

Escape from Nova Zembla Island and Dating the Dutch-Drake *La Heroike Interprinse*. . . Map

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RÉSUMÉ

« Nova Zembla » (Nouvelle-Zemble) est une île étroite et haute du nord de la Russie, située au-dessus du cercle polaire arctique. Cet article porte sur des cartes publiées de 1562 à 1650, qui décrivent Nova Zembla et la région géographique autour. De 1562 à 1592, toutes les cartes épèlent ainsi « Nova Zemla » et la représentent soit comme l'une des immenses îles circum-polaires, soit comme une péninsule de l'une de ces îles. Par la suite, certaines cartes utilisent la graphie « Zemla » et d'autres, la graphie « Zembla », mais presque toutes la représentent comme une île. Cet article traite des explorateurs qui ont navigué près de Nova Zembla dans la seconde moitié du XVI^e siècle et de la manière dont ils ont créé l'histoire de ce nom signifiant « nouvelle terre ». Il montre que l'évolution de l'orthographe et de la forme de Nova Zembla correspond au modèle de l'équilibre ponctué de l'évolution paléontologique. À l'aide de cartes sur lesquelles figure Nova Zembla, l'article montre que la carte hollandaise de Drake « La Heroike Interprinse. . . » a été réalisée dans la dernière décennie du XVI^e siècle, probablement vers 1594.

Mots-clés : cartes du XVI^e siècle, cercle polaire, Guillaume Barents, l'équilibre ponctué, Mer Arctique, Monsieur Francis Drake, Pôle Nord, région polaire, toponymes

ABSTRACT

Nova Zembla is a tall, skinny island north of Russia above the Arctic Circle. This article is about the maps that describe Nova Zembla and the geographical region surrounding it that were published from 1562 to 1650. From 1562 until 1592, all maps spelled it "Nova Zemla" and drew it either as one of the giant circumpolar islands or as a peninsula of one. Thereafter, some maps used "Zemla," and some used "Zembla," but almost all maps represented it as an independent island. This article discusses the explorers who sailed near Nova Zembla in the last half of the sixteenth century and how they created the history of the name Nova Zembla. The evolution of the spelling and shape of Nova Zembla is analogous to *punctuated equilibria* in paleontological evolution. Using maps containing Nova Zembla, this article shows that the Dutch-Drake *La Heroike Interprinse*. . . map was made in the last decade of the sixteenth century, probably around 1594.

Keywords: Arctic Circle, Arctic Sea, Willem Barents, Sir Francis Drake, North Pole, polar region, punctuated equilibrium, sixteenth-century maps, toponyms

Introduction

Nóvaja Zemljá (71°–77° N latitude and 52°–68° E longitude) is a tall, skinny island above the Arctic Circle north of Russia. It was explored by Willem Barents and his Dutch crews in 1594, 1595, and 1596–97. On their third expedition, their ship got trapped in the ice. They used driftwood and planks from their ship to build a cabin where they survived the winter. They had to avoid being eaten by polar bears and freezing to death where there was no sunshine for two months and the winter temperature averaged –13 °F (–25 °C). This harrowing adventure was

the subject of the film *Nova Zembla* (Oerlemans 2011) and several books (Campe 1821; De Veer [1609] 1853; Tollens [1819] 1884). However, these publications were about Barents and his crew wintering over on Nova Zembla. That is not what this article is about. This article is about maps published from 1562 to 1650 that encompass Nova Zembla and the geographical region surrounding it.

In [Figure 1](#), the jagged yellow lines are modern country borders. In this composite image, the sea around Nova Zembla is ice-free: however, in the winter, the Kara Sea is usually covered with ice. The ice is missing in this figure because Google Earth removes all ice floating on water.

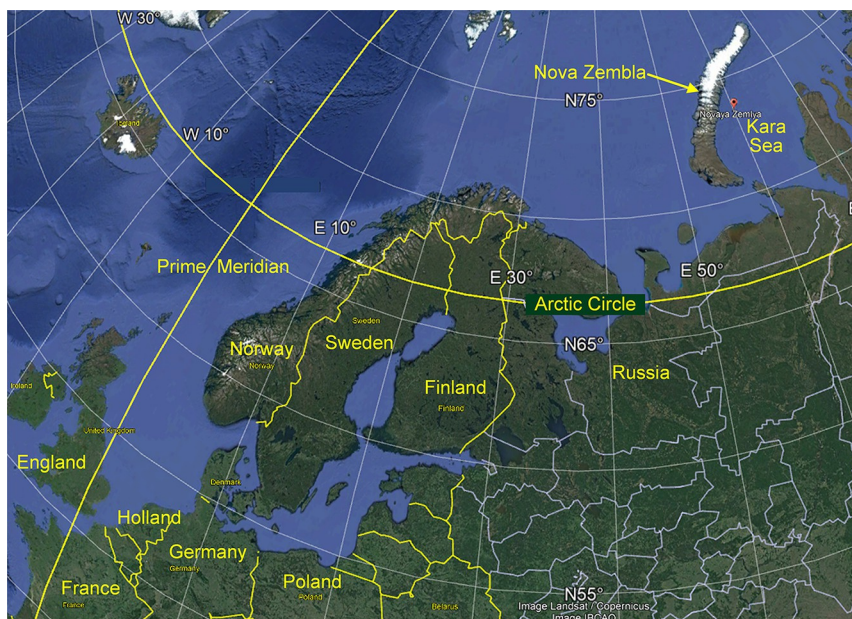


Figure 1. Nova Zembla and the geographical region surrounding it. This map was made with Google Earth, which uses an in-house, nonstandard map projection
 Source: Google Earth with author contributions.

Furthermore, the oceans are not satellite photographs. They are composite models.

To the Reader

This article has the following purposes:

- Describe Nova Zembla island and the geographic region around it
- Show the evolution of maps covering this area in the last decades of the sixteenth century and the first decades of the seventeenth century
- Show when the words *Nova Zemla* and *Nova Zembla* were first used on published maps
- Show when the description of Nova Zembla changed from a giant circumpolar island to a peninsula of a circumpolar island to a discrete independent island
- Show that research like this can be done strictly by looking at maps that are available on the internet. Long visits to libraries are no longer necessary.
- Show examples of punctuated equilibria in evolution
- Date the Dutch-Drake *La Heroike Interprinse . . .* map

Methods

This article analyses the relationships between late sixteenth-century and early seventeenth-century maps that show Nova Zembla Island. It is based on information

shown on these maps. For a historical description of Nova Zembla, watch the movie *Nova Zembla* (Oerlemans 2011) and read the books by De Veer ([1609] 1853) and Tollens ([1819] 1884).

When available, the date printed on the map is given. Otherwise, the date assigned by the map owner or other authority is given.

First, we studied large collections of maps such as those by Moreland and Bannister (1994) and Shirley (1983). Then we used the internet and examined more than 2000 late sixteenth- and early seventeenth-century physical maps. We downloaded 500 of these maps and studied them in detail. The most relevant 180 are described in our database, which is located at <http://sysengr.engr.arizona.edu/URLsForSixteenthCenturyMaps.xlsx>. Tables A.1 and A.2 in Appendix 2 list about 150 maps containing Nova Zemla or Nova Zembla. This article is based on studies of those maps.

Maps Containing Nova Zembla Island

This section presents eight maps of Nova Zembla island¹ and its surrounding region. It shows two spellings, Nova Zemla and Nova Zembla. It shows the different geographical shapes of Nova Zembla. It shows maps made by Barents and his crew members and maps made by famous sixteenth-century cartographers. It shows different map projections that are used to emphasize different features. These map projections show the same geography but from different viewpoints.

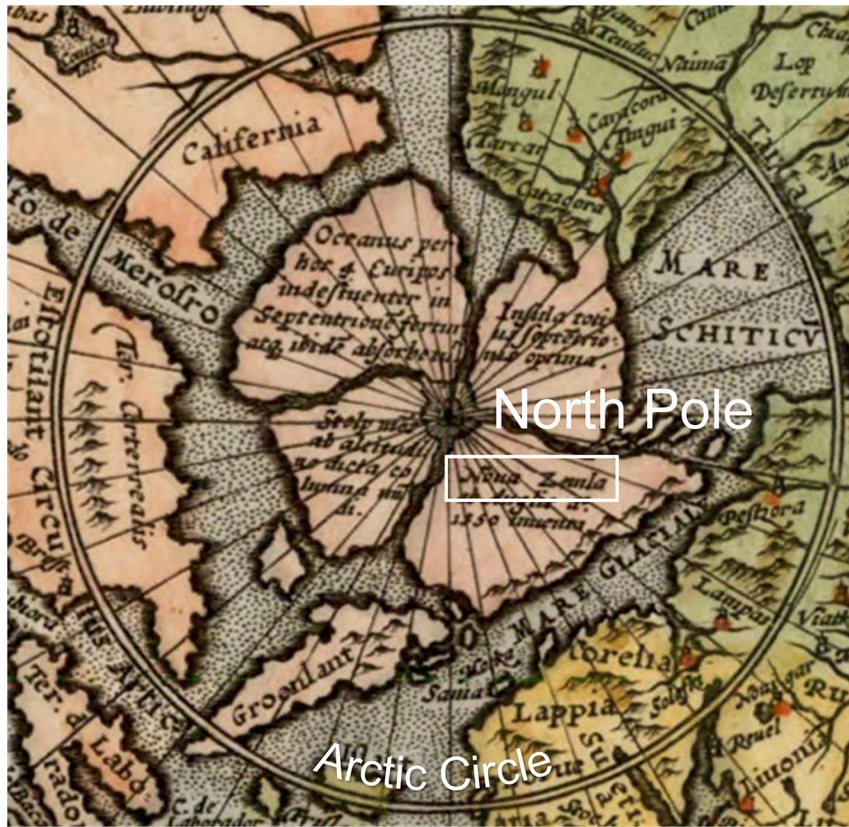


Figure 2. Nova Zembla represented as one of the four imaginary circumpolar islands. This is part of De Jode's 1593 *Hemispheriu ab Aequinoctiali Linea . . .* map of the north polar region inside the Arctic Circle. This is a polar azimuthal map projection.²
 Source: The Barry Lawrence Ruderman Map Collection, Stanford University Libraries.



Figure 3. Nova Zembla is shown as one of the four giant circumpolar islands. This is part of Ortelius's 1570 *Typus Orbis Terrarum* map. This map uses an Ortelius oval map projection.
 Source: Library of Congress (<https://www.loc.gov/resource/g3200m.gct00126/?sp=12&tr=-0.069,0.079,1.064,0.523,0>)

https://www.utpjournals.press/doi/pdf/10.3138/cart-2023-0011 - Friday, May 31, 2024 9:58:44 AM - IP Address:2601:500:8682:bc30:cdf1:c87e:287b:7009



Figure 4. Nova Zembla is shown as a peninsula of one of the four giant circumpolar islands. However, in another part of this map (not shown), Nova Zembla is clearly shown as an island. This is part of Plancius's 1594 *Europam ab Asia Et Africa segregant* map. The complete map has latitude scales along the sides. Therefore, this is part of an equirectangular portolan latitude chart map projection.

Source: Stanford University Libraries (<https://purl.stanford.edu/mk700zr3337>)



Figure 5. Nova Zembla shown as an island. This is a part of Hulsius's 1604 *Nova Zembla* map of Barents's second expedition of 1595 (determined by the home ports of the ships). The numbers in Traenbay indicate the depth of the water in fathoms. This is probably an equirectangular map projection.

Source: Renaissance Exploration Map Collection, Stanford University Libraries (<https://purl.stanford.edu/bg998pc2340>)

The figures in this section are *not* arranged in chronological order because this is not a *history* article. Figures 2 to 9 are arranged to show both (1) maps with the two different spellings, Zembla and Zemla, and (2) the different geographical representations of Nova Zembla: one of the four big circumpolar islands, a peninsula of

one of these circumpolar islands, and a discrete island. Figures 6, 7, 8, 9, and 13 show maps made by cartographers who were crew members of Barents's expeditions. The probable first use of the name *Nova Zemla* on a published map is on the map of Anthony Jenkinson titled *Nova absolutaque Russiae, Moscoviae et Tartariae, descriptio* and



Figure 6. Nova Zemla shown as an island. This is part of Plancius and Van Linschoten's 1596 *Orbis terrae compendiosa descriptio* . . . map, which uses a Mercator double-hemisphere stereographic map projection.

Source: John Carter Brown Library (<https://jcb.lunaimaging.com/luna/servlet/s/bi59gy>).



Figure 7. Nova Zemla shown as an island. This part of Barents's 1598 *Deliniatio Cartae Trium Navigationum* map that uses the spelling of Nova Zembla and draws it as an island. The parallel dotted lines represent the path of the 1596 voyage. This is a polar azimuthal equidistant map projection.

Source: The Barry Lawrence Ruderman Map Collection, Stanford University Libraries (<https://purl.stanford.edu/cg291cc8928>).

dated 1562 (Szykua 2012). This map was included in Ortelius's 1570 *Atlas Theatrum Orbis Terrarum*. It was followed a couple of years later by Abraham Ortelius's 1564 *Nova Totius Terrarum Orbis iuxta* and then by Gerard Mercator's 1569 *Nova et Aucta Orbis Terrae descriptio ad Usus Navigantium Emendate Accommodata* and Ortelius's 1570 *Typus Orbis Terrarum*. In this article, URLs for maps given without references can be found at <http://sysengr.engr.arizona.edu/URLsForSixteenthCenturyMaps.xlsx>. We found more than seven dozen maps published in the succeeding eighty years that contained the name Nova Zemla. See Appendix 2, Table A.1. All the relevant maps made up to

1592 had this label on one of the four giant islands thought to surround the north pole, as shown in Figure 2.

Tables A.1 and A.2 in Appendix 2 list maps that contain the names Nova Zemla and Nova Zembla, respectively. The right columns of these tables describe the geographical representations of Nova Zemla or Zembla as being either one of the four big circumpolar islands, a peninsula of a circumpolar island, or a discrete island.

Many sixteenth-century maps show the north pole surrounded by four giant circumpolar islands. Nova Zemla is often portrayed as one of these circumpolar islands, as in Figure 2. With other map projections, Nova Zemla is



Figure 8. Nova Zembla is an island on De Veer's 1601 *Tabula terrae Novae Zemblaë* map. It shows their escape route of 1597. The latitude scale on the left side and the horizontal distance scale with calipers are both linear indicating an equirectangular map projection, and there are interconnected compass roses. Therefore, this is an equirectangular portolan latitude chart. Source: National Library of Norway (https://urn.nb.no/URN:NBN:no-nb_digibok_2019080528003).



Figure 9. Van Linschoten's 1601 *Linschotens nordenkart* map. This is an equirectangular portolan latitude chart as indicated by the interlocking compass roses and the linear latitude scales on the sides. Source: National Library of Norway (https://www.flickr.com/photos/national_library_of_norway/12067624705/).

represented as a southern peninsula of one of these circumpolar islands; see Figures 3, 4, and 12. In all these cases, there is a large area of open ocean *south* of Nova Zembla. Later, Nova Zembla began to be represented as a discrete island just north of Russia. In this case, there is a large area of open ocean *north* of Nova Zembla; see Figures 6 to 8. Sometimes, it was difficult to determine if the cartographer intended to represent Nova Zembla as a peninsula of one of the circumpolar islands or as a big independent island, as shown in Figure 4. This confusion is caused by showing only the bottom part of Nova Zembla, a lack of accurate scales, the lack of an eastern boundary of Nova Zembla, and the lack of an open ocean above or below Nova Zembla. Maps that were made by Barents and members of his expeditions represented Nova Zembla as undoubtedly an independent island, Figures 6, 7, 8, 9, and 13. After the voyages of Barents became well known, virtually all maps represented Nova Zembla as an island just north of Russia.

From 1562 to 1594, Nova Zembla was often drawn along the top edge of the maps. Therefore, there was not enough room to draw all of Nova Zembla. So only the bottom part of the island was shown, as in Figure 4. A dozen other maps from the 1590s look like this. With only this information, it is not possible to guess the cartographers' intentions. Were they trying to show a small discrete island just north of Russia or the bottom of a large peninsula stretching all the way from a circumpolar island? The criteria we used to distinguish between a peninsula and an island were the size of Nova Zembla on the map, the presence of an open ocean north of Nova Zembla, the presence of a strait south of Nova Zembla, and the presence of toponyms on the northwestern side of Nova Zembla. For example, on the Plancius 1592 *Nova Et Exact Terrarum . . .* map, Nova Zembla is called part of a circumpolar island because there is no open ocean above it. Whereas on the Plancius 1594 *Europe & Asia* map the inset in the upper-right corner shows Nova Zembla as an island but the main map (Figure 4) shows it as a peninsula. Finally, on the Plancius 1594 *Opus Terrarum Typus de Integro . . .* map, there is open ocean above and a narrow strait below Nova Zembla; therefore, it is called an island. Consequently, we cannot state unequivocally whether, in the early 1590s, Plancius thought that Nova Zembla was an island or a peninsula or that he changed his mind. Accordingly, for Tables 1, A.1, and A.2, we marked with an asterisk (*) maps for which our assignment to island versus peninsula was difficult or equivocal.³

The Samiûten (Samoyed) people live in northern Russia below Nova Zembla. People shown living on Nova Zembla in Figure 5 are whimsical.

Van Linschoten was supercargo⁴ of ships on the 1594 and 1595 expeditions. Anyone who was on one of the Barents's voyages knew that Nova Zembla was an island with open

ocean above it. The open ocean above was the defining distinction. Figure 6 is the first map to show Nova Zembla as a discrete island unattached to the four giant circumpolar islands.

The simple double line at 66.6° N latitude is the Arctic Circle. The thick curved and dashed line circling the bottom is the engraver's mistake. This is the first of our maps to omit the imaginary circumpolar islands surrounding the north pole. This figure shows the east coast of Nova Zembla as completely unknown. It was not explored for another 300 years.

Willem Barents led voyages of discovery for Dutch merchants to Nova Zembla in 1594, 1595, and 1596–97. He wrote notes and drew a manuscript map while they wintered over on Nova Zembla. A manuscript map is a singular hand-drawn map that was not mass-produced. Barents's manuscript map was used by Baptiste Van Deutecum in 1598 to engrave copper plates and publish the map of Figure 7.

De Veer was a crew member on the 1595 and 1596–97 expeditions. The parallel dotted lines represent the 1597 return voyage of the third expedition (Figure 8). The eastern shore of the island is not shown here because no one had ever been there. The icons on the northeast corner of Nova Zembla indicate the cabin where they lived for nine months (76.25° N, 68.25° E) and their ship that was trapped in the ice.

Van Linschoten was a member of the 1594 and 1595 expeditions. This map is based on his notes from the first expedition (Figure 9). The dotted lines, mostly along the coast, represent their path on the 1594 outgoing and return voyages. The bottom part of Nova Zembla is labeled *Vaigatz*. The words *Nova Zembla* are in the bottom cartouche. Our translation of the bottom cartouche on the Jan Huygen van Linschoten 1601 map.⁵

True image and form of the Samoyeds, living on Nova Zembla, Waygats and the land south of Strait Nassau, namely from Pitzora to beyond the River Ob and they are riding with their sleds pulled by tame reindeer and also the form of their idols or wooden statues so as they are on many corners and cliffs in large numbers, as discovered and seen on [Barents's] first voyage in the year 1594.

See Appendix 1 for a discussion of translating old maps written in Latin.

Map projections. Figures 1 to 9 show roughly the same portion of the globe with similar distance scales. However, they look quite different because they use different map projections. Figure 1 uses the Google Earth map projection. We chose it because of its convenience and familiarity. Figure 2 uses a polar azimuthal map projection. De Jode probably chose it so that he could get all four

Table 1. Significant firsts in the history of Nova Zembla maps

Year of Publication	Cartographer and map name	Shirley (1983) entry number	Comment or Spelling	Geographical representation
1562	Anthony Jenkinson, <i>Nova absolutaque Russiae, Moscoviae et Tartariae, descriptio</i>		The first use of the name Novo Zemla on a published map	Peninsula*
1564	Abraham Ortelius, <i>Nova Totius Terrarum Orbis iuxta</i>	114	Second labelling of Nova Zemla on a map	Peninsula
1569	Gerard Mercator, <i>Nova et Aucta Orbis Terrae descriptio ad Usum Navigantium Emendate Accommodata</i>	119	Nova Zemla	Peninsula
1570	Abraham Ortelius, <i>Typus Orbis Terrarum</i>	122	Nova Zemla	Peninsula
1584	Abraham Ortelius, <i>Europe</i>		Nova Zemla	Peninsula
1584	Ortelius/Jenkinson, <i>Russiae, Moscoviae et Tartariae Descriptio Auctore</i>		Nova Zemla	Peninsula
1592	Petrus Plancius, <i>Nova Et Exact Terrarum . . .</i>	183	The first spelling of Nova Zembla on a map	Part of a Circumpolar island
1592	Lucas Waghenaer, <i>Universe Europe Maritime Eiusque . . .</i>		The first spelling of Nova Zembla on a map	Peninsula
1594	Petrus Plancius, <i>Orbis Terrarum Tpus Integro</i>	187	Nova Zemla	The first published drawing of Nova Zemla as a complete discrete island
1594	Petrus Plancius, <i>Europam ab . . . inset map only</i>		Nova Zemla	
1594	Van Langren, <i>Typus Orbis Terrarum,</i>	186	Nova Zemla	
1595	Gerard Mercator, <i>America sive India Nova ad magnae Gerardi Mercatoris aui Uiniversalis imitationem in compendium redacta</i>		Nova Zembla	Discrete island
1596	Petrus Plancius and Jan Huygen van Linschoten, <i>Orbis terrae compendiosa descriptio</i>	192	Nova Zemla	Discrete island
1598	Willem Barents, <i>Deliniatio Cartae Trium Navigationum . . .,</i>		Nova Zembla	First detailed drawing of Nova Zembla as a discrete island with toponyms. There are no circumpolar islands.
1598	Gerrit De Veer, <i>Novæ Zemblæ</i>		Nova Zembla	First detailed drawing of Nova Zembla as a discrete island with toponyms. There are no circumpolar islands.

Note. An asterisk (*) indicates maps where it was difficult to distinguish between an island and a peninsula.

circumpolar islands on the same map. [Figure 3](#) uses an Ortelius oval map projection. This was Ortelius's favourite map projection. [Figure 4](#) is part of a portolan chart as indicated by the interlocking rhumb lines emanating from the circle of compass/wind roses. It has latitude scales along the sides (on the complete map). It uses an equirectangular latitude map projection. Plancius used many map projections on numerous maps. He probably chose this projection for simplicity. [Figure 5](#) probably uses an equirectangular map projection because of its simplicity and the area covered is small. [Figure 6](#) uses a Mercator double-hemisphere stereographic map projection. Plancius chose this because he was just adding Linschoten's new information onto one of his existing maps that already used this map projection. [Figure 7](#) uses a polar azimuthal equidistant map projection. This allowed Barents to show Nova Zembla as well as the fact that the four large circumpolar islands did not exist. [Figure 8](#) is an equirectangular portolan latitude chart. De Veer probably used this projection because his precursor manuscript map was made while he was on the voyage and drafting tools and mathematical calculations were not available. [Figure 9](#) is a portolan chart with latitude scales that uses an equirectangular map projection. Plancius was the cartographer of this map. So, he probably chose this map projection because he already had the map of [Figure 4](#). These nine figures have the same information, but the map projections make them look different. The cartographers were probably not trying to be fancy. They were probably just using the tools that were most familiar to them and would do the job under the circumstances.

This section presented nine maps of Nova Zembla and its surrounding areas. It showed two spellings, Nova Zemla and Nova Zembla, and three different geographical representations: one of the four big circumpolar islands, a peninsula of one of these circumpolar islands, and a discrete island.

Chronology of Nova Zembla Maps

This section shows the history of Nova Zembla Island. It mentions the first explorers. It presents the two spellings: Nova Zemla and Nova Zembla. And it discusses the various shapes of Nova Zembla Island: in the beginning, Nova Zemla was one of the four big circumpolar islands, then it became a peninsula of one of these circumpolar islands, and finally, it developed into a discrete independent island.

In the 1550s, the Arctic region around Nova Zemla Island and the Strait of Waygats was explored by the English ship captains Sir Hugh Willoughby, Stephen Burrough, and others while searching for the apocryphal Northeast Passage to Cathay (China), India, and the Spice Islands. They may have written descriptions of the areas they explored, but they published no maps.

The first use of the name *Nova Zemla* on a published map is on the map of Jenkinson titled *Nova absolutaque Russiae . . .* and dated 1562 ([Szykua 2012](#)). This map was followed a few years later with maps by Ortelius in 1564 and Mercator in 1569. The Jenkinson map is accurate for the southern coast of the Barents Sea. This map looks like Mercator's 1569 map. Even many of the toponyms are the same, for example, Vaigats, Colgoyeue, Morzouetz, Ins S. Petri, Khegere, Wardhuys, and Kola. It was modified by Ortelius and included in his atlas of 1570. Ortelius also published it independently in 1584. This spelling was used in [Figures 2, 3, and 6](#) and in 100 maps mentioned in [Table A.1](#). Then, in 1592, Petrus Plancius on his *Nova et exacta Terrarum Orbis Tabula geographica ac hydrographica* and Lucas Waghenauer on his *Universe Europe Maritime Eiusque . . .* changed their spellings from Zemla to Zembla. After that, between 1592 and 1650, more than 70 maps with the Zemla spelling were published: they are listed in [Table A.1](#). Also, more than 30 maps with the Zembla spelling were published: they are listed in [Table A.2](#). A Google search of the internet showed presently 65,000 Nova Zemlas and 800,000 Nova Zemblas.

The first maps in [Tables A.1 and A.2](#) represent Nova Zemla or Zembla as one of the four giant circumpolar islands ([Figure 2](#)). Later maps represent it as a peninsula of one of them ([Figures 3 and 12](#)). Then, after Barents's voyages, most maps show it as an island north of Russia well separated by open ocean from the four giant circumpolar islands ([Figures 5, 6, 7, 8, 9, and 13](#)). The first maps showing Nova Zembla as a complete discrete island were those made by Plancius in 1594, Van Langren in 1594, G. Mercator in 1595, Plancius and van Linschoten in 1596, Barents in 1598, and De Veer in 1598. However, [Hacquebord \(1995, 250\)](#) wrote that the Plancius 1592 map "drew Novaya Zemlya as an independent island for the first time." But our inspection shows that Nova Zembla on this map is adjacent to or a part of a circumpolar island with no open ocean above it. These facts are highlighted in [Table 1](#).

A modern monograph by [Szaniawska \(2007\)](#) reviewed all the maps of the Nova Zembla region from 1531 to 1999. She wrote that the first accurate map of Nova Zembla Island was the *Nova Europe Descriptio Auctore* map of Hondius in the 1606 *Gerardi Mercatoris Atlas sive cosmographicae meditationes de fabrica mundi et fabricati figura*.

In summary, from 1562 until 1592, all maps spelled the name of the island as Nova Zemla and drew it as one of the giant circumpolar islands or a peninsula of one. Thereafter, some maps used Zemla, and some used Zembla, but after 1595, all maps that spelled it Zembla represented it as a discrete island.

Two Models for Evolution

The evolution of maps of Nova Zembla Island is similar to the evolution of all living things. There are two common models for evolution: *continuous* and *punctuated*

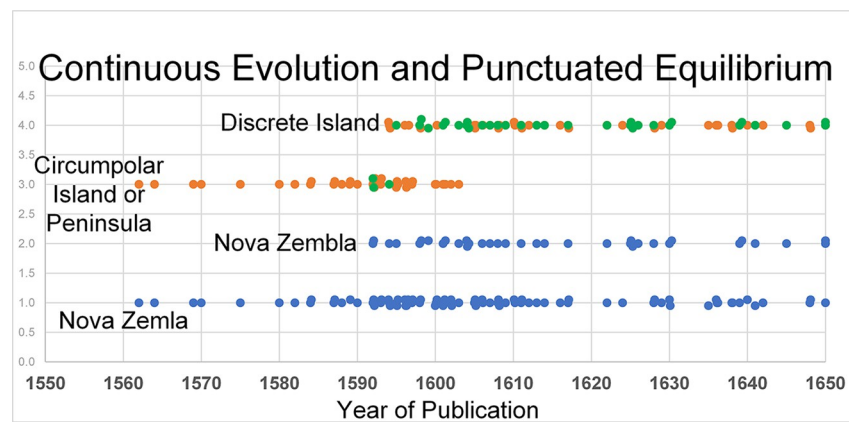


Figure 10. Additive and replacement punctuated equilibrium.
Source: Author's compilation.

equilibrium. Charles Darwin and his “survival of the fittest” made continuous evolution popular. He proposed that species evolve bit by bit. A slight change now and a slight change later. In contrast, Steven Jay Gould added punctuated equilibrium to paleontology evolution (Gould and Eldredge 1977). In the study of prehistoric fossils, there are long intervals in which nothing changed—*equilibrium*. This was *punctuated* by short, revolutionary transitions, in which species became extinct and were replaced by wholly new forms. Both of these models apply to the evolution of sixteenth-century maps.

In the Late Middle Ages and the Renaissance in Europe, the evolution of navigational world maps followed a continuous trajectory. Early in the fourteenth century, portolan charts showed the eastern part of the Mediterranean Sea, the Black Sea, and their surrounding lands. Later charts added the whole Mediterranean as well as scale bars, compass roses, and many toponyms. In time, cartographers added the Atlantic Ocean coast and particularly the British Isles. After Columbus's voyages, maps included the Caribbean Sea and northern parts of South America. Due to Portuguese explorations, the west coast of Africa was added. Then the east coast of South America was added. Subsequent maps added wind roses, more toponyms, latitude scales, longitude scales, and new lands as they were discovered. This evolution was continuous. Then suddenly, in the 1550s, the whole west coast of South America and half of North America sprouted coastlines and abruptly became populated with toponyms.

Some aspects of sixteenth-century maps of the Arctic Ocean exhibited punctuated equilibrium. For example, the name Nova Zemla did not change from 1562 to 1592. Then Plancius in 1592 and Waghenauer in 1592 changed the name to Nova Zembla, as shown in the bottom graph of Figure 10. Half of the cartographers immediately followed suit. There was a long period of stasis and then an abrupt addition—punctuated equilibrium.

This is analogous to the abrupt creation of a new species, but the old species stayed around.

Another aspect of sixteenth-century maps of the Arctic Ocean showed a different type of punctuated equilibrium. Figure 10 (top) shows that from 1562 to 1594, Nova Zembla was represented as one of the four giant circumpolar islands or as a peninsula of one of them. Then Van Langren in 1594 and Plancius in 1594 changed their representations to that of a discrete island. Everyone quickly followed suit. This is analogous to the extinction of one species and the formation of a new species in punctuated equilibrium, like the abrupt extinction of the dinosaurs and the rapid proliferation of mammals.

The blue disks in the bottom graph of Figure 10 show additive punctuated equilibrium. In the beginning, all maps spell the island Nova Zemla. Then after 1592, half of the maps spell it Nova Zemla, and the other half spell it Nova Zembla. This pattern with two spellings continued for the rest of the seventeenth century (Shirley 1983).

In the top graph, orange disks are for maps that spelled this island Nova Zemla, and the green disks are for maps that spelled it Nova Zembla. The top graph shows replacement punctuated equilibrium. In the beginning, most maps represented Nova Zembla as one of the four giant circumpolar islands or as a peninsula of one of them. Then in 1594, a notable change took place. Some of the Nova Zemla maps (orange disks) and all the Nova Zembla maps (green disks) changed Nova Zembla to discrete islands. Thereafter, all maps settled into a new equilibrium representing Nova Zembla as a discrete island. It took a decade, until 1603, for all Nova Zemla cartographers (orange disks) to catch on, but then everyone drew it as a discrete island. The discrete island replaced the circumpolar renditions.

In the first half of the sixteenth century, printed world maps began to appear that contained the Pacific Ocean coasts of South America. Most maps were similar. The cartographers just added details over the years. Then in 1561,

Ruscelli made a radical addition. He added a big bulge four times the size of Spain to the coast of Chile. No one knows why, and no one back then questioned it. But in the next decade, dozens of cartographers followed his lead. Then, abruptly 27 years later, without explanation, Ortelius removed the bulge from the coast of Chile. Within a decade, all cartographers followed his lead, and soon the phantom bulge was gone forever (Bahill 2022a). There were two abrupt changes: one in 1561 and one in 1588. This seems like a replacement punctuated equilibrium.

The first exploration of the Amazon River by Europeans occurred in 1541–42. A giant snake-like model for the shape of the Amazon River was created on maps independently by Antonio Pereira and Sebastian Cabot in 1544–45 (Bahill and Gitzen 2021; Bahill 2023). In the next decade, this model was copied by dozens of mainstream mid-sixteenth-century cartographers. For the next 50 years, few Europeans explored the Amazon, so the information remained static. Then around the turn of the century, many explorers and proselytizers traversed South America. Knowledge about the shape of the Amazon River improved. The models quickly changed into their modern more linear shapes (Bahill and Gitzen 2021). This seems like a replacement punctuated equilibrium.

Studies of latitude and longitude offer another example of punctuated equilibrium. Two ancient Greeks, Eratosthenes and Hipparchus, experimented with using latitude and longitude to represent the location of cities and other sites on maps. We will only discuss longitude here because latitude was easy even in ancient Greece. The zero-longitude meridian of Eratosthenes, third century BCE, passed through Alexandria (where he lived) and Rhodes. The zero-longitude meridian of Hipparchus, second century BCE, passed through Rhodes (where he lived) and Alexandria. Rhodes and Alexandria are only two degrees apart in longitude, so they were close enough together to call them the same back in those days. Ptolemy (a Greek living in Roman-ruled Alexandria) in 150 CE used the edge of the known world (the Canary Islands) as his zero-longitude meridian. This allowed him to avoid negative numbers, which were not yet invented. The concept of longitude developed continuously over two millennia.

Ptolemy wrote several books in the second century CE. The most famous, for our purposes, is his *Geographica*. He listed thousands of noteworthy cities and gave their latitudes and longitudes, sort of. He also showed their locations on maps. Unfortunately, all of his maps disappeared, and we only have copies of his tables and maps that were reconstructed from his tables 1000 years later. During those 1000 years, latitude and longitude disappeared from European maps.

During the fourteenth and fifteenth centuries, Portolan charts were the *crème de la crème* for nautical charts of the Mediterranean Sea, the Black Sea, and their surroundings;

but they did not have latitude or longitude. Later, there were dozens of translations and editions of Ptolemy's *Geographica* between 1477 and the early sixteenth century, mostly from Greek to Latin. This caused a rapid rise in maps with latitude and longitude. The 1501–1502 Kunstmann III map, shown in Figure 11, was the start of this rapid increase in maps with latitudes and longitudes MacIntosh and Gaspar (2021, 164). This Kunstmann III map was the first of the portolan latitude maps. It had a scale of latitude and a rudimentary scale of longitude. The Kunstmann III map was the predecessor of all sixteenth-century latitude maps. Almost all the maps in Tables A.1 and A.2 had labelled lines of latitude and meridians of longitude.

As shown earlier, in the third and second centuries BCE and the second century CE, Greek and Roman maps had rudimentary latitudes and longitudes. Then they went away for a thousand years. Around 1600, they came back and stayed.⁶ This is punctuated equilibrium.

Our second example of punctuated equilibrium, from the Kunstmann III map, is based on the shape of the Nile River. The Kunstmann III map of Figure 11 is one of the first sixteenth-century renderings of the Ptolemy model. The basic Ptolemy model for the Nile River has four (or possibly two) lakes around 10° S latitude. Their inputs come from a range of mountains to the south known as the Montes de Luna or Mountains of the Moon. The outputs of these lakes feed the White Nile River going north. This river merges with the Blue Nile River to form the Nile River that flows north to the Mediterranean Sea. Fourteenth- and fifteenth-century portolan charts do not have the Nile River because they only include *North Africa*. Furthermore, portolan charts usually do not include inland details.

The 1501–1502 Kunstmann III map was a watershed in African cartography (McIntosh and Gaspar 2021). It was the first sixteenth-century map with this model of the Nile River. The 1507 Waldseemüller map and later sixteenth-century maps also incorporate this model (Van Duzer 2020). The Kunstmann III map is the predecessor for sixteenth-century maps of Africa. Furthermore, this Ptolemy model for the Nile River was the standard until the middle of the nineteenth century. It held up until 1860 when John Speke explored and published his hypothesis that Lake Victoria was the source of the Nile River. That model has held until the present day.

As shown above, in the second century CE, Ptolemy's model for the origin and flow of the Nile River was proposed. It remained the best model until 1860 when a better model replaced it. The introduction of longitude and the source of the Nile River are two examples of additive punctuated equilibrium.

In many fields, evolution is best modelled as *punctuated equilibria*. For paleontology each sudden change took millennia. For sixteenth-century maps, each sudden change took a decade.

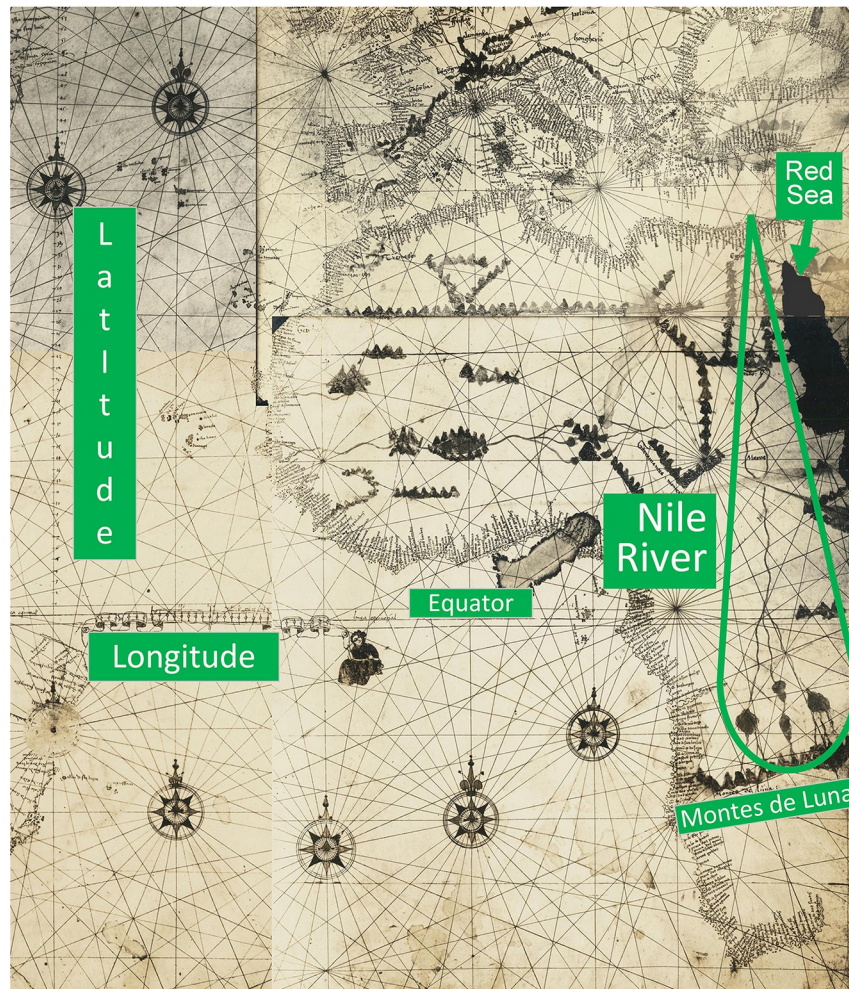


Figure 11. A portion of the Kunstmann III 1501–1502 map. *Notes:* This is an equirectangular latitude chart. It has a latitude scale near the left side. Numerous toponyms arranged perpendicular to the coasts and interlocking rhumb lines emanating from the compass/wind roses emphasize its portolan chart roots. However, a large amount of inland detail and the latitude scale belie its Portolan chart origins.

Source: The Barry Lawrence Ruderman Map Collection, Stanford University Libraries (https://commons.wikimedia.org/wiki/File:Photographic_Facsimile_of_Kunstmann_III_-_merged.jpg).

In contrast, there are also examples of evolution that are not punctuated equilibrium. For example, if you go back far enough and choose your binning interval carefully, then the average global temperature seems to gradually increase until the present day with no punctuation. Similarly, the population of the world seems to be increasing gradually. Radioactive decay is a continuous process. Likewise, the electromagnetic spectrum goes continuously from low-frequency radio waves, through microwaves, visible light, and X-rays and up to gamma rays, all with no punctuated interruptions.

Overall, the evolution of large time-series data sets can be modelled with punctuated equilibrium or with continual gradual changes. Paleontology evolution and some aspects of sixteenth-century maps are best modelled with both.

In summary, on maps of the 1590s, Nova Zemla, as a part of one of the great circumpolar islands, abruptly went away and was replaced by Nova Zembla as an independent island. This looks like replacement punctuated equilibrium. However, the spelling Nova Zemla stayed while a parallel spelling of Nova Zembla sprang up. This looks like additive punctuated equilibrium.

Dating the Dutch–Drake, *La Heroike Interprinse . . .* Map

In 1577–80, Francis Drake and his men circumnavigated the world. When he returned to England, he gave a map to Queen Elizabeth with the route of his journey. She hung it in a restricted area on a wall of her Whitehall palace. Thus, it is called the *Whitehall Map*. Because she did not want the feared and despised

Spanish to learn anything about Drake's voyage, she forbade her subjects from disclosing any details *under pain of death* (de Mendoza 1896). This ban was effective for about eight years, until the defeat of the Spanish Armada; then it faded away. In the next decade, many maps, texts, and globes popped up showing Drake's route. The following list lays out the creation dates for the original *Whitehall Map* and the eight maps, books, and globes published in the last dozen years of the sixteenth century that show Drake's route of circumnavigation (Bahill 2022b, 2024):

- *Whitehall Map* 1580, vanished in the seventeenth century
- Drake-Mellon map 1589, *Vera descriptio expeditionis nauticae* . . .
- Drake *Silver Maps* 1589, stamped into silver medallions
- Richard Hakluyt 1589, *The famous voyage of Sir Francis Drake* . . . in *The Principall navigations* . . ., text, no map
- French-Drake Van Sype map 1589, *La Herdike Enterprinse* . . .
- Dutch-Drake map 1594, *La Heroike Interprinse* . . .
- Emery Molyneux 1592, *Petworth House Globe*
- Jodocius Hondius 1590 and 1595 map, *Vera Totius Exbitionis Nautica*, (*Broadside*)
- Theodor de Bry 1599 map, *America Pars VIII*, a simplified copy of the Hondius *Broadside*

We examined these objects containing Drake's route of circumnavigation. In addition, we considered four more maps. John Blagrave's 1596 *Nova Orbis Terrarum Descriptio* . . . has Drake's route of circumnavigation (Shirley 1983, entry 191; Wallis 1984, 155). However, this map uses a polar stereographic map projection with extensions to a square. It is mathematically elegant, but for our purposes, it is useless because Drake's route cannot be followed into the corners. Furthermore, it did not link to the nine artifacts in the earlier list. A few years later, Gastaldi and De Jode's (correct date 1600) *Nova Totius Orbis Descriptio* also had Drake's route, but this map was not included in this article because its origin is obscure and it was published too late to have affected the Dutch-Drake map. A copy of Abraham Ortelius's 1579 *Typus Orbis Terrarum* in the British Museum has Drake's route drawn on it. But Drake did not return to England until 1580; therefore, this route must have been added to this map by an unknown person at an unknown later date (Bawlf 2003, 33; Wallis, 1984, fig. 9.3, 132). Crispin de Passe in his 1598 *Effigies Regum ac Principum* . . . has a portrait of Drake along with a simplified miniature of the Hondius 1595 *Broadside* map. However, it adds nothing new to our discussion. There are no other known sixteenth-century maps with Drake's route of circumnavigation. Of course, there may have been other maps with Drake's route that have simply disappeared over the last five centuries.

The dates of eight of the previously mentioned "maps" were well established (Bahill 2022b, 2024). However, the origin and date of the Dutch-Drake map (shown in Figure 12) were equivocal. Therefore, we will now try to better date that map.



Figure 12. The Dutch-Drake 1594, *La Heroike Interprinse* . . . world map with Nova Zembla labelled as a peninsula of one of the great circumpolar islands. *Note:* This map has a prominent equator and central meridian. Each of these is *linearly graduated* and labelled in degrees. This confirms that the map uses an equirectangular map projection.

Source: Daniel Crouch, Rare Books (<https://www.crouchrarebooks.com/maps/one-of-the-earliest-maps-to-depict-drakes-circumnavigation>)

Strangely, the Dutch-Drake map labels the meridians of longitude starting with zero at the zero-longitude meridian and increasing going westward to 360°. We have no conjecture about this very odd feature.

The Dutch-Drake map uses French for the title, a mixture of early modern Dutch and French for the cartouches and Latin and Spanish for toponyms.

Assumptions

- The maker of the Dutch-Drake *La Heroike Interprinse* . . . map (Figure 12) was not an explorer/navigator like Sir Francis Drake or Willem Barents. Nor was he a cartographic pioneer like Gerald Mercator or Abraham Ortelius: they studied every map and interviewed every available seaman. Rather, he was merely a map-maker who copied other maps. He was not close friends with any of the famous cartographers of the time.
- The Dutch-Drake map is an enhanced copy of the French-Drake map.
- Research studies like this can be done using the internet without visits to physical libraries.
- The reader can access these maps because their URLs are given at <http://sysengr.engr.arizona.edu/URLsForSixteenthCenturyMaps.xlsx>.

Aker (1970, 49) dates the Dutch-Drake map as possibly as early as 1581. Wagner (1926) dates this Dutch-Drake *La Heroike Interprinse* . . . map as after 1587. The copy in the Huntington Library is bound in with Bigges's (1588), but Stephen Tabor, curator of rare books, suggested that this is a mis-binding. Furthermore, the Library of Congress's copy of Bigges contains no maps. Kelsey (1990, 452, n18) wrote, "The map plainly was not intended for this book, as it does not fit the contents of the book, nor does it match the other maps in the book, which are all in Latin."

The Dutch-Drake map *La Heroike Interprinse* . . . is a copy of the French-Drake Van Sype map, 1589, *La Herdike Enterprinse* . . . (Shirley 1983, 173). Therefore, it must have been made after the French-Drake map, which, based on extensive circumstantial evidence, Bahill (2023) concluded was made in 1589. We will now try to get a more certain date for the Dutch-Drake map based on Nova Zembla Island using the figures in this article.

The Dutch-Drake map has a peninsula coming down from the North Pole above Russia that is labelled Nova Zembla. The 100 maps listed in Table A.1 label this area, but they spell it Nova Zemla. The Dutch-Drake map spells it Nova Zembla. Plancius and Waghenauer first used this spelling on maps in 1592. See Tables 1, A.1, and A.2 and Figure 10. Because all the other maps that use

this spelling were published after 1592, we suggest that the Dutch-Drake map was published after 1592. *This is a strong conclusion.*

The Dutch-Drake map spells Waygats Island with a W. This was first done by Plancius and Waghenauer in 1592. All previous maps spelled it with a V, Vaigatz Island. See Figures 4, 5, 6, and 9. This also dates the creation of the Dutch-Drake map to after 1592.

Like all maps published between 1562 and 1594, the Dutch-Drake map draws Nova Zembla as a part of one of the giant circumpolar islands. But in 1594, cartographers started correctly showing it as a discrete island. See Tables 1, A.1, and A.2 and Figure 10 top. In 1594, three maps showed Nova Zemla as a completely independent island: Plancius's 1594 *Orbis Terrarum* . . ., Plancius's 1594 (inset only) *Europam ab* . . ., and Van Langren's 1594 *Typus Orbis Terrarum*. Later Plancius and van Linschoten followed in 1596. Then Barents in 1598 and De Veer in 1598 represented Nova Zembla as an island just north of Russia with a large area of open ocean above it. After the voyages of Barents became well known, virtually all maps depicted Nova Zembla as an individual island close to Russia and far away from the circumpolar islands, with lots of open ocean between them. From Tables 1, A.1, and A.2 and Figure 10, we can see that in 1595 and after, all maps with the Zembla spelling represent Nova Zembla as a discrete island, not a peninsula. Because the Dutch-Drake map represents Nova Zembla as a peninsula of a circumpolar island, we are certain that the Dutch-Drake map was made before 1595. These facts suggest that the Dutch-Drake map was made after 1592 and before 1595. We suggest 1594.

The Dutch-Drake map has a large complete Northwest Passage. Such a passage did not appear on other maps until G. Mercator in 1569; Ortelius in 1570, 1584, and 1594; Dee in 1580; R. Mercator in 1587; and Plancius in 1594. In addition, the Dutch-Drake map prominently displays the words *Nicaragua* and *Guatemala*. One or the other of these names appeared sporadically on other maps starting in 1584. But they never appeared together until 1617. The Dutch-Drake map labels California, just as Ortelius's 1587 *America Sive* map, Martyr's 1587 map in Hakluyt (1589), and Plancius's 1590 map.⁷ The watermark on the paper might suggest that the paper of the Dutch-Drake map was made after 1590. These four facts do not present conclusive evidence for the date of the Dutch-Drake map. But they do show some of the other avenues that we explored.

Generally, maps of the last decade of the sixteenth century suggest that the Dutch-Drake map was made around 1594.

Extra-Cartographic Evidence

FIRST USE OF THE WORDS NOVA ZEMBLA

In this section, we abandon our rule of only using information contained on published maps. We will now report

information from *texts* that describe events of the late sixteenth century. There may have been earlier usage of the name Nova Zembla, but we start with a documented case.

In 1566, the English ship captain Stephen Burrough sailed along the Nova Zembla Island coast and talked with a Russian fisherman named Loskak (or Lushan) who said that this land was “called Nova Zembla . . . the New Land” (Hakluyt 1589, 318; Greely 1896, 23; Beke, in *De Veer [1598] 2021*, lxix; Beke in *De Veer [1609] 1853*, ix; Beke in *De Veer [1609] 1876*, lxix).

In this era, attempts to find the Northeast Passage started with trying to get to the Kara Sea by passing through the Kara Strait (aka the Burrough Strait, the Nausea Strait, and the Stratz Waygatz) south of Nova Zembla Island and north of Waygats Island. Thus, these expeditions initially sailed from north to south along the Nova Zembla coast (or from the northwest).

In 1580, the English ship captains Arthur Pet and Charles Jackman were given instructions to proceed to Waygats Island, then through the Kara Strait keeping Nova Zembla on their larboard (left) side (Greely 1896, 37). A manuscript Dutch translation of Pet’s narrative was found in Barents’s 1596–97 wintering-over cabin (*De Veer [1609] 1853*, v). So, Barents had seen the spelling Nova Zembla.

In 1581, John Balak wrote a letter to Gerald Mercator that mentioned Nova Zembla. It used the Latin words “Novam Zemblam” (Balak [1581] 1853, 262). This letter was also published by Hakluyt (1589). He had over a dozen Zemblas and no Zemlas.

In 1584, Oliver Brunel, sailing for Dutch merchants, explored the northwest side of Nova Zembla (Beynen [1598] 2021, x–xvi; Beynen [1609] 1876, xiv).

In summary, the phrase Nova Zembla (spelled that way) was used verbally and texturally before it appeared on maps in 1592.

The Route around Nova Zembla Island

In the 1580s, nautical explorers spoke of Nova Zembla as an island near Russia, quite detached from the circumpolar islands. However, no one described the east coast of Nova Zembla (see *Figures 7, 8, and 13*) because it was blocked by sea ice and was not explored for another 300 years. The Norwegian captain Johannesen was the first to circumnavigate Nova Zembla in 1869 (Beynen [1598] 2021, xlii–xliii).

Therefore, in this era, it was accepted that Nova Zembla was an independent island north of Russia and well distanced from the north pole.

Peter Plancius

The polymath Petrus Plancius (1552–1622) was a cartographer, astronomer, theologian, clergyman, merchant businessman, and entrepreneur who wanted to find the

Northeast Passage to the Orient. He promoted a path north of Nova Zembla and then southeast to the Kara Sea. He proposed that north of Nova Zembla, the sun would shine 24 hours a day in the summer, melting all the sea ice.

When the Dutch merchants created an expedition in 1594 to seek the Northeast Passage to the Orient, Plancius persuaded Barents to try the northern route above Nova Zembla (see *Figure 9*; Beke in *De Veer [1609] 1853*, liii–lix; Schilder 1984, 496). The other Dutch ships were launched with instructions to sail to the Kara Sea and then search for the Northeast Passage. These ships took the traditional route south of Nova Zembla and north of Waygats Island.

Later, Plancius was disappointed when the 1595 expedition did not try the north side of Nova Zembla. Therefore, for the 1596 expedition, Plancius organized the financing of two ships launched from Amsterdam. For the officers, they chose Barents to be the pilot major with Heemskerck as supercargo and convinced them to try the northern route above Nova Zembla.

The 1590 Plancius map has Nova Zembla drawn as a region of a big circumpolar island. His 1592 map shows Nova Zembla as a peninsula of a circumpolar island. However, the Plancius 1594 inset map shows it as an island close to Russia and far away from the circumpolar islands.

Our conclusions are that sixteenth-century Russian and Samoyed fishermen and Plancius the cartographer knew that Nova Zembla (spelled that way) was an island. But that spelling did not appear on maps until 1592. The shape of Nova Zembla as a discrete island close to Russia and far from the north pole started to appear on maps in 1594. In 1595 and thereafter, all Zembla maps drew it as a discrete island. Therefore, the Dutch-Drake map was surely made after 1592 and before 1595.

Toponyms on Nova Zembla Maps

Toponyms are the names of cities, towns, ports, rivers, capes, and other coastal geographic features on maps. The practice of placing toponyms on the land, perpendicular to the coastlines, started with portolan charts in the fourteenth century and on maps by Vesconte between 1311 and 1320 and Dulcert in 1325 and 1339.

Toponyms on the perimeter of Nova Zembla Island offer an ideal collection for studying the naming of toponyms. Most fourteenth- to seventeenth-century maps merely copied toponyms from previous maps. On them, it is hard to tell who invented the toponyms. However, in the Nova Zembla maps of this article, the cartographers were the people who explored Nova Zembla and created the toponyms. For example, *Figures 7, 8, and 13* have a large number of toponyms along the shore. Because the men on



Figure 13. A portion of De Veer's 1613 *Tabula terrae Nouae Zemblae...* map Notes: De Veer's 1601 and 1613 maps are almost identical except for the coloration. The parallel dotted lines represent the escape route of the 1597 portion of the third Barents expedition. This map is based on that of Figure 8. Therefore, it is also an equirectangular portolan latitude chart. (Source: Stanford University Library, Renaissance Exploration Map Collection (<https://searchworks.stanford.edu/view/10366712>).

Barents's voyages were the first people to draw maps of Nova Zembla, they must have been the people who cavalierly named them. For example, "they anchored again to a floating block of ice off a point which they named Little Ice Cape," they reached and named the Great Ice Cape the following day (Tollens [1819] 1884, 14, 32–36). They also named the Cape of Desire, Ice Haven, and the Islands of Orange, which were named after William of Orange. Unlike most fourteenth- to seventeenth-century maps, the creation and evolution of the toponyms and their abbreviations can be seen.⁸

The items in Table 2 are arranged in the order they were mentioned in their journey up the coast of Nova Zembla in 1596. Time runs from the bottom to the top. The estimated latitudes in the right column come from (Van der Werf 1998; De Veer [1598] 2021) and Google Earth Pro 2023.

Cartographers who were on the Barents expeditions made manuscript maps and wrote notes while they were abroad. These were then engraved into published maps one or two years after their return.

Summary and Conclusion

Nova Zembla is an isolated island inside the Arctic Circle north of Russia. In the last half of the sixteenth century, the region around Nova Zembla was investigated by the English ship captains Sir Hugh Willoughby, Stephen Burrough, and others while searching for the apocryphal Northeast Passage. They may have written descriptions of the areas they explored but they published no maps.

Later the region around Nova Zembla was explored by the Dutch ship captain Willem Barents and his crews in expeditions of 1594, 1595, and 1596–97. On the third expedition, their ship became trapped in the ice.⁹ For the next nine months, they lived in a primitive cabin and had to avoid freezing to death and being eaten by polar bears. This harrowing adventure was the subject of several books and a film.¹⁰

Most people think that sixteenth-century maps showed continuous evolution. However, this article has shown conclusively that they also showed punctuated equilibrium.

Table 2. Toponyms on De Veer's maps of Nova Zembla, arranged from bottom to top, in the order they were encountered on the 1596 voyage

Toponym			Meaning	North Latitude
Het Behouden Huys, from Barents 1598 map			'The Safe House,' their winter cabin	76° 15'
De Veer 1598 = 1609 map	De Veer 1601 = 1613 map of Figure 13	De Veer 1598 log, translated		
	C. Vlifyingher		C. Flissingsky, Eastern most point of Nova Zembla	76° 42'
C. der begerdn	C. der begerdn	Point of Desire	Cape of Desire	76° 58'
De eyland van orange	Ins Orange	Islands of Orange	Islands of Orange	77° 2'
Y s hoeck	Eijs eck	Ice Point	Northernmost point of Nova Zembla	77°
Beer hoeck	Bern Eck		Bear Point	76° 44'
Troost hoeck	Troost Eck	Trust Point	Cape Comfort (Tollens 1884, 31)	76° 30'
C. Nassou	C Nasou	Cape Nassawe	Cape Nassau, (Tollens 1884, 31)	76° 18'
Cruys Eylandt	Creucz Ins	Island of Crosses	There are three in this area	76° 17'
Willens Eylandt	Wilhelm Ins	Williams Island	William Barents Island	75° 58'
Beerefoort	Bernfort	Black Point	Bear Fort	75° 48'
Admiraliteyte Eylandt	Admiraliteyt Ins	Admiralds Island	Admiralty Peninsula	75°
Loms bay	Lombs Bay	Lombsbay	Lombs Bay	74° 30'
Langenes	Langenes	Langenes		73° 28'
Fretum Nassou	Fretum Nassou		Nassau Strait	70° 28'

That is, features remained relatively constant for extended periods, and then, suddenly, there was a dramatic change, followed by another period of relatively continuous equilibrium.

One of the conclusions of this article is that the probable first use of the name Nova Zemla on a published map is on the map of Anthony Jenkinson titled *Nova absolutaque Russiae, Moscoviae et Tartariae, descriptio* and dated 1562 (Szykua 2012). This map was included in Ortelius's 1570 Atlas *Theatrum Orbis Terrarum*. Its portion of the southern coast of the Barents Sea is accurate. Jenkinson uses the words *Nova Zemla*. This was followed a few years later by Ortelius in 1564, Mercator in 1569, and Ortelius in 1570. Subsequently, we found more than 100 maps published in the succeeding 80 years that contained the words *Nova Zemla*. See Table A.1. Like all the maps made from 1562 to 1594, this label was on one of the four giant circumpolar islands thought to surround the north pole, as shown

in Figure 2. Then in 1594, three maps showed Nova Zemla as a completely independent island: Plancius's 1594 *Orbis Terrarum . . .*, Plancius's 1594 *Europam ab . . .*, and Van Langren's 1594 *Typus Orbis Terrarum*. Later, many maps represented Nova Zemla as an island just north of Russia with a large area of open ocean above it. After the voyages of Barents became well known, all maps in Table A.2 depicted Nova Zembla as an individual island north of Russia.

Because the Dutch-Drake *La Heroike Interprinse . . .* map uses the spelling *Nova Zembla*, it was certainly made after 1592. Because it represents Nova Zembla as a peninsula of one of the large circumpolar islands it was surely made before 1595. We suggest 1594.

The following text ("Escape from Nova Zembla") is a summary of their escape from Nova Zembla Island written in the style of Gerrit de Veer.

Escape from Nova Zembla

Based on Gerrit de Veer, 1598

A long time ago in a land far away,
a Dutch ship was trapped in Arctic ice.
It was stuck offshore Nova Zembla island,
which is a bleak frozen island north of Russia,
south of the North Pole and north of the Arctic Circle.
Half a millennium ago, the ship's crew struggled on this island.
They fought off freezing, starvation, depression, and hungry polar bears.
and they survived eight months of sub-zero temperatures in a makeshift cabin.
When the ice melted the next summer, they left their cabin in two small open boats.
They rowed and sailed for two months before encountering Russian ships and huts 700 miles south.
Compared to living in the cold, smokey, sunless, cabin for eight months with continual polar bear attacks,
their two-month homeward voyage with fresh air, sunshine, and physical activity seemed like a pleasure cruise.
Seventeen sailors left Amsterdam and a year and a half later a dozen returned. These survivors were hailed as heroes.

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Appendix 1

TRANSLATING TEXT ON MAPS

This appendix should help you to translate text on sixteenth-century maps. Throughout this appendix, we use *angle brackets* to indicate written letters, for example <V>, and *single quotes* to indicate speech sounds, for example, 'b'.

Many millennia ago, **written language** was invented in order to capture verbal communication for use at either a different time or a different place. (Inventing tape recorders or flash memory sticks would have been just as effective.) Early examples of writing are the hieroglyphics of the ancient Egyptians and the cuneiform writing of the Babylonians. By the time of the Romans, many alphabets and languages had been invented for writing.

The **Latin alphabet**, which is also called the Roman alphabet, originated in the seventh century BCE. It comprised these 21 letters:

A, B, C, D, E, F, H, I, K, L, M, N, O, P, Q, R, S, T, V, X, Z

The letters G, J, U, W, and Y from our current alphabet were not yet invented. Because there is no agreement in the literature, we will not name these old Latin alphabets individually.

Then around the third century BC, they removed the letter <Z> because they were not using it and added the letter <G> because they needed it. This new Latin alphabet was missing the letters J, U, W, Y, and Z.

After the conquest of Greece by the Romans in the first century BCE, they found that they needed the Greek letters Y and Z. This created another Latin alphabet with the following 23 letters:

A, B, C, D, E, F, G, H, I, K, L, M, N, O, P, Q, R, S, T, V, X, Y, Z

It was missing the letters J, U, and W. This is the alphabet that was used to carve the inscription on Trajan's Column (see Figures 14 and 15) in about 100 CE.

In the Middle Ages, they added the letter <W>, and in the Renaissance, they added <J> and <U>. This created an alphabet with 26 letters. Most sixteenth-century maps and present European languages use this modern Latin alphabet.

These are the steps for **translating text** on a map from one language to another.

- Determine when the map was made.
- Identify the alphabet and language that was used for the text.
- Add spaces between words, if necessary.
- Identify abbreviations and expand them.
- Identify letters that represent two different spoken sounds. This has already been done for most eras and languages.

- Choose one of those letters and examine each instance of that letter in the source document.
- Assign one of the two (or three) alternative letters to it using a dictionary for the source language, tables for the frequency of use of all letter pairs, and simple phonological principles. This is difficult. But do not worry because you will have ample opportunity to correct and revise.
- Now that you have a clean text with no abbreviations, give it to a translator to translate it into the target language.
- Iterate.

As a simple example, let us **translate** some text from Latin to English.

Through the Middle Ages and the Renaissance, the <V> was used for both the 'v' speech sound and the 'u' speech sound. By the mid-16th century, the <V> had been split into a <V> to represent the consonant sound and a <U> to represent the vowel sound. Therefore, in translating words on maps of this era into a modern language when you encounter a <V> use that <V> to represent the consonant sound 'v' and substitute a <U> to represent the vowel sound 'u'.

A phoneme is a **speech sound**. It is the smallest unit of sound that distinguishes one word from another. We use letters or a cluster of letters to represent sounds. There are 44 sounds or phonemes in the English language. They are represented by the 26 letters of the alphabet individually and in combination.

These phonemes can be divided into two major categories: consonants and vowels. A consonant sound is one in which the airflow from the lungs is restricted or cut off, either partially or completely, when the sound is produced. For example, the 'b' in ball, the 'd' in dog, the 'ng' in ring, and the 'v' in van. Single quotes are used to delineate sounds or phonemes. In contrast to consonants, a vowel sound is one in which the airflow is unobstructed when the sound is made. For example, the 'i' in *igloo*, the 'e' in *bee*, the 'a' in *cat*, and the 'u' in *uniform* or *you*.

https://www.dvusd.org/cms/lib/AZ01901092/Centricity/Domain/3795/Sound_Spelling_Chart.pdf

Here is an example (see Figures A.1 and A.2) of translating Latin into English using **Trajan's Column** in Rome.

Trajan was a beneficent emperor of Rome in the early second century CE. To honor him, the Romans built a column of Carrara marble 38 metres (128 ft) high and 3.7 metres (12.1 ft) in diameter. The 10-foot by 4.5-foot inscription shown in Figure A.2 is carved on the pedestal at the base of the column (Stevenson 2001; Stein 2019; Danner 2023). See <https://arts.st-andrews.ac.uk/trajans-column/>.



Figure A.1. Trajan's Column in Rome
 Source: Steven Zucker (CC BY-NC-SA 4.0), <https://smarthistory.org/column-of-trajan/>



Figure A.2. The inscription on Trajan's Column
 Source: Steven Zucker (CC BY-NC-SA 4.0), <https://smarthistory.org/column-of-trajan/>

The inscription at the base of Trajan's column reads:

SENATVS POPVLVSQVE ROMANVS
 IMP CAESARI DIVI NERVAE F NERVAE
 TRAIANO AVG GERM DACICO PONTIF
 MAXIMO TRIB POT XVII IMP VI COS VI P P
 AD DECLARANDVM QVANTAE ALTITVDINIS
 MONS ET LOCVS TAN[TIS OPER]IBVS SIT EGESTVS

The spaces between the words are not in the original inscription. We added them.

We want to translate this into modern English. First, we expand the abbreviations (lowercase in the following lines), add a comma, and guess the meaning of the <V>s. For the first three lines, we get

SENATUS POPULUSQUE ROMANUS
 imperator CAESARI divinus NERVAE filius NERVAE
 TRAIANO Augustus Germanicus DACICO, pontifex
 MAXIMO

Now my translation of this Latin into English, yields

The Senate and the Roman people [dedicate this monument to]

Emperor Caesar Nerva Trainus, son of the divine Nerva, Augustus, Germanicus, Dacicus, supreme pontiff, . . .

The dozen words "Emperor . . . Dacicus" constitute his correct, complete, imperial name!

If we had incorrectly substituted <U>s and <V>s for the original <V>s, then the translation would make no sense. But how did we know which <V>s should change to <U> and which should remain <V>? The stone carver seems to have used regular abbreviations and followed most of our common rules for adjacent letters.

Let us examine the first <V>. The one in SENATVS. It is between the two consonants <T> and <S>. So, it must be a vowelⁱ. That means change it to a <U>. Besides that, 't' 'v' 's' is not intelligible. The same is true for the rest of the <V>s in the first line. However, the suffix QVE has its own rule. It must change to QUE because <Q>s are always followed by <U>s in Latin and English.

https://www.utpjournals.press/doi/pdf/10.3138/cart-2023-0011 - Friday, May 31, 2024 9:58:44 AM - IP Address: 2601:500:8682:be30:cdf1:c87e:287b:7009

Rules Invoked

The letter <U> is a vowel.

The letter <V> is a consonant that is almost always followed by a vowel and in particular <V> is never followed by an <S>. As they said in *HMS Pinafore*, “What never? Well, hardly ever.”

A <Q> is always followed by a <U>.

The next <V> is in the abbreviation DIVI. It is between two vowels so it must be a consonant, a <V>. Now what could DIVI be an abbreviation for? The Latin word DIVINUS works. It means divine. So, let us try that.

Rules Invoked

<V> is a consonant that is always followed by a vowel.

Three vowels in a row, like *oui* in French, is almost non-existent in Latin and English.

Next, we have a <V> that is not between two vowels or two consonants: the <V> in NERVAE is after a consonant and before a vowel. Furthermore, there is nothing wrong with ‘u’ ‘a’ and ‘v’ ‘a’. Likewise, there is nothing wrong with <R><V> and <R><U>. So, we need additional rules to solve this problem. However, we know that Trajan’s adoptive father was named Nerva. Therefore, we will use that.

In the third line, we find AVG, which in Latin, is an abbreviation for Augustus. Likewise, GERM is an abbreviation for Germanicus.

OK, that solves our problem of <V> being used for both the ‘v’ sound and the ‘u’ sound. So let us move on.

The rule for the letters <I> and <J> is similar to that for <V> and <U>. The Latin alphabet that we used above, which is the alphabet used on Trajan’s Column, has no letter <J>. This is an important problem because the *Emperor’s* name has a ‘j’ sound. On line 3, letter 4 has an <I> surrounded by two vowels: therefore, we need a consonant, a <J>. If we make this substitution we get *Trajan*, which is perfect. All of the other <I>s should remain <I> in order to get Latin words.

Rules Invoked

<I> is a vowel.

<J> is a consonant.

In the Latin language, there is no ‘w’ sound. Therefore, there was no need for the letter <W>. Indeed, there are no <W>s in the inscription on Trajan’s column; see [Figure A.2](#). However, after the Normans moved into England, after the battle of Hastings in 1066, they needed a letter to represent the ‘w’ sound in Anglo-Saxon words. Initially, they used the letter <V> or perhaps two <VV>s for <W>. Therefore, in translating words on

maps of this era (the Early Middle Ages) into a modern language, when you encounter a <V> use <V>, <U> or <W> depending on the surrounding letters.

Rules Invoked

<V> and <W> are both consonants.

We need another rule to handle <W>. But this is not really a problem because in Latin no words contain a ‘w’ sound.

After 1592, the letter <W> became common on Dutch maps, for example, *Der verwinter hoeck* (the Winter Cape, Barents, 1598), *Swarte clip* (Black Cape, Barents, 1598), *Schwart eck* (Black Cape, de Veer, 1613), *Wilhelm Ins* (Williams Island, de Veer, 1613), *Willems Eyland* (Williams Island, Barents, 1598), *Waerachtige* (True, van Linschoten, 1601), *Waygats Island* (Vaigatz Island, many maps after 1592), *Wardhuys* (Vardøhus Fortress in Vardø city Norway, many maps). URLs for these maps are in our database, which is located at <http://sysengr.engr.arizona.edu/URLsForSixteenthCenturyMaps.xlsx>.

The shape of the letter <W> became standardized after the invention of the printing press with replaceable type in the middle of the fifteenth century.

Lowercase letters were probably initiated by Charlemagne and his court in the eighth century CE. Lowercase letters allowed scribes to write faster. But lowercase letters have no effect on the preceding discussion.

There are other strange substitutions for letters; for example, on maps from the middle half of the sixteenth century, the number 2 was often represented with the lowercase <z> ([Bahill 2023](#), 21–22). From the eighth to the eighteenth century, the elongated or long <s> (ſ) was often used, for example, *iſland*. It was then the tallest letter. It is often confused with <f>.

In general, these rules apply to sixteenth-century maps written in Latin, Spanish, Portuguese, Catalan, French, Dutch, and many Romance languages. For extra help with translations, see [Stuart \(1995\)](#) and [Marshall \(2010\)](#).

In summary, when translating text from one language that uses the Latin alphabet to another, follow these steps: (1) Determine when the map was made. (2) Identify the alphabet and language that was used. (3) Add spaces between words. (4) Identify and expand abbreviations. (5) Identify letters that represent two different speech sounds. (6) Choose one of those letters and assign it one of the two alternatives. (7) Ask someone to translate your text into the target language. (8) Iterate.

To further illustrate the use of this technique, we will now translate the quotation attributed to Cicero by Ortelius in the bottom cartouche of his 1570 *Typus Orbis Terrarum* map, a portion of which is shown in [Figure 3](#).

This is the original text.

QVID EI POTES VIDERI MAGNVM IN REBVS
HVMANIS, CVI AETERNITAS

OMNIS, TOTIVSQVE MVNDI NOTA SIT MAG-
NITVDO. CICERO

This map was made in 1570. But the quote of Cicero was made around 45 BCE. It used the following Latin alphabet.

A, B, C, D, E, F, G, H, I, K, L, M, N, O, P, Q, R, S, T, V, X, Z.

The letters J, U, W, and Y were not included.

We believe there should be a space between TOTIVS and QVE.

No abbreviations were used.

In this quotation <V> was used for both <U> and <V>. It was not necessary to change any <V>s into <W>s. Similarly, it was not necessary to change any <I>s into <J>s.

Using the rules presented in this appendix produces the following Latin text.

Quid ei potest videri magnum in rebus humanis, cui aeternitas

omnis, totius que mundi nota sit magnitudo. Cicero

The most popular translation for this text that we have found is

“For what human affairs can seem important to a man who keeps all eternity before his eyes and knows the vastness of the universe? Cicero”

See, for example, the National Maritime Museum, Greenwich, London,

[https://www.rmg.co.uk/collections/objects/rmgc-object-565360#:~:text=37\)%20Quid%20ei%20potest%20videri,are%20placed%20in%20strapwork%20panels](https://www.rmg.co.uk/collections/objects/rmgc-object-565360#:~:text=37)%20Quid%20ei%20potest%20videri,are%20placed%20in%20strapwork%20panels).

Appendix 2

MAPS CONTAINING NOVA ZEMLA AND NOVA ZEMBLA

Most of the maps listed in [Tables A.1](#) and [A.2](#) are referenced in our database located at <http://sysengr.engr.arizona.edu/URLsForSixteenthCenturyMaps.xlsx>.

Notes

- 1 Nova Zembla is actually two closely spaced main islands of an archipelago. The words *Nova Zembla* mean "new land." These words, and many other Russian derivatives, date back to the twelfth century. They were used verbally and in texts before they appeared on maps.
- 2 In this article, statements about the type of map projection are based on the visual appearance of the maps, not on statements by the cartographers themselves.
- 3 On the Plancius 1594 map *Europam ab Asia . . .*, which is [Figure 4](#) in this article, Nova Zembla is at the top of the map. Only the bottom tip of Nova Zembla is shown. There is no open ocean above it, so we cannot use that to preclude it from being a part of one of the circumpolar islands. The actual physical distance between Wardhuys and Kolguyev Island (spelled Colgoÿa on most maps) is 390 nm. Using this as a distance scale, we calculate that Nova Zembla at the top of this map is 540 nm wide, wider than the distance between Wardhuys and Kolguyev Island. This indicates the cartographer's intention that Nova Zembla is a part of a circumpolar island. For an alternative example, we can use the distance between Palermo Sicily and the Rock of Gibraltar as our distance scale. This yields an apparent width of Nova Zembla at the top of this map as 550 nm. At its widest point, Nova Zembla is actually 80 nm wide. This confirms that this cartographer intended to make Nova Zembla huge compared to the Barents Sea. It is so huge that it would be half the average width of one of the circumpolar islands, because the average width of the circumpolar islands at their lowest latitude is 1000 nm (see [Figure 2](#)).
- 4 The supercargo was a high-ranking on-board representative of the ship owners.
- 5 "Waerachtige afbeeldinge ende gedaente der samoieden, de naer onthoudende zyn op Nova Zembla, Vayatz, en tlant vanby zuydn de Enckte van Nassau, te weten van Pitzora af tot voorby de Revier Oby, en soo gelyck als de selfde rydende zyn, met haere sleeckens ende ingespannen tamme Rheenen, mitsgaders de gedaente haerder afgoden ofte houten beelden, soo als op veel hoeken en clippen, by menichte stonden, gelyck als sulcks alles ondeckt ende sichtelycken dcerste reyse ondervonden is doorint laer 1594."
- 6 Some Islamic scholars knew the work of Ptolemy from ninth-century Arabic translations of his *Geographica*.
- 7 The word *California* was first used on a map by Diego Gutierrez *Americae Sive Quartae Orbis Partis Nova et Exactissima Descriptio* in 1562. Few Spanish or Portuguese cartographers are listed in [Tables A.1](#) and [A.2](#). The Spanish and Portuguese already had their routes to the Orient and were not interested in the northeast passage.
- 8 Because the Wright-Molyneux map ([Gitzen 2014](#)) was written in English not Dutch, it may help with translations of toponyms.
- 9 The ships used on Barents' third expedition were probably Dutch *fluyts*. <https://www.youtube.com/watch?v=QTaZ8WBIV-U>. These ships were optimized for carrying cargo not for warfare: therefore, they seldom had cannons. They typically had two main masts and a smaller stern mast. They were around 80 to 90 feet long and displaced perhaps 200 tons. Compared to other sixteenth-century ships, *fluyts* carried twice as much cargo at half the cost. Although they had shallow drafts, they still needed small boats to carry men and materials from ship to shore. These small boats were stored on or below the deck (perhaps disassembled) on long voyages and were towed behind the ship on short trips. [De Veer \(\[1598\] 2021\)](#) describes many such trips. These trips almost always comprised six or eight men: this would be the coxswain in the bow, the rudder man in the stern, and four or six rowers sitting side-by-side on two or three bench seats. Therefore, their *scute* was perhaps 14 feet long, and their *boate* was around 18 feet long. For their 1597 trip home, each was fitted with a mast and a sail.
- 10 This entire episode is analogous to the 1970 United States Apollo 13 moon mission.
 - i The *rules* used in this appendix were invented by Bahill. They have many exceptions.
 - ii We tried to find Van Langren's 1594 map on the internet. We searched the libraries at Bibliothèque nationale de France and Stanford University using the internet. However, we could not find a *Typus Orbis Terrarum* with circles containing maps in the four corners as in Van Langren's "1594?" ([Shirley, 1983](#), entry 186). The question mark is Shirley's. Furthermore, TinEye could not find a match to a scanned image of it. Therefore, we did not include it in our database.
 - iii Urbano Monte started a map project in 1585 ([Parker 2017](#)). There are three surviving manuscript maps from this project ([Van Duzer 2020](#)). A manuscript map is a singular hand-drawn map that was not mass-produced or published. The Stanford University Library copy has the label, Nova Zembla. But this label could have been added anytime between 1587 and 2017 when Stanford acquired its copy. [Van Duzer \(2020\)](#) wrote that the third version of Monte's manuscript is dated 1590, but it includes "material as late as 1604" ([Van Duzer 2020](#), 420, 430) when it was published. And "so it seems that he continued modifying the 1587 manuscript for many years" ([Van Duzer, 2020](#), 419). Material can be added to an unpublished manuscript map at any later date. This is why our policy is to not use unpublished maps.

Table A.1. A representative, but not exhaustive, sample of maps that contain the words *Nova Zemla*

Cartographer	Estimated Year of Publication	Shirley (1983) Entry number	Comment or map name	Geographical shape
Jenkinson	1562		The first use of the name <i>Novo Zemla</i> on a published map	Peninsula*
Ortelius	1564	114	Second use of <i>Nova Zemla</i> on a published map	Peninsula
G. Mercator	1569	119	Third use of <i>Nova Zemla</i> on a published map	Peninsula
Ortelius	1570	122	<i>Typus Orbis Terrarum</i> †, 28 maps from 1570 to 1598. Figure 3.	Peninsula
Belleforest	1575	135		Peninsula
Whitehall map	1580		Purchas (1625)	Unknown
Smyth	1580		Pet & Jackman	Unknown
Postel	1582	144		Circumpolar island
Ortelius	1584		<i>Europe</i>	Peninsula*
Ortelius (a modification of Jenkinson 1562)	1584		<i>Russiae, Moscoviae et Tartariae Descriptio Auctore</i>	Peninsula*
R. Mercator	1587	157		Peninsula
Ortelius	1587	158		Peninsula
Munster	1588	163		Circumpolar island
Ortelius	1589	167		Peninsula
Waghenaer	1589		<i>Nova Zemla</i> is shown but not labeled	Peninsula
Plancius	1590	177	<i>Orbis Terrarum Typus de Integro . . .</i>	Peninsula
Girault	1592	181		Circumpolar island
Molyneux	1592		<i>Petworth Globe</i>	
Hondius & Apian	1592		<i>De Globo Terrae - Jehova</i>	Peninsula*
Ortelius	1592			Peninsula
Ortelius	1593			Peninsula
De Jode	1593	184	Figure 2 of this paper	Circumpolar island
Plancius	1594	187	<i>Orbis Terrarum Typus di Integro</i>	First published drawing of <i>Nova Zemla</i> as a complete discrete island
Plancius, inset map	1594		<i>Europam ab Asia Et Africa segregant</i>	
Van Langren†	1594	186	<i>Typus Orbis Terrarum</i>	
Hondius & Van den Keere	1595			Peninsula
Hondius	1595		<i>A Wall Map of Europe</i>	Peninsula

(Continued)

Table A.1. (Continued)

Cartographer	Estimated Year of Publication	Shirley (1983) Entry number	Comment or map name	Geographical shape
G. and M. Mercator	1595		<i>Europe</i>	Peninsula
Plancius & Van Linschoten	1596	192	Van Linschoten was on the first and second expeditions, Figure 6 .	Discrete independent island
Andreas	1596	190		Peninsula
Ortelius & Magini	1596	195		Peninsula
Mercator & Magini	1596	196		Circumpolar island
Quad	1596	197		Peninsula
Blagrove	1596	191		Unlabeled Island
Hondius	1597		<i>Christian Knight</i>	Peninsula
Rosaccio	1597	205		Peninsula
Langenes	1598	211		Circumpolar island
Wytfliet	1598			Peninsula
Hondius & Apian	1598			Peninsula
Gastaldi & de Jode	1600	174	Date is 1600 not 1590	Island
Anonymous	1600	224		Island
Arnoldi	1600	227		Peninsula
Arnoldi	1601	228		Peninsula
Van Linschoten	1601		Labeled Vaigatz	Island*
Ortelius & Coignet	1601	230		Peninsula
Ortelius & Vrients	1601	231		Circumpolar island
Le Clerc & Hondius	1602	233		Peninsula,
Robacioli	1602	236		Peninsula
De Solis	1603	242		Peninsula
Plancius	1605	249		Island
Plancius	1605	250		Island
Merula	1605	254	Vaigatz	Island
Blaeu	1606	255		Island
Blaeu	1606	258		Island
Hondius	1607	259	<i>Typus Orbis Terrarum</i>	Island
Hondius	1608	263		Island
Van den Keere	1608	264		Island
Blaeu	1608	265		Island
Van den Keere	1609	266		Island
Van Geelkrtchen	1610	269		Island
Wright & Kip	1610	272		Island

(Continued)

Table A.1. (Continued)

Cartographer	Estimated Year of Publication	Shirley (1983) Entry number	Comment or map name	Geographical shape
Hondius	1611	273		Island
Van den Keere	1611	274		Island
Massa	1612			Island
Gerritsz	1613	278		Island
Visscher	1614	288		Island
Bertius (Hondius)	1616	291		Island
Visscher	1617	294		Island
Hondius	1617	296		Island
Lons	1622	309		Island
Blaeu & Hondius	1624	310		Island
Jansson	1628	325		Island
Vaughan	1628	326		Island
Van Wassenauer	1629	327		Island
H. Hondius	1630	336		Island
Verbiest	1630	338		Island
Blaeu	1630			Island
Massa	1635			Island
Boisseau	1636	340		Island
Hondius	1636	341		Island
Verbiest	1636	343		Island
Merian	1638	345		Island
Visscher	1638	346		Island
Visscher	1639	350		Island
Hondius	1640	354		Island
Culver	1641	356		Island
Cavazza	1642	357		Island
Blaeu	1648	371		Island
Turquet	1648	375		Island
Colom	1650	381		Island
Plancius & Danckerts	1651	389		Island
Colom	1655	395		Island
Moxen & Wright	1655	396		Island
Dancgerts	1658	403A		Island
De Wit	1660	421		Island

†The unnamed Ortelius maps in this table are *Typus Orbis Terrarum*.

‡Van Langren (1594). Shirley (1983) wrote that this date was questionable.ⁱⁱ

*Means not enough information is given to conclude with certainty whether the cartographer intended to draw a peninsula or an independent island.

Table A.2. A non-exhaustive but representative sample of maps that contain the words *Nova Zembla*

Cartographer	Estimated Year of Publication	Shirley (1983) Entry number	Comment or Map Name	Geographical representation
Plancius	1592	183	The first use of the name Nova Zembla on a published map	Part of a circumpolar island
Waghenaer	1592			Peninsula
Plancius, main map	1594		<i>Europam ab Asia & Africa segregant</i>	Peninsula
G. Mercator	1595		<i>Septentrionalium Terrarum descriptio</i>	Discrete independent island
De Veer	1598		Barents crew member	First accurate drawing of Nova Zembla as a discrete independent island
Barents	1598		First map in this table with no circumpolar islands, Figure 7	island
Wright & Molyneaux	1599		In English	Island
Van Linschoten	1601		Member of first and second expeditions, Figure 9	Island
De Veer & De Bry	1601		Barents crew member, Figure 8	Island
Monte ⁱⁱⁱ	1604			Island
Hulsius	1604		Figure 5	Island,
Van den Ende	1604	243		Island
Teixeira	1604			Island
Mercator and Hondius	1606			Island
Hondius	1607	259	<i>Typus Orbis Terrarum</i>	Island
Willemszoon	1608			Island
De Veer	1609			Island
H. Hondius	1611			Island
De Veer	1613		Figure 13	Island
Verhear	1614	287		Island
Van Geelkrtchen	1617	295	also Zemla Entry 269	Island
Lons	1622	309		Island
Hondius	1625	312		Island
Grent	1625	313		Island
Habrecht	1625	314		Island
Speed	1626	317		Island
Bertius	1628	322		Island
Blaeu	1630	333		Island
Cloppenburgh	1630	334		Island
Van Geelkercken	1639	348		Island
Tavernier	1639	349		Island

(Continued)

Table A.2. (Continued)

Cartographer	Estimated Year of Publication	Shirley (1983) Entry number	Comment or Map Name	Geographical representation
Boisseau	1641	355		Island
Boisseau	1645	362		Island
Plancius & Allard	1650	377		Island
Berey	1650	380		Island
Visscher	1650	387		Island
Tassin	1651	391		Island