We decided to continue celebrating our University’s 100th anniversary into the new year of 2018, by examining some of its most noteworthy efforts in environmental research, distant from this or any other campus of the institution. Last month, Russ Hopcroft reviewed current research in the Gulf of Alaska by the Institute of Marine Science and the College of Fisheries of UAF. This second of three First Friday OWLS events, we’ll explore some of the scientific contributions centered around the Naval Arctic Research Laboratory near Point Barrow, Alaska. Next month, Brian Barnes will address contributions by researchers based at the Toolik Lake Research Station on the North Slope.
Last month, I geared up to establish the historical context of our subject today, the Naval Arctic Research Laboratory, in a linkage going back to the end of the Middle Ages. That was when Portugal and Spain became rivals in a race to establish European hegemony over the expanding world of trade. That world hegemony was mysteriously vacated by the Chinese in the 14th and 15th centuries, after about a thousand years of tenure by a string of mostly non-European cultures and states. Because the Pope hastily divided the known world in 1492-93 between Portugal and Spain, lesser powers in Europe, including England under Queen Elizabeth I, set about scrambling to find a shortcut to the riches of Cathay. For much of the following 400 years, the scramble of exploration led Europeans to try to pioneer two possible shortcuts in the Far North: the Northwest Passage and the Northeast Passage.
Dwarfed by a larger overview of our species’ development, my historical link-tracing actually covered only a tiny slice of humans’ (*Homo sapiens*) overall development, from a welter of African primate species, to today’s products of evolution, climate change, and...history.

Consider: In the concluding phases (1860s CE) of the international search for Franklin’s Expedition, which departed Britain in 1845: an American, Charles Francis Hall, talked with Inuit residents on the eastern end of Baffin Island who could recite oral tradition going back nearly 300 years. That oral history quite clearly identified the three expeditions by the English scoundrel, Martin Frobisher, in the 1570s. *The Inuit of the Arctic Marine Mammal culture* recounted what his ships and crews did, where the strange light-skinned sailors and miners ended up, and how their own ancestors interacted with people whom they believed dropped in on them from outer space.

By comparison, tracing recorded (written, illustrated) history a little further back to 500 years (half a millennium) and to Columbus’s achievements and their influence on current affairs in polar regions including Alaska is a modest exercise, although it IS important!
Here’s an AVHRR image of part of northern Beringia from late winter 2001. Notice the very large polynyas along the Chukchi Sea Coasts, primarily off Alaska and a smaller one parallel to the Chukotka coast. The **Chukchi Flaw Zone** west of Barrow is a regular feature, and one which scientists suspect has long operated as a beacon to bowhead whales passing northward from the northern Bering Sea each spring. The ice dynamics were not fully explained on a global scale or in a circumpolar context until the **SHEBA (Surface Heat and Energy Budget of the Arctic) cruise of the late 1990s**. Modern Inupiat whalers use ecological and environmental knowledge of marine mammals and sea ice conditions in subsistence activities that can be traced back to the beginning of the holocene, some 13 kybp.
The impetus for the series of five International Polar Years (IPY) was a call for pooling resources and resulting information from a coordinated international effort by the Austrian naval scientist Karl Weyprecht in 1875.

Our excuses (as if we really needed them) for being interested in IPYs in general is that an expedition to Point Barrow in the newly acquired Territory of Alaska was one of two U.S. contributions to the first IPY. There were a total of 14 expeditions and stations in the first IPY of 1882-1883.
Here is a photograph of the U.S. Army Signal Corps Station at Barrow, with half of the crew of 10-12 expedition members. They accomplished many things in their 18-month residency, which ended in late August 1883.
Charles DeWitt Brower, along with one of Lt. Patrick Henry Ray’s scientific crew, named Herendeen, established a shore whaling station at the site (and in the very building) used by the Army Signal Corps, for the Cape Smythe Whaling Company, in 1884.

After most of “a lifetime of adventure in the Far North,” Brower published his famous “Fifty Years Below Zero” in 1942, which romanticized the accomplishments of himself, his family, and many associates and visitors.
Charles D. Brower lived through many technological advances and economic developments that changed things in the Far North:
• Commercial whaling declined and ceased;
• Petroleum replaced biogenic oil;
• Internal combustion engines made aviation feasible, even necessary;
• Wireless communications supplanted those by telegraph lines;
• Two world wars catalyzed further globalization;
• The science of meteorology and practices of weather forecasting were advanced, along with many other scientific disciplines and academic specialties.
By the end of WW II, the heyday of amateur polar exploration and explorers was almost over. Science and technology had become major concerns of Euro-American governments, and the victorious Allies. Big Science in every major nation was funded by government.

V. Stefansson (Stef) was an Icelandic-Canadian-American who profoundly admired any and all peoples who managed to live comfortably in the Far North through proficiencies and wisdom of all sorts. He had become a senior advisor to the U.S. government and its military services, as well as to commercial airlines seeking to shorten intercontinental travel and trade linkages by the end of WW II.

Per (Pete) Scholander was a student of northern adaptations in animals, plants, and human resourcefulness, equally an advisor to the U.S. military. He was also married to the daughter of another respected northern scientist.

Pete’s father-in-law was Larry Irving. Legend has it that Pete intended to surprise Larry with a self-contained multipurpose laboratory that would be housed in one or two of the military gliders used in the Normandy D-Day invasions, to be landed on Cornwallis Island in the Canadian Arctic.

The U.S. Navy’s Office of Naval Research scooped Pete, by selecting Barrow, Alaska for the location of a federal Arctic Research Laboratory, and appointing Larry Irving to be its first scientific director, in 1947.
As of the beginning of the ARL’s 2nd full open-water season, George McGinitie became the Lab’s second scientific director. He brought young Howard Feder north to be his field assistant in a survey of marine benthic biota in the vicinity of Point Barrow. The open-cockpit boat, *Ivik*, served them as a sampling platform, until freezeup in 1949. They began to amass a collection of arctic benthos, and along the way, while sampling the bottom with drags and trawls along the shore, chanced to discover a peculiar trench running parallel to the Northeast-Southwest coastline fronting the Chukchi Sea.
*Ivik* was piloted by experienced Iñupiaq boathandlers, who infallibly brought the scientists back through fog and heavy weather. The preliminary soundings that led George McGinitie to call this trench the “Barrow Sea Canyon (or Valley)” inevitably came to the attention of physical oceanographers and other Navy observers, including Waldo Lyon, who strongly advocated use of submarines in the Arctic. A few years after Howard Feder became the first trained biologist to remain year-round at the ARL, the Navy undertook a rigorous mapping survey of the Barrow Canyon. It was recognized as a deepening slot that cut through the edge of the continental shelf down to the greater depths of the central Arctic Ocean.
The summer after the USSR launched *Sputnik*, the U.S. was still smarting over this superpower one-upmanship in space. But as part of the IGY theatre, USS *Nautilus* successfully completed a transarctic run to the Atlantic. It was only on the third try that SSN571 backtracked (upon Waldo Lyons’ recommendation) to the head of the Barrow Canyon off Peard Bay, where the submarine could sneak beneath the deep keeled pack ice and the seafloor to reach deeper water. Weeks after taking that historic plunge, *Nautilus* was honored by fireboats in the East River off New York City.
While everybody surely remembers Sputnik, and many of you have heard the story of the Nautilus successfully completing the transit of the North Pole by way of Barrow, and possibly some of you even know of the crucial role of the Barrow Canyon in that success, you may not know about the narrowly missed opportunity to put on a dramatic north polar region rendezvous. Yes, a rendezvous was planned near the geographic North Pole between Nautilus and this Navy LTA submarine-spotting dirigible, nicknamed Snow Goose.

As luck would have it, a lingering heat wave in Ohio delayed Snow Goose’s flight northward into Canadian air space, then fog further delayed the dirigible’s penetration of the Canadian Arctic island archipelago. Nautilus had passed the North Pole on 3rd August 1958. Snow Goose turned south after reaching, and circling overhead of NARL’s Ice Island T-3 on 9th August, and returned to South Weymouth Naval Air Station in Massachusetts on 12th August.
In fact, the aborted rendezvous between dirigible and submarine marked twilight for dirigibles in military service, and nightfall for dirigible use in the Arctic; The *Snow Goose* was the last airship of any nation (that I know of) to have operated inside the Arctic Circle. Its adventure was a comedown from 1926 and 1928, years when two Italian-built dirigibles reached 90° N.

Sources: Norton (2002); Althoff (2011)
Meanwhile, back at Barrow, the crew at NARL in 1957-58 was as unaware of the high drama of *Nautilus* and *Snow Goose* as I found residents of Utqiagvik to be 40 years later. But after all, these missions were meant to be secret Navy operations, at least until after they had succeeded.
The first quarter-century of NARL’s activities was dominated by characterization of the Arctic. This phase of NARL may be thought of as “make the strange familiar.” And as such, this phase was a multi-faceted, multi-disciplinary enterprise, filled with fun, challenges, and surprises.

The Arctic Circle, and the area within it are shown, lightly shaded, so you can see how some of the defining characteristics of the Arctic are asymmetric (and in fact stray far southward from the Arctic), in comparison to the Geographic North Pole and the Arctic Circle. These include such characteristics as the Auroral Zone, Treeline, Limit of continuous permafrost, and mean limit of southern extent of sea ice (back in mid-twentieth century, that is).
Pete Sovalik, having snared an arctic fox pup for Larry Underwood’s physiological lab study, expresses his delight.

Pete was equally at home on sea ice as on land.
Here’s Pete Sovalik expressing delight with traditional dancing, as here celebrating successful spring whale hunting.
The Lab attracted scientific luminaries, such as Eric Hultén (3rd from Left), the Swedish botanist who coined the biogeographic term, “Beringia,” to designate the subcontinental area spanning eastern Siberia, northern Alaska, and NW Canada.
Prominent among the perennial scientific investigators was Frank A. Pitelka (L) who focused early career efforts on the herbivorous lemming (*Lemmus trimucronatus*) populations (inset) on tundra near Barrow, and their sharp oscillations between abundance and scarcity on 3-5-year cycles. Pitelka and his students figured prominently in guiding NARL-based biological studies from mere descriptive biology to ecological and ecosystem-based analyses.
Tracking the abundance of these herbivores, carnivores such as this young Snowy Owl (*Bubo scandiaca*) were found to breed in years when their prey were abundant, but to be absent when the lemmings were scarce.
Pitelka attracted many talented students to share his fascination with tundra ecology. Here is Bill Maher, weighing a young-of-the-year Snowy Owl on the bow of a “weasel” tracked vehicle.