



CARAVANS OF THE NORTH: A COMPARISON OF 20th C CARAVANS IN NORTHERN CANADA AND NORTHERN CHILE¹

CARAVANAS DEL NORTE: UNA COMPARACIÓN DE LAS CARAVANAS DEL SIGLO XX EN EL NORTE DE CANADÁ Y EL NORTE DE CHILE

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An examination of the historic caravans of northern Canada in the 20th c reveals compelling historical, technological, economic, social, political, and kinship comparisons to the developments of caravans in northern Chile in the 20th c. In Canada, the transport of goods across the northern reaches of the prairie provinces was spurred by mining and logging interests, and began with horses and donkeys, subsequently shifting to gasoline engine power when they became available, via “cat (caterpillar tractor) freight sleighs”. In northern Chile, camelid caravans had been replaced in many instances by horse and donkey caravans to haul the goods required for mining copper and nitrate. As vehicles became available, the horse and donkey caravans were replaced at the same time that roads were built, often along the same trails that had been used by animal caravans for hundreds and thousands of years. While rapid and convenient vehicle transport is widely available in both Canada and Chile, transport that is dependent upon and limited by specific environmental parameters has not been universally replaced, and continues to fill important social, economic, political, and behavioural roles that can be considered in reviewing and reconstructing ancient caravan lifeways.

Key words: Canada, Chile, caravans.

Una revisión de las caravanas históricas del norte de Canadá en el siglo XX revela convincentes comparaciones históricas, tecnológicas, económicas, sociales, políticas y de parentesco con los desarrollos de las caravanas en el norte de Chile en el siglo XX. En Canadá, el transporte de bienes a través de los límites septentrionales de las Provincias de las Praderas fue estimulado por intereses mineros y forestales y comenzó con caballos y burros, para luego incorporar, cuando estuvo disponible, el motor de gasolina a través de “trineos de transporte cat (tractor Caterpillar)”. En el norte de Chile, las caravanas de camélidos habían sido reemplazadas en muchos casos por caravanas de caballos y burros para transportar los bienes necesarios para la minería de cobre y nitrato. A medida que los vehículos comenzaron a estar disponibles, las caravanas de caballos y burros fueron reemplazadas al mismo tiempo que se construían caminos, a menudo a lo largo de los mismos senderos que habían sido usados por las caravanas de animales por cientos y miles de años. Mientras que el transporte por vehículo, rápido y conveniente, es ampliamente disponible en el norte de Chile, aquel tipo de transporte que depende de y está limitado por parámetros ambientales específicos no fue reemplazado universalmente y continúa cumpliendo importantes roles sociales, económicos, políticos y conductuales que pueden ser considerados al revisar y reconstruir los antiguos estilos de vida caravaneros.

Palabras claves: Canadá, Chile, caravanas.

I explore here the dynamics, evolution, and history of the 20th c long-distance cat (caterpillar tractor) freight sleighs of northern Canada as a counterpart development to the installation of rail and vehicle roads in northern Chile during a similar time period. Each of these transport systems replaced long-standing traditional overland routes, and in the end each has retained an essential role in modern transport. I propose that the elements that contribute to the sustained value of the well-organized and culturally integrated

Canadian cat freight system can provide fresh insight to frame the ancient long-distance transport systems of the Andes. I am particularly interested in the kind of person who engages in long-distance trade; it is an economic necessity that includes social advantages, but it was not undertaken by all members of each group—Canadian and Andean—and thus maintains an element of individuality.

The Canadian cat trains, a short-lived but key system of long distance trade that traversed through

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arduous geography, initially required the use of traction and pack animals, were the only means of movement of goods both exotic and basic to the settlements visited, and comprised the focus of lifeways for the people—many related by kin—who engaged in the trade. First-hand accounts and recollections by descendants of cat sleigh operations provide a unique view into the thinkscape of the people who engage in long-distance trade, with the aim to provide insight into reconstructions of ancient caravanning. The northern Canada case study is compared to the contemporaneous historic trends of caravans in northern Chile, which has a well-documented and ancient history within the Andean sphere (Núñez 1976), and which is not the focus of the discussion here.

This research was borne out of two connected but unrelated events. The first came about from my fascination with Andean caravans, inspired by the rock art, geoglyphs, and modern caravans evident throughout the Andean region. Upon discovering Khazanov's *Nomads and the Outside World* (1984, 1994), I have been transfixed by comparisons of caravaners—people who travel long distances for weeks and months at a time, relying upon memory of landscape and social contacts, experts in political and economic survival—throughout time and space. Caravaners may travel with family or with economic partners, and rely upon both kin and non-kin hospitality en route, much in the way that Melanesian Trobrianders rely upon their trading partners maintained across generations (Malinowski 1922; Mauss 1970; Weiner 1992), and the way that Kalahari Jo/hoansi rely upon their non-kin social partners [*hxaro*] for survival when outside of their 'home' territory (Lee 2013).

The second impetus came with the discovery of established long-distance trade networks still in use by resourceful and knowledgeable inhabitants of northern Manitoba, Canada. An international gathering of archaeologists, historians, and anthropologists led me to reflect upon the broad parallels that underlie caravan activity: What skills and knowledge are required for those who undertake seasonal or annual trade journeys with pack animals? What makes a successful caravaner beyond the luck of survival through sometimes unpredictable and unreliable environmental or social zones? What factors link the personality and actions of caravaners over time and space? (Clarkson et al. 2017).

My actual experience with Andean caravans is limited to a week-long re-creation of a caravan undertaken in 2000 with Lautaro Núñez and Luis Briones for the purposes of a documentary entitled *La Última Caravana* (2002). To complement and expand on this brief experience, I have spent much time walking on caravan trails and camping in the Atacama Desert alone, as well as in the company of my colleagues Luis

Briones and Oscar Varela, and also with colleagues at the Museo San Miguel de Azapa in northern Chile. I've got a good sense of direction, I can think my way to finding disrupted trails with excellent results, and I've got a good sense of the kinds of places where people camped or stopped to make offerings before proceeding. But I travel where there are no longer permanent settlements, I rarely cross ecological zones, and I have not encountered anything but one errant hummingbird, a bat, and an occasional condor. What is the practical side of the journey—the social, political, or economic—skills that play into successful caravanning?

In recent decades there have been numerous ethnographic studies on caravanning peoples that provide invaluable insight for specific analogies and cross-cultural comparisons to comprehend precontact practices, organization, and values, and the Andean research includes studies on the mixed economies of pastoralists who engage in caravanning (Capriles and Tripcevich 2016; Flores Ochoa 1975, 1977, 1988; Lecoq 1997; Nielsen 1997, 1997-1998, 2011; Núñez and Nielsen 2011). Old World ethnoarchaeological research has been undertaken in Ethiopia (Woldekiros 2014), Sudan (Förster et al. 2013), Chad and Libya (Meerpohl 2013), and Tanzania (Biginagwa 2012).

The extant ethnographic comparisons of caravans can be applied to regions of similar geography, environment, and lifeways. The traditional caravans of both the Old and New Worlds traversed through what some might call desolate landscapes: arid lands dotted with oases and concentrated pockets of dispersed settlements. The long distances between rest and trading points require(d) caravaners to be away from home for extended periods of time, and the journeys required physical resilience and situational ingenuity for social, physical, and political encounters, plus intelligent management of the animals necessary to caravaners—and later, mechanical ability with powered vehicles.

We have both models and exemplars to reconstruct the caravans of old: ethnographic and historic studies of existing caravaners, augmented by the archaeological evidence and interpretations, imagery in rock art, geoglyphs, and on portable goods, such as a donkey etched into the wet clay of a New Kingdom amphora (Kuper 2001), and irrefutable behavioural remains such as stacks of 18th dynasty amphorae at Abu Ballas, Egypt (Förster 2013:299). The ethnographic studies provide insight into the behavioural components that are difficult at best to reconstruct from archaeological sources, and Nielsen's (1997, 1997-1998) and Pimentel's (2009; Cases et al. 2008) research, for example, provide excellent examples.

When we consider the definition of caravans and caravanning—a lifeways focused upon moving goods over long distances with beasts of burden—additional

case studies can provide insight into the entirety of a caravan journey: the planning, the participants, the goods moved (although these are generally invisible on the journey because they are end-point goods), the activities en route, the rest stops, etc. (Clarkson et al. 2017).

Cat Freight Sleighs of Northern Canada

The northern portions of the Canadian provinces of Alberta, Saskatchewan, Manitoba, and Ontario (west to east) are the homelands of Cree, Ojibway, and other indigenous peoples (Figure 1). The southern and central areas of these provinces had been settled by horticultural peoples (Siouan and others) who made use of the rich soils, and these were some of the first lands occupied by European settlers. To the north, the soils of the boreal forest and muskeg were inadequate for farming, and these areas were penetrated beginning in the 17th c by European traders and voyageurs who made use of the routes familiar to the indigenes, adopting the indigenous transportation practices of canoe, sled, and snowshoes to bring out the furs that made the Hudson's Bay Company (HBC; founded 1670) and Northwest Company (1779-1821, thereafter consolidated with the HBC) prosperous. By the early -to mid 1800s, a change

in European fashion preferences caused the market for furs to drop, accompanied by an expanding market for lumber, which signalled the beginning of railroad construction throughout the country. The discovery of gold and other valuable ores in northern Canada from the 1930s onward, plus the concomitant need for massive hydroelectric power generators to process the mined ores, brought additional rail lines to service these regions. However, the vast regions of muskeg — marshlands of the boreal forest— made it impossible to construct rail lines in some of these northern areas. Enterprising entrepreneurs¹ hauled goods into and out of the camps with teams of horses hitched to wooden sleighs when the muskeg was frozen and the ice was thick enough to support the weight of the loads; one example refers to 150 lbs (68 kg) per sleigh, for a total of 10,200 lbs (4762 kg) (Memories of Deep River: Freight Swing Era <http://www.jkcc.com/brffreight.html>). As gasoline-powered vehicles made their way into the more rural and remote areas, these replaced the horse teams. But, the dog sleds used by local Cree Indians remained an essential part of the transportation and communication system, and the Cree were renowned for their indefatigability, carrying repeated portage loads with a tump line, sometimes each load weighing 300 to 400 pounds (Huffaker 2002)².

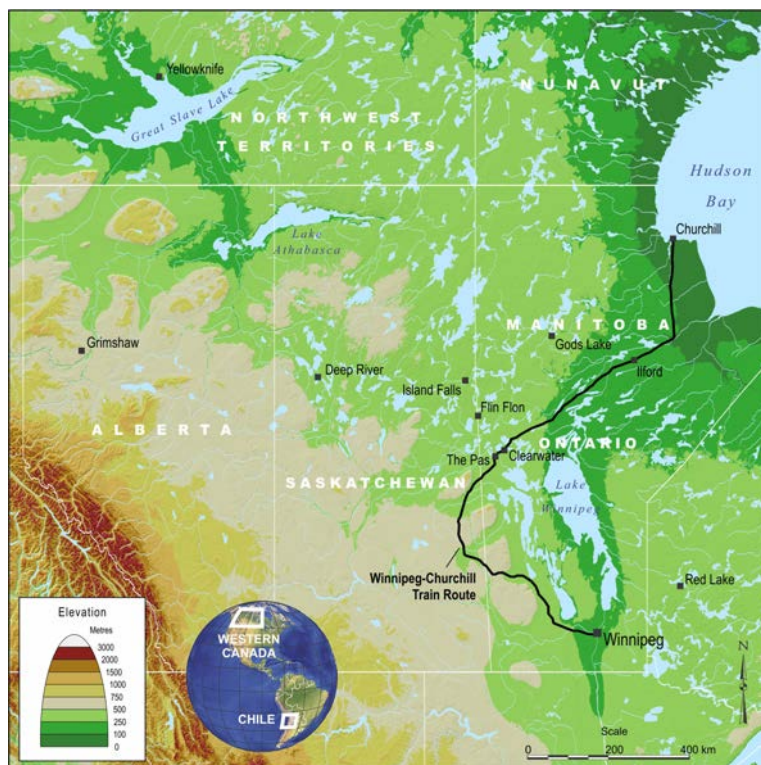


Figure 1. Map of central Canada, showing locations mentioned in the text.

Mapa de Canadá central que incluye los sitios mencionados en el texto.

A variety of gas-powered vehicles were both adapted and invented in Canada for winter applications. Ford Model A vehicles (built 1927-1931) were used at some of the northern camps, but the engine was not powerful enough to haul much, and the Model As were relegated to short runs around camp and on cleared routes on the winter ice (Huffaker 2002). The exigencies of winter transportation in northern climates led to a number of powered innovations that both pre-dated and post-dated the Huffaker Model A adaptations. The “snowflyer”, patented in 1915, was based upon rear-tracks and front-mount skis (Popular Mechanics 1934:878). The “B7” —a seven-passenger vehicle— was invented out of necessity by Canadian Joseph-Armand Bombardier and first sold in 1936. By the late 1950s it was redesigned for the recreational market as the “Ski-doo”, a term that has become synonymous with ‘snow machine’. The snow machine remains a vital part of personal travel for inhabitants of northern climes, and often travel as caravans for both recreational and utilitarian purposes (Lynch, personal communication, 2018).

The Linn tractor (built 1916-1952) proved to be an excellent solution for hauling the cargo loaded on sleighs across ice and frozen muskeg. Ski runners attached in the front allowed the rear axle-powered roller chain on a flexible track to move through snow efficiently. When additional tractors were added, the amount of load that could be carried was impressive: a Linn tractor train hauled a 120 ton load between Flin Flon and the depot³ (Theobald 2014). Each “cat-swing” was comprised of tractors and freight sleighs, followed up by a caboose where the crew ate and slept in 8-hour shifts. A cat-train consisted of several cat-swings that travelled together (Figure 2).



Figure 2. Linn tractor pulling “cat swings” of freight through snow. 1933, Linn Tractor.

Tractor Linn tirando “columpios” de carga Caterpillar a través de la nieve. 1933, Tractor Linn.

The winter journeys required months of planning to ensure that all of the ordered goods and maintenance materials were ready and loaded when the ice was deemed thick enough. The collection points were located well outside of centralized cities. Although Winnipeg, Manitoba, was a major railroad centre of the Prairies in the early 20th C, the collection depots, like Ilford, Manitoba, lying 700 km north-northeast of Winnipeg and 300 km south-southwest of the port of Churchill on Hudson Bay (both distances are reported here as direct line; the on-ground travel reality is much longer), were situated as centrally as possible to the remote regions serviced. Outbound cat slings carried tinned goods, clothing, tools, replacement parts for the hydroelectric generators and mining camps, and dry goods, as well as some fresh foods and perishables, the latter of which were hauled in a heated trailer (Huffaker 2002). Return cat slings carried lumber, gold and other ores, fish, and furs. The arrival of a cat sling at a settlement —and the noise of the Linn tractors could be heard a long way and for a long time— brought out the community to purchase and barter for goods: meat, sugar, flour, tea, coffee, baking powder, salt, fuel, etc., plus household goods, tools, clothing, etc. The cat sling arrival was especially exciting for children, who got exotic treats like candy (personal communication, Pat Johnson 9II17). The cat slings also brought “world” news and welcome social time, an interruption from the isolation and quiet of the distant settlements. The cat swings did not stop as frequently as the earlier horse-drawn sleighs, which required food and shelter for the crew and horses at the end of each day (Memories of Deep River [n.d.]: Freight Swing Era (<http://www.jkcc.com/brfreight.html>)).

The cat-trains travelled non-stop, with crews rotating every four hours. The ice needed to be two- to three-feet thick in order to sustain 200-300 tons of goods per sling (Huffaker 2002). In the Northwest Territories (NWT), a cat train run of 900 km from Grimshaw, Alberta to Yellowknife, NWT, was said to take about 40 days, at an average speed of 0.9 km/hr (French 2016). The cat-train trip between Island Lake and Flin Flon (Manitoba) travelled an average of 9 km/hr on the 90 km trip, and at the height of winter, this meant about 7 hours of daylight. Lighter loads were not dependent upon the cat-trains, and mail and people moved regularly via dog teams driven by Cree and other Indians. If a Linn tractor had already cleared a route through the snow, Island Falls residents outfitted a Ford Model A with skis on the front and “three wheels on each side on the rear axles with a chain running on these three wheels, with two of them as idlers and one as the driving wheel” to follow a Linn tractor (Huffaker 2002) (Figure 3).



Figure 3. Modified Ford Model As with skis on front and rear wheels with chains. Northern Canada, from Huffaker Journal, photo dated 1931.

Ford Modelo A modificado con esquíes en las ruedas delanteras y traseras con cadenas. Norte de Canadá, tomado del Huffaker Journal, fotografía con fecha de 1931.

The winter journeys were replete with hazards. The temperatures often dipped to -55°C and below, and the drive-tractor was not heated. Pressure ridges up to three feet high on larger lakes necessitated chopping through them and laying timbers laid across the crack (Memories of Deep River [n.d.]: Post Freight <http://www.jkcc.com/five.html>).

Occasionally the ice gave way beneath the loads—a terrible tragedy when horse trains were used, as they could not always be rescued (Memories of Deep River [n.d.]: Freighting <http://www.jkcc.com/dlffreight.html>). A very deep snow layer on the ice served to insulate the ice from fully freezing, and this required the crews to don snowshoes to tamp down the snow along the route. A pause of a couple of days and nights was usually sufficient for the ice to freeze deep enough to sustain the freight loads. When the cat-slings broke through the ice (Figure 4) -which tended to be the most friable near lake edges- the entire crew was called out to assist.

The Linn crew carried 8" x 16" timbers 14 feet or 16 feet long on the first sleigh so if the tractor rear end broke through the ice and was held up by the front snow plow hanging on the remaining ice, they could stand these timbers upright in the water and ended on the lake bottom, with a timber across the top of them and a set of chain blocks, they could lift the tractor clear of the water and in a short time the open water would freeze over and then by draining the oil out of the Linn engine and replacing it with new hot oil, they could crank up and be on their way again (Huffaker 2002).

Ice break-throughs did not always conveniently occur in shallow water. Jack Johnson's (son of company founder Hi Johnson) job was to dive into dark slushy bogs to hook up sunken loads at depths of up to 80' (24 m)—an incomprehensibly frigid and blind task. Some loads were just too heavy and deep to retrieve—like the load of gold lost en route from the God's Lake (Manitoba) mine (Pat Johnson, personal communication 8III17).



Figure 4. Linn tractor broken through the ice, northern Canada. From Huffaker Journal.

Tractor Linn averiado y atravesado en el hielo, Norte de Canadá. Tomado del Huffaker Journal.

Navigating a route through these remote regions depended upon accuracy —both for economy as well as for survival. To the outsider, the terrain can appear to be an unbroken and indistinguishable view of rock and conifers, and in the winter— white. Huffaker noted that their Cree guides could “go out on any lake and steer a canoe in summer or a dog team in winter across the lake among islands for many miles in all kinds of weather and even in the dark of night and arrive at the portage across the lake and never miss even by a few feet” (Huffaker 2002). The huge and remote stretches of terrain covered by Johnson Transport across muskeg, lake, river, and boreal forest each winter -much of it in darkness- required a relatively permanent and reliable means of marking the routes. The tallest visible conifer from a point on the trail was ‘trimmed’ of all the branches except for a cluster on the top (known as a “lobstick” or “lopstick”) and also used to mark portages at rapids [Memories of Deep River [n.d.]: Lost Land of the Caribou: Travel in the North <http://www.jkcc.com/travel.html>]; this clearly highlighted the tree in the viewscape. Further along, the next high-point conifer was marked in a similar manner, creating a string of site-line markers. Lopsticks were a familiar part of navigation on the fur trade routes, and the association of the trimmed trees with a variety of indigenous ritual practices is strongly indicative that the use of lopsticks predated European traders (Podruchny et al. 2010). Considering that the cat slings ran full-time, the limited amount of daylight in winter at that latitude, and the inability to rely upon full-moon clarity during all night journeys, the drivers needed to rely on more than the marked trees to guide them through the terrain and this was an inherent or developed sense of route, critical to bringing the goods and crew safely through any journey.

The length of the transport season was dependent upon the weather in any particular year. An early freeze-up might mean extra trips to deliver and retrieve goods. In view of the unpredictability of the timing for the season, the people in the business of moving the goods via cat slings had to have their supplies warehoused and ready in anticipation of the freighting season. The transporters stocked the goods ordered by community residents in the previous season, as well as the supplies required by mine operators; the transporters also had to understand the preferences of their consumers. In one case, a supplier in Winnipeg attempted to have a transporter purchase a quantity of cloth that was available at a good price. The transporter said “that the price might be good, but his customers would not want it or buy it even with no other choice” (Memories of Deep River n.d.). Huffaker refers to a heated caboose that submerged through the ice, flooding the supply of tinned goods within. The caboose was recovered and drained, but the labels came off of the tins. Purchasing tinned goods at the commissary that year was a guessing

game because one never knew if they were buying beans or cherries (Huffaker 2002).

The tractor cat freight trains were used in various locations in northern Alberta, Saskatchewan, Manitoba, and Ontario in the late 1930s, but were replaced by railroads and airplanes in the mid-1940s. There is little left to show for the remarkable and intensive cat freight train transport. The occasional abandoned sleigh or caboose, seemingly in the middle of nowhere, is one of the few reminders (Canadian Broadcasting Corporation 2015; French 2016); the wood from the sleighs was repurposed (Pat Johnson, personal communication, 8III17), which also accounts for the lack of material evidence of the cat slings.

The cat freight trains thrived during the Great Depression (1929-1939), and in spite of the long hours in darkness, dangerous conditions exacerbated by bitterly cold temperature, broken ice, large carnivores (bears, wolves, etc.), and back-breaking work, there was never a shortage of men to work. What kind of person chose to engage in this lifestyle, what were the motivations, and what were the rewards? The wages were good —\$200 a month— equivalent in buying power to about \$3500 US in 2018 (Dollar Times n.d.), and the prestige was high to secure one of the most skilled jobs on the freight trains (Canadian Broadcasting Corporation 1958).

The history of the development of transportation in the northern Canadian provinces reflects the special requirements that accompany natural resource exploitation in remote regions, where settlements and industrial operations required routine service with supply centres in the south. The seasonal and geographical constraints of the northern landscape, typified by enormous areas of muskeg, lakes, and rivers, meant that supplies could only be moved when the surface was frozen, thus constraining transportation to the coldest months of the year. As populations and industrial operations expanded, the construction of railway lines and airport runways became an economically feasible means of transport for people and many supplies, and the winter road freight service was replaced. Rail transport became the most economical, particularly for large and heavy goods.

Transportation in Northern Chile: Andean Adaptations

A series of events similar to those of northern Canada can be found in northern Chile, where global demand for mineral resources spurred by European colonization led to the development of infrastructure to establish and maintain these industries. Andeans have relied upon long distance travel to move goods for thousands of years, and the llama was the sole pack animal native to the region. Although native to the highlands, llamas fare well from

sea level to the altiplano (above 3200 masl). Bonavia's (2008) exhaustive volume *The South American Camelids* notes llama cargo-bearing ranges up to 60 kg, although there is a general consensus of approximately 25-45 kg per llama, depending upon the length of the journey. Distances covered in a day have been stated to range up to 60 km, although a more conservative and widely acknowledged distance estimates range between 10-30 km per day (Bonavia 2008:416-423).

The unique geography of northern Chile consists of a strip of coastal desert from which the Andes mountains rise and give way to the altiplano, sometimes within a distance of less than 50 linear km (Figure 5). In northern Chile, predominated by the Atacama Desert and the solitary Río Loa that loops from the Andes to the Pacific, long distance caravan transport was facilitated by movement between oases like Pica and San Pedro de Atacama that lie between the coast and the highlands. The exceptionally dry climate and sparsely distributed settlements throughout this region have preserved

innumerable caravan trails used first by llamas, and later by horses and donkeys in historic times. In addition to the presence of extensive caravan trails throughout northern Chile, images of caravans were recorded in rock art and geoglyphs: depictions of camelids are prominent. A typical caravan scene portrays a human holding a line tethered to one or more camelids, and camelids with loads on their backs. A geoglyph scene in the Quebrada de los Pintados, which is crossed by a major north-south caravan trail, contains over a hundred identically depicted camelids in a single line (Figure 6). The landscape of caravan trails is dotted with stone piles of various configurations and sizes, created as coverings for burials, pause points to reflect on the journey passed and to be undertaken, and route markers. The 'eared' markers (*hitos*) built on the summits of a northern Chilean Inca road, stood out uniquely among the rock piles for ritual and memory, and likely had a similar function to the lopsticks of Canadian winter roads (Lynch, personal communication, 2018).



Figure 5. Map of northern Chile, showing locations mentioned in the text.

Mapa del norte de Chile que muestra los sitios mencionados en el texto.

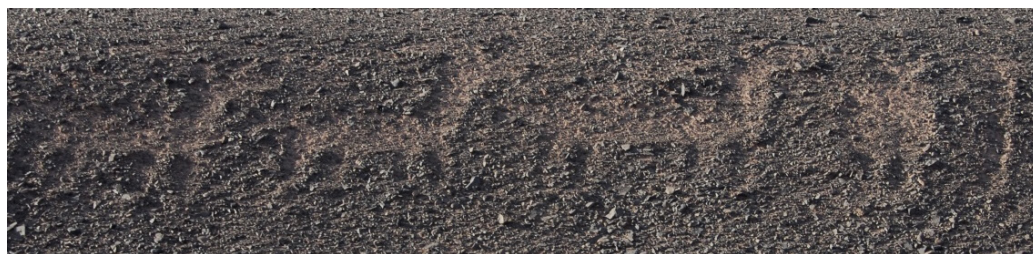


Figure 6. Geoglyph of a camelid caravan, Quebrada Pintados, Chile.

Geoglifo de una caravana de camélidos, Quebrada Pintados, Chile.

The geophysical attributes of the Atacama Desert channelled populations to frequent or settle in locations with reliable water. The native camelid species (*llama*, *alpaca*, *guanaco*, and *vicuña*) early fostered nomadic hunting and gathering patterns that gave way to pastoralism, with the addition of agriculture in regions where this could be supported. The extraordinary changes in altitude within very short distances encouraged multiple economies and exchange systems (Murra 1985; Núñez and Dillehay 1978). The development of nitrate mining on the coast that intensified after the War of the Pacific (1879-1883) was the first major externally driven economic boom since the exploitation and export of gold and silver in the Colonial period. The extremely arid, hot and dangerous conditions of working the nitrate mines is legendary (Rodríguez et al. 2002; Vilches et al. 2008). The early 20th c brought the discovery of rich mineral deposits in the high Andes, where conditions of extremes of aridity and cold prevail at gruelling altitudes over 4000 masl. Roads and railroads were a necessity to ensure rapid and reliable movement of bulk goods both to and from the mines. But, specific challenges beyond the geography remained, unique to the history and culture of both Canada and Chile.

In northern Chile, the fuel required for both domestic and industrial purposes was scarce, and the issue was particularly compounded in the high altitude puna where the mining operations were concentrated. Llareta (*Azorella yareta*), a flowering plant found in the puna, was traditionally collected for fuel and transported by human and llama. Rudolph, the American geographer who first visited the Atacama region in 1922 (Rudolph 1951, 1963:1), noted that after roads were constructed into the region, cars were used to haul llareta. As the llareta became scarce along the roadways, llamas were used to collect the plant from distant and vehicle-inaccessible areas and bring it to the roadways, until the availability of this slow-growing plant became too scarce to be viable. In the 1920s electric transmission lines and railroads were built throughout the north, often paralleled by roads

(Rudolph 1963:25). The nitrate industry of northern Chile necessitated enormous amounts of goods to be transported to and from the nitrate *oficinas*, and mules and horses were the preferred beasts of burden, each capable of hauling up to 70-140 kg. The enormous wealth created by the nitrate industry came to a crashing halt in 1928 with the development of synthetic fertilizers, resulting in economic depression, political instability, and abandonment of the construction of a major railroad (Rudolph 1963:31). Economic fortunes shifted again with the discovery of the extent and quality of copper at Chuquicamata in the Andes, and the need for a railroad, particularly to move cattle and other goods from neighbouring Argentina, was deemed essential. But, the steep terrain typical of Chuquicamata—and other copper mines subsequently discovered throughout the region—is not amenable to rail transport: trucks can negotiate the terrain far more efficiently and effectively (Rudolph 1963:35, 73).

As roads and vehicles became the available means of travel in more remote areas, goods local to those remote settlements could be transported out to market, while imports like tea and sugar were transported in, along with construction materials for schools, homes, etc. (Rudolph 1963:60). The impact and antiquity of these movements was noted by the geographer Isaiah Bowman in his memorable monograph *Desert Trails of Atacama*:

What we have here is a reorganization of the commercial life of a group of mountain communities widely dispersed but having well established relations and customs that have come down to the present almost from the time of the Conquest. With the first development of trade in South America, routes were discovered whose trade has become imbedded in the commercial life of the people to such an extent that when that trade is relocated it produces a shock upon every community involved. That shock the modern railroad has supplied. It is a matter not merely of romantic interest but

also of great geographical importance to trace the old trade routes and to study the trade that passed over them. The more this is done the closer is seen to be the relation between the physical circumstances of a region and the life in it as it has been lived for centuries (Bowman 1924:292).

The introduction of powered transport in northern Chile in the early 20th C had a profound impact on industry, settlement, and development in the region. Rudolph wrote of the enormous changes that had occurred since Bowman had passed through decades earlier:

Here [in the puna] there are no changes to be noted over the fifty years since Isaiah Bowman's visits. Only in accessibility has the region been aided, through equipment which man has developed during this period. One is the four-wheel drive vehicle, which can negotiate the steep ascents to the high passes and can operate over the Puna's rugged terrains without need of roads. The other is the small airplane, for which the first landing field near the Salar de Laco was built a few years ago in the interest of minerals exploration (Rudolph 1963:9).

Boom and Bust: back to the old ways

Today, in the Andes, there remains a niche of transport that relies upon llamas, the beast that was the backbone of Andean society throughout time. Trucks can go where railroads can't, but llamas remain the kings of difficult terrain. For the Andean dweller, llamas are an affordable and reliable means of transport that tap into the routes and the social and kinship ties that have been cultivated for generations (Browman 1990; Núñez 1976:197-198; Téllez and Silva 1989:48-49). Llamas have one more advantage — they can maneuver in and out of places unforgiving to horses and mules, and are particularly desirable for the traffic that crosses international borders between Bolivia, Argentina, Peru and Chile to avoid taxes and to move contrabanned goods, including the undocumented trade of camelids (*llamas*, *alpacas*, *vicuñas*). Lynch (1995:192) has noted similar back-and-forth transitions of use of transportation routes and their purposes from pre-Inca through post-Inca times in northern Chile.

The concurrent historical circumstances of tapping into established transportation routes and systems and adapting them to the changing needs brought on by mining, industry, and settlement in both northern Chile and northern Canada has led each region to invest in

railroads as an efficient and reliable method to move large and heavy goods. In northern Chile, plans to lay railroad tracks were instigated by the boom of resources such as llareta and copper in remote regions, and concomitantly were halted or abandoned by the bust of the failure of those resources (llareta) or the inefficiency of transport (railroads) for the desired purposes. In northern Canada, investment in roads and railroads in the 1930s and 1940s hastened the end of cat freighting that had become the chief reliable means of transport for all goods in and out. The Canadian winter roads remain an important adjunct to existing rail and air services.

Winter roads, also known as ice roads, are prepared each year on previously established routes that take best advantage of the terrain and efficiency. Unlike the winter routes that were used by the cat freighters, modern winter roads are built and maintained with provincial and federal funds. In Manitoba, twenty-three communities are connected to each other and to the south by winter roads; some of these communities have no other terrestrial connections to outside communities, and all have limited access to major supply hubs. The roads are generally prepared and used for a two month span between mid-January and mid-March. Portions of winter roads that traverse lakes require maximum speeds of 15 kph for vehicles with loads up to 39,500 kg, with vehicles spaced about a kilometer apart. The overall intention of the speed and distance regulations is to prevent "pop-outs, cracking, wave action, and complete ice failures" (Winter Roads in Manitoba n.d.). Winter roads are also a significant though fading feature of bordering northern states like Minnesota, where frozen terrain and ice access are used to move heavy and bulky materials in anticipation of the next season's construction.

Winter roads remain a permanent fixture in northern Canada, and are marked as such on maps. The unique driving conditions of winter roads have been memorialized in two reality television programs, *Dead End Express* (National Geographic 2015), which features individuals in remote areas of Montana, Idaho, and Alaska who move goods via boat, plane, mule team, and dog sled, and *"Ice Road Truckers"* (2007-present), which chronicles trucks and truckers that transport freight on ice roads during the brief season of late January to early April. The people featured in *Dead End Express* are largely those who have chosen to live off-grid, unlike the areas serviced by the ice roads which are communities situated for purposes of commerce, industry, and tradition. Trucks that use the winter ice roads travel in groups for safety (Bray 2009), similar to the formation of the cat slings into cat trains. *Ice Road Truckers* has featured Manitoba winter roads for several seasons (*Ice Road Truckers* n.d.), with headquarters for the main trucking company located about 240 km from

Iflord (62 km as the crow flies) the same place where Johnson Transport centralized their shipping 75 years previously⁴.

The reliability of the railroads in extreme latitudes are at the mercy of the terrain and climate. For high speed trains, cold temperatures wreak havoc on brake lines, snap electric lines, and contract the size of the rails to the point of necessary travelling at slower speeds (Kloow and Jenstav 2006; Winter and Railways Study n.d.). In addition to the cold weather phenomena noted in railroad operations, many of the routes in Canada run through permafrost (a feature present for rail lines in northern China; see Wei et al. 2009) and areas with temperature extremes that cause additional problems for year-round operation.

The Canadian railroads service smaller communities as well as major industry, and are conceptualized as a functioning year-round service. The vast areas of permafrost over which the northern Canadian railbeds run are repeatedly subjected to freeze-melt heaving that damages the tracks and consequently disrupts the rail service—an economic as well as political and social disaster where rail and air are the only means of year-round access. Railbed maintenance is expensive, and inroads into solving the damage caused by heaving ground are slow to occur, particularly in consideration of the warmer winters that have been recorded in recent years (Lambert 2014; Wei 2009). Many communities receive a year's supplies of goods shipped in during the limited season when the routes—rail or vehicle—are firm enough to support the freighted goods. When roads or rail lines are impassable, communities are left with no choice but to bring in goods by air at enormous expense.

One example of the problems encountered when rail service is interrupted is demonstrated by the events on the 1700 km rail line between Winnipeg and Churchill, Manitoba in 2017. Churchill is the only northern port from which tanker ships can move grain, minerals and other goods to international markets, and the railroad is the only viable means by which these goods can reach Churchill. In early March 2017, a series of blizzards closed down Churchill to rail and air service, and it was three weeks before a train was able to reach the town with basic supplies (Canadian Press 20 March 2017; Cash 10 June 2017). Subsequently, the rail line was made impassable by unusually excessive overland flooding of reportedly up to 4 m of melted snow on top of frozen ground over major sections of the line (Turner 2017). Months of finger-pointing ensued between the private owners of the rail line and the Port of Churchill and the city, provincial and federal governments about who was responsible for the repairs (Lett 2017). In the interim, the prices of food—already subsidized by the federal government—shot up as staples became scarce. Tourism, a major economic staple of Churchill,

dropped off as visitors were unable to secure affordable transportation to Churchill, and hotels and restaurants were unable to pay staff and secure goods required. The Churchill Northern Studies Centre experienced huge cost overruns to support the scientists and staff, plus the utilities for the facility. The airport remained open and active, but this is a costly alternative for freighting bulky and heavy goods. The residents of Churchill indicated their resolve, yet options run thin when jobs disappear and basic necessities carry an exorbitant price (Robertson 2017; Sanders and Emerson 2017). Ironically, two locomotives and five passenger cars were stranded at the Churchill train station, with the only means to return them to Winnipeg via tanker through Hudson Bay.

Desperate times call for unconventional thinking. Airships—thermally-heated air or other gas “balloons”—have been touted as the great breakthrough for remote regions. They run most cost-effectively with loads of 500-1000 tons, and thus have great potential to deliver the kinds of goods needed to come and go from Churchill (Anonymous 2017; Cash 24 June 2017). The start-up cost is huge, as are the costs of maintaining roads and rail lines, and no airships are available or in use for cargo at this time (Laskas 2016).

Circular progress

Concurrent 20th c historical developments of global economic demands in Chile and Canada for minerals necessitated the development of large-scale transportation systems and infrastructure to meet those needs. The roads and then railroads that replaced “pack trains” (llamas in the Andes, dogs in northern Canada, and horses and mules in both the Andes and northern Canada) and “caterpillar freighting” could not make use of the same routes due to the small-scale and flexibility of the pack trains and caterpillar freighting to traverse an enormous variety of terrain. Further, the muskeg terrain of northern Canada limits transportation to winter when the ground, rivers, and lakes are frozen. Railroads solved the long-term issue of moving large amounts of goods to and from the remote mining operations except that issues of terrain in both northern Canada and northern Chile are too extreme to rely exclusively on trains, and economic considerations have also played into both their construction and maintenance. In Chile, llamas have remained the ideal solution for extremes of terrain, or, for the most elusive way to travel unnoticed for purposes of smuggling. In northern Canada, the railroads were seen as a year-round solution for accessing major centres. Yet, the repeated problems encountered with railroad service, and the higher costs associated with air transport (airplane or airships), suggest that no single year-round solution can suffice

to maintain industries situated remotely to major supply centres without a major economic investment in railbed upgrades and maintenance. The winter roads traversed by trucks are a modern complement to the cat trains of the 1930s and 1940s, and the theatricality of reality television does depict the reality for some to transport goods and people via snow machines and dog sleds.

The case study presented here on northern Canada presents an analogy that duplicates historical and geographical contexts found in northern Chile in the 20th c. The mental resiliency and political savvy of the people who choose to make a living in distant and remote areas is one that is celebrated in history and myth. The stories of the individuals who drove cat freighters and who drive the winter ice roads consistently paint personalities of independent, resourceful, intelligent, and tireless people. These stories come from documentaries, family histories, personal journal records, and reality television. Hi Johnson, the founder of Johnson Transport in Manitoba was, by today's and yesterday's standards, a remarkable person who excelled in negotiating the physical and social environment of remote regions of northern Canada. He raised his family within this environment, and lived to the generous age of 89; his descendants continue to thrive in the heart of the northern forests of Canada (The Pas Herald 1975). We can surmise the skills required of the caravaner in Andean antiquity based upon both economic exchange models that rely upon both kin and non-kin ties

to secure safe passage through 'foreign' territories and for trustworthy exchanges, based upon generalized models of economic exchange. The caravaner was a master of navigation, memory, socialization, chutzpah, and improvisation.

Can we reasonably infer similar "outstanding" characteristics of northern Canadians to the individuals in antiquity who plied the Andean caravan trails across environments that spanned extremes of temperature, terrain, and resources, i.e., unique characters who were memorialized in memory and stories? Are the tributes to the Andean caravaners of northern Chile to be found in the representations of a camelid train and their human attendant etched in the hillside geoglyphs and rock art?

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Notes

- ¹ I have made extensive use of several first- and second-hand accounts of this remarkable stage of commerce in the Canadian northern Prairie provinces. I have benefitted enormously from the recollections of the Johnson Transport Company by Pat Johnson, a grandson of the founder of the company, Hiram (Hi) Johnson. Johnson Transport operated out of Clearwater and Ilford, Manitoba prior to and beyond the end of the short-lived cat freighting epoch of the late 1930s into the mid 1940s. A documentary produced by the Canadian Broadcasting Corporation (1958) portrays the workings of Johnson Transport on the winter trail and in the supply depots. Portions of the journal of Marvin Huffaker dating from 1930-1944 detail routine and specific events while Huffaker was stationed in Island Falls, Saskatchewan, as an electrical engineer for the Hudson Bay Mining and Smelting Company operations just over the border in Manitoba (Huffaker, 2002). Deep River, Saskatchewan, is situated approximately 350 km west of and at approximately the same latitude as Island Falls. It was the location of a fur farm begun in 1925, and the website documenting the history of the area includes numerous independently-authored first- and second-hand accounts for this time period that provide a rich cross-section of both Indigenous and European experiences related to transportation in the north (Memories of Deep River n.d. <http://www.jkcc.com/index.html>).
- ² As a point of comparison, the current record for flour-packing at the Annual Trapper's Festival in The Pas, Manitoba, is 1000 lbs, set in 1972 by John Flett (distance unknown, presumed less than 0.5 km). This short-term feat cannot reasonably compare to sustained loads and distances noted by Huffaker (2002).
- ³ This is possibly the same snow haul mentioned by Huffaker (2002); the depot is not specified, but it may have been Island Lake, a distance of 90 km.
- ⁴ Coincidentally, "Ice Road Truckers" featured a spin-off series "Ice Road Truckers: Deadliest Roads" which featured trucking breeding llamas across the Bolivian Salar de Uyuni in 2011.

