International Polar Day

Above the Poles

www.ipy.org

Welcome to:

Live from IPY!

Looking Out and In

Observations of, and from, the Polar Regions

4 December 2008

10:00 am AST, 11:00 am PST, 12:00 pm MST, 1:00 pm CST, 2:00 pm EST

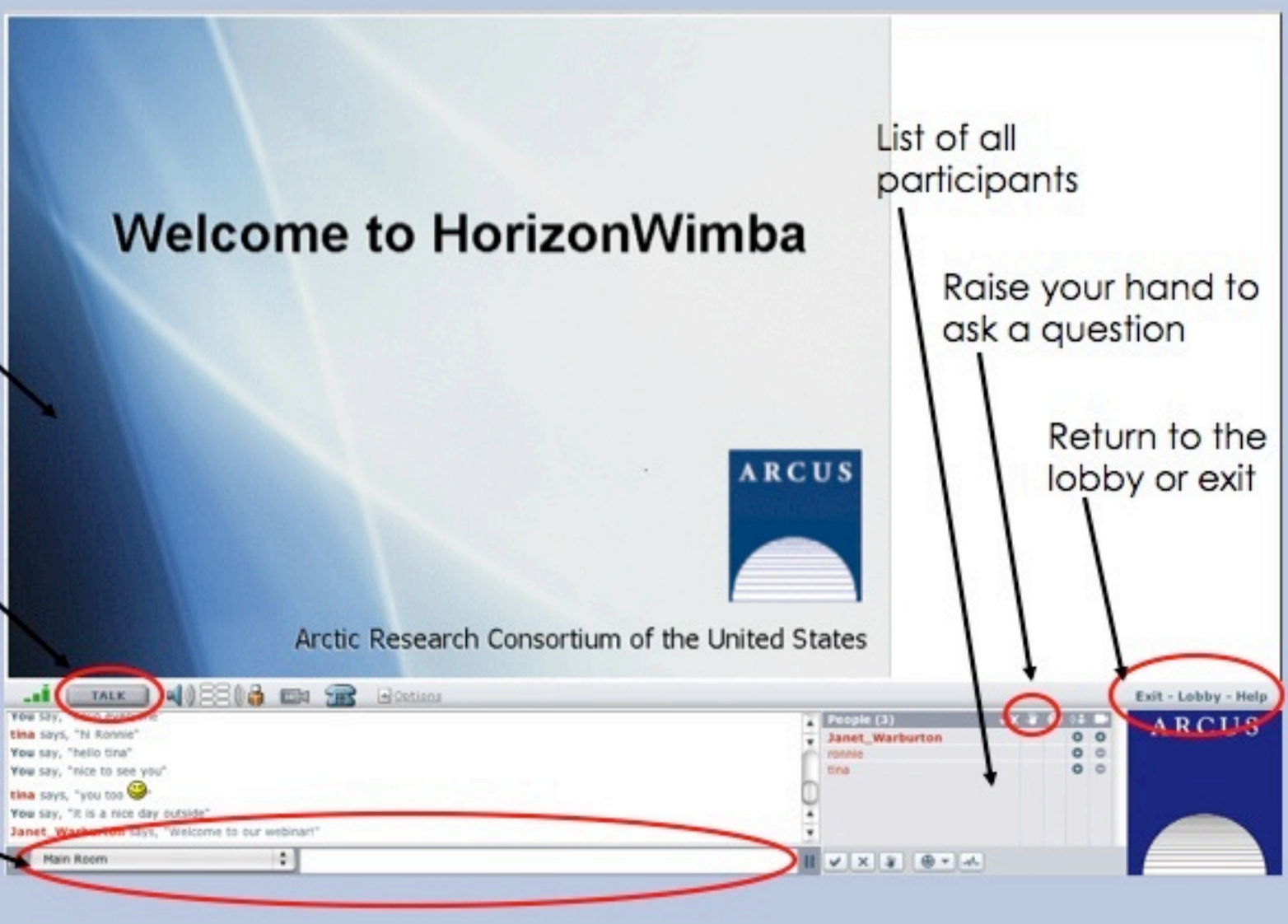
Chile 1600, Sao Paulo 1700, UK 1900, Europe 2000, Sydney 0600, NZ 0800

Wimba
people teach people

Slides will be shown here

If using VOIP, press here to talk

'Chat' with one person or the entire group



List of all participants

Raise your hand to ask a question

Return to the lobby or exit

Please note: Today's event will be recorded and archived at www.polartrec.com.

Roll Call

- **When called, please state your:**
  - Name
  - School / Institution
  - The number of students participating today

International Polar Year (IPY)

The International Polar Year (2007-2009) is an exciting scientific campaign focusing on the world's polar regions!

IPY is a time for discovery, science, learning, and awareness about the polar regions with activities for youth, scientists, and the public.

www.ipy.org

Today's Agenda:

- Presenter Introduction
- Introduction: "Looking in and Looking Out"
- Observing Space from the Poles
- Observing the Poles from Space
- Question & Answer Session

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Today's Presenters:

Darryn Schneider
IceCube, Neutrino Observatory

LIVE FROM ANTARCTICA

Bob Bindschadler
LIMA [Landsat Image Mosaic of Antarctica]

Ken Jezek
GIIPSY [Global Inter-Agency IPY Polar Snapshot Year]

International Polar Day

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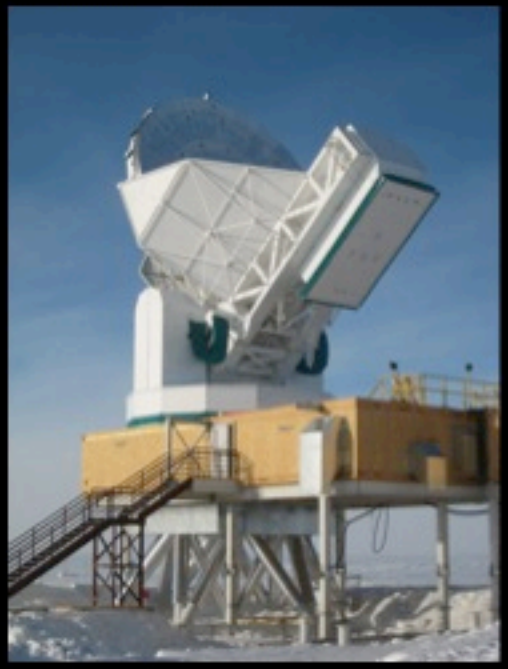
Looking Out:

The polar regions provide unique locations for observing layers of the upper atmosphere and outer space.



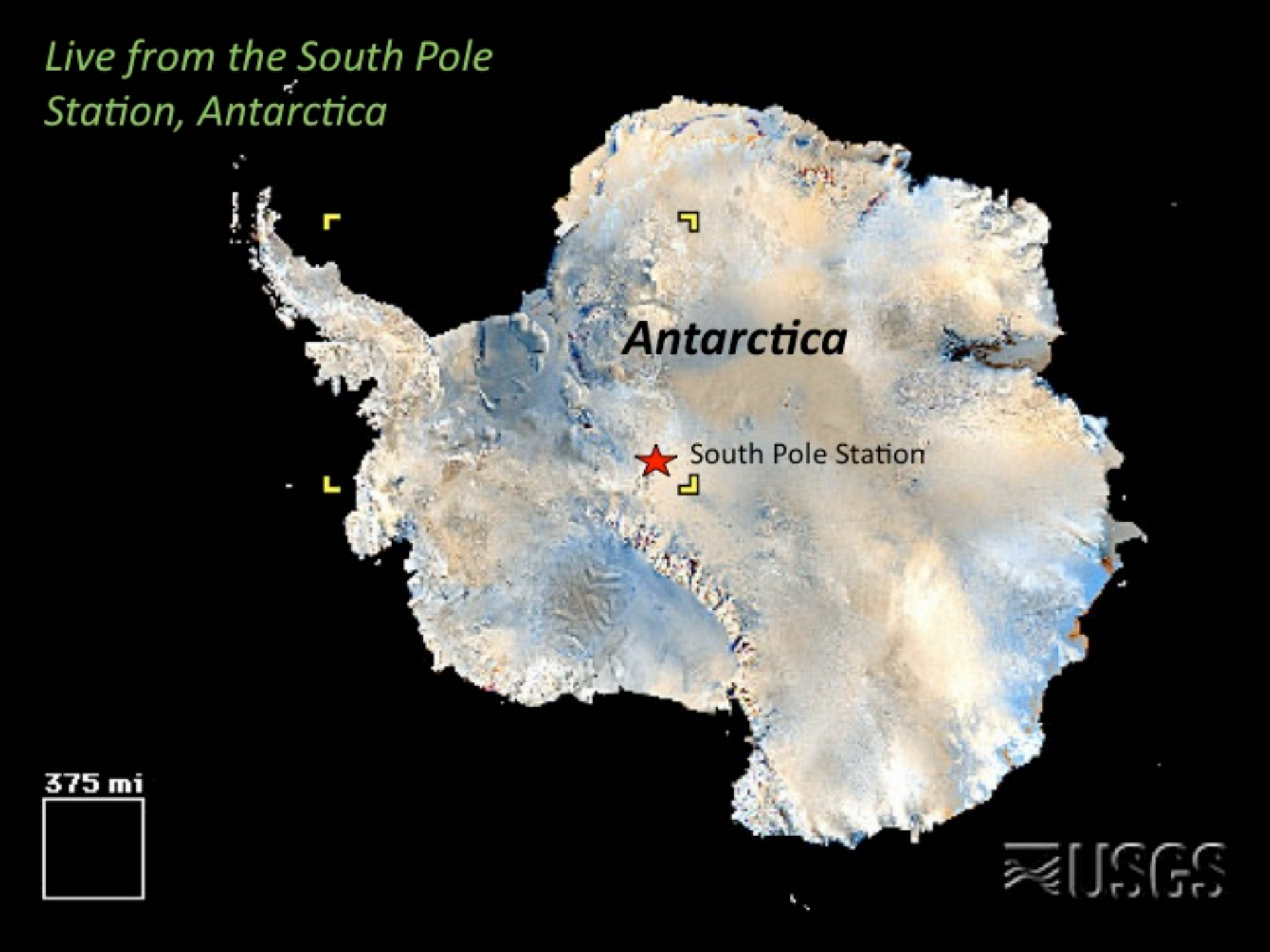
Looking In:

Images from space obtained from satellites, give us a unique view of the polar regions and help us to learn a lot about processes happening on the Earth. Satellite images help researchers on the ground by providing images of the area they are working in, and even providing practical information like where the sea ice is in their area.

Dr. Darryn Schneider
Observing Space from the Poles

- University of Wisconsin - IceCube neutrino telescope
- Bachelor of Science - University of Queensland
- PhD Plasma Physics - Australian National University
- Darryn's first job was wintering over at the Australian Antarctic base Casey where he maintained the geophysical observatory, which had a strong emphasis on ionospheric studies.
- This is Darryn's 13th trip to Antarctica and he has spent about 4 years there in total.

Live from the South Pole Station, Antarctica

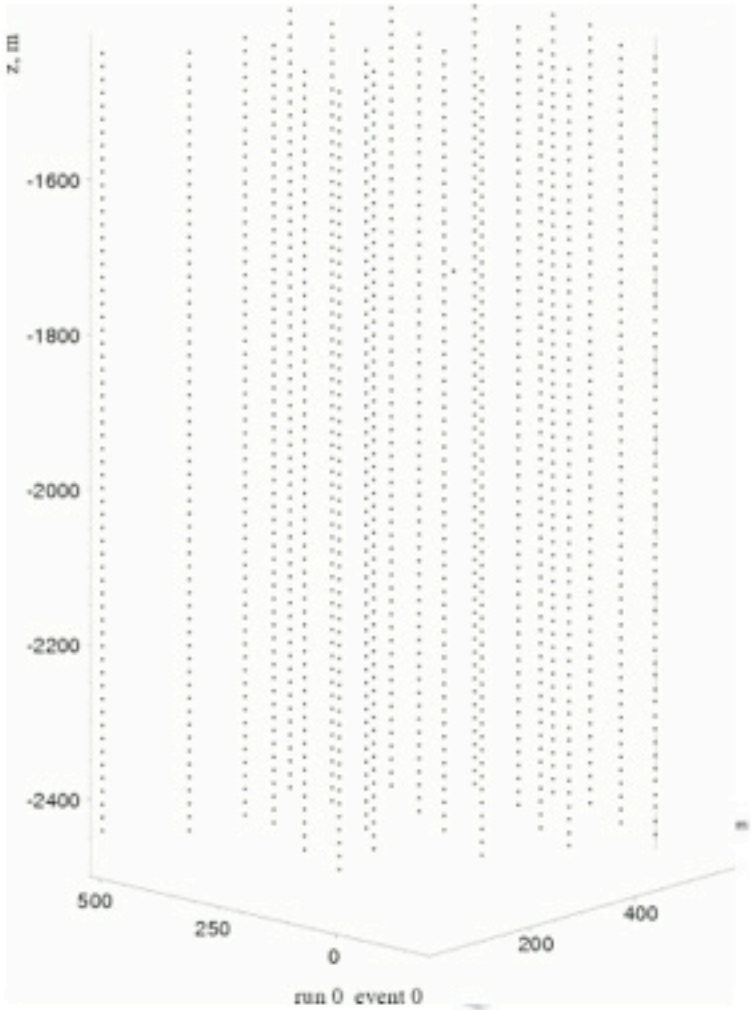


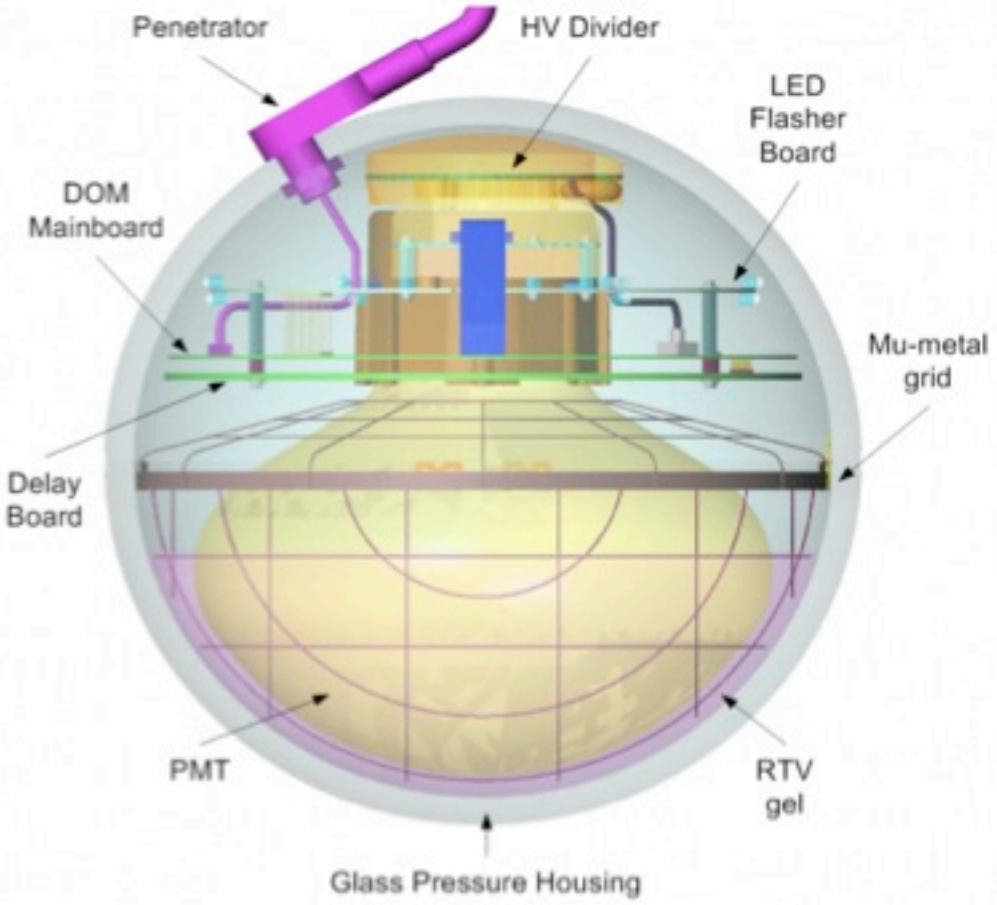
Astronomy at the South Pole

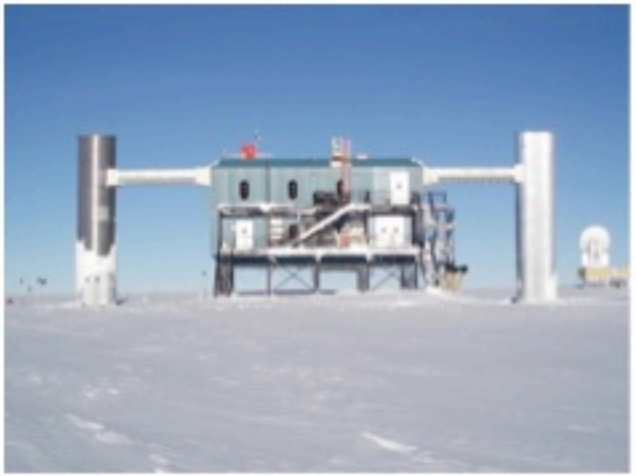
Radio Telescopes
South Pole Telescope (SPT)
BICEP

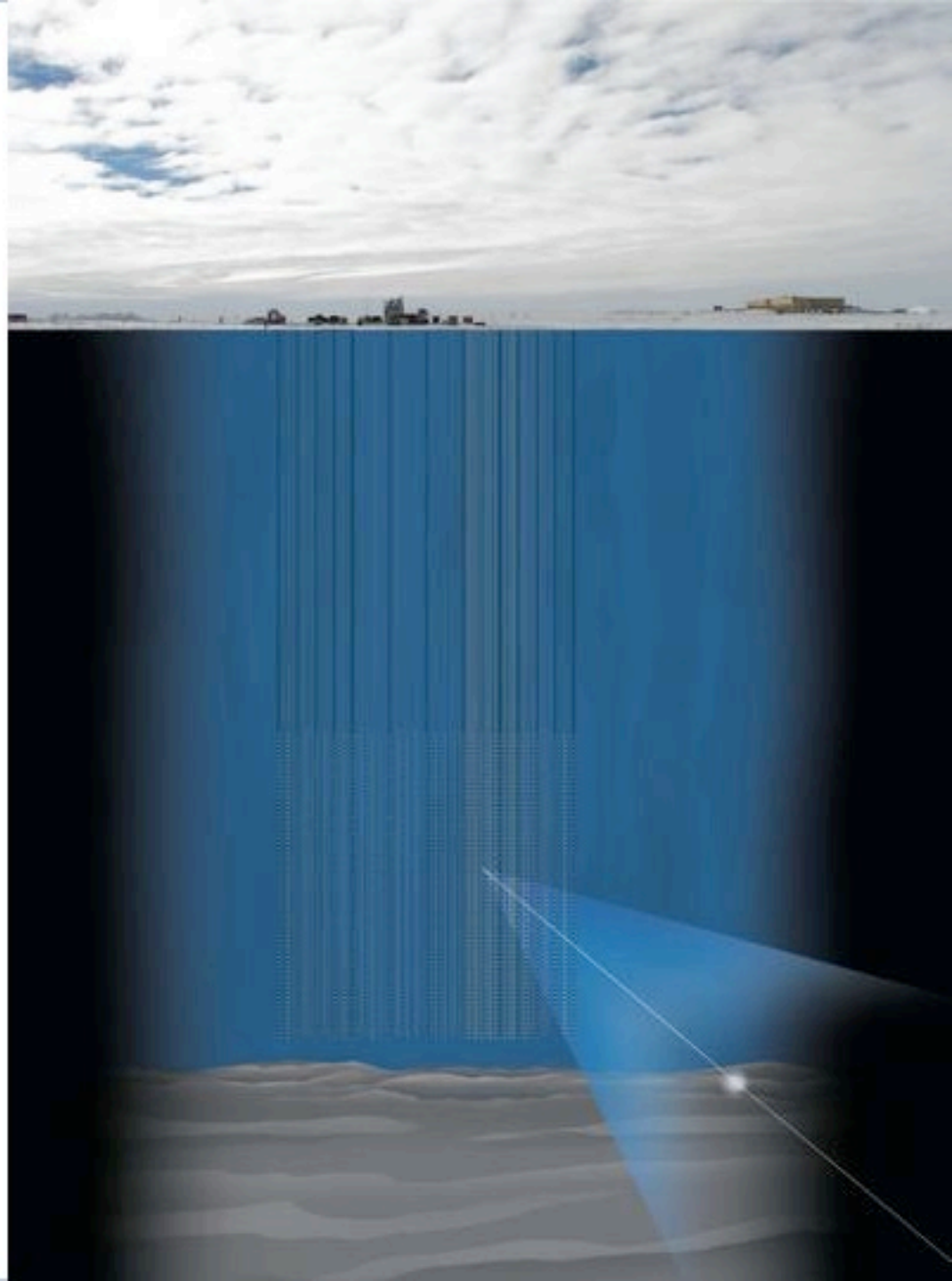
Neutrino Telescopes
AMANDA
IceCube

IceCube Neutrino Telescope

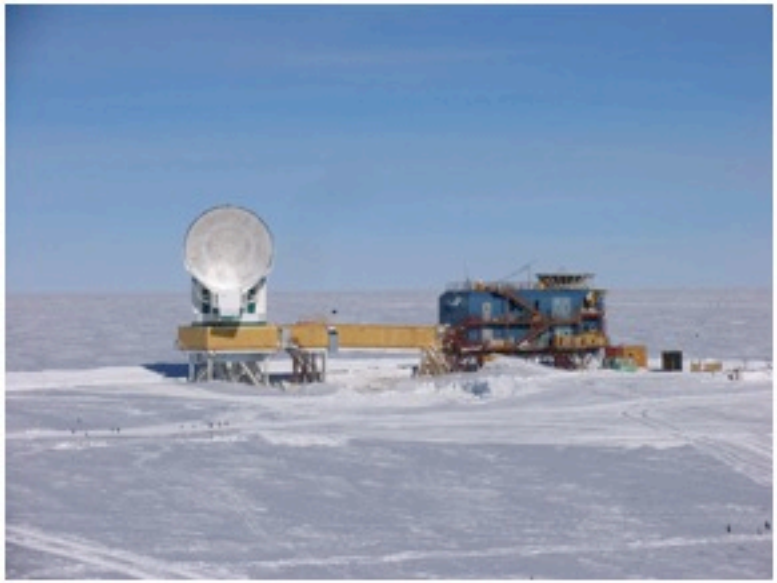


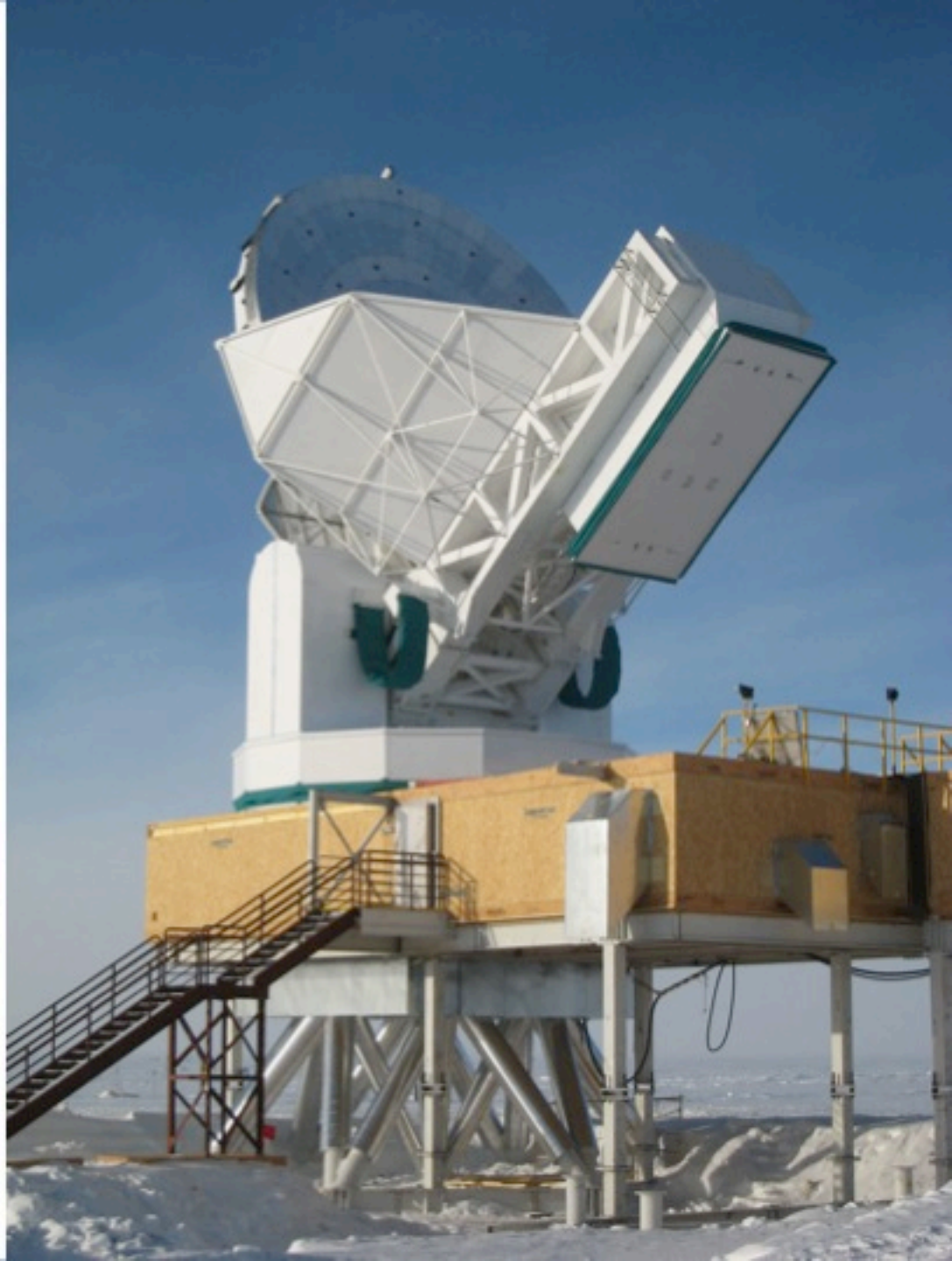


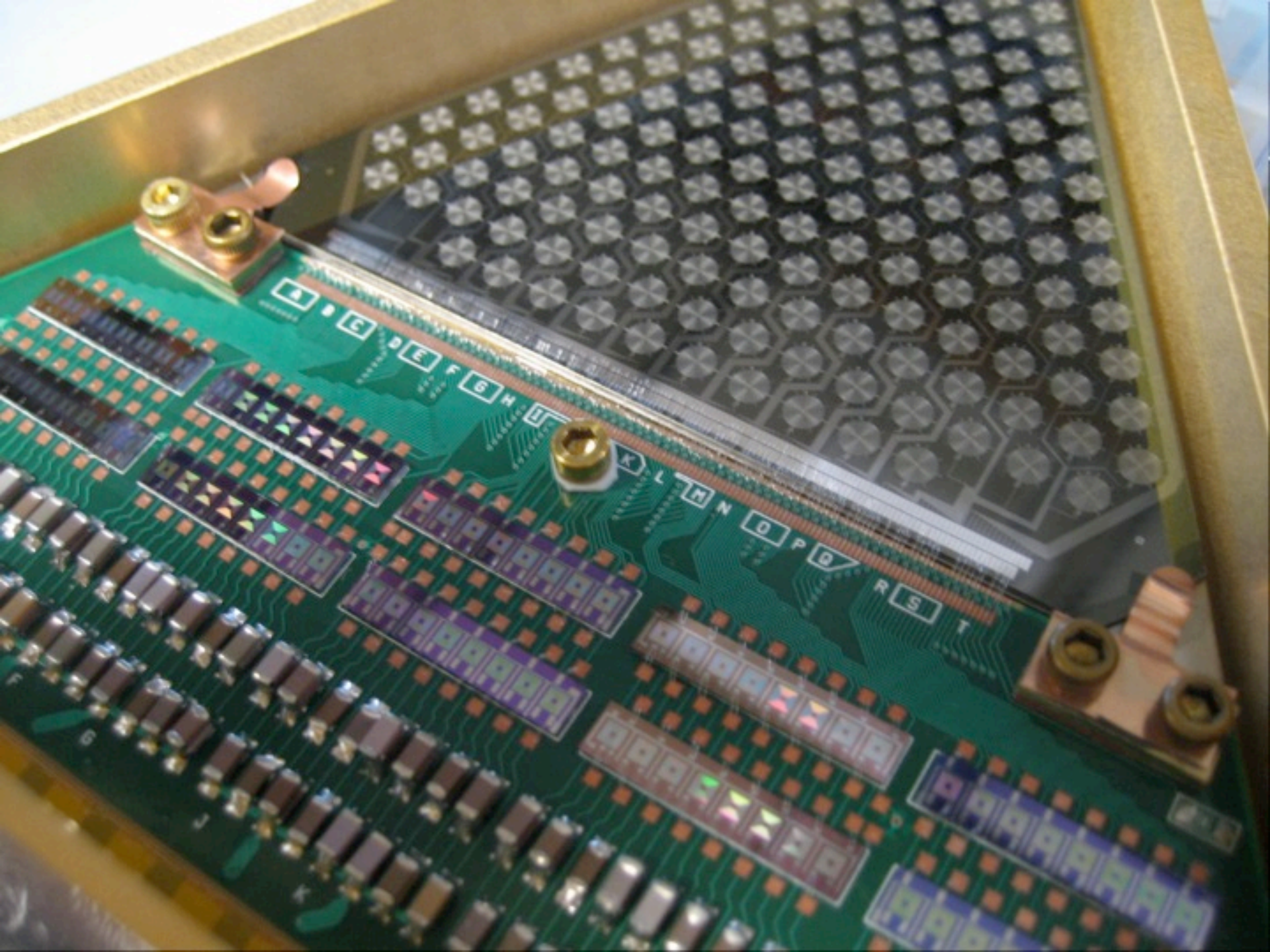


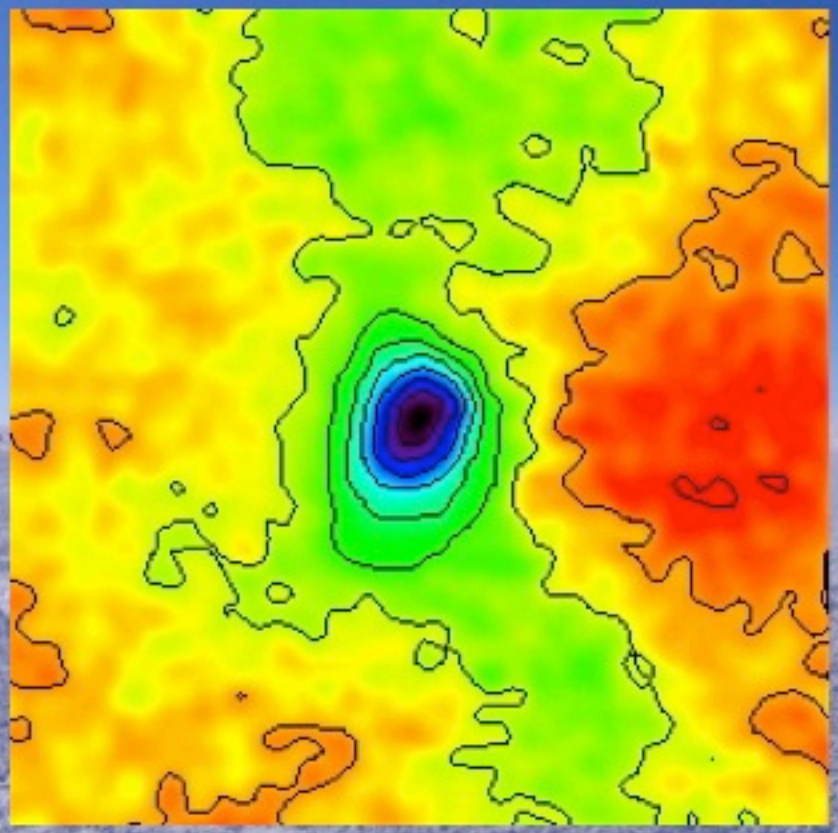


South Pole Telescope (SPT)

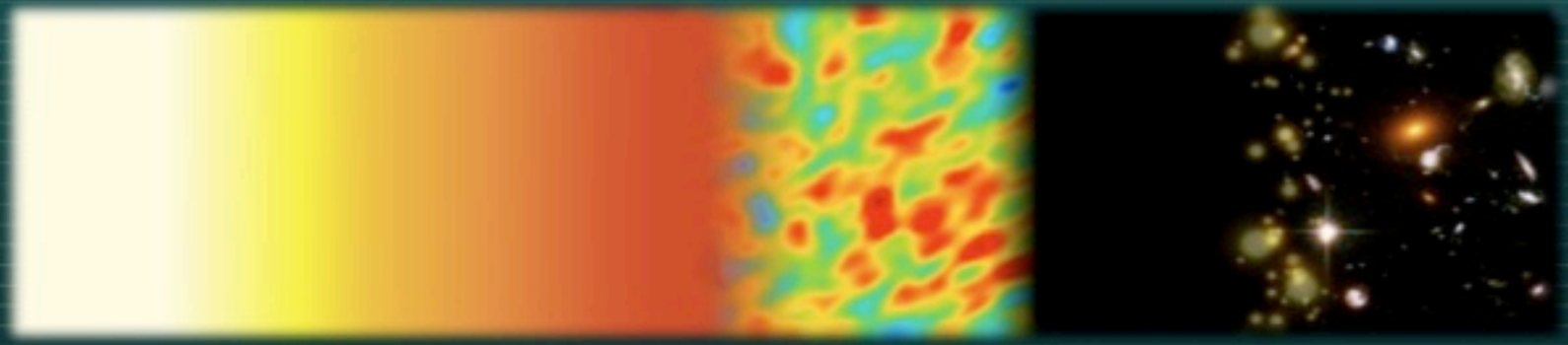








How did the universe begin?



Big Bang,
t = 0

"Inflation" -- accelerated expansion of the universe at $t = 10^{-35}$ s (?)

Formation of the *cosmic microwave background* (CMB), a snapshot of the early universe at t = 400,000 yr

First stars,
t = 1 billion yr

We live here,
t = 13.7 billion yr

Inflation generates *gravitational waves* that imprint a handedness or "B-mode" in the polarization of the CMB.

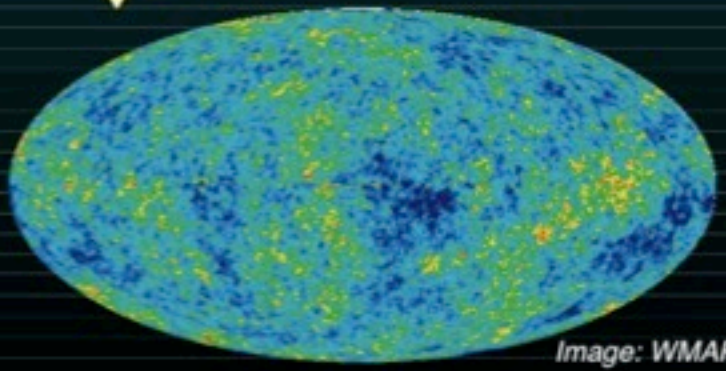
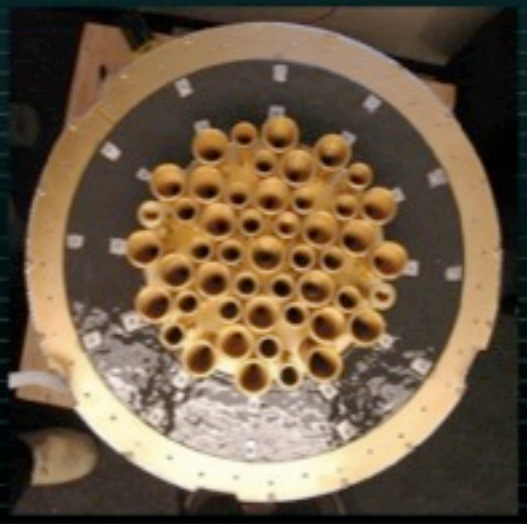


Image: WMAP

Background Imaging of Cosmic Extragalactic Polarization

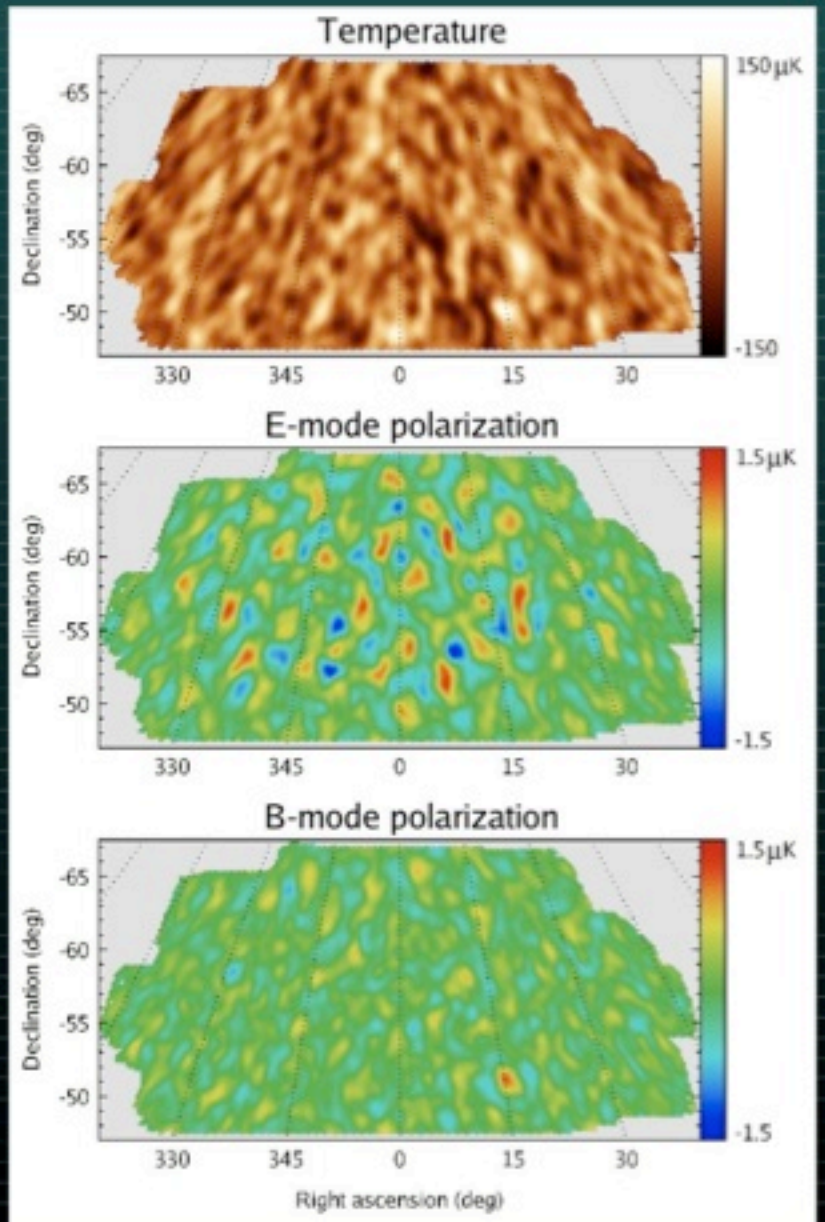
Team BICEP and the telescope: an upward-looking refractor and 3-axis mount



49-pixel focal plane observing at two microwave wavelengths, 2 mm and 3mm

Mapping ~2% of the sky with degree-scale resolution

Temperature and polarization maps from BICEP



Temperature fluctuations correspond to under- and overdense regions that evolved into the largest structures visible in the universe today.

The CMB has intrinsic "E-mode" polarization, and BICEP makes the first high signal-to-noise measurements at these angular scales.

BICEP doesn't see B-mode polarization (yet), so we can set tight upper limits on the gravitational waves produced by Inflation.

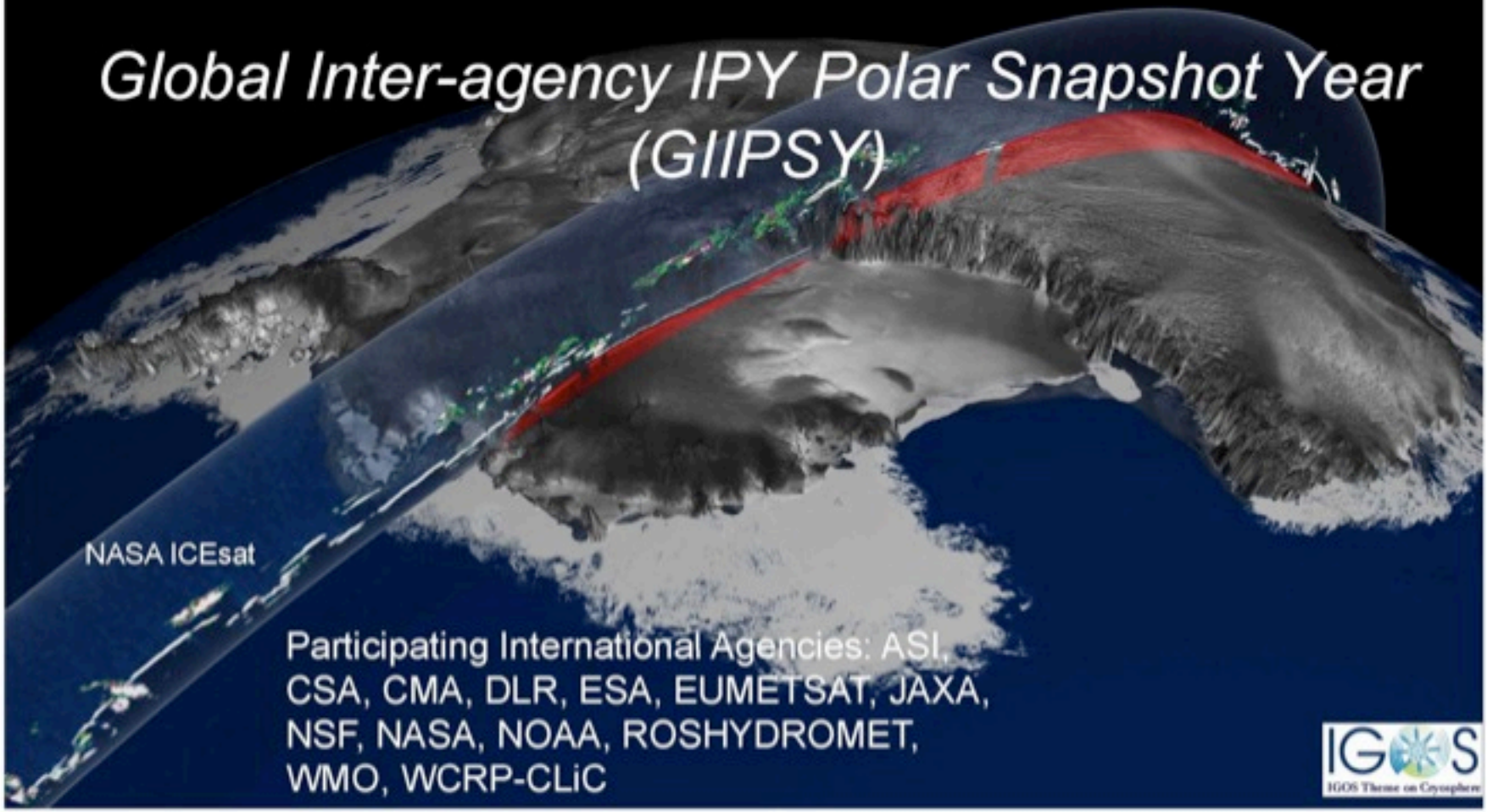
Dr. Kenneth Jezek

Observing the Poles from Space

- Professor, Byrd Polar Research Center, School of Earth Sciences, Ohio State University
- Began Antarctic research in 1973 when he manned the cosmic ray laboratory located at McMurdo Station
- Scientific interests include: remote sensing of ice sheets and sea ice and innovative technologies used for creating three-dimensional images of the land buried beneath the polar ice sheets
- Co-leader on the GIIPSY project which aims to assemble legacy data sets during the International Polar Year using the international constellation of Earth observing satellites

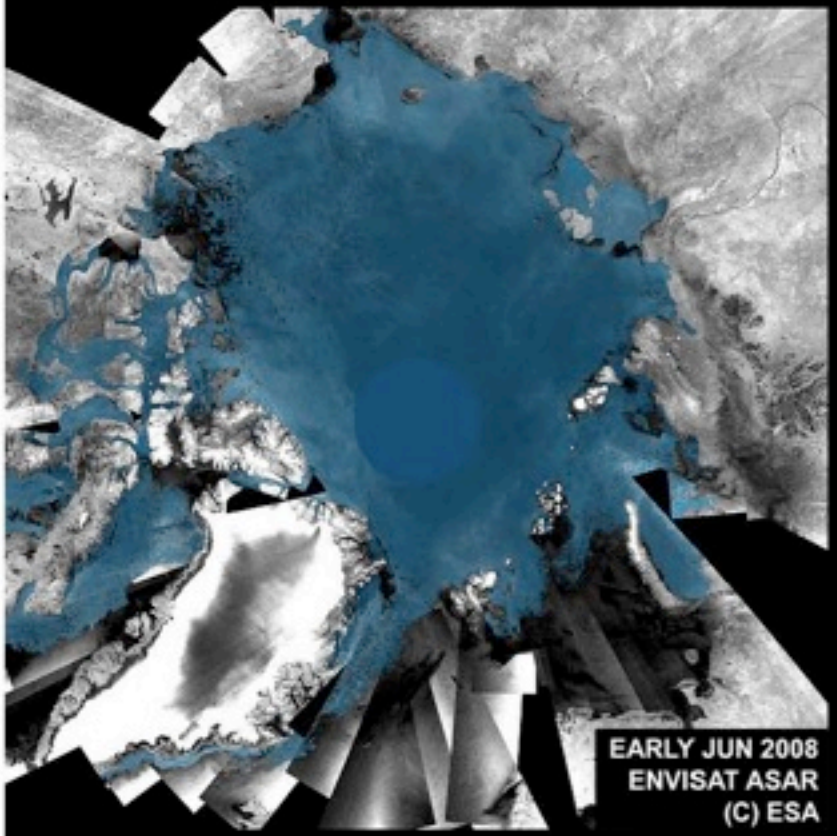
Observing Pole to Pole – A virtual observing system

Global Inter-agency IPY Polar Snapshot Year (GIIPSY)



Participating International Agencies: ASI, CSA, CMA, DLR, ESA, EUMETSAT, JAXA, NSF, NASA, NOAA, ROSHYDROMET, WMO, WCRP-CLiC

IGOS
IGOS Theme on Cryosphere

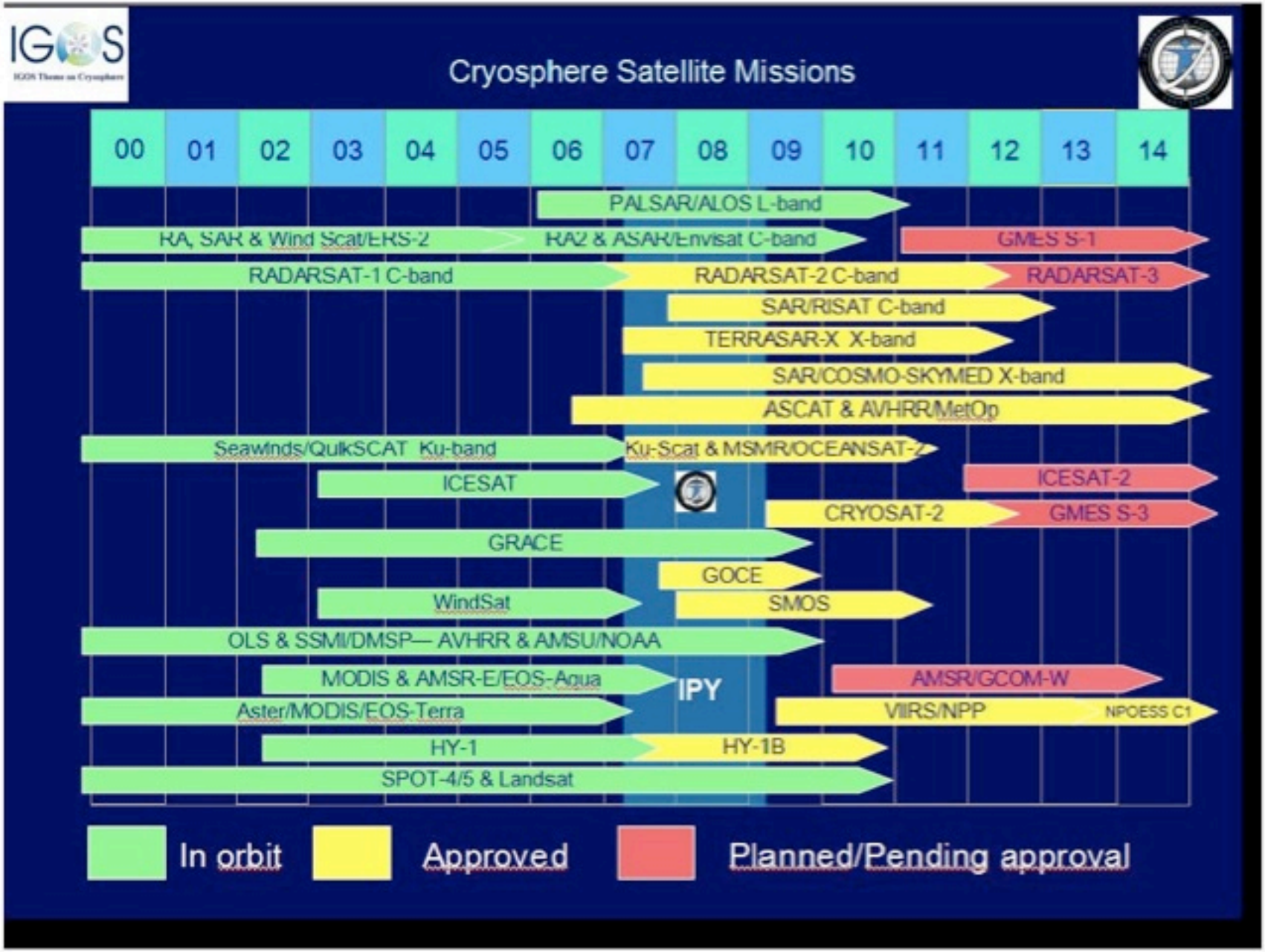


GIIPSY

The 1957 IGY began the rigorous scientific investigation of the Polar Regions.

The 2007-08 IPY goes beyond the IGY through the numbers and capabilities of earth observing satellites. These systems can routinely observe the poles and cast polar processes within the context of the global environment.

Different satellites use different measuring techniques. Combined, the international network of satellite capture a unique snapshot of the polar regions.


IGOS
IGOS Theme on Cryosphere
Cryosphere Satellite Missions
00
01
02
03
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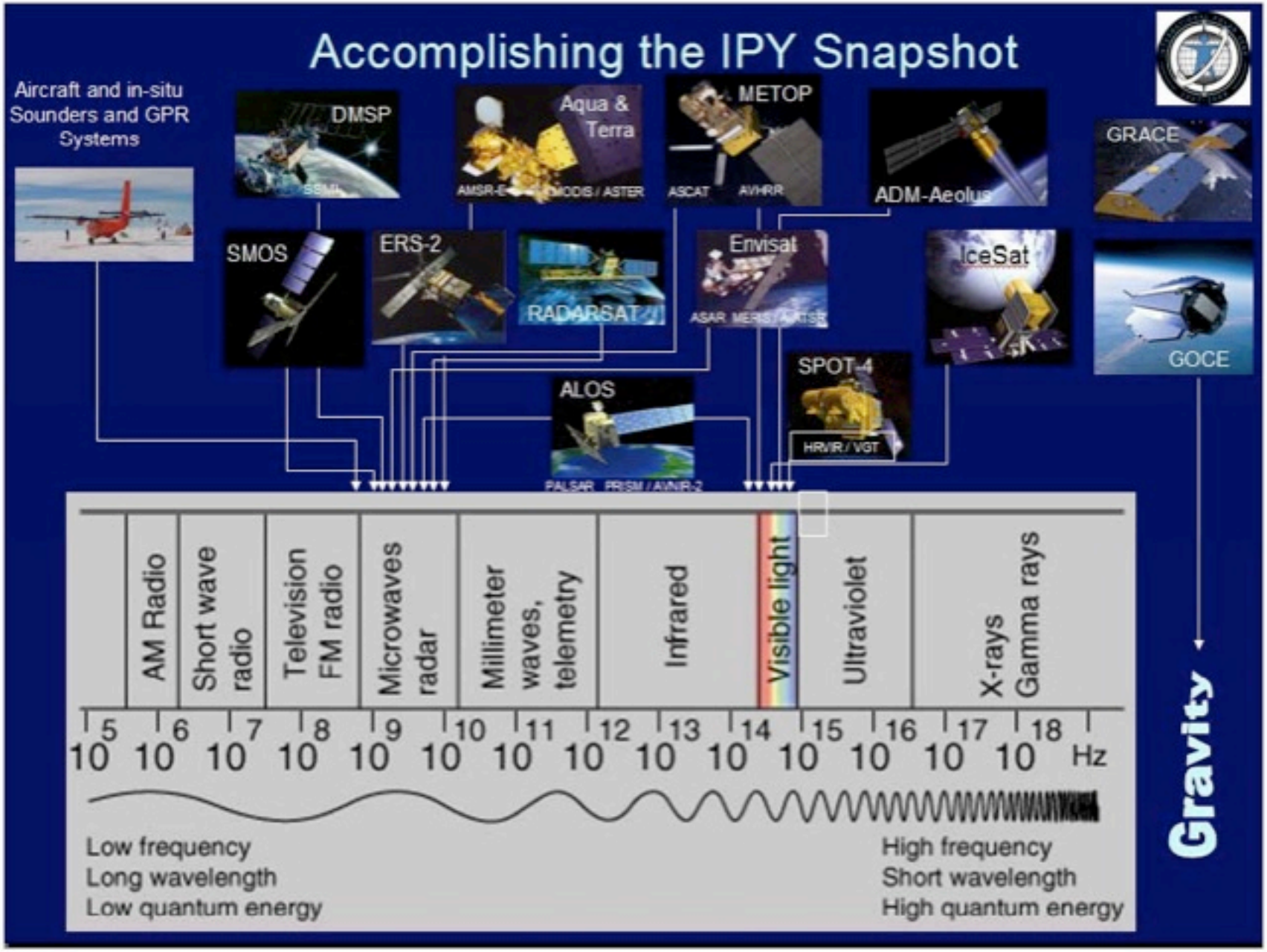
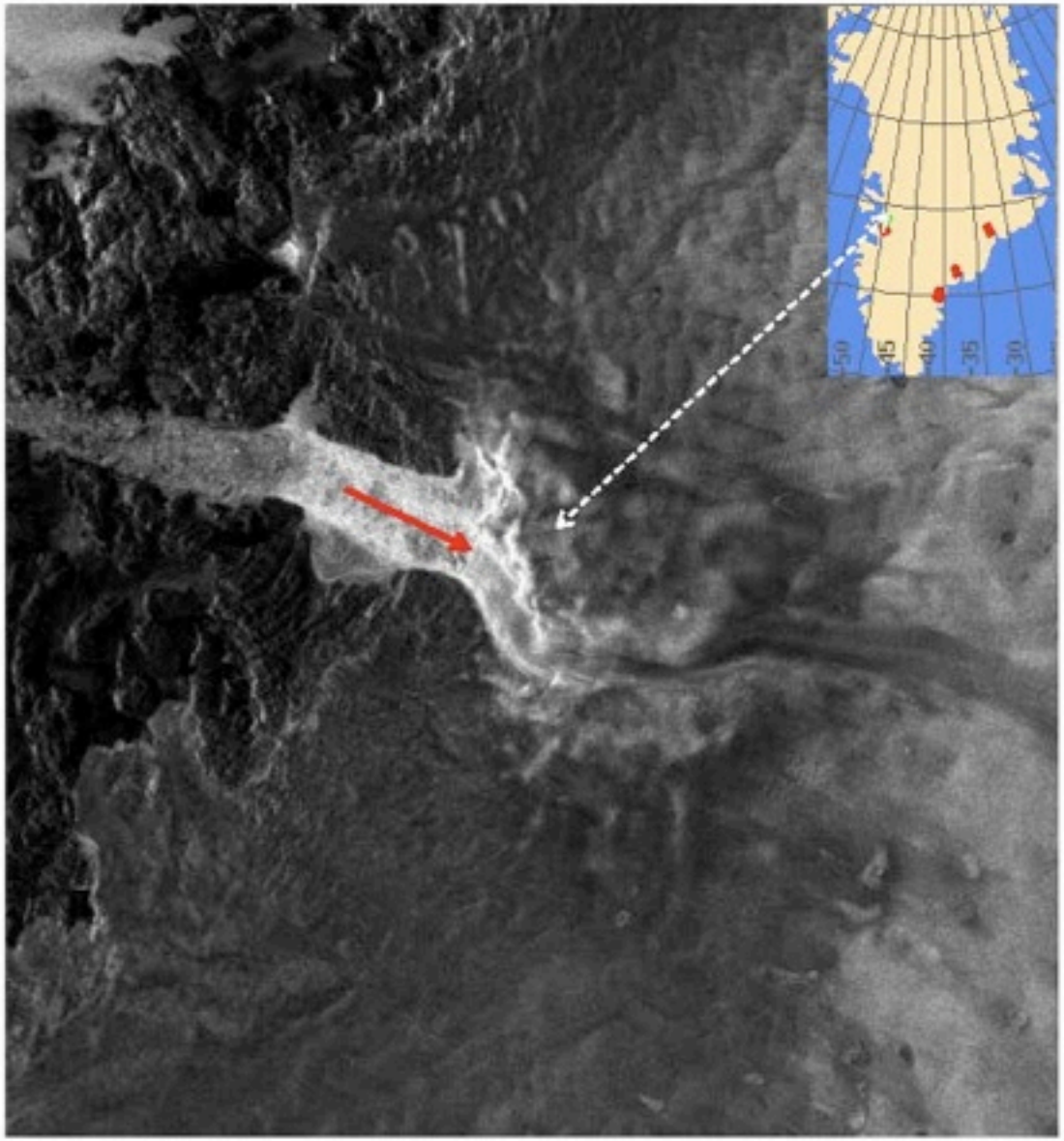
PALSAR/ALOS L-band
RA, SAR & Wind Scat/ERS-2
RA2 & ASAR/Envisat C-band
GMES S-1
RADARSAT-1 C-band
RADARSAT-2 C-band
RADARSAT-3
SAR/RISAT C-band
TERRASAR-X X-band
SAR/COSMO-SKYMED X-band
ASCAT & AVHRR/MetOp
Seawinds/QuikSCAT Ku-band
Ku-Scat & MSMR/OCEANSAT-2
ICESAT
ICESAT-2
CRYOSAT-2
GMES S-3
GRACE
GOCE
WindSat
SMOS
OLS & SSMI/DMSP— AVHRR & AMSU/NOAA
MODIS & AMSR-E/EOS-Aqua
IPY
AMSR/GCOM-W
Aster/MODIS/EOS-Terra
VIIRS/NPP
NPOESS C1
HY-1
HY-1B
SPOT-4/5 & Landsat
In orbit
Approved
Planned/Pending approval


Accomplishing the IPY Snapshot
Aircraft and in-situ Sounders and GPR Systems
DMSP
SSMIS
Aqua & Terra
AMSR-E
MODIS / ASTER
METOP
ASCAT
AVHRR
ADM-Aeolus
GRACE
SMOS
ERS-2
RADARSAT
Envisat
ASAR MERIS/AATSR
IceSat
GOCE
SPOT-4
HRVIR / VGT
ALOS
PALSAR PRISM / AVNIR-2
AM Radio
Short wave radio
Television FM radio
Microwaves radar
Millimeter waves, telemetry
Infrared
Visible light
Ultraviolet
X-rays Gamma rays
10^5 10^6 10^7 10^8 10^9 10^10 10^11 10^12 10^13 10^14 10^15 10^16 10^17 10^18 Hz
Low frequency
Long wavelength
Low quantum energy
High frequency
Short wavelength
High quantum energy
Gravity



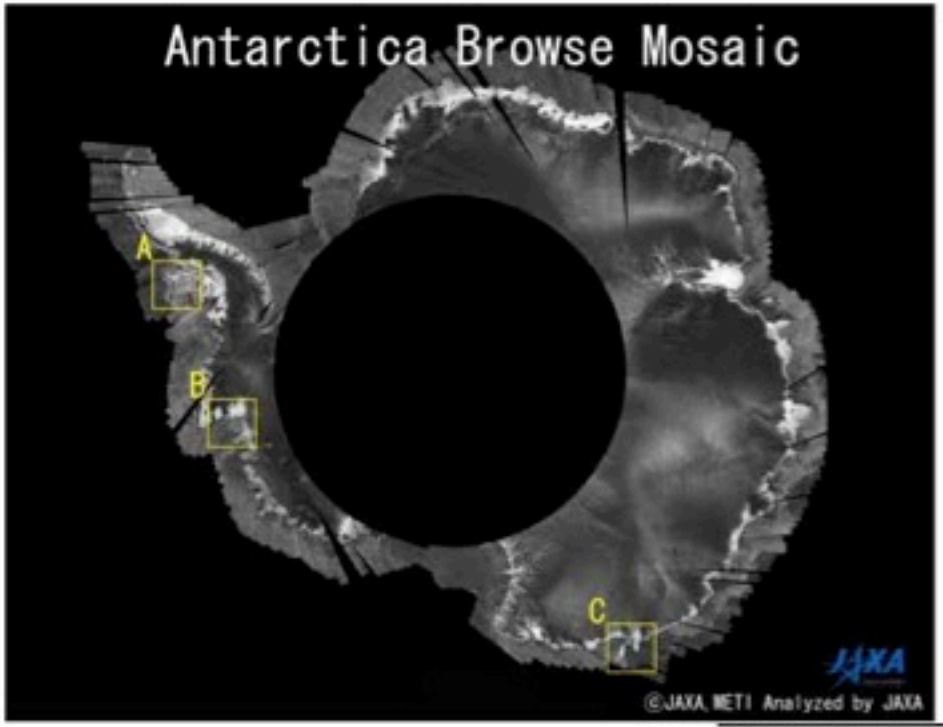
See for yourself !!

This ESA ASAR image of Jacobshavn Glacier Greenland was taken by the ESA ASAR on Nov 27, 2008. The red arrow shows how much the glacier has retreated since 2000.

You can watch for future changes. It is easy. For example, download the EOLI_SA at

http://earth.esa.int/resources/catalogues/

to monitor this glacier.



More places to look for images:

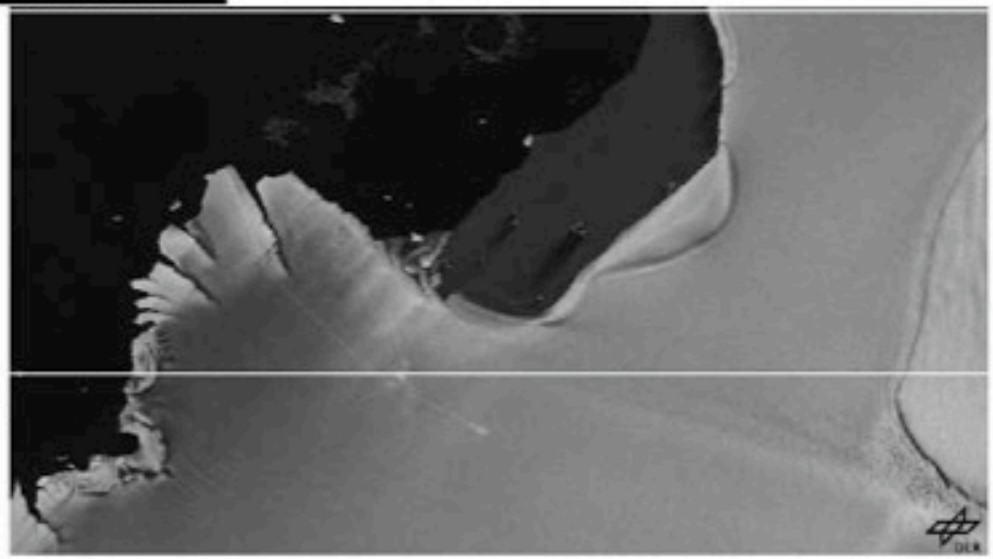
http://nasadaacs.eos.nasa.gov/

https://cosmo-skymed-ao.asi.it/asi/asi

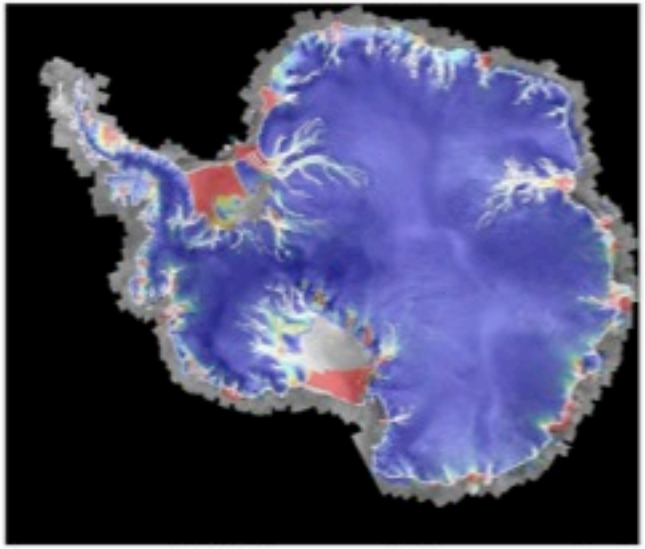
http://polardali.spotimage.fr:8092/IPY/dalisearch.aspx

http://www.eorc.jaxa.jp/ALOS/ipy/ipy_index.htm

Japanese PALSAR Mosaic:
Dec. 2007 – Jan. 2008



German TerraSAR-X: 10 Feb. 2008;
Antarctic station Neumayer II



IPY Opportunity for Coordinated Spaceborne Observations

- IPY provides an international framework for acquiring coordinated spaceborne observations of the polar regions.
- The confluence of international science programs, technical capabilities and the IPY present a **once-in-a-life-time** opportunity for gathering data essential for understanding changing polar climate and its global impact.
- In the spirit of the IGY, secure these data sets as our legacy to the next generations of polar scientists.

Beyond GIIPSY: GEOSS

GEOSS: The Global Earth Observation System of Systems

- Cooperation amongst international agencies
- Image top of the atmosphere to the depths of the core
- Complex Science
- Information delivery to the public

International Polar Day

Above the Poles

www.ipy.org

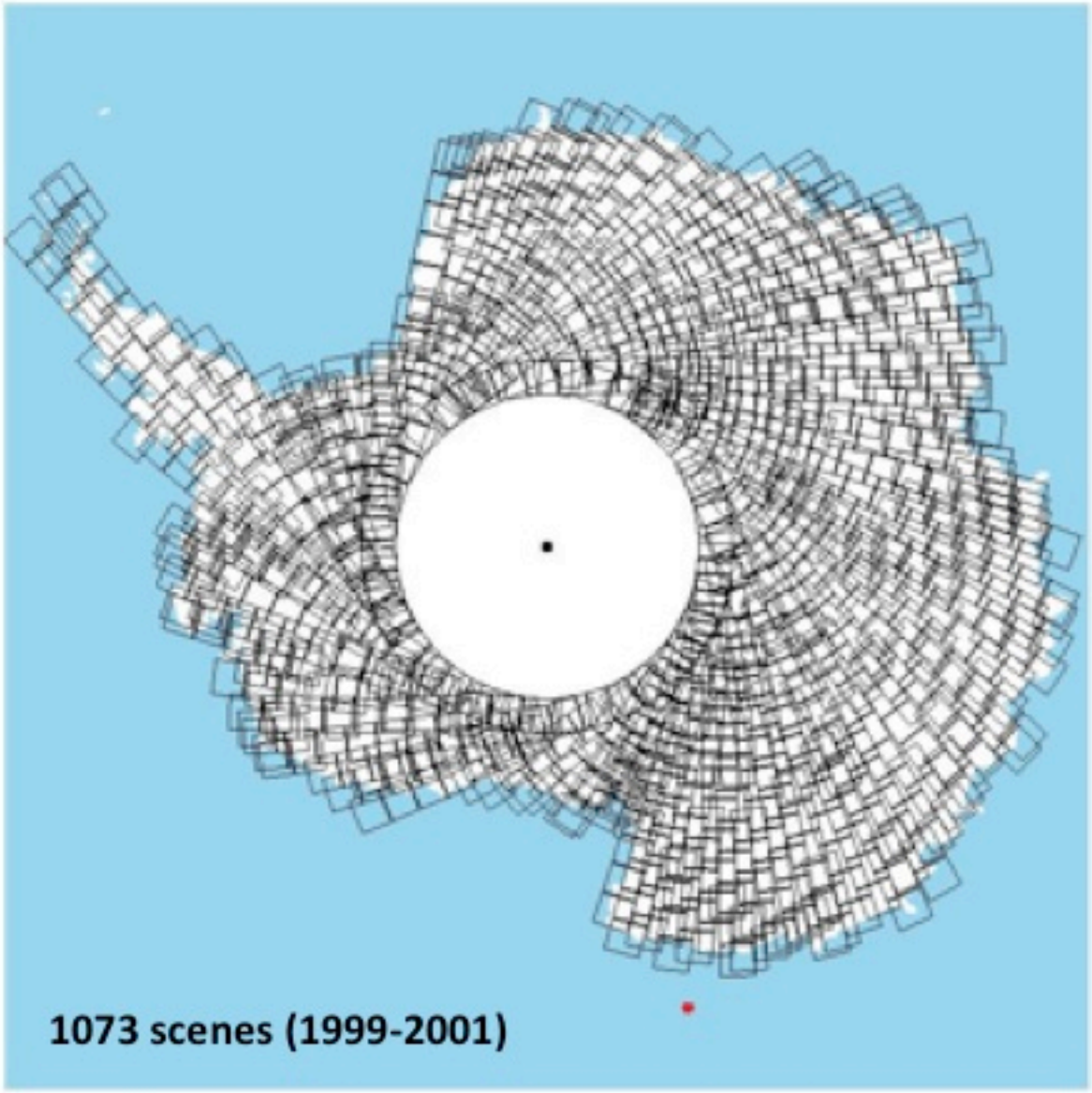
Dr. Robert Bindschadler

Observing the Poles from Space

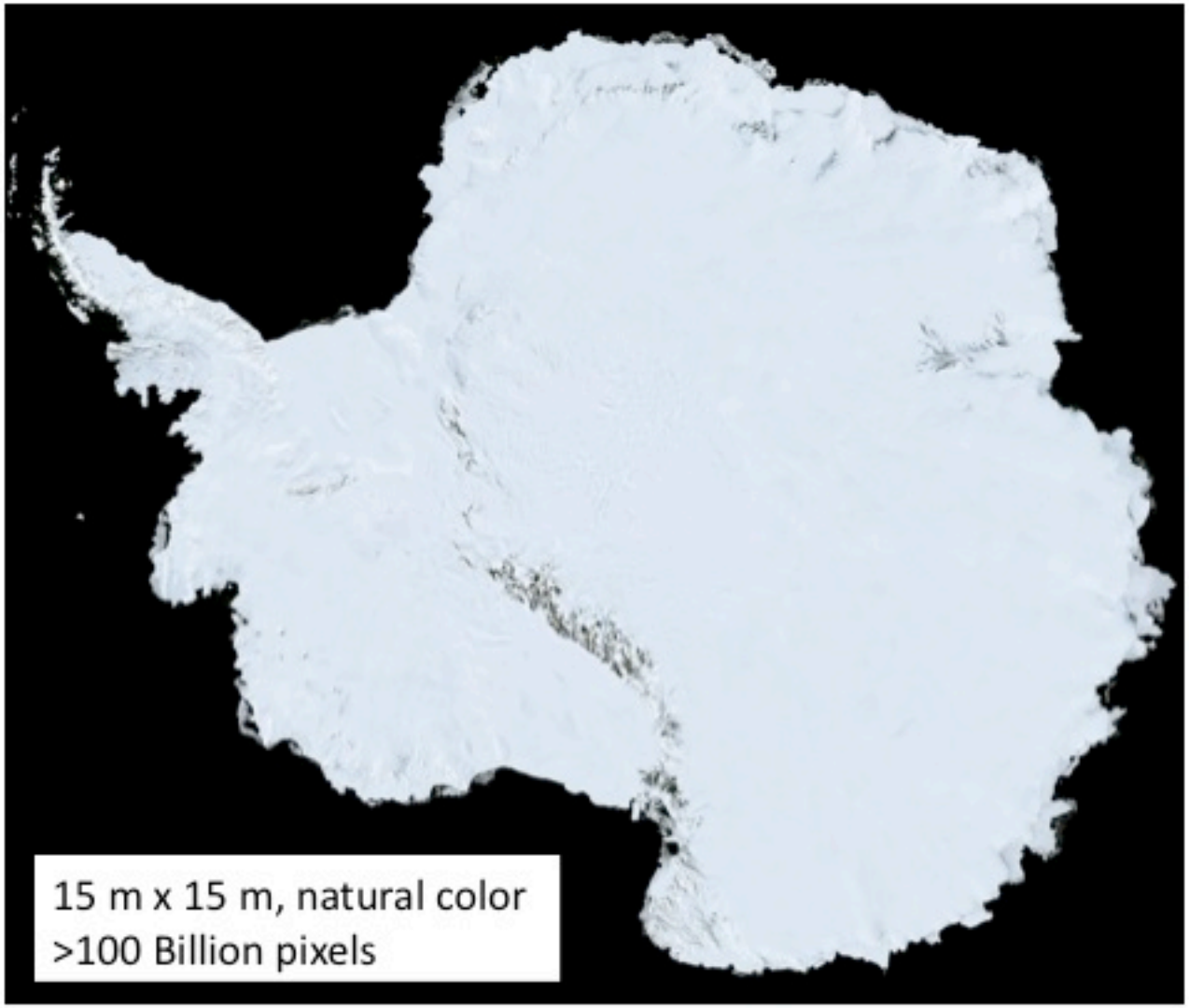
- Chief Scientist of NASA's Hydrospheric and Biospheric Sciences Laboratory-NASA Goddard Space Flight Center
- Senior Fellow of the Goddard Space Flight Center
- Fellow of the American Geophysical Union
- Past President of the International Glaciological Society
- Scientific Interests: Dynamics of glaciers and ice sheets, remote sensing, role of ice in the Earth's climate.
- 15 Antarctic field expeditions, Greenland and various glaciers throughout the world

Antarctica in High-Definition: The Landsat Image Mosaic of Antarctica (LIMA)

A 1000-piece Jigsaw Puzzle



How Antarctica Really Looks

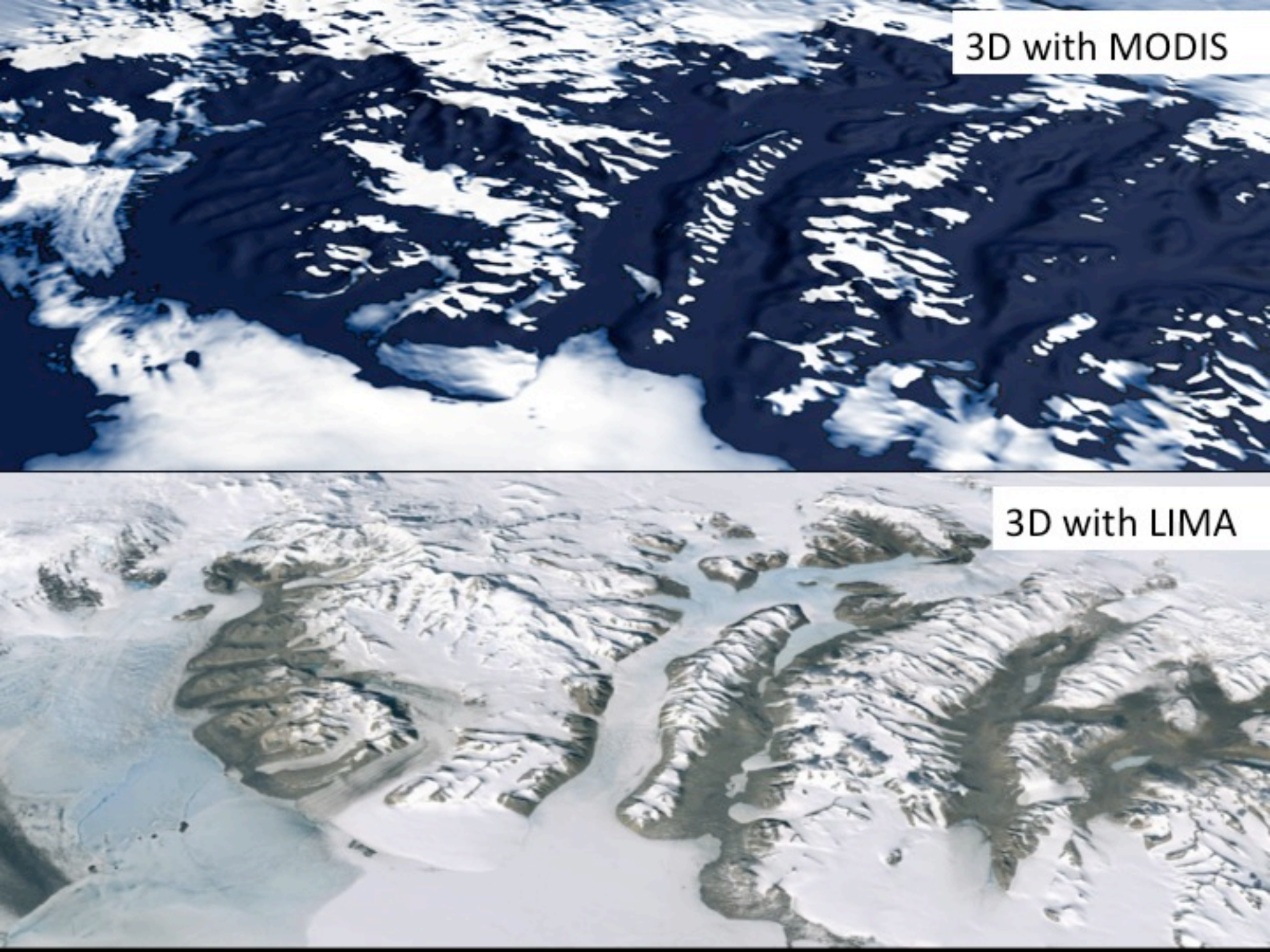


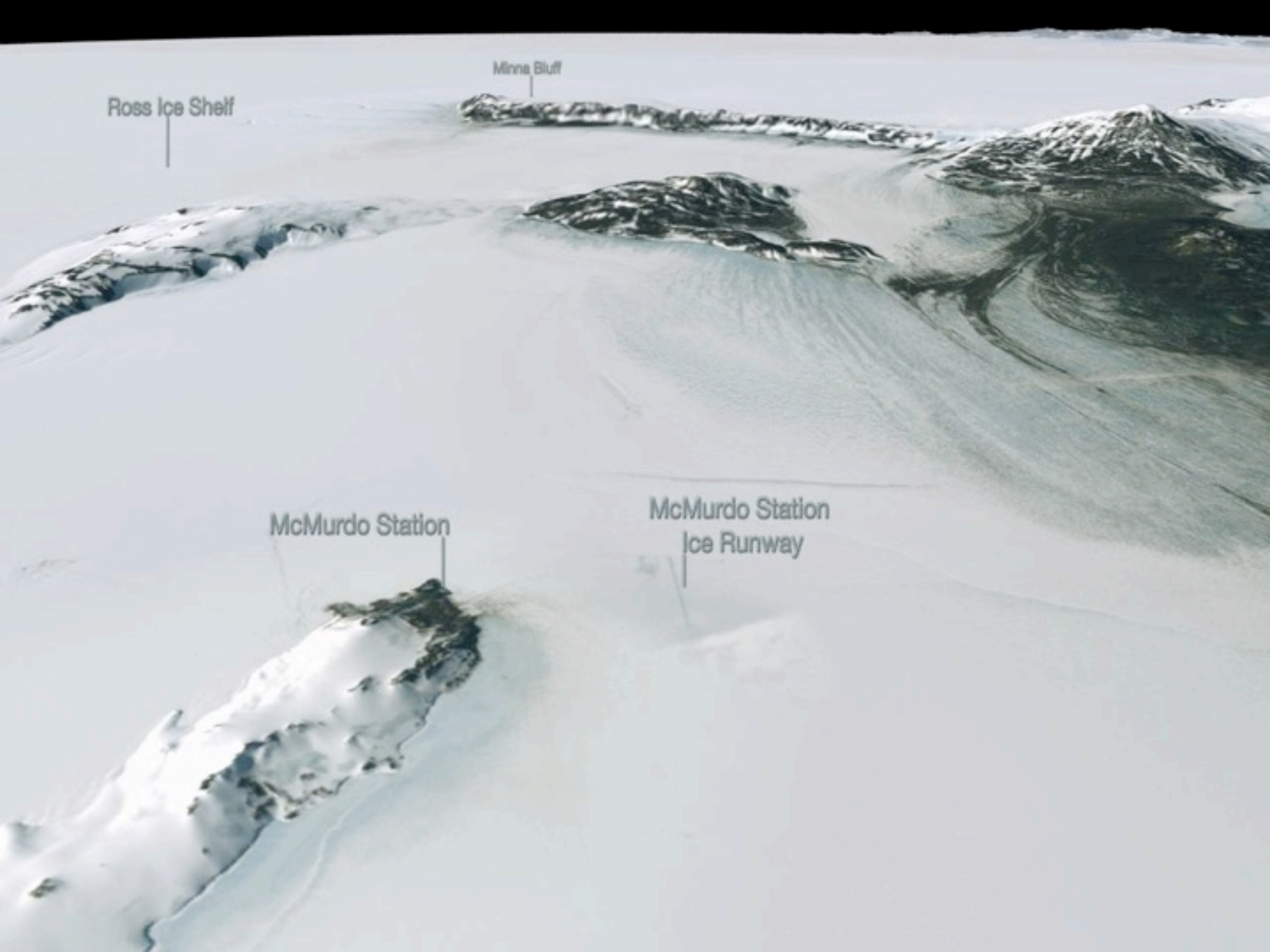
http://lima.nasa.gov

- Lesson plans
- Hands-on samples
- Videos of scientists explaining use of imagery
- Links to >13,000 Antarctic names
- Flying tour of Antarctica

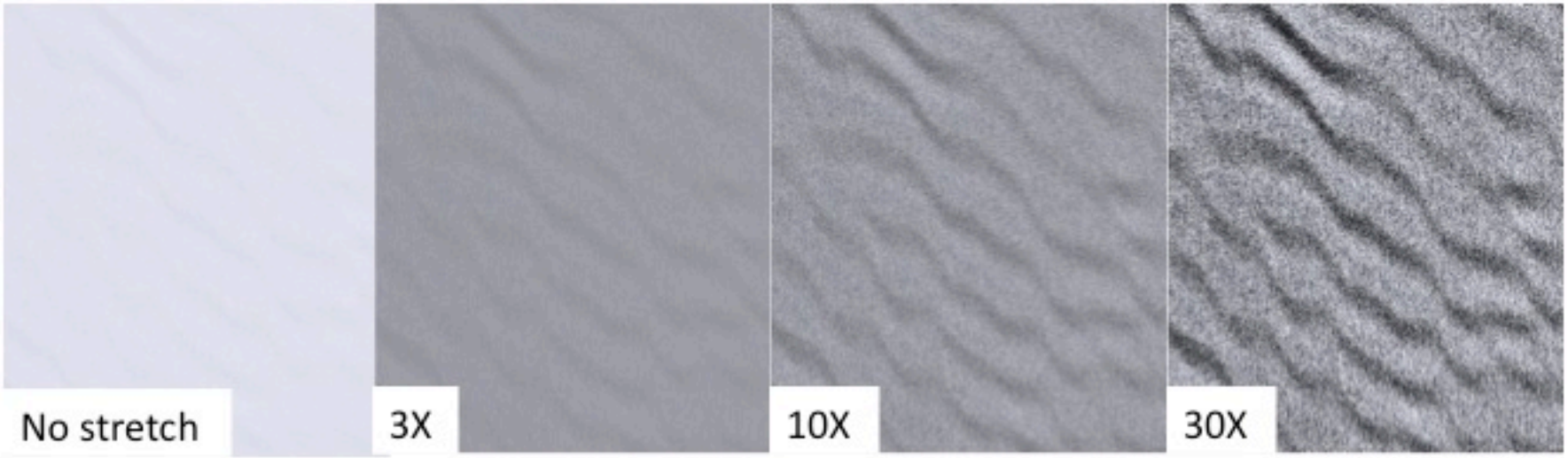
http://lima.usgs.gov

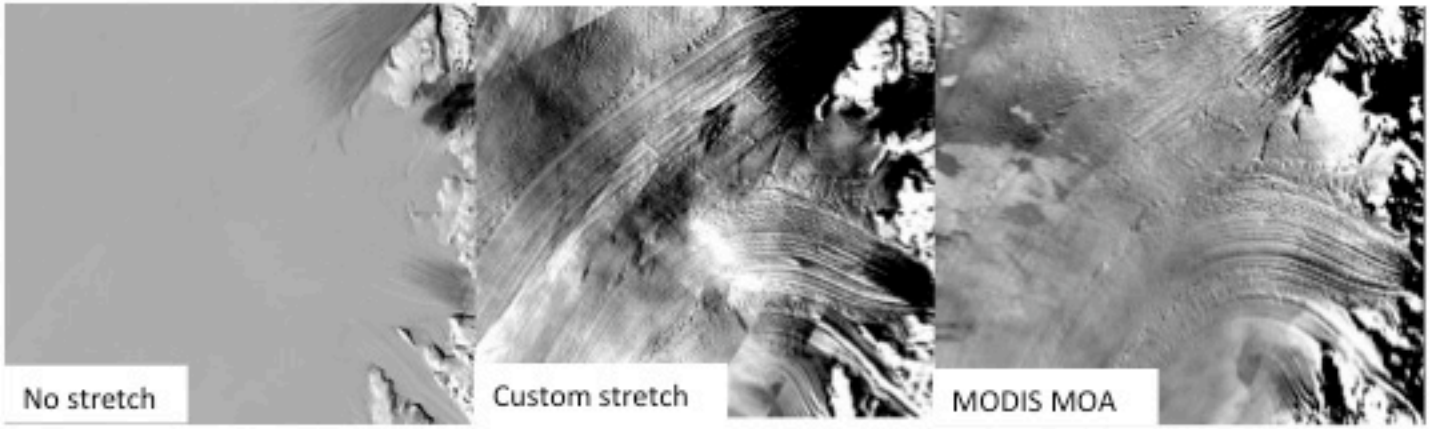
- Pan and zoom
- Download data
- GIS resources
- Maps, posters and wall art


3D with MODIS
3D with LIMA

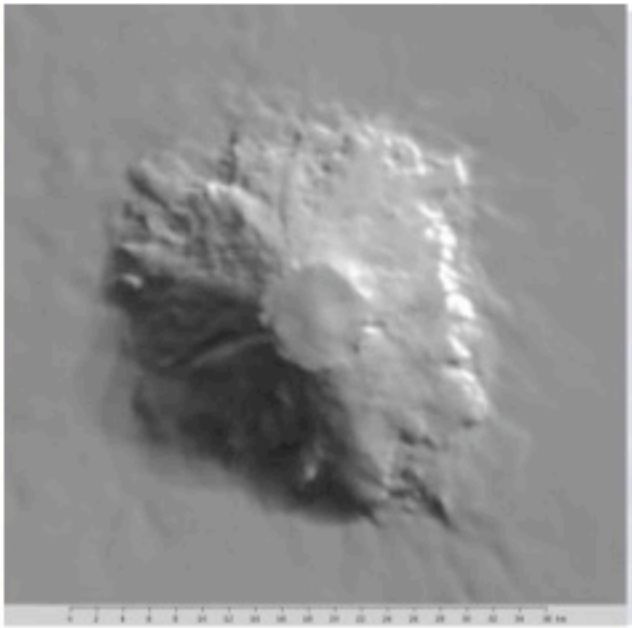

Minna Bluff
Ross Ice Shelf
McMurdo Station
McMurdo Station
Ice Runway

Enhanced Versions show Details

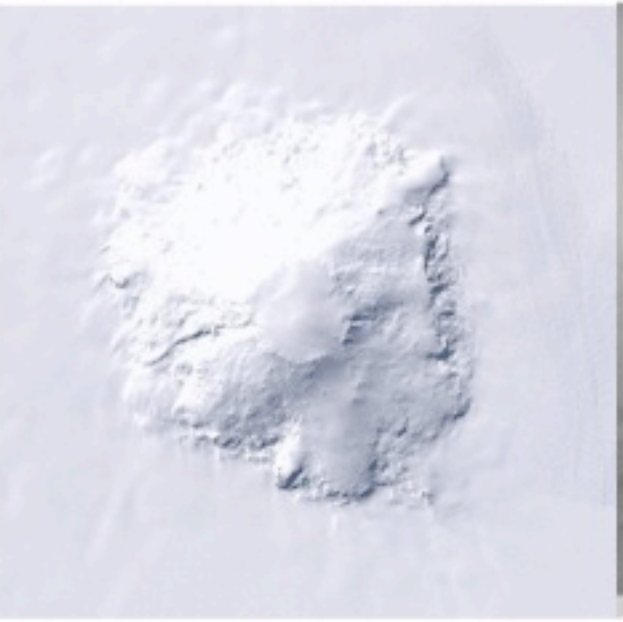




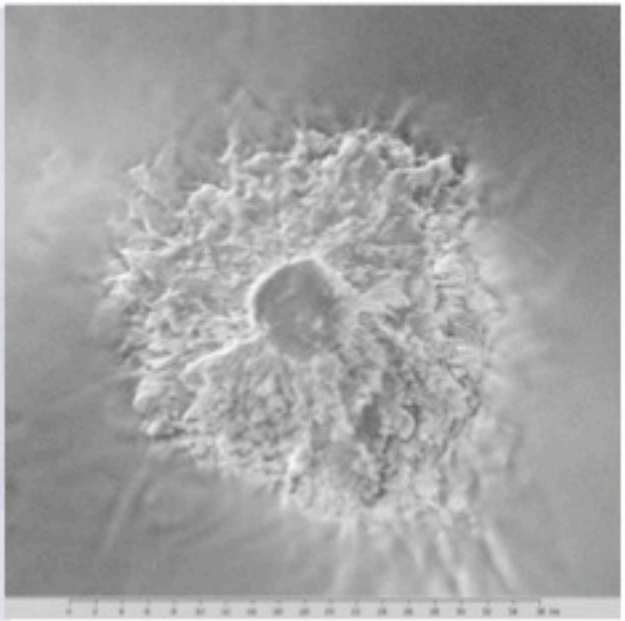
Complementary Mosaics



MOA



LIMA



RadarSat

LANDSAT IMAGE MOSAIC OF ANTARCTICA (LIMA)

Comparison of natural-color image with false-color enhanced image

Natural-color image

False-color image

LIMA and other image mosaics of Antarctica

Images showing detail of flow features

Medium contrast stretch

High contrast stretch

Access LIMA on the Antarctic Web Portal

View and download the eight versions of LIMA and all the component Landsat scenes on the Antarctic Web Portal. Scientists and the general public can download the entire seamless mosaic or just the specific areas they need.

The LIMA online map viewer displays the mosaic and ancillary Geographic Information System (GIS) features, such as location names, in polar stereographic projection. Web Mapping Services (WMS) provides access to the eight versions of the mosaic over the Internet with desktop GIS tools.

Access LIMA data

http://lima.usgs.gov/

NASA LIMA Education and Outreach

http://lima.nasa.gov/

LANDSAT IMAGE MOSAIC OF ANTARCTICA (LIMA)

In support of the International Polar Year (2007–2008), the Landsat Image Mosaic of Antarctica (LIMA) brings the coldest continent on Earth alive with a comprehensive view of Antarctica. The U.S. Geological Survey (USGS), the British Antarctic Survey (BAS), and the National Aeronautics and Space Administration (NASA), with funding from the National Science Foundation (NSF), created the seamless LIMA mosaic along with an Antarctic Web portal and online map viewer.

Choose from eight versions of LIMA

LIMA is available in two principal versions and six enhanced versions. The natural-color, pansharpened version merges Landsat ETM+ bands 3, 2, and 1 (red, green, and blue) at 30 m spatial resolution with the 15 m panchromatic band 8. The false color, pansharpened version merges Landsat ETM+ bands 4, 3, and 2 (near-infrared, red, and green) with the panchromatic band 8. Both the natural-color and false-color, pansharpened versions of LIMA are available in different stretches that enhance details in the snow and ice.

Discover how LIMA was created

The LIMA team identified 1,065 scenes from more than 8,000 Antarctica scenes taken by the ETM+ sensor since Landsat 7 was launched in 1999. Each Landsat 7 scene is 184 km by 170 km (115 miles by 105 mi). As much as possible, scientists chose adjacent scenes from a single Landsat pass over Antarctica because of the consistent sun angle and weather conditions. Then each Landsat scene was processed with elevation data and a sun-angle correction to ensure surface features were accurately represented. Finally, the team used custom software to merge the processed Landsat scenes into the seamless mosaic.

LIMA is the highest resolution, continuous dataset for the whole continent north of the 82° S Landsat orbital limit. The area between this limit and the South Pole is completed using imagery from the MODIS Mosaic of Antarctica (MOA) (earthsky.org/data/moa).

Outlines of Landsat ETM+ scenes used in LIMA

Zoomed images illustrating sharp resolution available at increasing scales

Questions

When asking a question, speak slow, loud, and clear and state your:

- Name
- School
- Question

Watch for Upcoming Events from Antarctica at :

www.polartrec.com!

Thank You!

If you have further questions, please contact us at: info@polartrec.com or call 1-907-474-1600

The archive of this event will be available shortly at: www.polartrec.com!

INTERNATIONAL POLAR YEAR 2007-2008

NSF

ARCUS