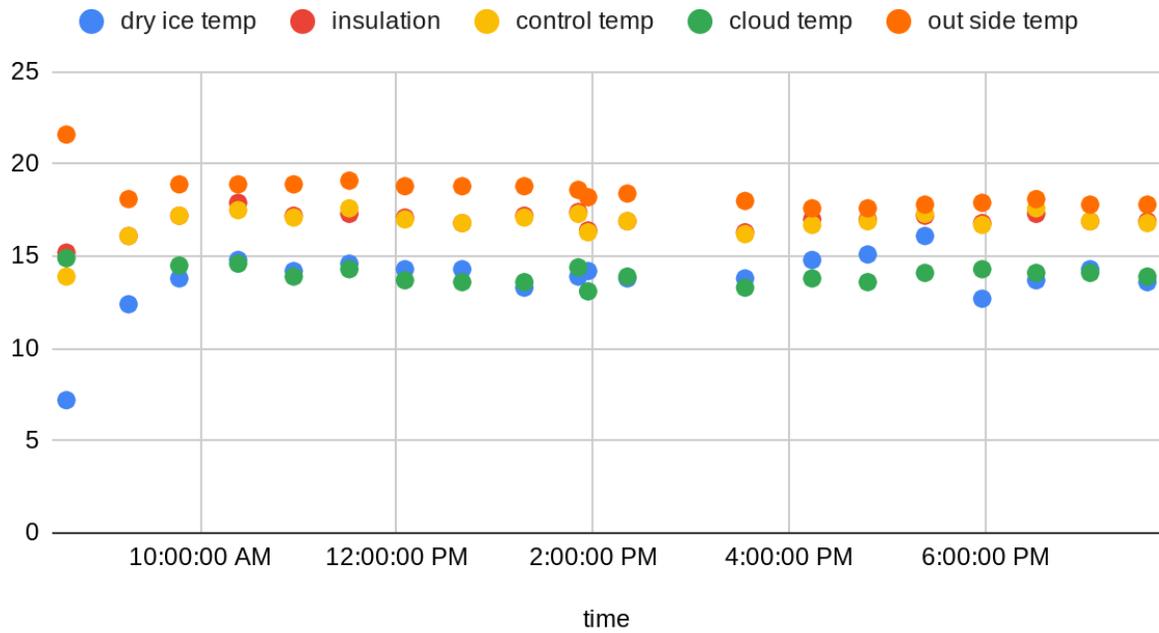
25-Jan-2020	11:08	13.3	18.2	17.1	15.2	22.2	
25-Jan-2020	11:50	14.6	18.2	17.2	15.3	23.3	
25-Jan-2020	12:19	14.9	18.2	17.3	15.2	22.3	added more dry ice.
25-Jan-2020	12:52	15.2	18.2	17.4	15.2	23.3	
25-Jan-2020	1:35	14.9	18.2	17.5	15.1	23.4	the dry ice never got hotter than 15.3 degrees
25-Jan-2020	1:55	15	18.1	17.5	15.1	23.2	
25-Jan-2020	2:27	14.8	17.9	17.5	15.1	23.2	to keep the dry ice going you need to keep clearing it out.
25-Jan-2020	3:6	15.8	17.7	17.6	14.9	23.1	
25-Jan-2020	3:52	14.7	17.5	17.4	14.9	22.9	cloud has melted a lot.
25-Jan-2020	4:22	14.6	17.2	17.3	14.7	22.8	
25-Jan-2020	4:54	14.1	17.2	17.3	14.7	22.5	dry ice still hasn't melted much
25-Jan-2020	5:20	14.2	17	17.2	14.6	22.3	refilled dry ice
25-Jan-2020	5:54	11.2	16.8	17.2	14.6	22.2	
25-Jan-2020	6:26	13.5	16.8	16.9	14.1	22.1	the dry ice has melted more than the dry ice.
25-Jan-2020	7:00	14.2	17.5	17.8	14.3	22.3	

25-Jan-2020	7:33	12.7	16.4	16.9	14.2	22
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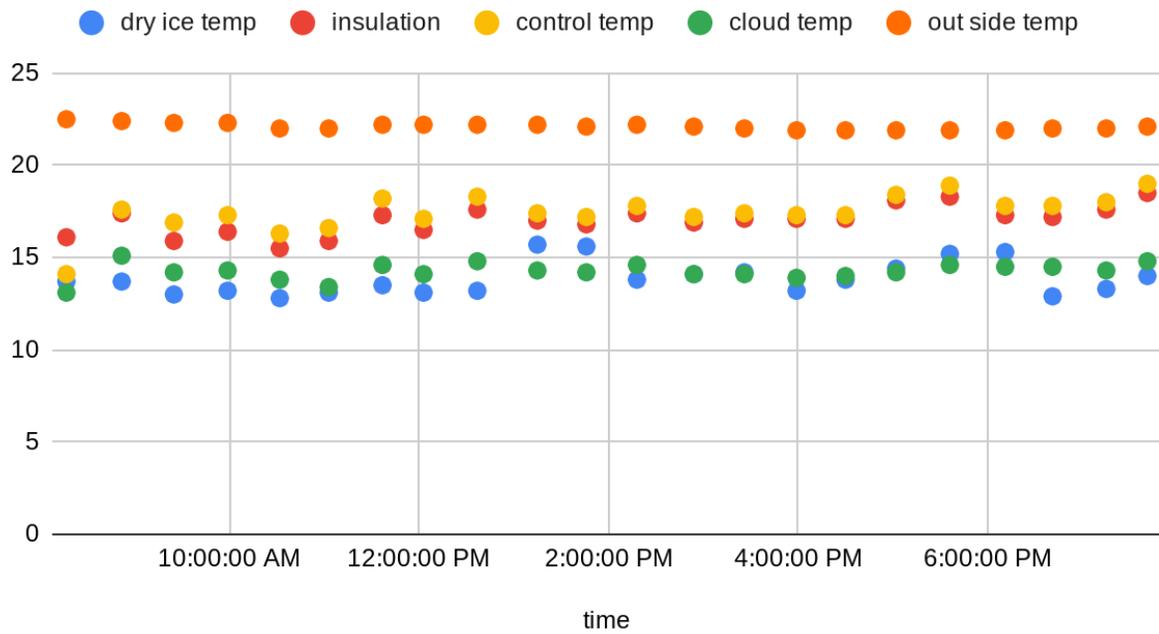
results	1	2	3	4
starting weight	9.5 lbs	9.5 lbs	9.5 lbs	9.5 lbs
finish weight without water with bucket	5.5 lbs	5 lbs	6 lbs	4.5 lbs
amount of water removed from bucket	2010 ml	2200 ml	1820 ml	2600 ml
weight of ice that was left over	1921 g	1762 g	2133 g	1468 g
size of ice	10 1/2 x 12 in	11 3/8 x 10 1/8 in	10 1/2 x 12 1/4 in	10x11 1/2 in
melted ice that was left over	1900 ml	1720 ml	2100 ml	
circumference of ice	20	21 1/4	22 1/4	20 1/2 in
				125 ml of condensation out

Feb 3

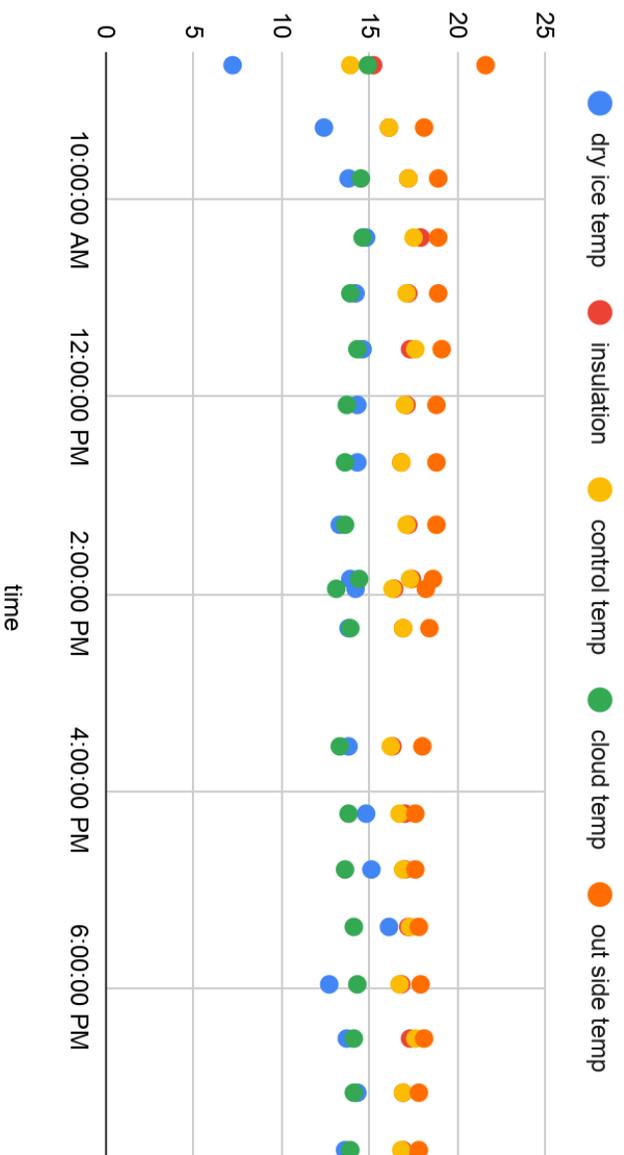
test one



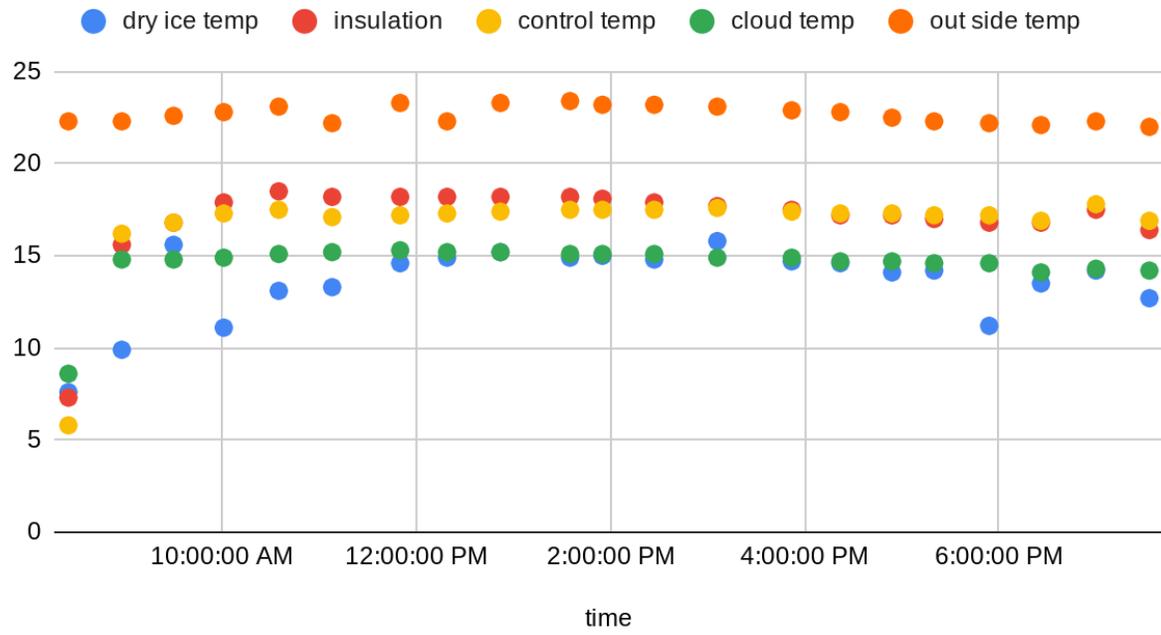
TEST 2



TEST 1



TEST 3



Feb 3 2020

Polished up stuff

LOG BOOK 2020-2021

I worked in getting info

This is some of the info i got its a bit of a mess but it works

Direct air capture

Estimate 94-232 per ton of co2

burning biomass and string carbon underground

Does not have to be super tall

Easily salability

Not to expensive

Electromagnetic waves from the sun bounce off the earth as infrared and carbon dioxide traps it.

Mt Pinatubo eruption released gasses into the stratosphere colling the planet by 0.5 degrees c

5-8 mg /year of aerosol slow climate change negative effects famine hurt ozone if we stop

How to make dry ice sub colling liquefying carbon dioxide and injecting it into a holding tank where it's frozen at a temperature of -109 Fahrenheit and compressed onto solid ice

Chemical used to extract co2 to amine

Carbon sink=somthing that absorbs carbon dioxide

Jan 29

I started typing up my question hypothesis and research

Feb 4

Procedure:

Design

Do the math to see if it will work

Build model

Test parts individually

Start to put parts together and test

put it all together

Test it

Feb 17

I have started to design what it will look like and how it will work. And I was thinking that i would smush direct ait capturer and dry ice making into one and come up with a way to disperse the co2 on to a glacier to help prevent it from melting

Feb 17-20

I and my dad started to put my model together using a computer colling fan and heat sink. And we are using actual amine for the model and so far the fan and pumps work

Feb 25

I worked a bunch on my slide show thing and did some research

Video <https://www.youtube.com/watch?v=GkEAA7VnyhE>

Feb 27 I worked on making my direct air capture and am hopefully going to get the filter installed today. the filter is scotch bright pads. today I also made clear sides to con=tain the liquid that will be pumped through the scotch Brite pads they are clear so that you can somewhat see what is happening. Yeay I got the filter in place and it seems to work. In not sure if I mention this earlier but I removed the heatsink from a computer so we had a fan and the thing that held the heat sink so I inserted the scotch Brite pads in there and it works pretty well. I also shrunk the arctic to use for my project. It's just a piece of fome. Maby tomorrow or later today I would like to get the water system working

Feb 28i did not get the wa=ter system ready yesterday but am going to get it done today I finished cutting and sanding a piece of container to use for holding water while my dad sadered the electronics for the pumps. After I finished I went to help my dad

March 1 I got the water system done.

Some other day I made a roof for the water storage aria

Another day started to get the electronics in place

One more day I started to make it look good I added buildings and shaped the fome I put it on

Match 6 I finished my model

Match 7 did a lot of typing for my project

<https://carbonengineering.com/our-technology/>

<https://www.pri.org/stories/2020-07-03/can-direct-air-capture-make-real-impact-climate-change>

<https://www.youtube.com/watch?v=GkEAA7VnyhE>

<https://www.weforum.org/agenda/2020/06/direct-air-capture-co2-environment-climate/>

<https://cryocarb.com/how-dry-ice-is-made/#:~:text=What%20is%20Dry%20Ice%3F,into%20pellets%20or%20large%20blocks.>

https://en.wikipedia.org/wiki/Carbon_dioxide_scrubber

<https://www.nature.com/articles/s41428-020-00400-y>

<https://www.nature.com/articles/s41428-020-00400-y>

https://en.wikipedia.org/wiki/Amine_gas_treating

<https://www.intechopen.com/books/carbon-dioxide-chemistry-capture-and-oil-recovery/solvents-for-carbon-dioxide-capture>

https://link.springer.com/chapter/10.1007/978-3-030-18858-0_2