



Catching Cosmic Rain



Jongil Jung

Dr. James Madsen
University of Wisconsin
River Falls

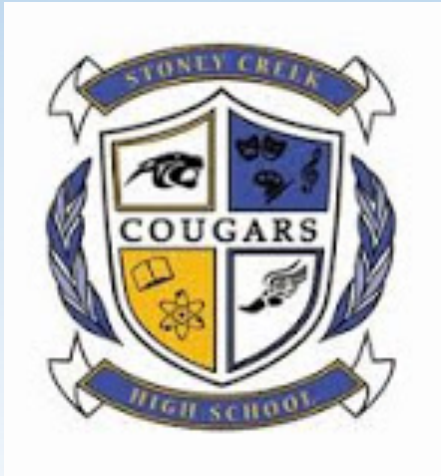


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Samantha Pedek
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Dr. Paul Evenson
University of Delaware

Eric Thuma
Stoney Creek HS



PolarTREC Expedition 2016: Neutron Monitors for Solar Study



- Where did we work?
- How did we get there?
- Who was involved?
- What are we studying?
- What did we do?
- What about students?

Where did we work?

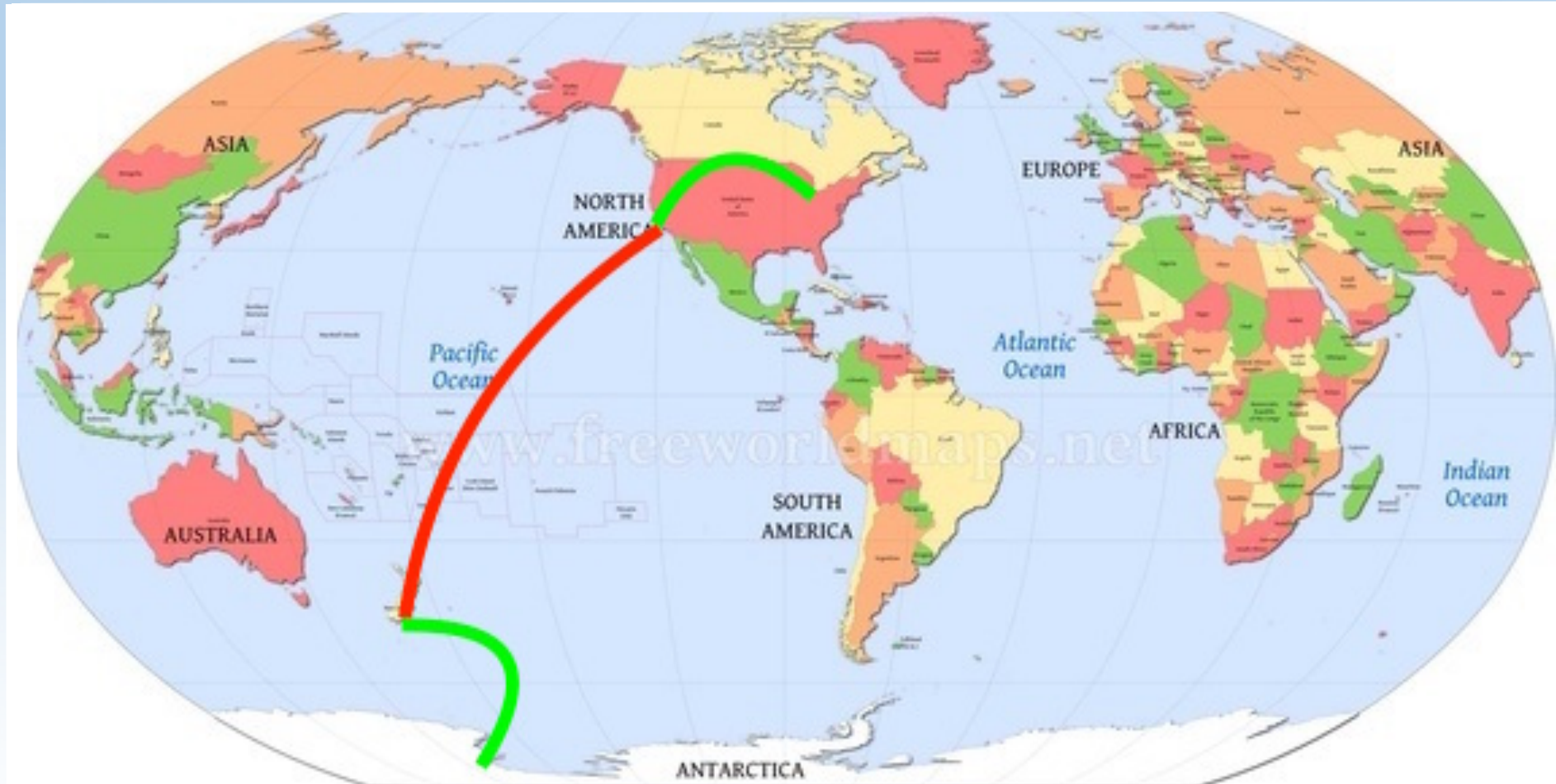
Antarctica!

- Coldest, Windiest, Highest, Driest Continent
- McMurdo Station, Ross Island
- Amundsen-Scott Station, South Pole

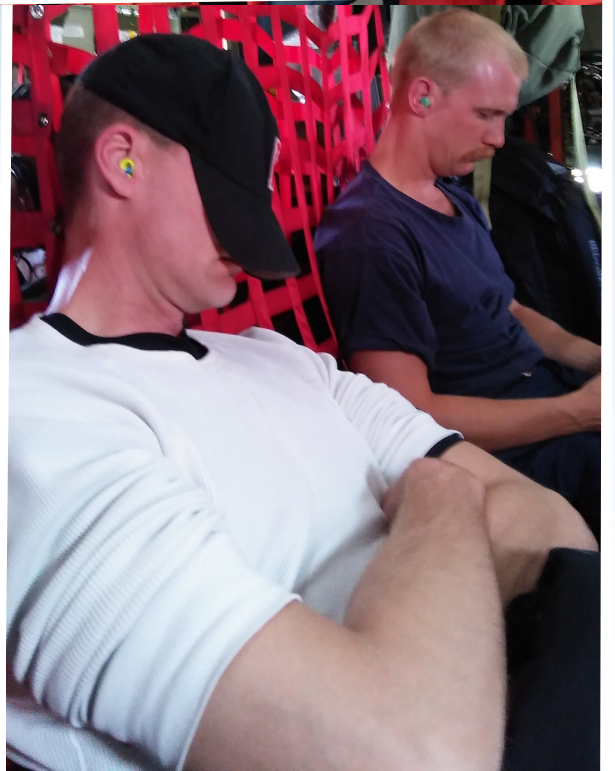
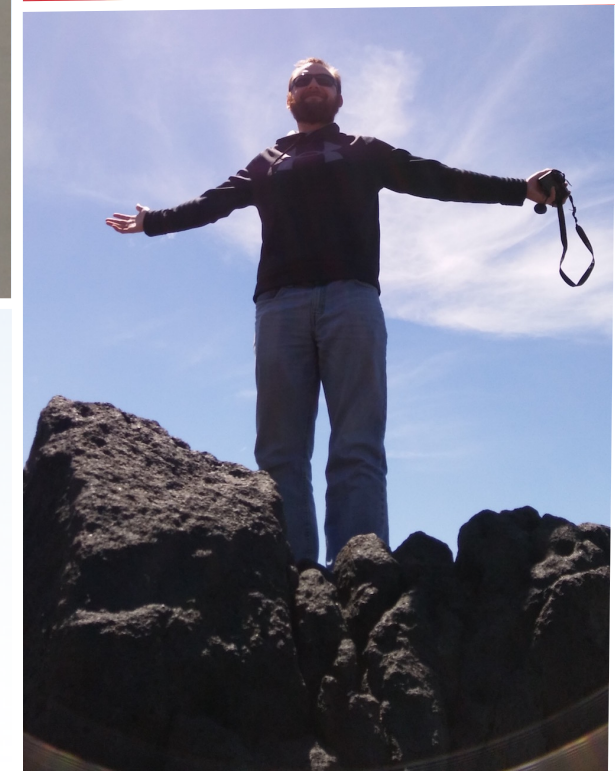


How did we get there?

- 27 hours in airplanes
 - Detroit to Dallas to Los Angeles to Auckland, NZ to Christchurch, NZ
 - Christchurch to McMurdo Station, Antarctica
 - Then some of us go from McMurdo to the South Pole



- Getting cold weather gear in Christchurch
- We were delayed for four days coming in from Christchurch to McMurdo. So we had some time to enjoy New Zealand.



- Inside the C-130, lots of space but little comfort
- First steps in Antarctica
- Our transport to McMurdo Station, Ivan the Terra Bus



Who was Involved?

Eric Thuma

- High school teacher at Stoney Creek High School in Rochester, MI
- First time in Antarctica



Dr. James Madsen

- Professor, Chair UWRF Physics Department
- Associate Director of IceCube, responsible for Education and Outreach
- 5th deployment to Antarctica



Dr. Paul Evenson

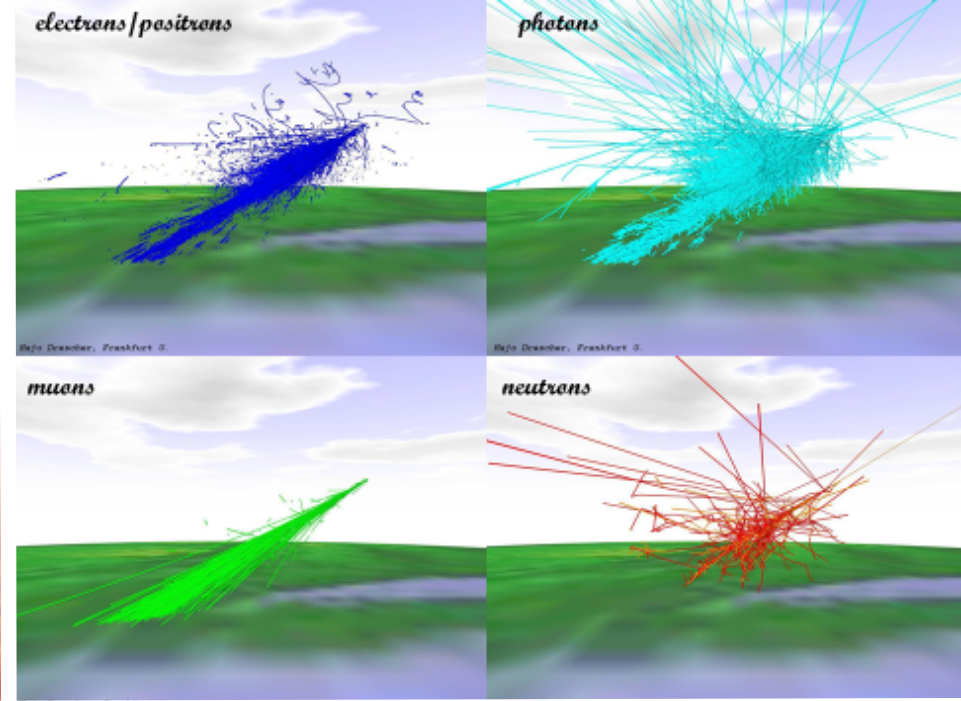
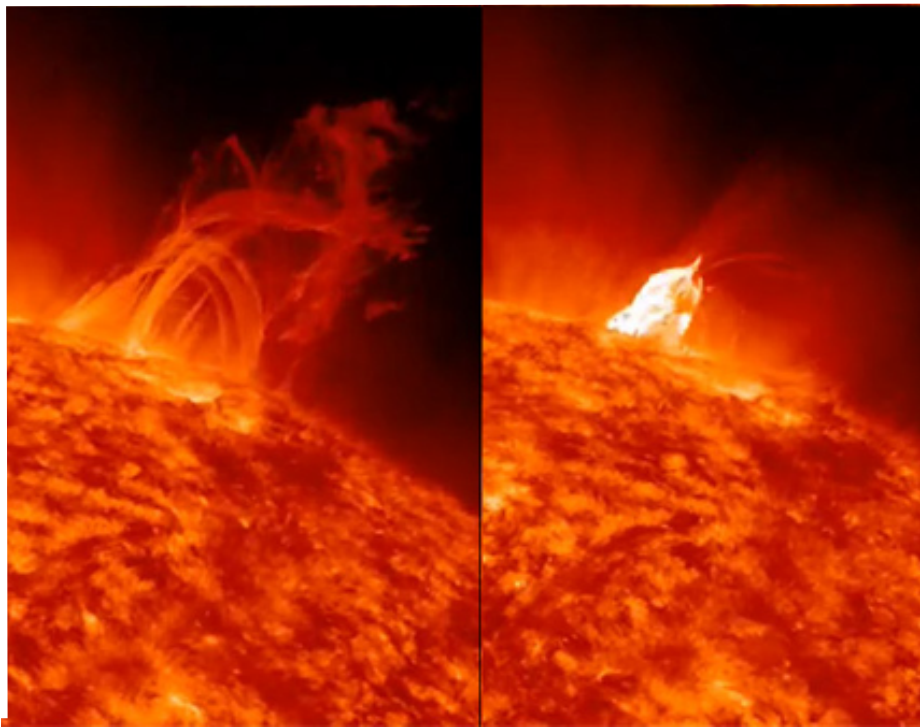
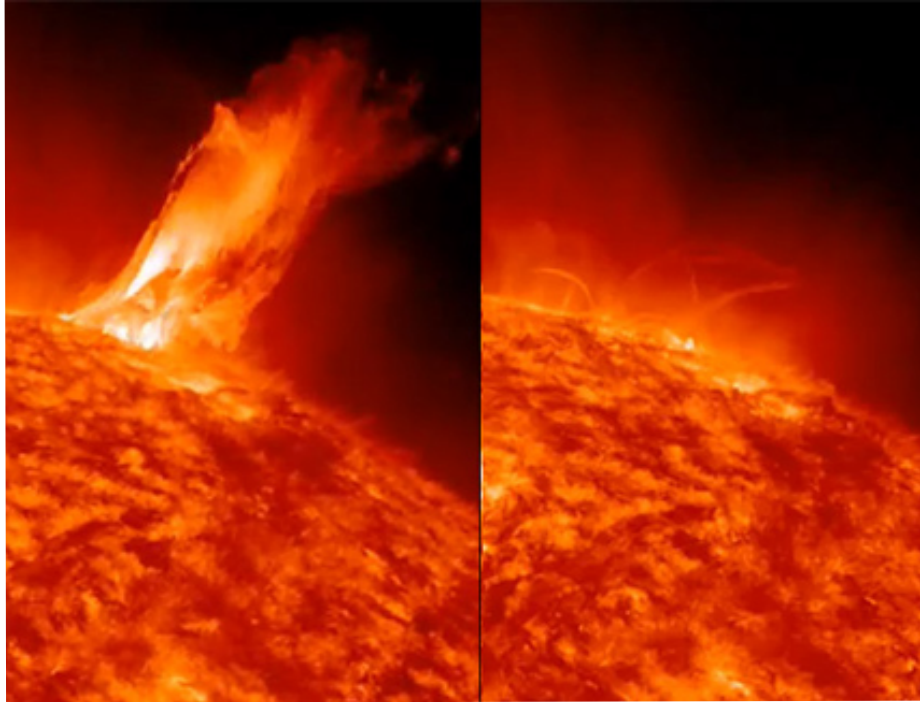
- University of Delaware
- Lead Researcher for the CosRay neutron monitors
- 15th deployment to Antarctica



What are we studying?

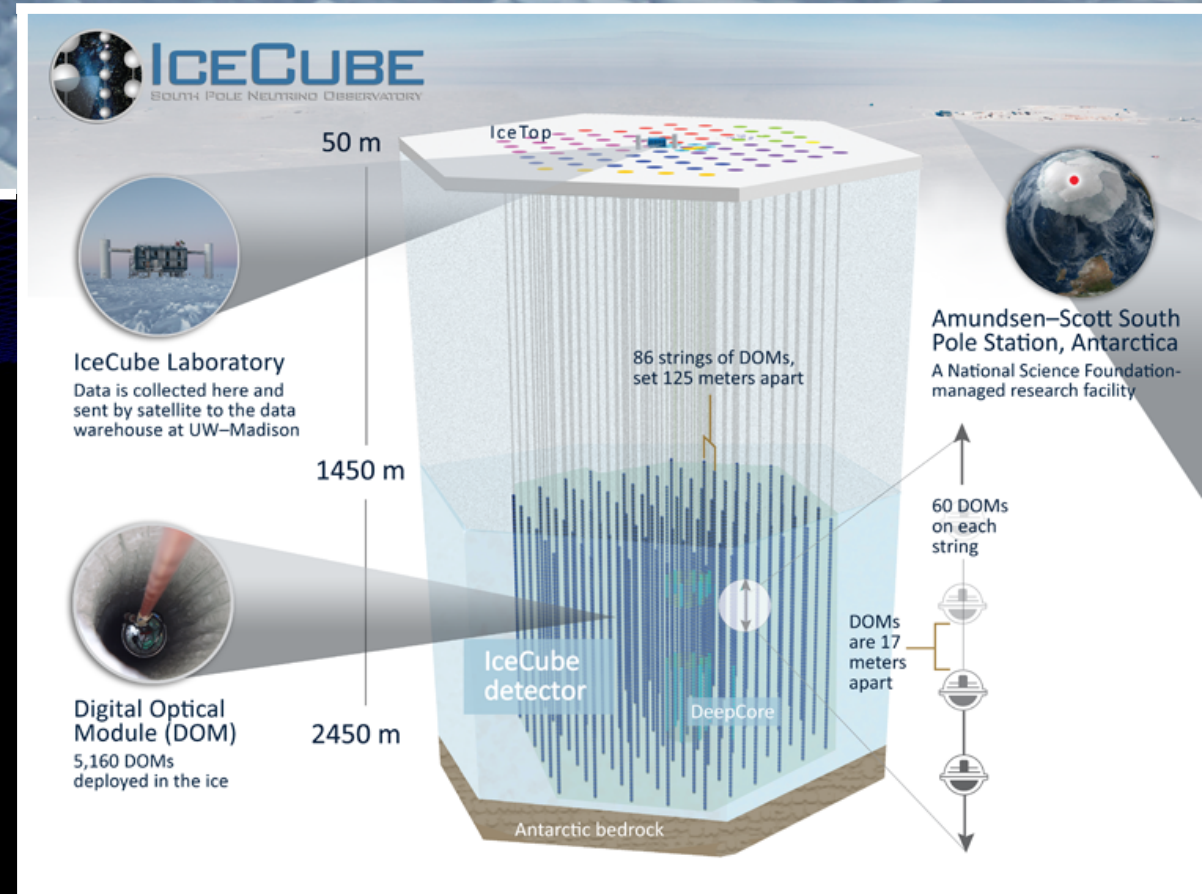
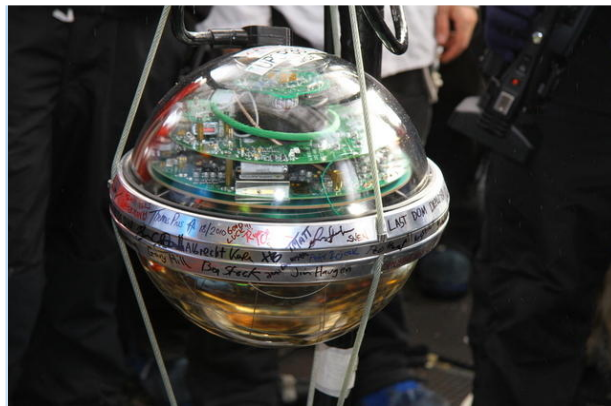
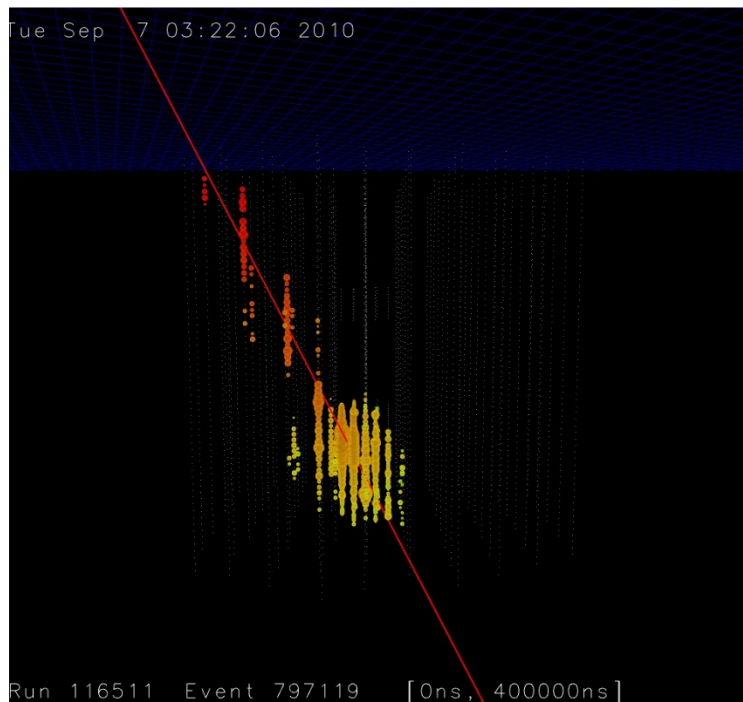
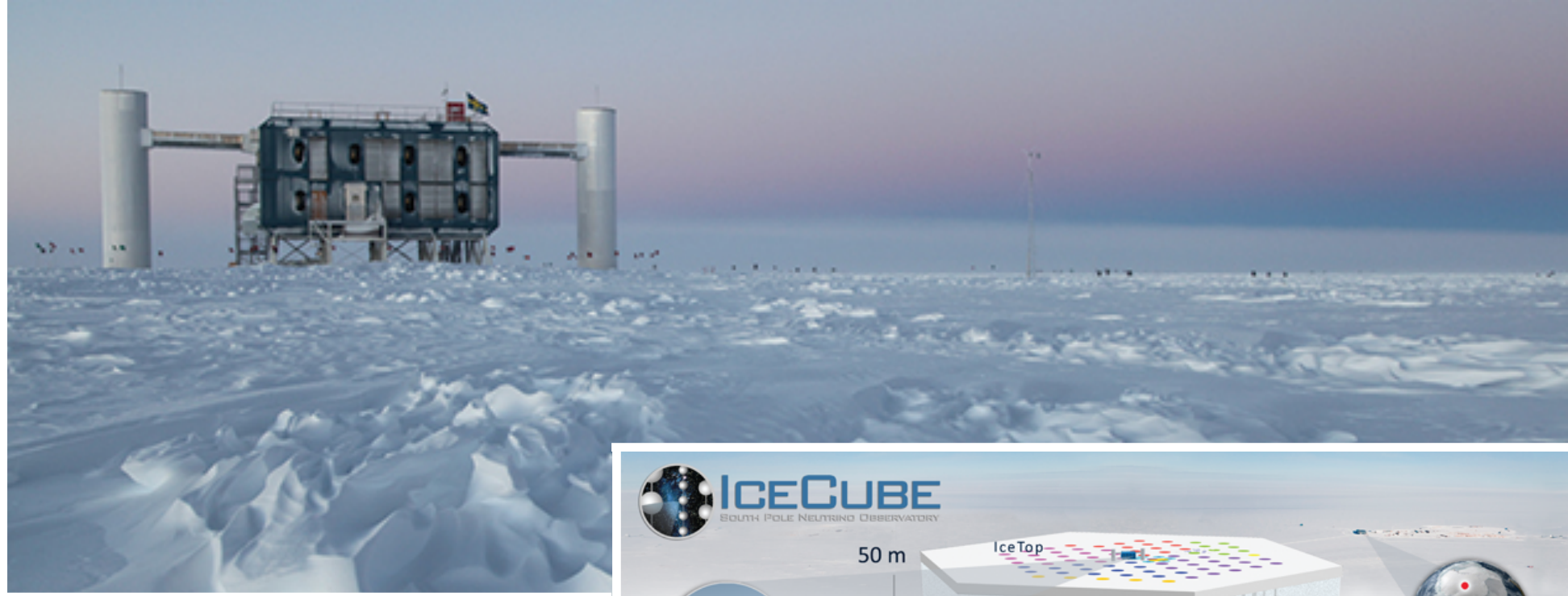
CosRay

- Studying the severe solar storms
- These produce high energy particles
- We want to know how this happens
- We record neutrons produced when the high energy particles interact in the atmosphere



IceCube

- Studying high energy astrophysical events



What did we do?

We prepared to ship the neutron monitors to New Zealand for transport to Jang Bogo Station.

- Unloaded Shipping Materials
- Disassembled the NM64 neutron monitors



- Removed and repaired the tubes

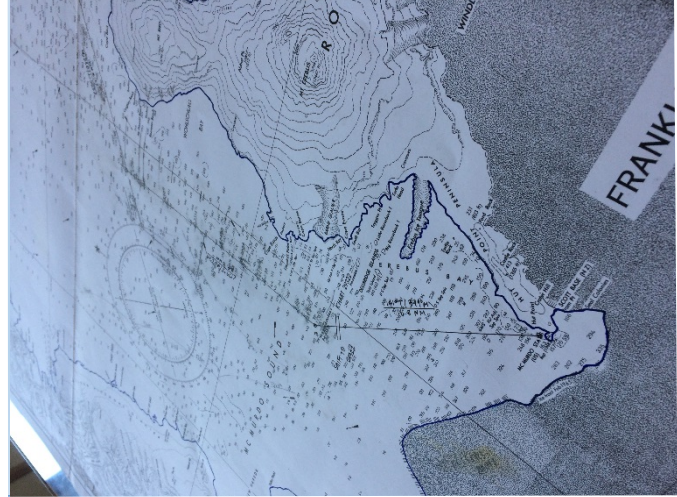


- Staged the lead

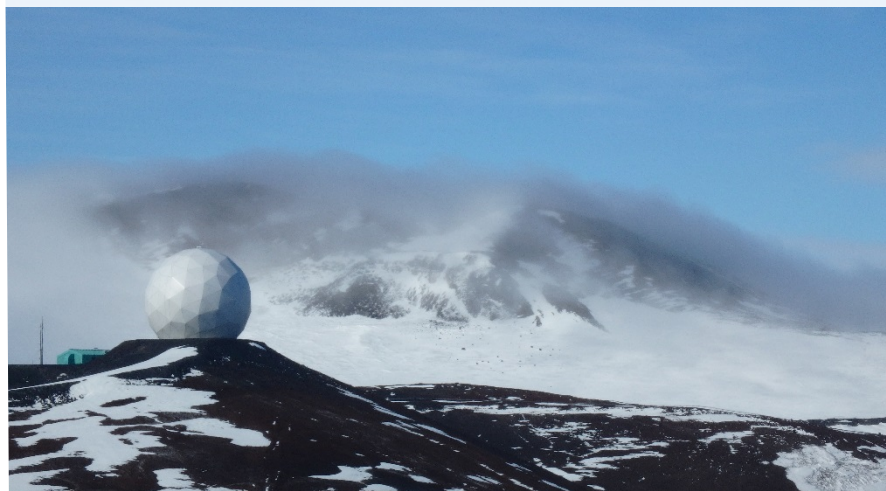


- **Disassembled the smaller IGY neutron monitor**
- **Prepared everything for shipping**
- **Cleaned out the CosRay building**





... And a few other things



What about students?

- Students corresponded with me and Antarctic scientists through a daily online journal. We answered hundreds of student inquiries over the deployment. Students are still in contact with several of the lead scientists.

21 January 2017 Getting Packed

McMurdo from above. IF the weather cooperates this will be my last day in McMurdo (and that is a big if). I am scheduled to bag drag tonight and then begin the long trek home tomorrow, as long as Antarctica cooperates. I've absolutely got mixed feelings. This place is beautiful but it is harsh. The people are great but I miss my family. I've learned a lot but it's been hard work. I guess I'm ready to go home but I wish I could make it back someday. That is a very doubtful prospect though because very few people ever make it here. I hope I made the best of the experience. Clouds act weird here...



→ Read Journal 🗨️ 99

20 January 2017 The Antarctic Treaty

Nations with regular operations in Antarctica are bound by the Antarctic Treaty of 1959. The 12 original nations to adopt the Antarctic treaty were Argentina, Australia, Chile, France, New Zealand, Norway, the United Kingdom, the United States, the Soviet Union, Japan, South Africa, and Belgium, but the number who have adopted the treaty has grown to 53. It is a symbol of international cooperation that is unparalleled and its influence can clearly be seen in the Outer Space Treaty of 1967. Flags of the first 12 nations to sign the Antarctic Treaty. Some important provisions of the Treaty are...



→ Read Journal 🗨️ 33

19 January 2017 Adventures on the Ice Sheet

Today I got to spend part of the day in the McMurdo Ice Sheet. This was really my first time in the field, most of my responsibilities have been on Station so far so this was a real treat. This is near the transition zone. There were better pictures showing pressure ridges but none of those showed off my beard. My visit was courtesy of Dr. Doug MacAyeal. Doug is a glaciologist who has been studying the ice for 40 years. He is currently investigating the way in which the ice cracks. This is not well studied in Antarctica but is very important because it goes directly into the stability of the...

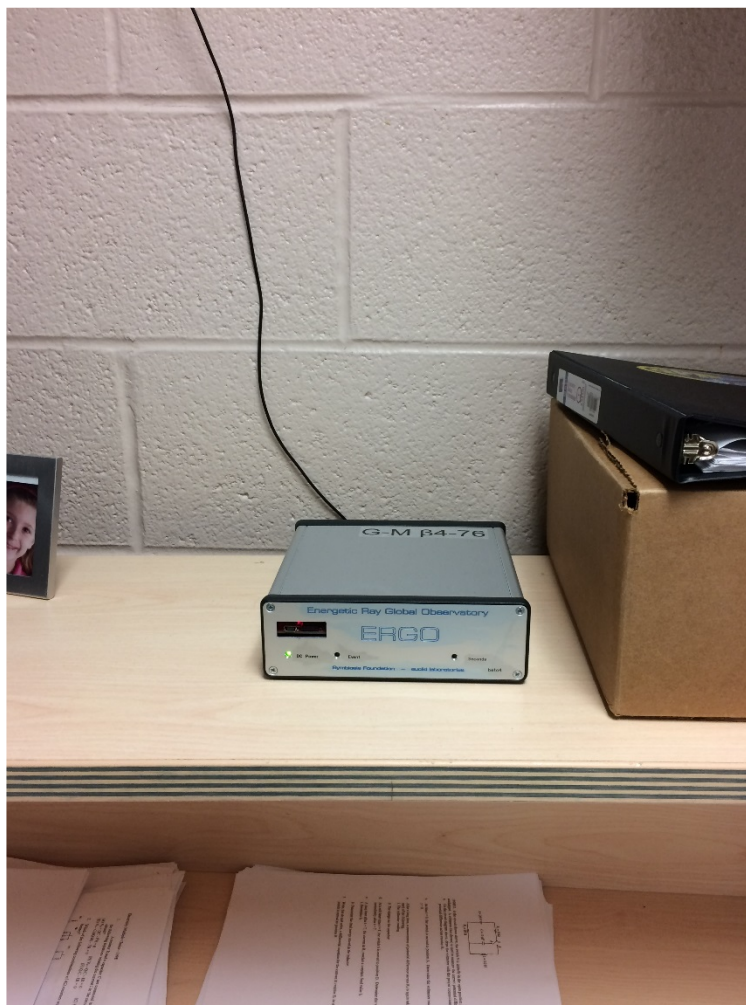


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Students and teachers also participated in multiple webcasts given live from Observation Hill at McMurdo Station.

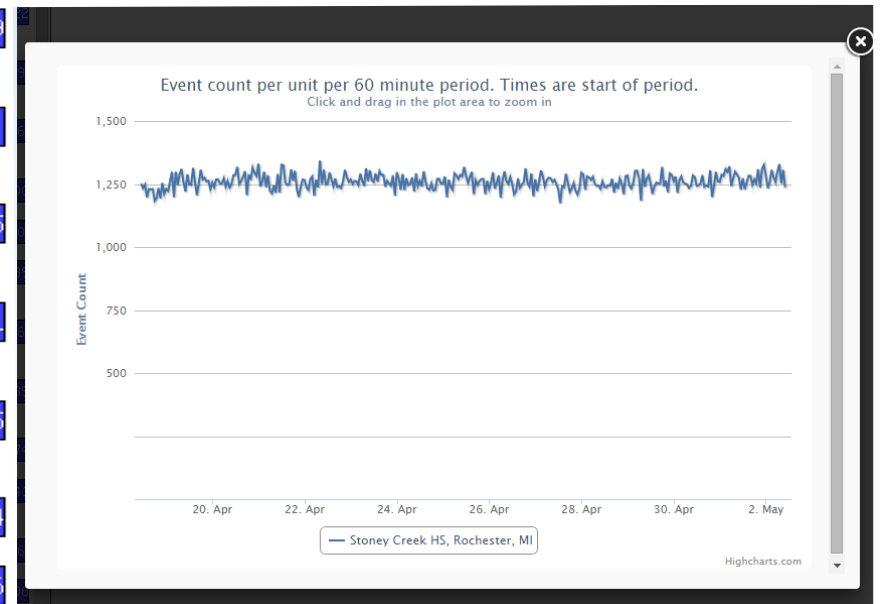
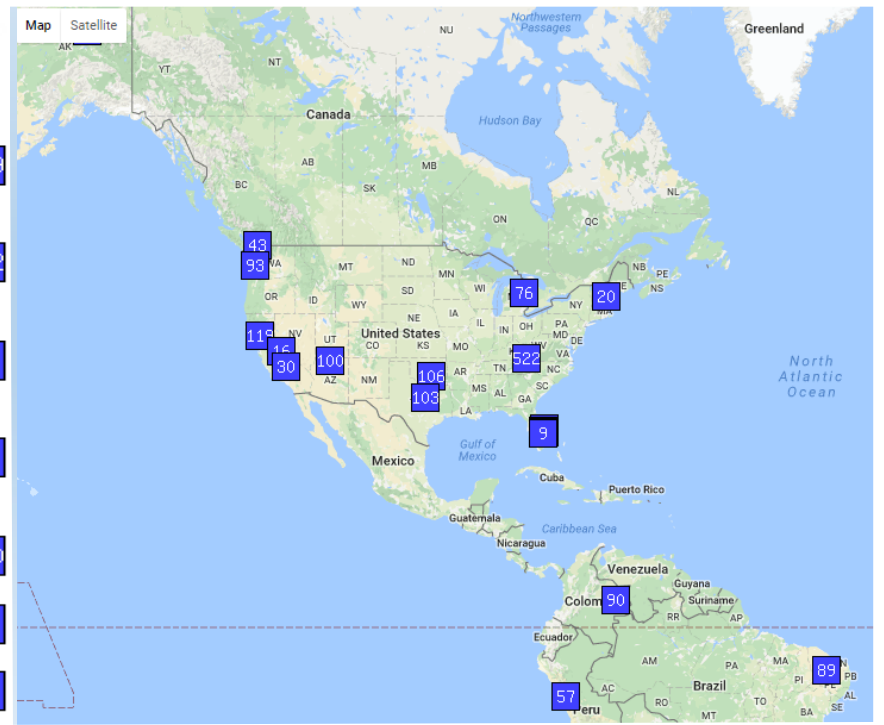


- Students are also doing related research through the Energetic Global Ray Observatory (ERGO)



Top Observatories

1. Univ. of Sofia, Bulgaria 109
1592 events in the past hour.
2. Brevard College RasPi 522
1515 events in the past hour.
3. Nebeto, Smolyan, Bulgaria, 89
1486 events in the past hour.
4. Stoney Creek HS, Rochester, MI 76
1282 events in the past hour.
5. Petrescu, AZ 100
1173 events in the past hour.
6. Caltech 30
1126 events in the past hour.
7. SIA Starspace, Latvia 96
1121 events in the past hour.
8. Findley FLL Team, RasPi 539
1096 events in the past hour.
9. Museum of Science, Boston 20
1046 events in the past hour.
10. Ragnar Kalleberg, Grimstad, Norway, 115
1031 events in the past hour.
11. Sebastian Abisleiman, RasPi 541
1017 events in the past hour.
12. Pedro Pavao, RasPi 585
998 events in the past hour.
13. RasPi 574
996 events in the past hour.
14. Brookhaven College, Dallas, TX 106
994 events in the past hour.
15. CERN, Switzerland 79
984 events in the past hour.



And NASA ... through the NASA GLOBE Program and the Global Precipitation Measurement Mission.

Aerosols *Editing*

Measured at date and time (24hr)

2017-04-17 16:33

UTC [Get Current UTC Time](#)
 Local

Does your photometer measure AOT directly?

Yes No

Photometer Model

calitoo

Photometer Serial Number

125

Your UTC time converted to Local (EDT) time is 2017-04-17 12:33



Aerosols *

* indicates required sections or fields

[Expand/Collapse](#)

Do you know when there was a satellite overflight on date of measurement? * Yes No

Trial 1* UTC Time (24hr) 16:30:18

Channel Wavelength 465 nm AOT Reading 0.0713

Channel Wavelength 540 nm AOT Reading 0.0581

Channel Wavelength 619 nm AOT Reading 0.0581

Stoney Creek High School

Stoney Creek High School

Latitude 42.704682, Longitude -83.120032, Elevation 238m

Atmosphere

Aerosols ★

[New observation](#) [Past observations](#)

Clouds ★

[New observation](#) [Past observations](#)

Multi-Day Soil And Air Temperatures ★

[New observation](#) [Past observations](#)

Surface Ozone ★

[New observation](#) [Past observations](#)

Air Temperature 1-Day ★

[New observation](#) [Past observations](#)

Integrated Atmosphere (1-Day) ★

[New observation](#) [Past observations](#)

Multi-Day Soil And Soil Temperatures ★

[New observation](#) [Past observations](#)

Water Vapor ★

[New observation](#) [Past observations](#)



What else?

- **Since returning I have ...**
 - **Given additional resources to teachers of Environmental Science, Wilderness Survival, Biology, Physics, Chemistry, and Social Studies.**
 - **Provided training and information to science staff.**
 - **Given presentations to the Science Honor Society and other student groups.**
 - **Developed new resources for physics in nuclear science.**

A red truck pulling a long red trailer is driving on a snowy mountain slope. The background shows a vast, snow-covered landscape with a mountain peak in the distance under a clear blue sky. The text is overlaid on the left side of the image.

But with the relationships we have built ...
there is no limit to the lasting effects this
experience can have.

Further research, additional visits from
scientists, further collaboration with
teachers in the field, even student field
work.

Thanks to

