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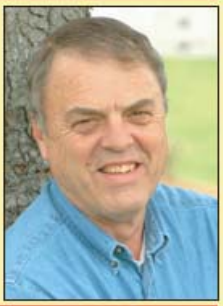

Neal G. Lineback

CRUISING A FJORD?

Fjords are incredibly interesting geographic features created by complex geologic processes. Almost everyone has seen breathtakingly beautiful photographs of cruise ships sailing up the narrow fjords of Norway or the Inland Passage of Canada's west coast.

"Fjord" (fee-ORD) is a Norwegian word, sometimes spelled "fiord" in English. A fjord is typically a long, narrow arm of water that extends inland from the ocean and created by a glacier. Its walls are canyon-like, often rising precipitously from the water.

Fjords occupy glacial troughs that are relatively recent landforms. During the glacial period called the Pleistocene epoch, between one million and 10,000 years ago, great continental glaciers formed in both the northern and southern hemispheres. During this epoch, perhaps one-half of the Northern Hemisphere's land was covered by glaciers.

In North America, these glaciers extended over most of Canada and southward to the Missouri and Ohio rivers and Long Island, N.Y. In Europe, glaciers moved from the Gulf of Bothnia in Scandinavia southward to cover most of the islands of Ireland and Great Britain and half of Germany. In Central Europe, glaciers extended nearly to the Black Sea and covered most of the Ural Mountains.

The continental glaciers grew outward from their origins by accumulation of additional snow. Snow continued to pile up, forming ice at glacier centers around Hudson Bay in North America and the Gulf of Bothnia. Because of the increasing weight, the glaciers spread outward, or advanced. During periods of advance, the glaciers scoured the landscape. The glaciers were channeled along preexisting valleys initially carved by water, creating the glacial troughs, later to become fjords.

About 18,000 years ago the continental glaciers reached their greatest extent and have been retreating ever since. Only two remnants of these continental glaciers still exist -- the Greenland and Antarctic glaciers. But current mountain glaciers, as in the Canadian Rockies, could also be considered remnants.

Although fjords are often thought to be solely the products of glaciation, the processes are much more complex. Normal erosion of the steep lands by water along steep coasts of high latitudes typically created youthful valleys with V-shaped cross-sections at this stage of development.

During glaciation, glaciers flowed down these valleys scouring them. The results are valleys that become troughs with U-shaped cross-sections, some of which extend to the ocean. In the final stages of fjord creation, the glacier retreats, or melts back, allowing the ocean to enter the glacial trough.

Fjords are best developed in polar and west coast marine climates. The polar coasts of Greenland and Antarctica are heavily fjorded. In west coast marine climates, the wind generally blows from the water onto the west coasts at these high latitudes, bringing abundant precipitation. At latitudes poleward of 40 degrees where high elevations exist close to shore, much of the winter precipitation is snow. Hence, glaciers have created fjorded coasts along Canada's western and Alaska's southwestern coasts, in Europe's Iceland, Scotland and Norway, along Chile's southern coast and Tierra del Fuego (South America's southernmost island), on New Zealand and even on Australia's Tasmania.

Fjords make some of the best harbors in the world. Their winding, serpentine patterns and steep valley walls protect ships from both wind and ocean swells. The problem is that few people live at these poleward latitudes. Although such harbors may be used by fishing boats, a few cargo ships and an occasional cruise ship, these natural harbors are in the wrong geographical locations to be heavily used.

The hearty Norsemen used available fjords for safe refuge during the development of their seafaring skills. To the American cruising tourist, the beauty of fjords absolutely crowns an Alaskan, Norwegian, Canadian, Southern Chilean or New Zealand vacation.

And that is *Geography in the News™*. July 21, 2006. #842.

(The author is a Professor Emeritus of Geography at Appalachian State University, Boone, NC and wrote the first version of this article in 1993. Mandy Lineback Gritzner is serving as summer editor and recently revised it.)