TELESCOPES of the SOUTH POLE

The South Pole is one of the premier sites for astronomy. At more than 9,000 feet elevation, the thin, dry air and six months of darkness during the polar winter make for ideal observing conditions. For more than forty years, astronomers have trekked to the bottom of the world to study the cosmos above.

Numerous telescopes over the years have found a home at the South Pole. With them, astronomers have peered deep into space and back in time to when the universe was young. The harsh Antarctic climate can be tough on equipment, but despite sub-zero temperatures and winter storms, researchers working at the South Pole continue to conduct cutting edge research from one of the most isolated places on Earth.

1978-1982

POLAR SOLAR OBSERVATORY | Type: Optical

The first funded telescope at the South Pole. After a successful proof of concept run its first season, it was used to study seismic oscillations on the Sun during the 24 hours of daylight at the South Pole.

Built: Late 1978 | Decommissioned: Late 1982

Image Credit: Martin A. Pomerantz

1980-1981

POLAR SOLAR OBSERVATORY-II | Type: Optical

The second Polar Solar observatory improved on the original test version and focused on collecting data from the Sun's chromosphere.

Built: Late 1980 | Decommissioned: Early 1981

Image Credit: Lieutenant Cindy McFee, NOAA

1980-1985

SOLAR OSCILLATION TELESCOPE | Type: Optical

Another tower-type solar telescope at the South Pole. This one focused on studying sunquakes and wobbles from the helioseismology of the Sun.

Built: Late 1980 | Decommissioned: Early 1985

Image Credit: National Solar Observatory Association of Universities for Research in Astronomy, Inc.

1984-1986

EMILIE | Type: Microwave

Short for "Emission Millimetrique," EMILIE was a collaboration with the French to test if microwave astronomy was possible in the thin, dry atmosphere at the South Pole. Their success turned Pole into one of the premier sites for these observations.

Built: Late 1984 | Decommissioned: Early 1986

Image Credit: Martin A. Pomerantz

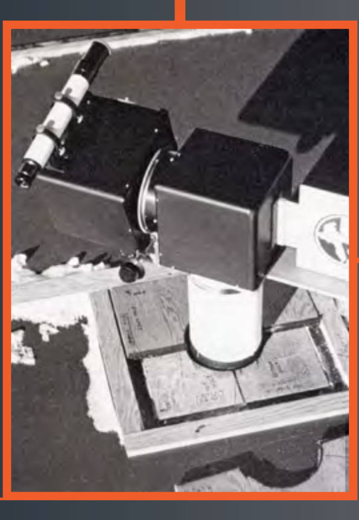
1984-1986

SOUTH POLE OPTICAL TELESCOPE-1 | Type: Optical

"SPOT-1" was the first test of an automated optical telescope system to observe stars during the South Pole's long winter darkness.

Built: Late 1984 | Decommissioned: Early 1986

Image Credit: University of Florida



1986-1988

SOUTH POLE OPTICAL TELESCOPE-2 | Type: Optical

"SPOT-2" Improved on the design of SPOT-1 to test the feasibility of an automated optical telescope to observe the night sky.

Built: Early 1986 | Decommissioned: Early 1988

Image Credit: University of Florida

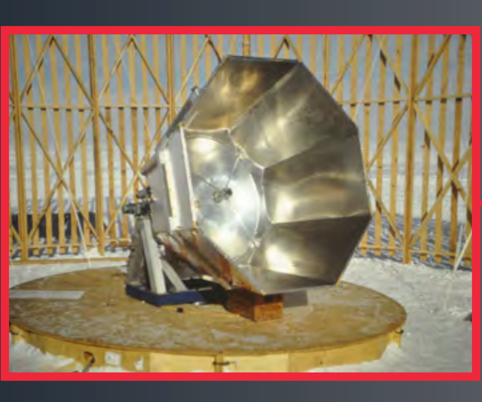
1986-1992

BELL LABS PROJECT SERIES | Type: Microwave

Over several summers, a rotating team of astronomers and their instruments led by researchers at Bell Labs tested out different systems to observe the Cosmic Microwave Background Radiation, the oldest light in the universe.

Built: Late 1986 | Decommissioned: Early 1992

Image Credit: Center for Astrophysical Research in Antarctica



1988-1993

WHITE DISH | Type: Microwave

Though only operated during summers, White Dish was one of the first to take detailed measurements of the Cosmic Microwave Background from the South Pole.

Built: Late 1988 | Decommissioned: Early 1993

Image Credit: Gregory Tucker

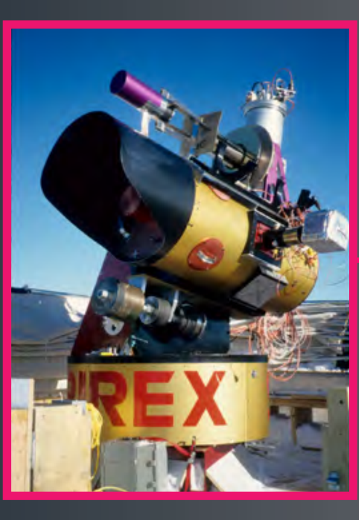
1992-1997

PYTHON | Type: Microwave

PYTHON was the first CMB telescope to operate during the winter at the South Pole, taking full advantage of the site's dark skies, high elevation, and dry thin air.

Built: Late 1992 | Decommissioned: Late 1997

Image Credit: NSF



1993-1999

SPIREX | Type: Infrared

The South Pole Infrared Explorer Telescope was used to map the sky in infrared, and in 1994, it had the most continuous view in the world when fragments from the comet Shoemaker-Levi 9 collided with Jupiter.

Built: Late 1993 | Decommissioned: Late 1999

Image Credit: Joe Rottman

1995-2005

AST/RO | Type: Microwave

The Antarctic Submillimeter Telescope/Remote Observatory studied interstellar dust and produced data for more than 100 papers on star formation.

Built: Early 1995 | Decommissioned: Early 2005

Image Credit: Ginny Figlar, NSF

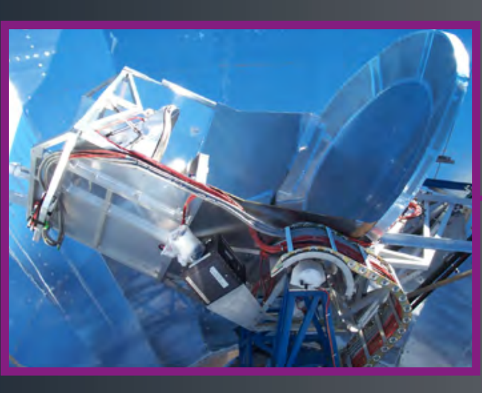
1996-2004

AASTO | Type: Various

The Automated Astrophysical Site Testing Observatory was an Australian collaboration to test a variety of different small automated telescopes and instruments at the South Pole.

Built: Late 1996 | Decommissioned: Early 2004

Image Credit: Douglas Caldwell



1998-2005

VIPER | Type: Microwave

The most powerful CMB telescope of its time, VIPER helped prove that the universe will go on expanding forever, disproving the theory the cosmos would collapse in a "Big Crunch."

Built: Early 1998 | Decommissioned: Late 2005

Image Credit: William Holzapfel

1999-2003

DASI | Type: Microwave

The Degree Angular Scale Interferometer, or "DASI," was the first telescope to measure polarization in the Cosmic Microwave Background Radiation.

Built: Late 1999 | Decommissioned: Late 2003

Image Credit: Brien Barnett, NSF

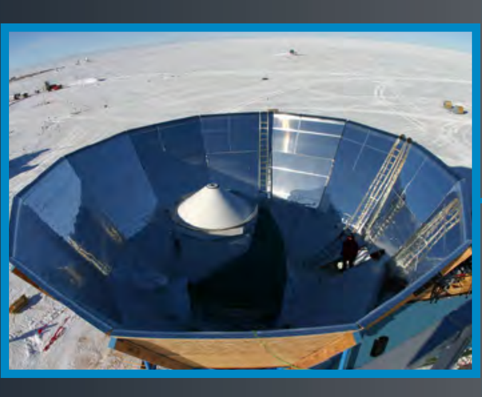
2004-2006

VULCAN SOUTH | Type: Optical

Operated by SETI, the Search for Extraterrestrial Intelligence, VULCAN South searched for planets by looking for a tell-tale dip in a star's brightness when their planets passed in front of them.

Built: Early 2004 | Decommissioned: Early 2006

Image Credit: Douglas Caldwell



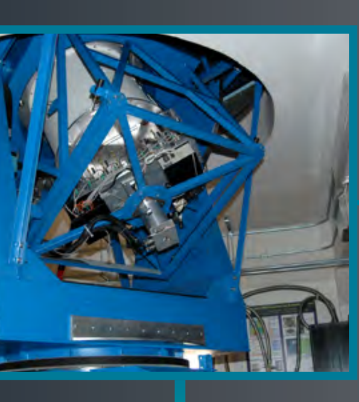
2004-2008

QUaD | Type: Microwave

The QUaD telescope further measured the polarization of the Cosmic Microwave Background.

Built: Late 2004 | Decommissioned: Early 2008

Image Credit: Rfriedman81



2005-2009

BICEP 1 | Type: Microwave

Short for "Background Imaging of Cosmic Extragalactic Polarization," the first BICEP telescope began the hunt for B-mode polarizations in the CMB that might be leftover from moments after the Big Bang.

Built: Late 2005 | Decommissioned: Early 2009

Image Credit: Steve Martaindale, NSF

2009-2012

BICEP 2 | Type: Microwave

An upgrade over the first BICEP, adding more detectors making it more sensitive in the hunt for evidence in the CMB of inflation, when moments after the Big Bang the universe expanded very quickly.

Built: Late 2009 | Decommissioned: Late 2012

Image Credit: Ketiltrout

2015-PRESENT

BICEP 3 | Type: Microwave

Another BICEP upgrade further increasing its power and sensitivity by an order of magnitude over BICEP 2.

Built: Early 2015

Image Credit: Mike Lucibella

2006-2012

SOUTH POLE TELESCOPE SPT-SZ

Type: Microwave

At 10 meters in diameter, the South Pole Telescope, or "SPT," is the largest telescope ever built in Antarctica. The versatile telescope's first task was mapping distant galaxy clusters.

Built: Late 2006 | Decommissioned: Early 2012

Image Credit: Peter Rejcek, NSF

2012-2017

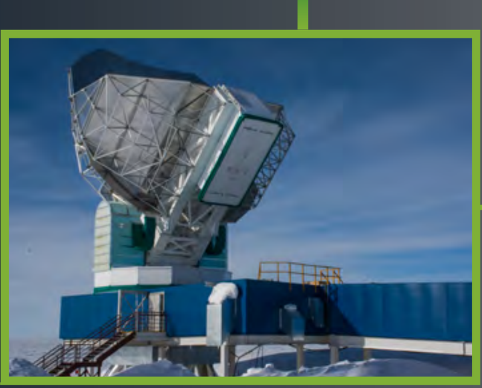
SOUTH POLE TELESCOPE SPTpol

Type: Microwave

After an update to its sensors to measure polarization, the SPT mapped a wide part of the southern sky, producing the most detailed microwave maps of such a broad area.

Built: Early 2012 | Decommissioned: Early 2017

Image Credit: John Mallon III



2017-PRESENT

SOUTH POLE TELESCOPE SPT-3G

Type: Microwave

The SPT's third upgrade further increased its sensitivity. Its current sky survey overlaps with BICEP's area of observation, helping in the hunt for evidence of cosmic inflation.

Built: Early 2017

Image Credit: Mike Lucibella

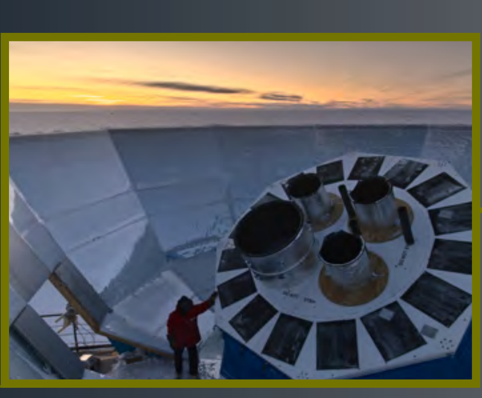
2011-2019

KECK ARRAY | Type: Microwave

Made up of five versions of the BICEP2 telescope on a single mount, the array aids in the hunt for inflation by observing the CMB while also taking measurements of dust in the foreground that could affect results.

Built: Early 2011 | Decommissioned: Late 2019

Image Credit: Mike Lucibella



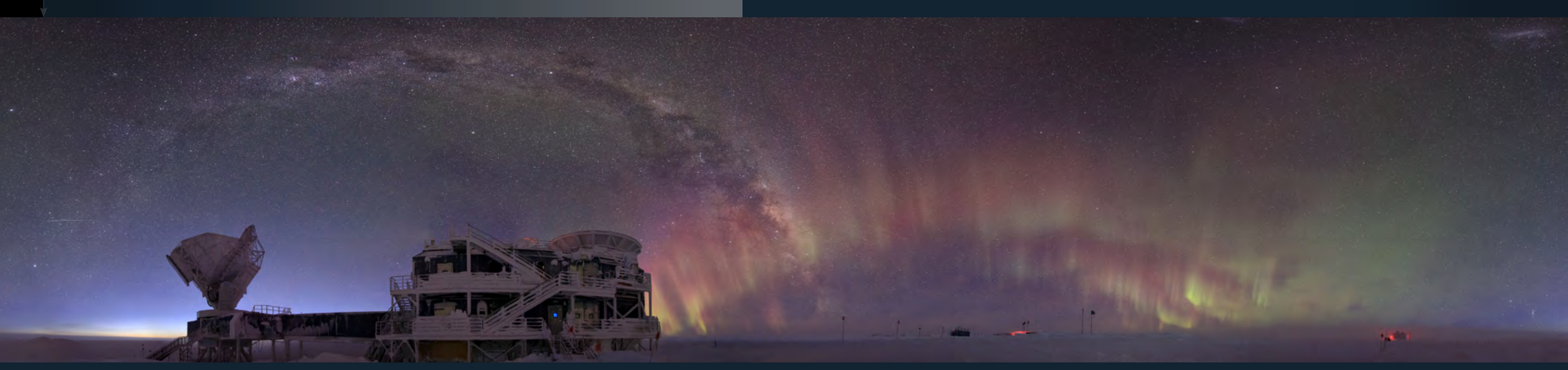
2019-PRESENT

BICEP ARRAY | Type: Microwave

Made up of four connected BICEP3 telescopes, the BICEP Array is furthering the search for evidence of inflation embedded in the CMB.

Built: Late 2019

Image Credit: Nathan Precup



National Science Foundation
WHERE DISCOVERIES BEGIN

UNITED STATES
Antarctic Program

Top photograph by: Daniel Luong-Van, Bottom photograph by: Dr. Daniel Michalik. Special Thanks to Bill Spindler, Denis Barkats, and Mike Lucibella.