

ON LAND

UNIQUE RESEARCH CAPABILITIES ON LAND SUPPORT A RANGE OF SCIENTIFIC DISCIPLINES.



RESEARCH FACILITIES IN ANTARCTICA

USAP is home to one-of-a-kind **research facilities** that support scientific research that is best done or can only be done in Antarctica.

NSF PALMER STATION

- The **International Monitoring System** at the NSF Palmer Station Terra Lab is part of a worldwide network of radionuclide monitoring stations that helps to verify compliance with the Comprehensive Nuclear Test-Ban Treaty.



Photo Credit: Elisabeth Soued

NSF AMUNDSEN-SCOTT SOUTH POLE STATION

- The **Ice Cube Neutrino Observatory** was built specifically to study cosmic neutrinos that come from outside our solar system.
- The **Atmospheric Research Observatory** houses the National Oceanic and Atmospheric Administration's (NOAA) South Pole Global Monitoring Laboratory, where long-term trends of trace gases, aerosols and solar radiation and the different ways these things influence the Earth's climate are tracked.
- The **Dark Sector Laboratory** and **Martin A. Pomerantz Observatory** house the 10-meter South Pole Telescope, the BICEP (Background Imaging of Cosmic Extragalactic Polarization) Array and BICEP3, which measure cosmic microwave background and can provide insights into constraints on fundamental physics and the earliest formation of the universe.



Photo Credit: Calee Allen

NSF MCMURDO STATION

- The **Ross Island Earth Station** assists with global weather forecasting and storm tracking.
- In cooperation with the National Aeronautics and Space Administration (NASA), the **Long Duration Balloon Facility** allows the construction, testing and launch of high-altitude payloads important for astrophysical data.



Photo Credit: Mike Lucibella



Photo Credit: Troy Leighton

SCIENCE TRAVERSES

Overland science traverses reduce costs and increase efficiency of fuel and materials transport between USAP stations and field sites.

- Three South Pole Traverses drive the **990 miles (1,600 km)** from NSF McMurdo Station to NSF Amundsen-Scott South Pole Station, delivering **300,000 gallons** of fuel and up to **540,000 pounds** of cargo each season.
- Other "science traverses" transport heavy science equipment to field sites **hundreds** of miles away from the stations.
- The USAP "heavy science traverse" was purchased using funds from the American Recovery and Reinvestment Act. The platform carries scientific drilling equipment and fuel to research sites **700 miles** or more from NSF McMurdo Station.

NEAR-FIELD AND DEEP-FIELD CAMPS

USAP establishes and operates various Antarctic research camps in areas of particular scientific interest.

- USAP currently has **12** semi-permanent field camps that support between **four** and **80** people each.
- Field camps can be single or multi-season efforts.
- About **150** USAP participants will be camping in the field at any given time in a summer season.
- Planning for deep-field operations can take years to ensure safety and proper logistical support. More than **50** field sites are supported from USAP's primary Antarctic stations during the austral summer months.
- Multiple modes of transportation are used to support camps, including LC-130 transport planes, small fixed-wing flights, overland traverses and airborne fuel drops.
- The West Antarctic Ice Sheet Divide Camp, USAP's largest field camp, is **1025** miles (**1650** km) from NSF McMurdo Station and is USAP's hub to access research sites throughout West Antarctica. The camp supports up to **55** researchers and **25** operational staff in a summer season. Roughly **35** LC-130 missions each season bring in personnel, supplies and up to **50,000** gallons of fuel.



Photo Credit: Brian Minnear



Photo Credit: Martin Reed

LABORATORIES AND DIVING

USAP hosts state-of-the-art laboratories and is supported by world-class divers, who assist with science research and logistics.

- The **Albert P. Crary Science and Engineering Center** at McMurdo Station has advanced instrumentation to facilitate research and advance science and technology, including laboratory space, computers and workstations, analytical instrumentation, and high-resolution satellite imagery and mapping capabilities. It is the largest laboratory in Antarctica.
- NSF Palmer Station's **Terra Lab** houses a variety of observing instruments, including geospace receivers, global positioning system antennas and a UV monitor.
- The aquaria at McMurdo Station and Palmer Station pump seawater directly from the ocean and can maintain **-1.8C° (28.8F)** temperatures that simulate the below-freezing temperatures of the Southern Ocean. Researchers collect local specimens while diving or by fishing through the sea ice or from research vessels.
- Some of the premier cold-water divers in the world support USAP science and assist with underwater repairs, inspections and equipment installation and recovery.
- USAP supports approximately **700** dives each season. Over the past **30** years, USAP has supported over **19,000** dives from both land and boats.
- In addition to diving under the sea ice, researchers dive in permanently ice-covered lakes in the McMurdo Dry Valleys, some of the world's saltiest lakes, to uncover how organisms interact with and change their environments. The Dry Valley lakes are part of a hydrologic system that is considered the best Mars analog site on Earth.