The position of the snout of Blue Glacier has remained remarkably constant for five years, although stakes placed in the ice, in a tunnel beneath the snout, move forward about 0.3 centimeters a day.

The Blue Glacier Project

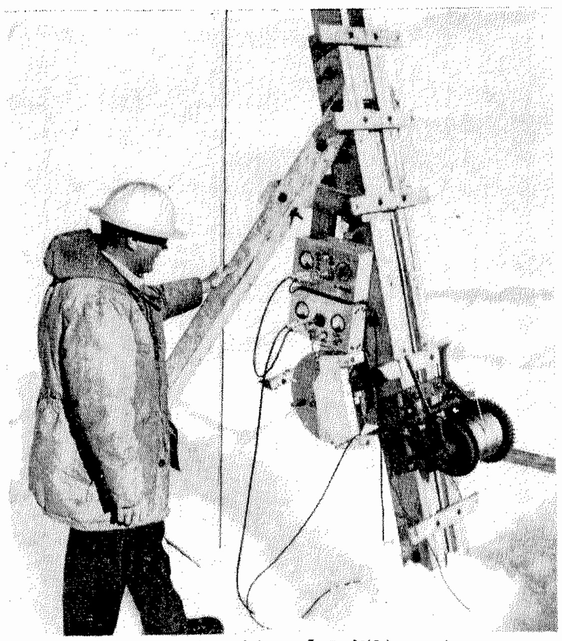
Caltech geologists started the Blue Glacier Project on Mt. Olympus in northwestern Washington in the summer of 1957 as part of the IGY program, with the objective of gaining a better understanding of the flow processes in ice.

In the summer of each succeeding year, faculty members and graduate students have returned to the glacier to make further observations and measurements. During August 1964 the principal efforts – pictured on these pages – involved the coring of ice from within the glacier, and seismic measurements of the thickness of the ice.

Senior engineer Jim Westphal and graduate student Hugh Kieffer examine a seismic record. In the new technique under development here, reflected seismic waves at a frequency of about 1,000 cycles per second are recorded. This frequency is almost ten times as large as that conventionally used in seismic exploration. The equipment of the coring operation is visible near the base of the icefall. At upper right is the summit of Mt. Olympus.

The geologists' campsite is on a moraine near the edge of the glacier. In the background — Blizzard Pass.

In the coring operation a wood tripod supports electrical and other cables from which drilling or coring hotpoints are suspended. The thickness of the ice here is 110m and 45 cores were obtained in a profile from top to bottom, including the deepest meter of the ice.



Ronald Shreve, (BS '52, PhD '59), assistant professor of geology and geophysics at UCLA, adjusts electrical and monitoring equipment. Shreve designed most of the equipment used in the coring and drilling work.

Barclay Kamb, professor of geology and geophysics, removes a 1-meter ice core from the coring hotpoint. The core is first examined visually, and internal structures are recorded and measured. An interesting feature observed is the formation of fine, perfectly planar cracks due to release of the confining pressure.

The core is flattened (using a gasoline iron). It is then sectioned to a thickness of 1 mm for optical examination.

The core sections are examined by Dr. Kamb in a 15-cm-diameter universal stage, between crossed polaroid plates, to reveal the internal crystalline structure and to measure the orientation of the component crystals.

Sections of the ice core from a depth of 100 m, as seen in the universal stage. In spite of the irregular shapes of the individual ice crystals (areas of different shading), the axes of the crystals are arranged in a remarkably regular pattern of spatial orientation, caused by recrystallization of the ice in the process of flow. The axial orientations (not visible in the picture) are determined by optical measurements.

Research on Blue Glacier is usually conducted in August, since this is the driest month of the year there.