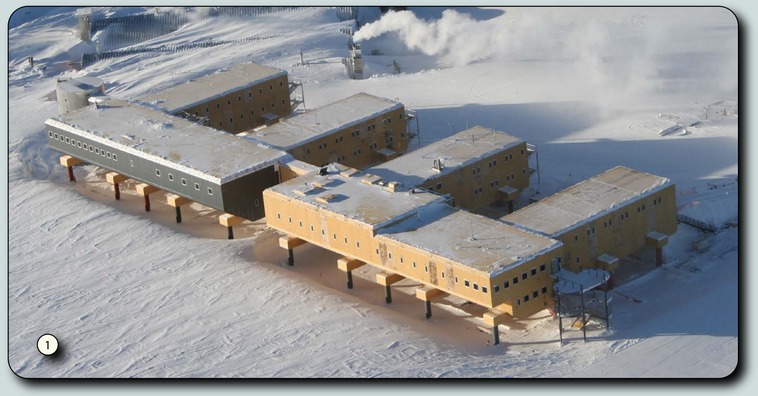
International Polar Year 2007-2008

Amundsen-Scott South Pole Station

National Science Foundation



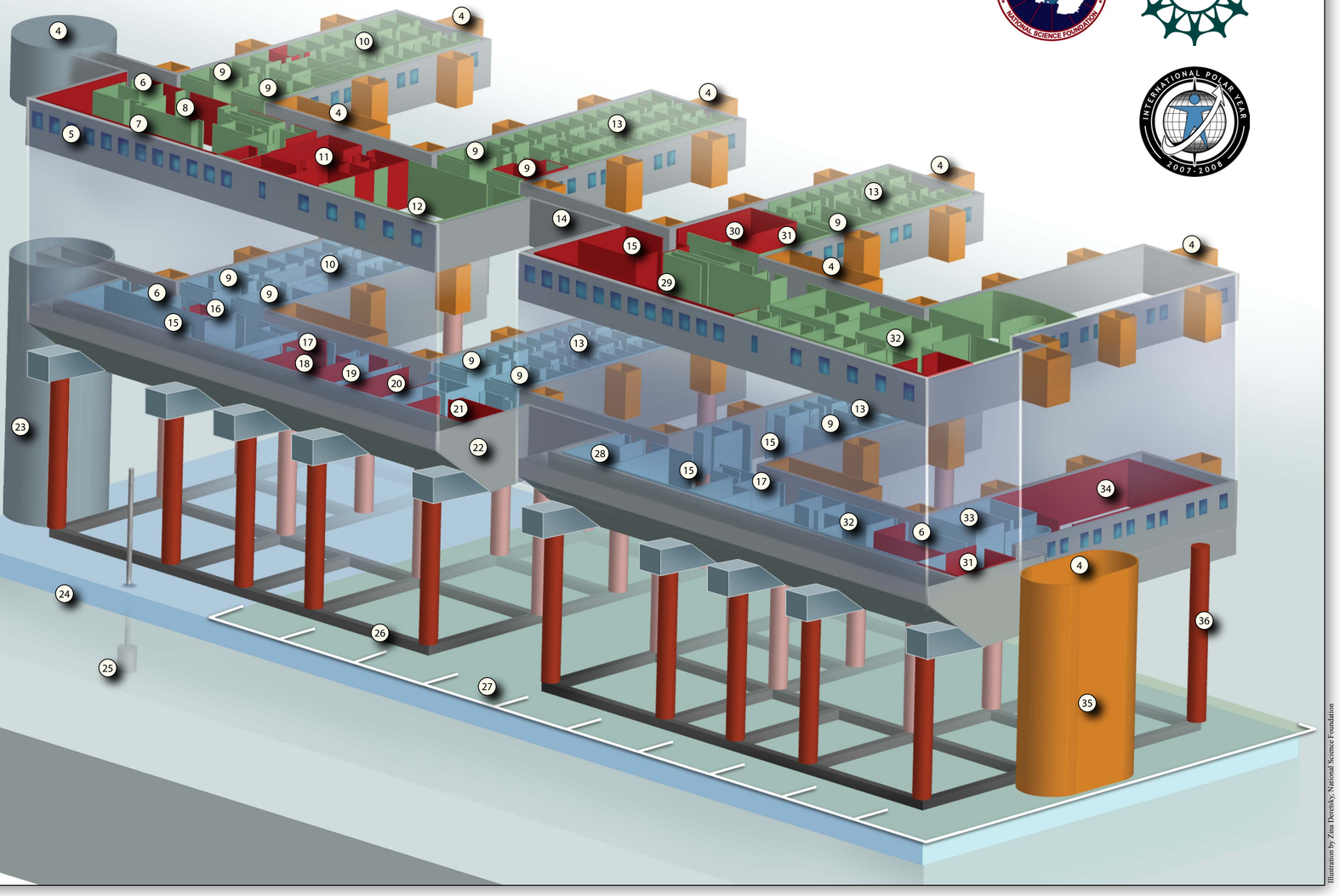


Illustration by Zina Deretsky, National Science Foundation

1. ***Photograph of station:***
This aerial photograph of the National Science Foundation's Amundsen-Scott South Pole Station was taken in October 2006.
Credit: National Science Foundation, USAP

2. ***Hercules cargo aircraft:***
The new station measures 124 x 45 x 24 meters (408 x 50 x 80 feet). All of its components, and the machinery that built it, had to be flown in on ski-equipped Hercules LC-130 aircraft with a maximum cargo capacity of 11.5 x 2.4 x 2.4 meters (38 x 8 x 8 feet). "Heres" never shut down their engines at the Pole. The cold would make it hard, if not impossible to restart. In the austral winter it is too cold for aircraft to land.

3. ***Antarctica's ice cover:***
The station sits on 3.21 kilometers (two miles) of ice that flows toward the ocean at 10.5 meters (33 feet) per year.

4. ***Exits:***
There are two main exits on either end of the station and six more at the back.

5. ***Windows:***
Windows are a wonderful novelty for those who had worked in the station housed under the geodesic dome and can make a big psychological difference for station personnel. In winter they are covered to limit light pollution for scientific instruments.

6. ***Coatrooms:***
Crew members wear 25 pounds of clothing in up to seven layers to combat the debilitating cold. Functionality cutoffs are -40 C (-40 F) for machinery such as cranes, -45 C (-50 F) for aircraft and -62 C (-80 F) for people.

7. ***Dining Facility ("Galley"):***
The average person must eat about 5000 calories a day to help make up for energy lost in keeping warm at the Pole. Nonetheless, people typically lose 4.5 to 6.8 kilograms (10 to 15 pounds) a season.

8. ***Kitchen:***
The kitchen serves 150 during the summer season. In winter, supplies must last 265 days and feed 50 people.

9. ***Bathrooms:***
Conservation of resources is essential at the station. Bathrooms are equipped with high-tech waterless fixtures.

10. ***Winter berths:***
There are 48 winter berths in wing A1. They are 2.7 x 2.4 meters (9 x 8 feet), a foot wider than summer quarters.

11. ***Biomedical facilities:***
An important part of the station—the biomed unit—becomes indispensable in the winter when it is impossible to fly out to get medical treatment.

12. ***Computer rooms:***
Station personnel share facilities. Computer technology is essential for science.

13. ***Summer berths:***
There are 104 summer berths found in wings A4 and B1. Each room measures 2.7 x 2.1 meters (9 x 7 feet)—enough for a bunk and desk.

14. ***Skywalk:***
The connecting walkway between the two "pods" of the station is flexible to prevent possible damage resulting from movement of the ice below.

15. ***Utility rooms:***
Utilities at the Pole face unique exigencies and the station dedicates a sizeable space to an emergency power generator. There are multiple fan rooms. All heat for the building comes from "waste" heat generated by other functions of the station.

16. ***Sauna:***
A sauna is among the amenities designed to help lessen the stress of living at the Pole.

17. ***Recycling rooms:***
All waste generated at the station must be packed up and shipped back out.

18. ***Station store:***
People at the Pole can buy souvenirs, candy and sundries.

19. ***Greenhouse:***
The station contains a growth chamber that generates fresh salad, cucumbers and tomatoes.

20. ***Laundry room:***
Even at the Pole, people need to wash their clothes; but to conserve resources, they do so less frequently than at home.

21. ***Reading room:***
Leisure reading is an important pastime in such a remote and quiet place.

22. ***Airfoil shape:***
The new South Pole Station is designed to face directly into the wind. It has an aerodynamic profile. As wind is forced under the structure, it speeds up (the Venturi effect), scouring out the ice and snow from below and limiting snowdrift.

23. ***Vertical tower:***
The vertical tower, with its lift and staircase, provides access to the three arches under the ice that house the garage, power plant and fuel storage. When accumulated snow requires the station to be jacked up, a section will be added to the top of the tower.

24. ***Foundation:***
The 1.8-meter (six-foot) foundation of the station was built up in .15-meter (six-inch) increments of highly compacted ice. Natural ice is 60 percent air; the foundation is only 48 percent air. It weighs 1.8 million kilograms (4 million pounds) more than the station itself which is 3.6 million kilograms (8 million pounds).

25. ***Reference marker:***
The highly mutable substrate of ice makes measuring changes in elevation of each section of the station a challenge. A marker buried 12.1 meters (40 feet) deep aids the surveying process.

26. ***Grid of grade beams:***
The station "floats" on a latticework of 50 grade beams, or "pontoons." These distribute the weight of the building. The station and its foundation add 4.5 - 6.8 kilograms (10 to 15 pounds) of pressure per square inch on the ice below.

27. ***Outer dimensions:***
At 124 x 45 meters (408 x 150 feet), the new station has a significantly larger footprint than the existing geodesic dome of the 1975 station. Compare it to a football field's 91 x 48 meter (300 x 160 feet).

28. ***Arts and crafts room:***
Outdoor diversions are minimal at the Pole, so indoor recreation is extrememly important to all.

29. ***Science lab:***
Most of the scientific research at the Pole is related to astrophysics and space weather.

30. ***Game room:***
Recreational spaces are important for morale at the Earth's most isolated research station.

31. ***TV rooms:***
Although live video is not available, the station has an extensive collection of recorded programming.

32. ***"Comms":***
This area houses management, station operations, computers, communications and conference rooms.

33. ***Activity room:***
This area serves as a center for social activities.

34. ***Gym:***
The gym spans both stories of the station for basketball and also has a loft with weight-lifting machines.

35. ***Main entrance:***
Unlike the 1975 domed station, the new station's entrance is well above the ice surface and provides a panoramic view.

36. ***Columns:***
Thirty six columns standing 15 meters (50 feet) tall hold up the station and prevent snowdrift. They can be jacked up to lift the whole station two more stories (seven meters / 24 feet) in response to future snow and ice build-up. As ice shifts under the station, the columns are adjusted to keep it level.

Celebrating 50 Years of Science at the South Pole.

for more information visit http://us-ipy.gov and http://nsf.gov

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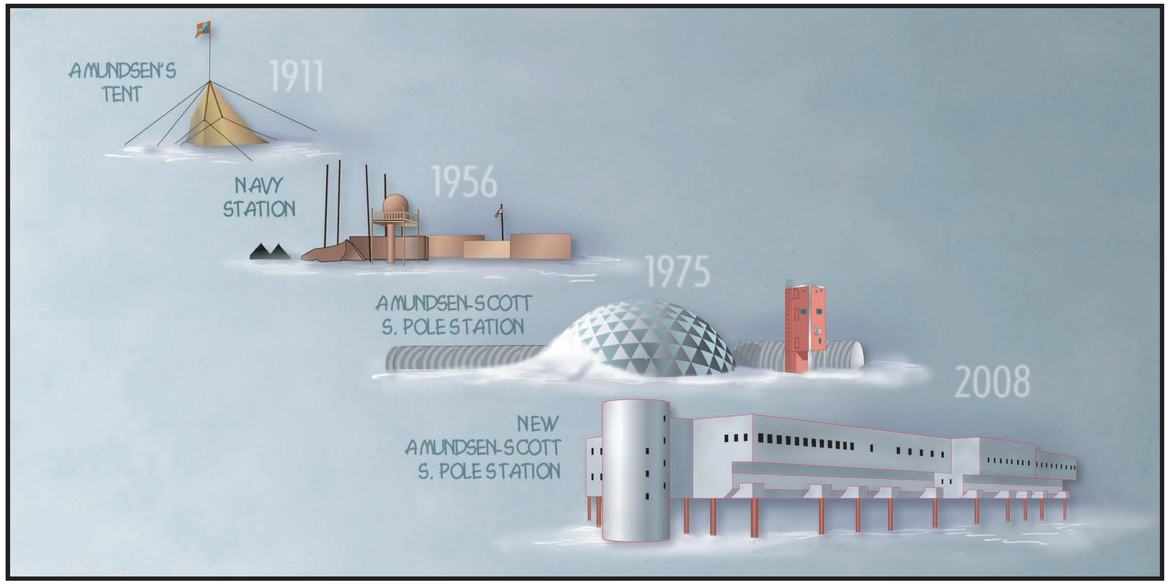


AMUNDSEN'S TENT

- First human presence at the Pole
- Erected by Amundsen (Norwegian) in December 1911
- Materials hauled by dogs
- Scott (British) reached this site in January 1912
- Scott and his men carried their gear without dogs

NAVY STATION

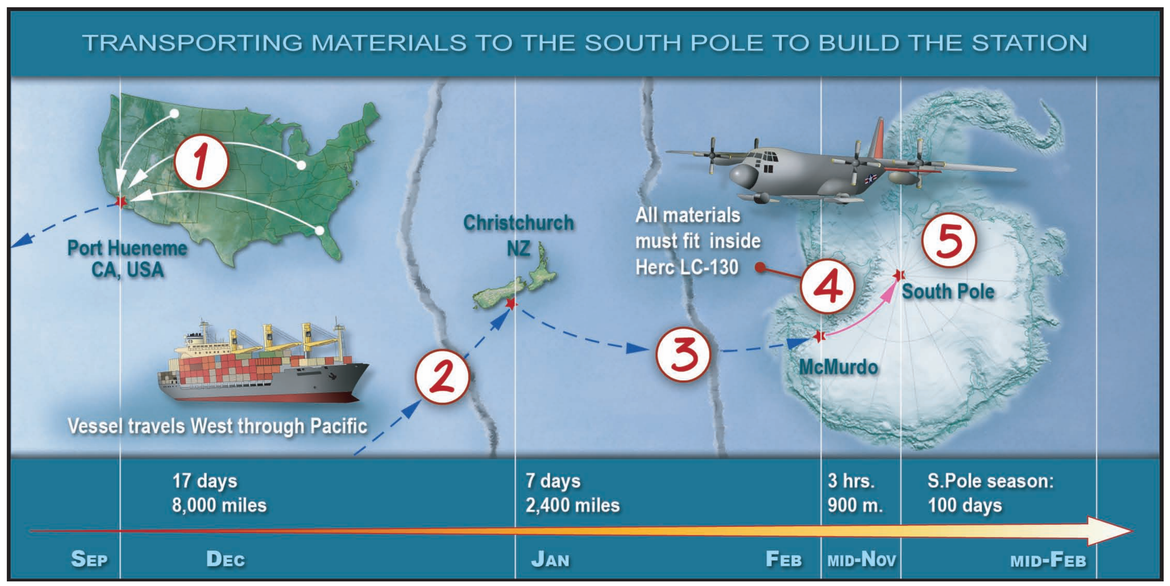
- Built by U.S. Navy in 1956 for International Geophysical Year
- First structure at the Pole for scientific purposes
- Capacity: 20 people
- Materials flown in by DC-3 plane
- Never intended to be a permanent structure

AMUNDSEN-SCOTT S. POLE STATION

- Built by NSF in 1975
- Iconic geodesic dome building
- In the mid-90's, e-mail communication began at the station
- Capacity - 30 people
  80 more in huts

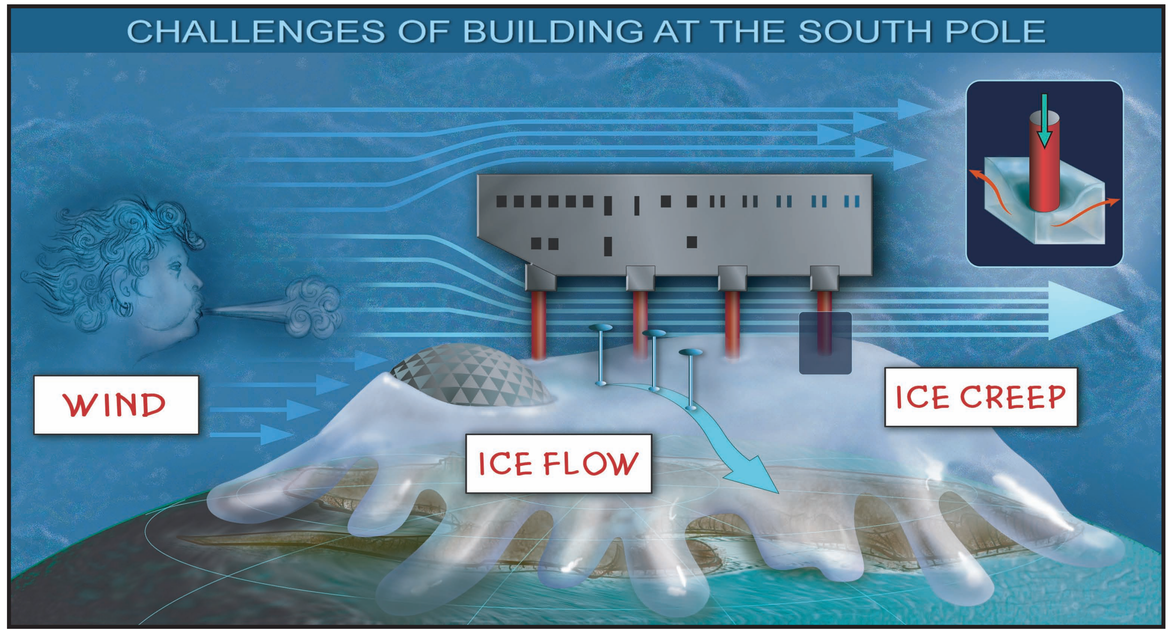
NEW AMUNDSEN-SCOTT S. POLE STATION

- Elevated station
- Construction by NSF began in 1997
- To be dedicated in 2008 in time for 4th International Polar Year
- Capacity: 150; 65K square feet
- Has windows, greenhouse, and is networked



Earth's polar regions, located some 12,000 miles apart, are vast, icy and inhospitable landscapes. Yet, they offer unique opportunities to answer some of life's most perplexing questions. International Polar Year (IPY) 2007-2008 follows in the footsteps of historic past campaigns that led to discoveries that fundamentally changed how we view the polar regions and their global linkages. Research and education projects carried out during IPY 2007-2008 will explore new frontiers in polar science; discover details about the amazing adaptation strategies polar life forms use to survive in "unearthly" environments; better define the critical role the polar regions play in global environmental and ecological processes; and educate students, teachers and the public about the importance of the polar regions to life on the entire planet.

All U.S. federal agencies engaged in research and education will participate actively in IPY. The National Science Foundation is the lead agency for coordinating U.S. IPY activities. Dozens of foreign countries will also take part.



WIND

- Constant winds result in snow pile-up on buildings.
- The new station faces into the wind, and is airfoil-shaped.
- The airfoil forces air into a compressed space where it accelerates.
- The fast wind scours out built-up snow.
- Years later, if snow still builds up, the building can be lifted two more stories on its columns.

ICE FLOW

- The station sits atop a 2-mile-deep layer of ice.
- Each year, the geographic South Pole is marked.
- Ice (cold water), slowly drips down to the ocean with gravity.
- The trail of yearly South Pole markers shows that the ice moves 33 feet per year.

ICE CREEP

- The weight of the building causes the ice to move locally.
- Ice compresses and shifts away from sources of pressure.
- Resulting variable rates of sinking make keeping the building level a challenge.
- Architectural elements built into the design will help meet that challenge.

This poster is one in a series that depict NSF's science themes and observatories that are key to fulfilling NSF's role as the designated lead federal agency for the International Polar Year 2007-2008.

Illustrations: Zina Deretsky, National Science Foundation