

Climate-related information in Labrador/Nunatsiavut: evidence from Moravian missionary journals¹

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Light for the dreary vales
Of ice-bound Labrador !
Where the frost-king breathes on the slippery sails
Till the mariner wakes no more,
Lift high the lamp that never fails
To that dark and sterile shore.

“LET THERE BE LIGHT.” A Mission Hymn.
Lydia Howard Sigourney (1837), p. 204

KEYWORDS. – Labrador/Nunatsiavut; Moravian missionary journals; climate-related information.

SUMMARY. - Climate-related information in Labrador/Nunatsiavut: evidence from Moravian missionary journals. - After reconnaissance voyages, the Moravian Brethren established their first missionary station on the Labrador/Nunatsiavut coast in August 1771 at a location named by them as Nain. At that time, the Labrador coast belonged formally to England. The Moravian missionaries remained in contact with England by means of an annual ship voyage. Information from the missionary stations and during the annual travel was published in the Moravian missionary journals in England and on the continent. Climate-related information has been gathered from these journals. A selection of the descriptions of weather and climate together with the impacts on the native Inuit and the missionary families is given. This information, combined with the extant early quantitative climatological records, provides an excellent overview of Labrador's climate and environment for the centennial period 1771 – 1880s.

TREFWOORDEN. – Labrador/Nunatsiavut; Moravische missietijdschriften; klimaat gebonden informatie.

SAMENVATTING. – Klimaat gebonden informatie in Labrador/Nunatsiavut: evidentie uit de Moravische missietijdschriften. – Na verkenningsreizen vestigden de Moravische Broeders hun eerste missiepost op de kust van Labrador/Nunatsiavut in augustus 1771 op een plaats die door hen Nain werd genoemd. In die tijd behoorde de Labrador kust formeel tot Engeland. De Moravische missionarissen bleven in contact met Engeland door middel van de jaarlijkse scheepsreis van de missieboot. Informatie vanuit de

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missieposten en over de jaarlijkse scheepsreis werd gepubliceerd in Moravische missietijdschriften in Engeland en op het Continent. Klimaat gebonden informatie uit deze tijdschriften werd verzameld. Een selectie van klimaat- en weersbeschrijvingen samen met hun impact op de oorspronkelijke Inuit bewoners en de families van de missionarissen wordt gegeven. Deze informatie, in combinatie met de overgebleven vroege kwantitatieve klimaat gegevens geeft een uitstekend overzicht van het klimaat van Labrador over de honderdjarige periode 1771-1880.

MOTS-CLES. - Labrador/Nunatsiavut; périodiques de l'Unité des Frères; information climatique.

RESUME. – Information climatique de Labrador/Nunatsiavut: évidence des périodiques missionnaires de l'Unité des Frères. – Après des voyages de reconnaissance les missionnaires de l'Unité des Frères établissaient leur premier poste de mission sur la côte du Labrador en août 1771 à un endroit nommé Nain par eux. En ce temps la côte du Labrador appartenait formellement à l'Angleterre. Les missionnaires gardaient le contact avec l'Angleterre à travers le voyage annuel du bateau missionnaire. Les périodiques missionnaires anglais et du Continent européen publiaient de l'information provenant des postes missionnaires. De l'information climatique a été récolté et une sélection de descriptions du temps et du climat en même temps que l'impact sur la population Inuit et les familles missionnaires est donnée. Cette information, combinée avec les séries climatologiques survécues donnent une vue excellente sur le climat du Labrador pour la période centenaire 1771-1880.

Introduction

The Moravian Brethren, also known in England as the *Unitas Fratrum*, in Germany as *Evangelische Brüder-Unität* or *Herrnhuter Brüdergemeine*, and in French-speaking Switzerland as *Unité des Frères* are protestant Christians whose pre-Reformation origins date back to the Bohemian reformer Jan Hus (ca. 1369 - July 1415). An interesting aside is that one of his most famous followers, Ján Amos Komenský (Jan Amos Comenius, 1592 –1670), may be considered to be the father of modern education and also served as bishop of the Unity of the Brethren. After the virtual extinction of the movement, Bohemian survivors of the Counter-Reformation persecution migrated in the early 1700s to Saxony where they found refuge. Count Nicolaus Ludwig von Zinzendorf und Pottendorf permitted them to build the village of Herrnhut on a corner of his estate of Berthelsdorf. Through the influence of Count Zinzendorf a vast program of missions was launched including: the Danish West Indies (1732), Greenland (1733), Surinam (1735), South Africa (1737), and British West Indies (1754-1777).

An initial journey to the Labrador coast in 1752 was an attempt to establish a missionary post at Nisbet Harbour (near present-day Hopedale) but failed due to hostilities with the native peoples. Subsequently, three exploratory missions were made to the Labrador coast in the years 1764, 1765 and 1770. Then in August 1771 the Moravians established their first missionary post at Nain on the 100,000 acres of land that had been granted to

them by Commodore Hugh Palliser, the British Governor of Newfoundland. The missionaries continued to explore the Labrador coast in order to find suitable places for further mission stations. The station Okak (spelled 'Okkak' until 1854) was opened in 1776 and a third post at Hopedale (in German 'Hoffenthal' or 'Hoffental') in 1782. Nearly another 50 years passed before Hebron, north of Okak, was opened. Later on, further missionary stations were established at Zoar in 1865 (located between Nain and Hopedale), at Ramah in 1871, and at Makkovik in 1895, and finally at Killinek, near Cape Chudley (the northern tip of Labrador), in 1904.

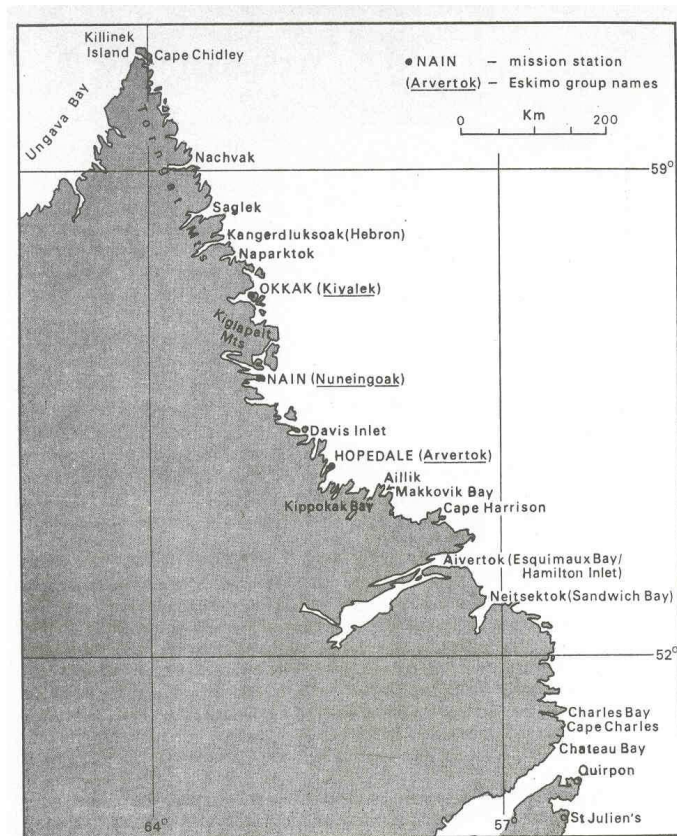


Figure 1. Geographical location of the Moravian stations in Labrador/Nunatsiavut (from Hiller, 1991).

Moravian missionary journals

In the late eighteenth century, and in the early part of the nineteenth, missionary journals (called *Missionsblätter* in German) began to be published. These journals mainly served as a communication between, on the one hand, the flock of the Moravian communities in Europe and, on the other, their sympathisers with the Missionary-families in the far-away mission stations. The journals had the primary purpose of informing the readers concerning the advances of the missionary work among the 'heathen'. The Moravian communities in Europe organized specific activities for the benefit of the missions and to support the overseas missionary work. The collected goods and funds were shipped with

the missionary vessel on its yearly journey to the Labrador coast. One drawback of the information from the missionary journals is that the voice of the native peoples of Labrador is very faint. Indeed their contributions, if present, are merely related to religious affairs and are, of course, filtered by the missionaries.

In general, the information in the journals was relatively broad and stress was laid upon the harsh conditions in which the missionaries had to work. For Labrador, this included information on the extreme climate and environment. Particular information on the so-called “externals” (in contrast to the “internals” or religious aspects) of the Inuit people was given. The well-being of the Inuit in the stations was an important element. This well-being could be challenged by the prevalence of diseases and epidemics and lack of foodstuffs which could potentially lead to famine. Therefore the fishing, hunting and seal-catching activities of the Inuit are considered of great importance and are described in detail. The interest of the general European public in the nineteenth century also included wider topics such as the state of the country, climate, weather, geography and environmental conditions, as very little information was available for Labrador.

The missionary diaries were brought to Europe by means of the Moravian vessel that visited the Labrador stations in the summer of each year. For this reason, the information is organised in “ship-years”. This means roughly July of one year to August or September of the next. The exact date on which this period began or ended was variable depending on many conditions, among them drift-ice and meteorological conditions encountered crossing the Atlantic Ocean.

The following missionary journals were consulted for climate-related information for the centennial period 1771-1880s:

- (a) Periodical Accounts related to the Missions of the Church of the United Brethren (1790-1889 and 1890-1930) at London, abbreviated as (P.A.);
- (b) Missions-Blatt aus der Brüdergemeine (1837-1939), at Herrnhut, Germany; abbreviated as (M.B.B.);
- (c) Nachrichten aus der Brüder-Gemeine (1817-1894) at Gnadau, Germany, abbreviated as (N.B.G.);
- (d) Calwer Missionsblatt (1828-1918) at Calw, Germany, abbreviated as (C.M.B.);
- (e) Journal de l'Unité des Frères (1835-1938) at different locations in French-speaking Switzerland, abbreviated as (J.U.F.).



Figure 2. The missionary ship ‘*The Harmony*’ in the harbor of Killinek, Labrador.

Instrumental Meteorological observations in Labrador

The climate-related documentary information in the sources described here complements the quite fragmented instrumental meteorological observations published in nineteenth scientific journals (see table 4 in Demarée and Ogilvie, 2009). These instrumental meteorological observations can be subdivided into 4 different time-spans:

(a) The earliest or the *Ancien Régime* observations.

These observations cover approximately the period 1771 to the late 1780s. Manuscripts of the observations are located at the Moravian Archives in Herrnhut and London, at the Archives of the Royal Society in London, or were in possession of Cleveland Abbe in the U.S.A. in 1873 (see Tables 1 and 2 in Demarée and Ogilvie, 2009). De la Trobe (1779/1781) published two extracts of meteorological observations at Nain and Okak in the *Philosophical Transactions of the Royal Society in London*. Another printed source is the extracts published in the ‘*Wittenbergsches Wochenblatt*’ by Johann Daniel Titius (Demarée, *et al.*, 1998 - see also Table 3 in Demarée and Ogilvie, 2009).

(b) The nineteenth-century observations and interactions with European scientists.

It is most probable that the instruments of the first time-span were still used in Labrador as individual readings appear in the missionary journals. Fragmented information was published in several scientific journals but, at present, no systematic records are available. For this time period collaboration with several European scientists, for

example, Alfred Gautier (1793-1881) in Geneva and Johan von Lamont (1805-1879) in Munich, was established through the channels of the Moravian communities in Europe.

(c) A third time-span corresponds with the establishing of a Meteorological Service of Canada in 1871 and the First International Polar Year 1882-1883. The German Polar Commission took advantage of the Moravian missions in Labrador and dispatched the physicist Dr. Karl Richard Koch (1852-1924) to instruct the missionaries on how to carry out quantitative meteorological observations. The observations were forwarded to, and partly published by the *Deutsche Seewarte* or the German Naval Observatory in Hamburg.

(d) In the prelude to the Second World War, for clear strategic reasons the Canadian authorities took over the meteorological observations. In this connection it is interesting to note that a German U-boat erected the fully automated weather station 'Kurt' in October 1943 close to Cape Chidley for the purpose of weather forecasting.

Climate-related information from the Moravian Missionary journals

The climate-related information from the Moravian missionary journals may be subdivided into different categories. Thus for example, it can take the form of: i) specific climatological information and information dealing with climate and climatic changes; ii) information on the occurrence of drift-ice during the annual travel of the missionary ship in the summer; iii) geophysical observations; iv) plant phenological observations in the mission-gardens; v) prevailing health conditions and the occurrence of epidemics and epizootics. In the following, a few examples of climate-related information will be shown illustrating the possibility of obtaining a more detailed picture of the weather and climate of the Labrador coast in the period 1771-1880s.

The climate of Labrador and climatological information

The missionary Johannes Körner at Hopedale, Labrador, writes on 1 September 1831 to a friend in Württemberg thanking him for the gifts that had been sent: "The dried plumbs that you have sent us two years ago have been very useful to us as our garden harvest turned out to be very meagre. The present year of 1831 won't become better as until now the summer has remained mostly cold, and heavy storms and frosts reigned in June and July. In May 1831, the snow still lay 10 feet thick in front of our house."

He continues giving a description of the Labrador climate and, as an example, the weather in the year 1790:

The cold in Labrador is very severe, more severe than in the more northerly situated Greenland. The rum freezes in the air like water; strong spirit becomes thick like oil. In the houses of the missionaries that are heated by means of large iron stoves, the windows and even the walls are covered with ice, so that the bedclothes freeze to the walls. On a journey in the month of February, the

eyelids of the Europeans dressed in furs froze together, so that they had to tear them apart, and had constantly to rub them so that they didn't close again. In the year 1790, the snow still lay in June, 20 feet thick, and it was only with great effort that there was success, after many attempts, in growing some garden fruits, sugar peas, beets and potatoes. In 1791, at the end of May the snow pack was still 10 feet thick and the missionaries sowed their garden on the 24th of June. Two days later everything was again covered with snow. The few summer months are sometimes warmer than at home in Germany. The air is then filled with insects whose bites often cause ulcers (C.M.B., 1831).

In 1830, the station of Hebron – then the most northerly station – was established. The missionary August Freitag describes its climate in private correspondence in 1833:

Hebron may be a very healthy place for young persons, blessed with sound constitutions, the air being clear, and unwholesome vapours unknown; but for persons advanced in life, or such as are hectic or consumptive, the climate is too severe, the atmosphere being too rare, and the cold much too intense. During the winter 1832-1833, the thermometer⁴ has been at -40°C . You speak of trees; but you are not to suppose that there are any to be seen in this neighbourhood. Even brush-wood is much less frequent on this part of the coast than in Greenland. Yet I have observed, here and there, a few birch and alder bushes, and willows of two kinds. The birch appears to thrive the least in the neighbourhood of the sea; it seldom attains the height of a foot; but the diminutive branches become so interwoven into one another, that it would be difficult for a bird to build her nest among them. The willows flourish best; some of them grow to the height of four or five feet. Mineral productions are not to be found in great variety (P.A., Vol. XII).

In the middle of October 1817 most of the Eskimos at the station of Okak returned from their outlying places, improved their winter dwellings, and moved into them in a hurry, as the cold increased so that the bays around us froze up before the end of the month. On the 30th October 1817, the ice was already so fast that the Eskimos could go to hunt on it without hesitation. But the seal catch with nets was unfortunately once more prevented by this early ice. In January 1818 the cold increased to -36°C and became more severe due to the strong westerly wind (N.B.G., 1820).

At the mission station Nain, the sea froze up on the 30th November 1844 and on 1st December, the cold rose to -30°C and in mid-January 1845 to -37°C . April 1845 was very sweet and warm for here, but in May and a part of June 1845 we had genuine winter. The snow was not significant; it had already thawed. On 30th June 1845 we had open water again. For seven full months we had not seen any other water than that which was carried into the kitchen. It is truly

⁴ All temperature observations expressed in degrees Fahrenheit or Réaumur in the missionary journals have been converted to Celsius by the authors.

refreshing to see the blue sea water again after such a long time (C.M.B., 1845).

At Nain, the winter, 1863-1864, was marked by an unusually scanty fall of snow. The bay was covered with ice at the end of November 1863, and the cold continued in an equal degree of severity during the following months, reaching its climax on 16th February when the thermometer showed -33.3°C. The month of May 1864 brought us a succession of fine warm days, which were followed by a return of the cold season in June. Since the ice left the bay, at the end of June, we have had some very warm summer weather. On the 29th June, the thermometer stood at 26.1°C. The season has been marked by drought in an unprecedented degree; our watercourse has been quite dry for a time, and the necessary supply of water, for all purposes, had to be fetched from the other side of the bay (P.A., Vol. XXV).

The missionary Carl Gottlieb Kretschmer wrote in a letter dated 4 June 1885 on the summer in Labrador and concurred hereby with the general belief in a colder climate in the northern regions:

The scientists have claimed that the North Pole gets colder and we are inclined to prove them right. Three weeks ago the winter came again. On the 9th May 1885, by a lot of effort we succeeded in putting some little plants in their beds but a cold of -8°C, accompanied by a glacial wind, has brought us snow and ice again. On the 1st of June, some good and warm sunshine caused our small stream to thaw and we hastened to plant our potatoes. Alas! *Ajornapok*, it is impossible. Today, it snows like in the month of December and all gardening work has stopped. Truly, we are in the country of the seals but not of gardening! Over the last 30 years we have never been so much delayed as this time. On the 9th of June 1885, we could finally plough. My colleague Haugk, equipped with warm fur gloves, has planted a few hundreds of potatoes. However, today everything is white from the snow that has fallen without interruption since yesterday evening! We are reduced again to useless laments. On the 28th June 1885, as the month of June approached its end, the calendar tells us that we are in the summer; we could have believed it yesterday, a pleasant day, 19.5°C warm, but today it is cold again. The mosquitoes, hardly appeared, were in haste to disappear. One needs to cover the potatoes in the night (J.U.F., 1887).

Occurrence of drift-ice on the Labrador coast

The occurrence of drift-ice along the Labrador coast was one of the main constraints regarding the safe arrival of the annual missionary vessel reaching the stations. The presence of the ice could make the journey dangerous and could potentially delay the arrival of the ships. The year 1816, known famously as 'the Year without Summer', is well-known for its vast amounts of drift-ice along the Labrador coast (Harington, 1992; Newell, 1992; Hill, 1999). It is generally agreed that the unusual cold and rainy climatic anomaly of this year occurred because of the highly explosive volcanic eruption of

Mount Tambora on the island of Sumbawa, Indonesia, on 5 April 1815. Furthermore, the year 1816 was in the middle of the Dalton period, a period of low solar activity.

However, the year before (1815) also presented severe drift-ice conditions: “On the 19th July 1815, the Lord unexpectedly led the missionary vessel *Jemima* hither in safety, through the drift-ice which had for a long time encircled our coast” (P.A., Vol. VI). It may be concluded that the set of the 3 consecutive years 1815, 1816 and 1817 are years of medium or high drift-ice conditions near the Labrador coast.

The recording of the complete absence of drift-ice is also of great interest climatically; “To our great delight no drift-ice was found. On the 30th of July 1842, in the early morning, we saw the first land, although it was very foggy, and in the evening we reached the entry to Hopedale” (C.M.B., 1852).

Brother Johannes Körner writes on his travel to Labrador: “On the 20th June 1829, we sailed from Stromness, Orkney Islands and had favourable wind and the best weather until 9th July when we caught sight of ice for the first time. On the 12th July the skipper took the courage to enter the ice, and to see if it was possible to advance. The ice in which we were seemed to be the Labrador ice as it wasn’t very thick and firm. On the 13th we saw an unbelievably large amount of ice around us. From the 14th till the 17th we passed partly in the ice, partly out of the ice. On the 17th, for the first time, we cast anchor to the ice for which one selects firm and large ice fields. Our ship occasionally suffered heavy pushes from the ice, and the sailors had a hard time for a few hours. On the 31st we neared our Hopedale while we had most to fight with the ice” (C.M.B., 1830).

In the biography of Brother August Freitag, the difficulties encountered with the drift-ice are remembered as follows: “On the 13th July 1831, on the moment we thought to be near the coast of Labrador, we met drift-ice that our sailors had already suspected because of the drop in temperature. The fog completely hid watch the horizon when the seamen on suddenly shouted “ice in front” and actually, through gaps in the fog, it didn’t take a long time to see rising above the water ice needles and peculiar forms. For a fortnight it was impossible to find a passage through the ice that was heaping up more and more. On the 24th July 1831, on a Sunday, there was a moment when we hoped we would be able to pass and we saw the coast, but an adverse wind, and the reappearing of the fog made this hope vanish rapidly. Finally, on the 28th July 1831, a favourable wind rose, the ice being split and having even disappeared. Finally on the 69th day of our journey we reached the harbour of Hebron” (J.U.F., 1868).

Geophysical information

In Iceland, the Lakagígar volcanic eruption, also named in Icelandic the Skaftáreldar, the River Skaftá Fires, one of the largest fissure eruptions to have occurred in historical times burst out at Whitsun, June 8th, 1783, and lasted till February 1784. The eruption was followed by the appearance of a fog over a large part of the Northern Hemisphere which was named the “Great Dry Fog” (Stothers, 1996; Demarée and Ogilvie, 2001). It was

known from Moravian sources of information that the missionaries in Labrador had observed a peat-smelling smoky atmosphere in July 1783. This information was published in the *Wittenbergisches Wochenblatt* by Johann Daniel Titius (Demarée, *et al.*, 1998). The daily weather observations carried out by the Moravian missionaries at the three stations in Labrador in the early period and located at the Archives of the Royal Society, London, (see Demarée and Ogilvie, 2009, Table 2) mention this fog as follows:

Nain: This month of July 1783, I observed something that I never observed before, *vz.* that the whole air looked like as if it was filled with smoke or a thin fog. This kind of weather I will call smoky. The Sun never shone clearly enough⁵ that one could candle a pipe by it. The 2nd of July 1783 was observed as smoky, the 4th, 5th, 7th, 10th, and 11th as misty, the 3rd, 12th, 13th and 14th was observed a 'miste', the 16th as hazy, on the 17th, 21st and 22nd a haze was observed and from the 23rd to the 31st of July 1783 the condition is described as 'quite thick smoky'.

Okkak: Thursday 3 July 1783 "For several days thick smook fly throw the Air as from a great fire we so hope the Ukas [?] set some great woods on fire. They do so sometimes."

July 22, 23, 24, 25 and 26: "Smoke and Sun Shine"

July 29: "The Air full of smoke for 5 weeks past."

July 31: "Thick smoke and Sun Shine"

Hoffenthal: June 1783: "Great fog sequence"

23 June: "very much mist"

28 June: "much mist. A little sunshine through the mist"

10 July: "Clear sunshine, no clouds, but much smook on the land, a very high sea, much cloudy."

11 July: "small rain and mist on the hills"

Similar appearances were observed in July 1821 but cannot be ascribed to a known historical volcano eruption (Simkin and Siebert, 1994). In this context it is of interest to note that the last eruption of the Eyjafjallajökull in Iceland, before the one of 2010, started in December 1821 and lasted till January 1823. Regarding the year 1821 an account from Nain reads: "About the middle of July 1821, a dark, smoky vapor, and something like ashes, filled the atmosphere." (P.A., Vol. VIII)

Also, from Okak:

In the night of the 1st of July, 1821, it froze so strongly at Okak that in many places the ice was half an inch thick as a result of which the plants in the garden, in particular the potatoes, suffered much. On the contrary, on the 6th, it was 10° to 19°C. The air was very hazy and smelled like peat. On the next day, the *Höhenrauch* became so thick that we had to put the light on in the room at half past seven. This darkness lasted for 2 hours. As we had no calendar we didn't

⁵ The original text from the manuscripts at the Archive of the Royal Society is kept.

know if on that day there was a solar eclipse.⁶ (N.B.G., 1822).

As noted, it is not possible at present, to ascribe an historical volcano eruption for these observations. However, the use of the German term *Höhenrauch* may refer to the Great Dry Fog of the year 1783 or to *Moorrauch* or *Moordampf* (Finke, 1820) in the first quarter of the nineteenth century in Lower Germany (a phenomenon witnessed and related to peat-burning in the areas of Westphalia). It is also possible that large area inland fires were responsible.

As regards a “cold fog” mentioned in Labrador in 1884 it may be questioned as to whether this was due to the eruption of the volcano Krakatau, Indonesia, on 27 August 1883. “The winter 1883-1884 has been very severe in Labrador. One had hoped for a nice summer in 1884 but a cold fog has enveloped the coast almost daily” (J.U.F., 1884).

The Labrador missionaries (as well as their Greenland colleagues) also observed a few earthquakes in their missionary posts. From Nain, 12 August 1809 an account reads: “On January 21st, 1809, and for some days after, we perceived some shocks of earthquakes, which seemed to be felt, as far as we could learn, all down the coast” (P.A., Vol. IV). Also, “On the 2nd of June 1838, an earthquake was felt at Nain and strongly shook the house of the missionaries without, however, damaging it” (J.U.F., 1839).

A list of the earthquakes mentioned in the missionary journal is given in Table 1.

Date	Station(s)	Source(s)	Brief Description
21 Jan. 1809	Nain	P.A., IV	Some shocks of earthquakes felt all down the coast
30 Nov. 1836	Hopedale, Nain,	P.A., XIV N.B.G., XX.	Smart shock of an earthquake Strong noise of the air with strong movement of the earth
2 June 1838	Nain ⁷	J.U.F., 1839 N.B.G., 22.	Earthquake, strongly shook the house Earthquake making to move the house
26 May 1839	Nain	P.A., XV	Slight shock of an earthquake Plates reared against wall - vibration
12 Jan. 1857	Okak, Hebron	P.A., XXII	Earthquake felt by the Esquimaux Smart shock of earthquake felt by the Esquimaux

Table 1. List of earthquakes observed in Labrador at the stations of the Moravian Brethren in the time frame 1770 – 1880.

This list completes the work carried out by Adams and Staveley (1985) and Staveley *et al.* (1986). Indeed the two earthquakes of 2 June 1838, and 26 May 1839, the first one

⁶ A central two limits solar eclipse was visible in Labrador on Aug 27, 1821 (see: NASA Eclipse Web Site, Five Millennium Canon of Solar Eclipses by Espenak and Meeus).

⁷ See also the earthquake of the San Francisco Peninsula, California, in June 1838, given a magnitude of 6.8, and the Southern Illinois earthquake on June 9, 1838.

referenced in the continental missionary journals and the second one from the P.A., Vol. XV, complete the picture.

Plant phenological observations

The German missionaries in Labrador almost certainly had some experience of plant cultivation, coming as they did from areas with an agricultural tradition. Certainly, their garden produce was a first-hand necessity for surviving the long winter. They attributed the absence of scurvy in the missionary family to the consumption in the winter of vegetables from their gardens. The severe climatic conditions of Labrador are the factors which constrain the produce of the missionary gardens, indeed spring and summer weather conditions are conditional for the raising of good garden produce.

When founding a new station like that of Hebron in 1830, the missionaries spent considerable manpower in preparing the garden: "My colleague, Brother Freytag, and myself [Ferdinand Kruth] had much pleasure in the spring of this year, in the laying out of a garden, which we have called Elim⁸. It is situated on the margin of our rivulet called the *Neiss*⁹, and is surrounded by a wooden paling. Although our Elim cannot boast of any palm-trees, it stands like an Eden¹⁰, in the midst of the rugged vale; and every time that we have wandered forth to it during the summer evenings, to enjoy a social cup of coffee or tea, we have admired it afresh, and felt thankful to the Giver of all Good for this pleasant retreat." (P.A., Vol. XIII).

Early botanical material provided by the missionaries Benjamin Gottlieb Kohlmeister (1756–1844) and Johann Georg Herzberg (1792–1864) was published by Pursh (1814) and by Ernst Heinrich Friedrich Meyer (1791-1858) (Meyer, 1830). Ritter von Schranck described a few plants from Labrador while meanwhile von Schreber, President of the Royal Bavarian Botanical Society in Regensburg also received a parcel from "a certain Kohlmeister" with plants from Labrador (von Schranck, 1818). The missionary Carl Gottfried Albrecht (1800-1888) was in contact with the botanist Ernst Gottlieb von Steudel (1783-1856) who lived in Esslingen, Baden-Württemberg. Albrecht forwarded to him botanical material from Hopedale between 1846 and 1848 (Cayouette & Darbyshire, 1994).

Botanical knowledge of the missionaries was part of a three-partner process involving the

⁸ Elim was one of the places where the Israelites camped following their Exodus from Egypt. It is referenced in Exodus 15.27 and Numbers 33.9 as a place where "there were twelve wells of water, and seventy date palms," and that the Israelites "camped there near the water".

⁹ The (Lusatian) Neisse is a river in the Czech Republic and along the Polish-German border, in total 252 km long. It is a left tributary of the Oder River.

¹⁰ The Garden of Eden is described in the Book of Genesis as being the place where the first man, Adam, and his wife, Eve, lived after they were created by God. Literally, the Bible speaks about a garden *in* Eden (Gen. 2:8).

Labrador Inuits, the missionaries and the botanical networks in Europe. On the one hand, the agricultural craftsmanship may have impressed the natives and contributed to their conversion while on the other hand ties with natural history networks in their homelands Saxony, Bavaria and Baden-Württemberg may have provided institutional and political supports to the mission (Bravo, 2007). It lasted time before the Inuit took over the agricultural habits of cultivating a garden: “We rejoiced to see, that our Esquimaux are more and more disposed to lay out gardens, and attend to their cultivation.” (P.A., Vol. XV, 1839). The Moravian Bishop Levin Theodore Reichel (1812-1878) provides, after his visitation in the year 1861, a list of 170 plants of Labrador which were known to the missionaries (Reichel, 1863).

The harvest of the missionary gardens was carried out in September or early October generally after the missionary ship had already left the stations. Therefore the reports on the harvest and the missionary gardens refer to the past ship-year.

In the beginning of October 1818 we were occupied at Okak to collect our garden fruits which, beyond expectations, turned out well. This was particularly the case with the potatoes, which could remain in the ground four months and didn't suffer once in that time at the leaves from the frost, a rare example here (N.B.G., 1820).

The whole spring was cold; and the whole May of 1836 through was like a real winter, only a few days with thaws. June had snow and fog, July rain and fog; only with August did summer weather come so that also the trees became green. The state of the gardens is very regrettable which is no wonder (C.M.B., 1836).

The winter 1856-1857 was not cold, only once did the thermometer go as low as -33°C, but was full of snow, and the spring wet, and this humid weather continued till the beginning of July 1857, since when we only had warm weather so that we may expect a good harvest in the garden (M.B.G., 1858).

Epidemics and epizootics

The Labrador Inuit did not have natural immunity to the typical illnesses prevalent in Europe so that in cases of prevailing epidemics a part of the population invariably died. In general, according to the Missionaries' view, the origin of the disease was said to be brought from the Southlanders and then spread by Inuit from station to station.

At Hopedale, in the autumn of 1806, after the Esquimaux had removed into their winter-houses, a malignant disorder broke out amongst them, resembling both the small-pox and the measles, which caused to some much and to others less pain and suffering. Old Thomas, formerly known by the name of Kapik, was most severely attacked by it, as the eruption in his face struck inward, and

turned into a kind of scrofula¹¹, by which one of his upper jaw-bones was eaten away. (P.A., Vol. IV)

“On the 21st August 1821, on the *Clinker* sloop of war Captain William Martin arrived at Nain, from Okak. The benevolent captain offered to have the Esquimaux children inoculated with the cow-pox, but we had several reasons for declining his kind offer” (P.A., Vol. VIII). Smallpox was brought to Canada in the 17th century and because the natives were totally devoid of immunity, they were ravaged by smallpox (see e.g. Fenn, 2001). Edward Jenner’s (1749-1823) experiments in 1796, inoculation against smallpox had become a popular preventive method in Europe. Vaccination – a more effective and less dangerous technique - was introduced into North America by the Reverend John Clinch (1748/49-1819). Clinch was a medical missionary for the Church of England at Trinity, then the second largest settlement in Newfoundland and had been a classmate of Edward Jenner. However, the widespread use of vaccination, advocated by public-health leaders met with much resistance by anti-vaccinationists. Nevertheless many colonists and American natives became vaccinated. It is not mentioned why the Moravian missionaries objected to the suggestion of the inoculation of the Inuit children.

In the month of September 1827, an infectious epidemic arose among our Eskimos. This illness started with a violent catarrh that attacked the breast and mainly the neck, and which caused much suffocation. One noticed moreover several symptoms of putrid fever. The number of ill persons increased so much that we feared to run out of medicines. Our hall was full of Eskimos who came, evening and morning, to look for medicines. At the end of the month, the number of ill persons increased to 175. It pleased God to call to him by these illness six adults and six children in the time of one month (Extraits des Journaux de l’Église de l’Unité des Frères, 1837).

The feelings of solemnity were kept alive and intensified throughout the months of February and March 1864, by the prevalence of sickness with a degree of mortality, which has never been known before at this place. An epidemic, which at first appeared nothing worse than an ordinary catarrh, assumed an inflammatory character, fixing itself on the chest and lungs; it spread to such an extent, that not a single individual of the community remained unaffected by it. The circumstance that so many were attacked at the same time increased the general distress, as the possibility of rendering mutual assistance was greatly diminished, and there were none left to provide the needful supply of food and fuel. All day long our Mission-house was never without some person or persons who came for medicine or food, themselves often so ill that no doctor would have sanctioned their leaving their beds. But the missionary brethren were themselves suffering from symptoms of the same disease, so that it was for a time impossible to visit the huts of the poor Esquimaux; we did all that lay in our power to supply the poor people with soup and dried fruit, as well as medicine. In spite of all our endeavours, the disease, favoured by the poverty

¹¹ Scrofula is any one of a variety of skin diseases; in particular, a form of tuberculosis, affecting the lymph nodes of the neck.

and want of proper attention and accommodation on the part of the natives, proved fatal in many cases. In the short space of a month twenty-one persons died, of whom one-third were children. On March 8th, 1864, fifteen corpses were buried at the same time (P.A., Vol. XXV).

Okak, September 8th, 1869: “The epidemic [summer and autumn of 1868] had scarcely left us, when another made its appearance among the children, which proved fatal in several instances. Of those who were not carried off by its attacks, not a few remained partially lame in the lower extremities; some recovered sufficiently to be able to walk about, others continued incapable of walking or standing and we entertain little hope of their eventual recovery. The brother on whom the duty of doctor devolved had a heavy time of it, as he had continually to visit the sick, or give medicine to the poor people who crowded our mission-house” (P.A., Vol. XXVII).

The Brethren & Sisters Schött, Schneider and Dam from Okak, Report from the mission conference, 8th September 1869: “At the departure of the ship *Harmony* last year still raged here an infectious disease, yes it was still rising and brought us with the poor staff of our station many serious difficulties. Hardly was this illness decreasing or an epidemic broke out among the children by which the entire number of them was seized. When some deaths followed, the Eskimos and we became really scared. But the Lord heard our sighs and begging and made the fast dying stop. With many patients it took a long time before they recovered, some of them have such a slackness of the limbs so that up to now they cannot use them completely, and several remained even completely lame. In the course of the year again 30 deaths happened” (M.B.B., 1870, p. 7-10).

According to these descriptions, the epidemics might have been Poliomyelitis (polio) or Infantile Paralysis. This illness was first described by the German physician Jacob Heine (1800-1879) in 1840 while its epidemic character was recognized by the Swedish physician Karl Oskar Medin (1847-1927). This illness remained endemic until the 1880s when localized major epidemics started to occur in Europe, notably in Sweden, Norway, Germany, Lower Austria and Vienna, Northern Italy, France, and in London and Saint Petersburg (MacMurchy, 1912). In the U.S. epidemics began to occur like in Vermont with 132 cases and 18 deaths, and approximately 2500 cases and 125 deaths in New York in 1907. In June 1916, a large epidemic broke out with over 27000 cases and 6000 deaths in the United States, with over 2000 deaths in New York City alone. From 1916 onward, a polio epidemic appeared each summer in at least one part of the United States (MacMurchy, 1912; Trevelyan, Smallman-Raynor and Cliff, 2005). The situation of poliomyelitis in Canada was similar to the one in the United States (Barreto, Van Exan & Ruddy, 2006). If the epidemics that occurred in 1868-1869 along the Labrador coast could be truly interpreted as poliomyelitis, it would be one of the very early outbreaks of the illness in Canada, and in the New World.

Also epidemic diseases or epizootics were witnessed among the sledge-dogs of the Inuit.

Later, a severe and maybe a never at this level seen disaster was endured by our poor Eskimos, by which in February an epizootic among the dogs broke out, by which little by little more than 100 animals were taken away. Also 20 dogs belonging to the mission were killed by this epizootic. This is a great loss for those poor Eskimos in the long wintertime. (M.B.B., 1860)

Conclusions

The continental and English missionary journals of the Moravian Brethren contain a wealth of climate-related information on Labrador/Nunatsiavut. A brief selection of the descriptions of weather and climate together with the impacts on the native Inuit, the Inuit Society and the missionary families is given for the centennial period 1771-1880s. This information, combined with the extant early quantitative climatological records (see Demarée and Ogilvie, 2009) provides an excellent overview of Labrador's climate and environment.

In particular, the statements on the occurrence of drift-ice along the Labrador coast and the narratives of the difficulties of the mission-ships to reach the harbors of the mission posts are good indicators of the climatic evolution in the given time frame. The set of the 3 consecutive years 1815, 1816 (= the Year without Summer) and 1817 are years of medium or high drift-ice conditions near the Labrador coast. The climate picture is completed by descriptions of the winter climate as experienced by the missionary families. Furthermore, the produce of the missionary gardens which is essential for their survival under the harsh climatic conditions is heavily depending on weather and climate.

Geophysical phenomena are particularly stressed as information concerning earthquakes and volcano eruptions experienced by the missionaries in that remote location fully help to document the worldwide geophysical history. In that context, two hereto unknown earthquakes - 2 June 1838 and 26 May 1839 – are listed and complete the knowledge on historical seismicity of Labrador. The observation in the three missionary posts of the 'dry fog' weather conditions due to the Icelandic Lakagígar volcano eruption of 1783-1784 yields further evidence the Northern Hemispheric coverage of the event.

It is shown that the Moravian missionaries adopted the attitude of anti-vaccinationists at the occasion of the visit of the '*Clinker*' in 1829. It is further hypothesized that the descriptions of the epidemics occurring at the missionary station of Okak in 1868-1869 might be a very early outbreak of Poliomyelitis (Polio) or Infantile Paralysis in Canada. This would possibly complete the polio epidemics history in Canada.

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