

# Antarctica Day Celebration



## IceCube and the Askaryan Radio Array

With PolarTREC Teacher Lesley Anderson & Researcher Dr. James Madsen

**4 December 2017**



**OUR SPACES**  
FOUNDATION FOR THE GOOD GOVERNANCE OF INTERNATIONAL SPACES



**ICECUBE**  
SOUTH POLE NEUTRINO OBSERVATORY



# Getting to Know Adobe Connect

Slides will be shown here

Exit presentation

Mute your speakers

Raise your hand

List of all participants

Follow the chat

Find out more about the presentation

Chat here



# Participant Introductions

**In the Chat box, please introduce yourself  
by typing in your:**

- ✓ Name
- ✓ School or Institution
- ✓ The number of students and adults participating with you in the same location

# Have you launched your Virtual Balloon yet?

As part of the 2017 Antarctica Day Celebration, you can launch your own virtual balloon.

Be part of the celebration!

Visit: <http://www.ourspaces.org.uk/antarctica-day.html> and launch a balloon from your location

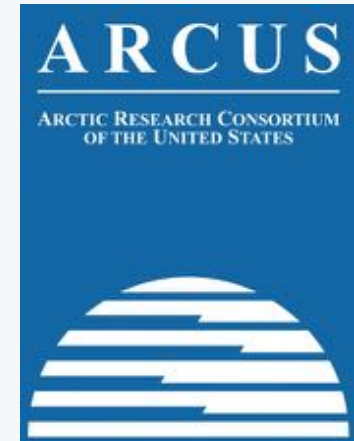
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# What is PolarTREC?

- Since 2004, the Arctic Research Consortium of the United States (ARCUS), a non-profit organization, has been administering the PolarTREC Program.
- PolarTREC is professional development for K-12 teachers. They are paired with researchers for 2-6 week research experiences in the polar regions.
- Over 150 teachers from around the United States have joined scientists in the Arctic and Antarctica to learn about science, the polar regions, and to share what they have learned with their students and communities.



*25 Years of Connecting Arctic Research*  
[www.arcus.org](http://www.arcus.org)

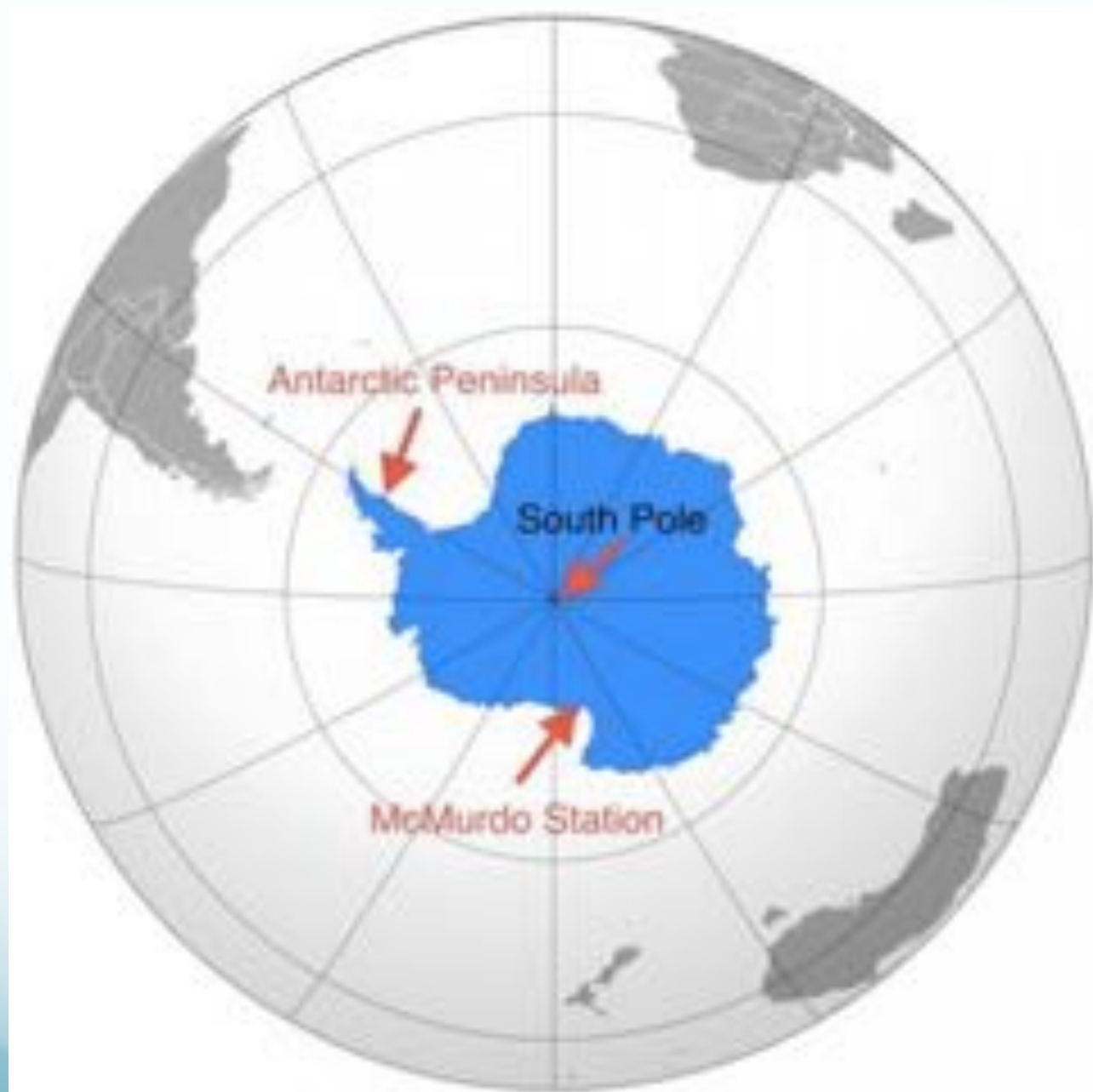
# Questions

## During the Presentation:

- Type your question in the text chat box

## At the End of the Presentation:

- Raise your hand with the “hand button”.
- PolarTREC staff will call on you and activate your microphone.
- Speak loud and clear, directly into the computer microphone or the phone to ask your question.



Antarctic Peninsula

South Pole

McMurdo Station

# History of Antarctic Exploration



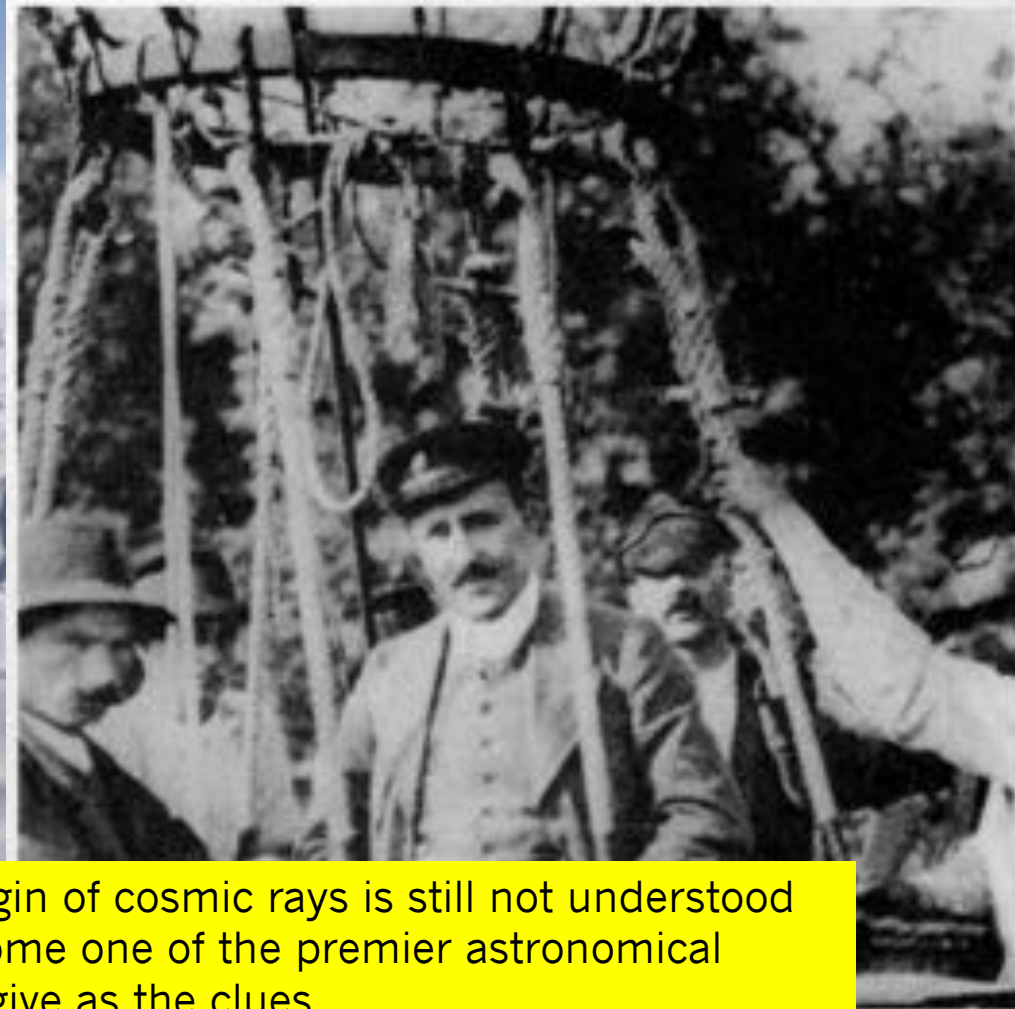


# One hundred years ago

December 14, 1911:  
Rould Amundson succeeds  
in reaching the South Pole

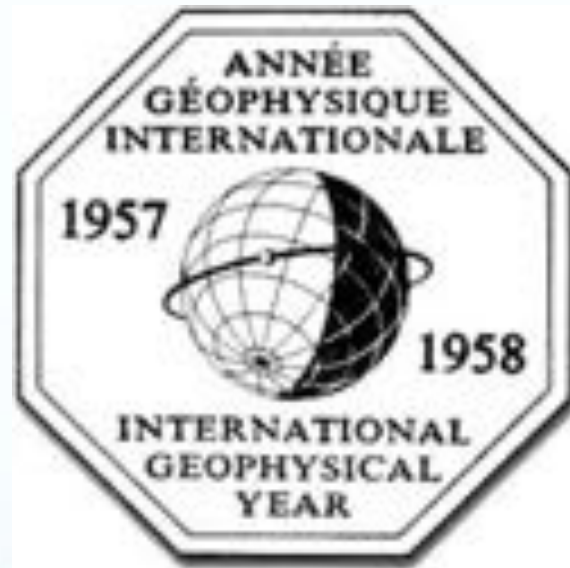


1911/1912:  
Victor Hess discovers  
Cosmic Rays



100 years later: The origin of cosmic rays is still not understood  
The South Pole has become one of the premier astronomical  
laboratories which may give as the clues.

# International Geophysical Year (1957-1958)



# Antarctic Treaty - 1959



# Antarctic Conservation Act



Now almost 100 years after  
Amundsen and Hess' discoveries...



# McMurdo Station



# South Pole Station



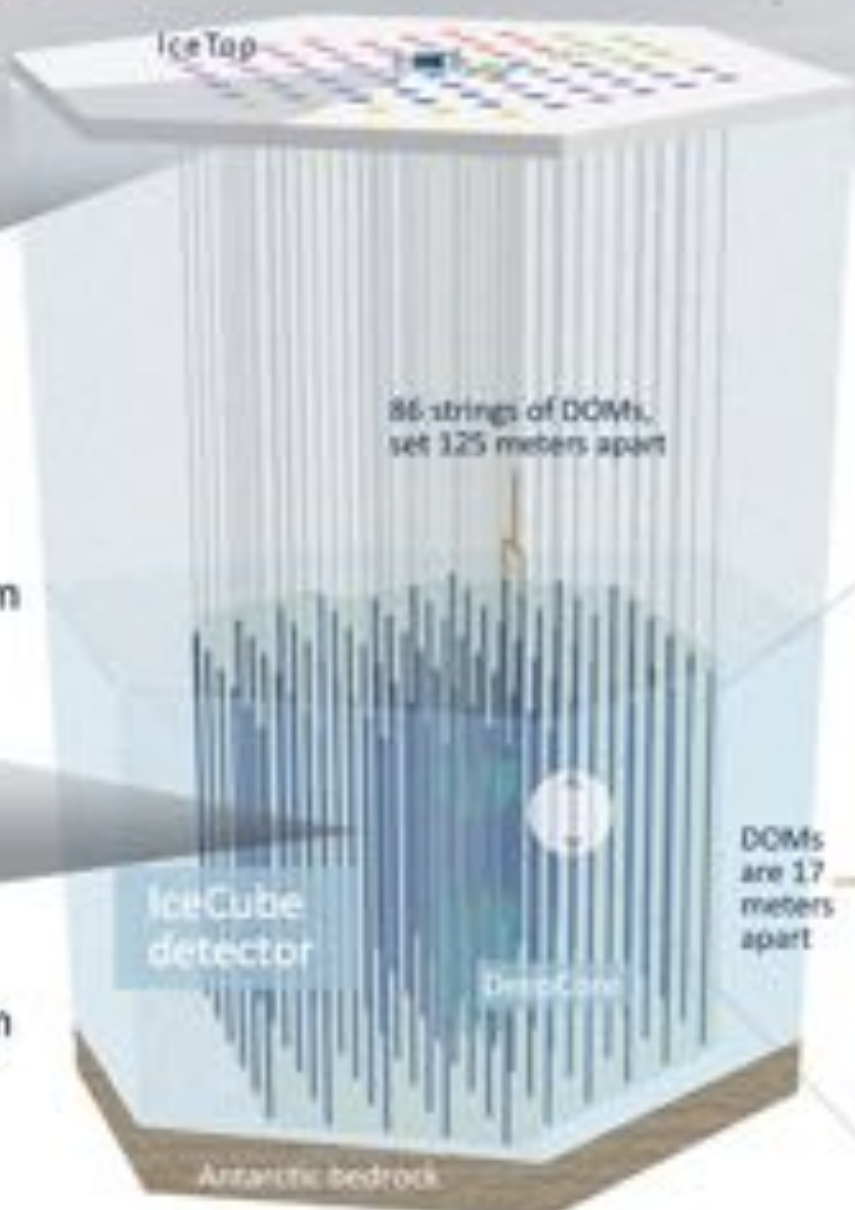


# ICECUBE

ANTARCTIC POLAR NEUTRINO OBSERVATORY

50 m

Ice Top



86 strings of DOMs,  
set 125 meters apart

1450 m

IceCube  
detector

Dome Core

2450 m

Antarctic bedrock

Amundsen-Scott South  
Pole Station, Antarctica  
A National Science Foundation-  
managed research facility

60 DOMs  
on each  
string

DOMs  
are 17  
meters  
apart



### IceCube Laboratory

Data is collected here and  
sent by satellite to the data  
warehouse at UW-Madison



### Digital Optical Module (DOM)

5,160 DOMs  
deployed in the ice





# Cosmic rays, gamma rays, and neutrinos from the cosmos

Cosmic accaerator:  
Active galaxy with supermassive black hole in the center.

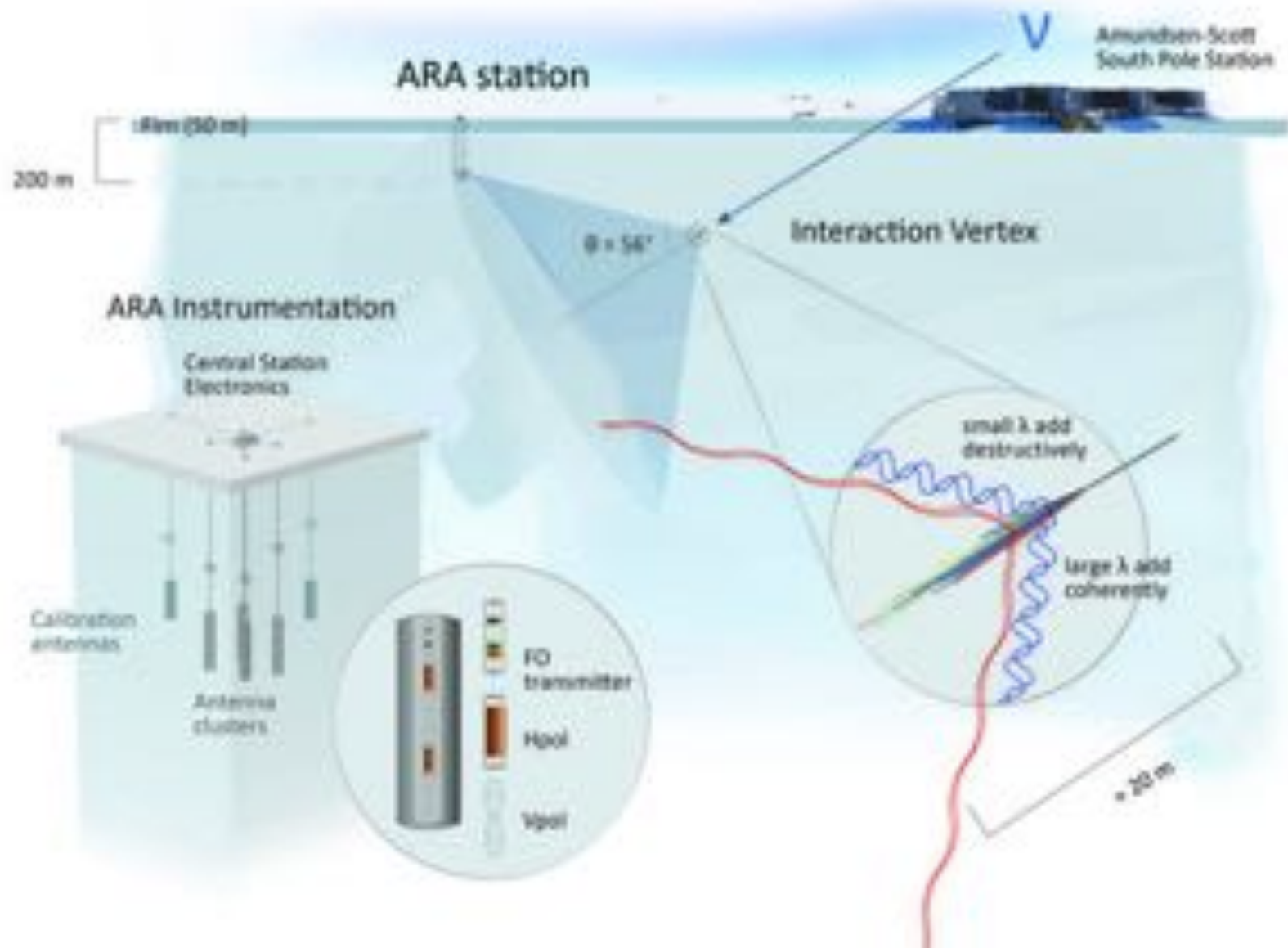
Energetic photons may get absorbed.  
Charged particles will get randomized in magnetic fields  
→ Neutrinos will travel in straight line through the Univers

Cosmic protons will create many articles in collision, among them neutrinos





## Detection of ultrahigh-energy neutrinos in ARA



# Join PolarTREC!

[www.polartrec.com/about/join](http://www.polartrec.com/about/join)

Everyone can participate in different ways:

- **Follow Expeditions**
- **Participate in PolarConnect Events**
- **Join the Polar Education Email List**
- **Check out the great resources**
- **Become a PolarTREC Teacher or Researcher**
- **Become a member of ARCUS**

# Thank You!

*An archive of the event will be available shortly.*

<http://www.polar-trec.com/polar-connect/archive>



*25 Years of Connecting Arctic Research*  
[www.arcus.org](http://www.arcus.org)