

Virtual Reality Tours Educational Guide

	Huascarán	Kelleys Island	Kennicott Glacier	Jakobshavn	McMurdo Dry Valleys
Region	Peru, South America	United States, North America	United States, North America	Greenland, North America	Dry Valleys, Antarctica
Setting	Route and drill sites used to collect ice cores from mountain glaciers and laboratories where the cores are examined	Island in Great Lakes with features created by Laurentide Ice Sheet	Mountain glacier with lake outburst events	A fjord, coastline, and field site used to monitor a large outlet glacier from the Greenland Ice Sheet	Steam sampling sites feed by glacier meltwater spread throughout a cold desert
Summary	Glaciers are like time machines, recording Earth's past atmosphere in layers of ice and making them available to study today. To recover these records, researchers travel to locations where they are preserved. Join a team ascending Mount Huascarán in South America to recover an ice core before climate change permanently damages the record, and see some of the dangers created when glaciers flow down steep terrain.	Covered with a massive ice sheet 12,000 years ago, Kelleys Island is now a popular place to visit because of its many natural environments, including beaches and limestone outcrops. Visit the island's quarry and look at features carved by glaciers thousands of years ago.	Start in the mountains and follow a park service team down the Kennicott Glacier on an annual expedition to track snowfall and monitor changes in the glacier's size. See what it's like to travel by helicopter, record measurements in a logbook, and witness an avalanche from a safe distance!	Glaciers are rivers of ice, slowly flowing from higher to lower elevation under the pull of gravity. Jump on a flight with researchers as they travel from the coast up onto one of Earth's fastest flowing glaciers, Jakobshavn, and see how this glacier is rapidly changing.	Not all of Antarctica is covered with snow and ice. Join researchers on an expedition to the polar desert in the Dry Valleys of Antarctica. Explore the tools that this team is using to learn about the water available in this cold, dry region.
Science	<ul style="list-style-type: none"> * Using evidence preserved in glaciers to understand how climates were in the past * Understanding that glaciers are masses of ice that flow downhill 	<ul style="list-style-type: none"> * Using rock and sediment records to understand how past ice sheets can impact lake levels and scour bedrock 	<ul style="list-style-type: none"> * Using a snow pit at high elevation to look at details of snowfall and storm events * Using sensors located at different places on a glacier to monitor changes that occur over a year * Documenting the history of human settlement in a location 	<ul style="list-style-type: none"> * Using images to monitor changes in the length and thickness of glaciers * Looking at weather and snow data to understand the drivers of changes to glaciers * Understanding that glaciers are masses of ice that flow downhill 	<ul style="list-style-type: none"> * Using the amount of meltwater and material carried in the meltwater to look at changes happening in a cold desert * Understanding how the amount of meltwater and material carried by it could alter the ecology of the nearby ocean
Activities	<ul style="list-style-type: none"> * Ice core drilling * Analyzing ice cores * Mountaineering 	<ul style="list-style-type: none"> * Observing * Hiking 	<ul style="list-style-type: none"> * Snow sampling * GPS monitoring of glacier height and speed * Transport via helicopter 	<ul style="list-style-type: none"> * Analyzing satellite images and aerial photos * Snow sampling and installing weather stations * Using ground penetrating radar on glaciers * Transport via airplane 	<ul style="list-style-type: none"> * Collecting and analyzing water samples * Living at a field camp * Transport via helicopter

	MOSAiC Expedition	Quelccaya	South Pole	SALSA
Region	Arctic Ocean near North Pole	Peru, South America	South Pole, Antarctica	Subglacial Lake, Antarctica
Setting	Sea ice floating on the surface of the Arctic Ocean	Ice cap and surrounding highlands	Research station atop Antarctic Ice Sheet	Lake beneath ice streams in Western Antarctica
Summary	Repeating a drift expedition from more than one hundred years ago, the MOSAiC expedition intentionally froze a modern ice breaker, outfitted with special equipment and a large team of researchers, in sea ice. Using the trapped ship and surrounding sea ice as a floating platform, join researchers working to better understand the Arctic Ocean from all angles.	While you might not think of the tropics as a place to find ice, it's possible on the tops of mountains. Explore the largest ice cap in the southern hemisphere, which has been sampled and monitored since the 1970s, and see how researchers access this high mountain landscape via Cusco, a culturally important city in Peru.	With almost two miles of ice between your feet and the ground below, Amundsen-Scott South Pole Station can be an incredibly cold, windswept outpost. But there is a lot to discover for researchers who are studying ice, atmosphere, and space. Learn what it's like to live and work at the South Pole, which is dark and inaccessible much of the year.	Join an international team of scientists to explore a subglacial lake, buried 3,600 feet beneath the Antarctic ice, to reveal hidden truths about our planet's dynamic past. As you struggle against the ferocity of the ice and wind, consider how our relationship with nature will impact humanity's future and the future of all life on our rapidly changing planet.
Science	<ul style="list-style-type: none"> * Documenting changes that are occurring in the Arctic Ocean * Understanding the processes in the Arctic Ocean using a variety of disciplines (oceanography, meteorology, biology, engineering) and a range of tools (water samplers, weather stations, drills, remote sensing instruments) 	<ul style="list-style-type: none"> * Using evidence preserved in glaciers and the surrounding environment to understand how climates were in the past * Documenting evidence of climate change 	<ul style="list-style-type: none"> * Understanding the processes occurring in a massive ice sheet and the atmosphere over Antarctica using a variety of disciplines * Capitalizing on the unique conditions at this location to collect information for physics and astronomy * Documenting changes that are occurring in Antarctica 	<ul style="list-style-type: none"> * Understanding the life forms that exist in a lake below a mass of ice * Understanding the processes happening beneath the ice including how water moves; how the bedrock/sediment is impacted; and how materials are exchanged between the water, bedrock/sediment, and living things * Using evidence preserved in glaciers to understand how climates were in the past
Activities	<ul style="list-style-type: none"> * Collecting and analyzing data on a ship * Setting up research sites on sea ice * Transport via a variety of vehicles 	<ul style="list-style-type: none"> * Collecting ice cores * Digging snow pits * Collecting plant samples * Recording changes to ice cover and lake size * Living in the field 	<ul style="list-style-type: none"> * Collecting and analyzing of data for many scientific disciplines * Installing a weather station * Performing research on an ice sheet * Living in a large and remote research station * Serving as a base for nearby fieldwork * Transport via a variety of vehicles 	<ul style="list-style-type: none"> * Drilling through ice almost 1 mile thick to reach a lake * Using probes to collect and analyze data on the water, material contained in the water, bedrock/sediment, and life found in the lake * Living in the field