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## Transport-geographic continentality of Canada: from sea to sea

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## **Transport geographical continentality of Canada: from sea to sea**

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### **Annotation**

In the article estimation of transport-geographical location of territories, population and mining industries of Canada is considered. The hand-made inner water ways of the Great Lakes and the St Lawrence River, is represented as the main factor which lowered continentality of Canadian eucumene by having increased transport, economic and geographical access to the sea. Overall, Canada demonstrates a successful realization of its maritime potential. It was proved by estimation of adducted transportation share of economy that confirmed considerable de facto cost reduction of transport work owing to sea transport use.

**Keywords** Canada, economic-geographical location, maritime location, transport, northness

Many generations of explorers never doubted in the fact of maritime location of Canada. These are the interocean location and the most extensive coastline in the world that imply the effective use of the benefits and advantages given by the seaside of the country. The ocean has always been a remarkable source of alimentation and at the same time an important transport route for the whole humanity. However, the immediate proximity to the sea does not always allow benefiting in every know way: as the researches of the Canadian transport and communication waters' characteristics show, it is tougher to benefit from its strategic location than the maps display. The configuration of inland waters, large rivers, harbors suitable for ports, width and flow capacity of the channels, ice situation and other conditions of navigation do have great influence on the integral assessment of the maritime location in particular and on the whole development of the seaside region in general.

A value of maritime location was widely presented in the classical works on geopolitics (K. Ritter, H. Mackinder, K. Haushofer, F. Ratzel, A. Mahan, P.N. Savitsky, A.G. Dugin, etc.), economic geography and economy (W. Petty, A. Smith, L.I. Mechnikov, N.N. Baranskii, I.M. Maergoiz, V.V. Pokshishevsky etc.). Among recent works, research of L.A. Bezrukov pioneered the concept of continental-oceanic dichotomy worthy of being noted. He

also proposed a method for assessing the impact of maritime position on international and regional development, most thoroughly examining the problems associated with continentality of Russia.

Such studies are relevant to other countries. Thus, commitment of Canada to diversify its geographical structure of foreign trade relations led to a marked increase in interest in the subject. This paper aims - geographical assessment of maritime location provisions of Canada.

### **Canadian maritime location: unobvious fact**

Generally the studies of the seaside region begin with the estimation of its coastline. Canadian coastline is more than 200 thousand km, which five times long as equator. Canada ranks first in coastline in the world and is formally “the most maritime country of the planet”. Mr Y. N. Gladki<sup>1</sup> suggests calculating coastline length-to-land frontiers ratio – for Canada this ratio equals to 20 (comparing with Russia – 1,8; Germany – 0,65). Next figure is that of “remoteness from the world ocean”<sup>2</sup>, which is a coastline length-to-square root of the land area ratio. For Canada this ratio equals to 22, comparing with the Italian peninsula with the ratio of 24 and the isle of Greenland with 20. Given the high quotients from the calculations we can speak about the beneficial maritime location of Canada. At the same time such index as the number of population having their domiciles not far than 100 km from the seaside<sup>3</sup> – approximately 15% of the total – implies that the population of Canada lives quite far from the ocean, the same situation as in Russia.

Thus each approach used separately would not allow judging the extent of so-called maritimeness of Canada, and the combined use of different approaches could lead to discrepant results. Moreover, none of the given above approaches gives any notion of the possibility of navigation in the nearby seas and of the geographical distinctions of the sea access from region to region; provided the conditions of the world being more and more global, it is the potential of navigation that becomes a remarkable factor of competitiveness (price aspect of) for the country in the international market.

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<sup>1</sup> Gladkiy Ju.N., Sravnitel'nyj podhod k ocenke geograficheskogo polozhenija afrikanskih stran (Comparative approach to assessing the geographical situation of African countries), Jekonomicheskaja i social'naja geografija: problemy i perspektivy., Izd-vo GO SSSR, 1984, pp. 127-145. (Rus)

<sup>2</sup> Illarionov A.N., Pivovarov N.A., Razmery gosudarstva i jekonomicheskij rost, (Dimensions of state and economic growth), Voprosy jekonomiki, 2002, №9, pp. 18-45. (Rus)

<sup>3</sup> Gallup J.L., Sachs J.D., Mellinger A. Geography and Economic Development. 1999.

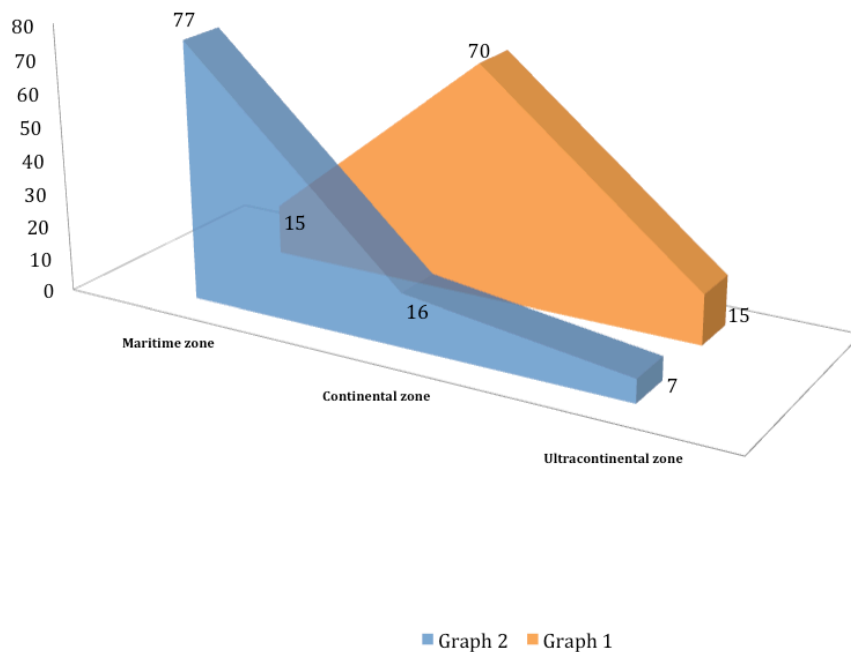
– [http://www.hks.harvard.edu/var/ezp\\_site/.../001.pdf](http://www.hks.harvard.edu/var/ezp_site/.../001.pdf)

A strategy for estimating transport geographical continentality elaborated by L. A. Bezrukov<sup>4</sup> takes into consideration allocation of population in the fixed zones with different remoteness from the seashores and ports with year-round navigation (pic. 1, pic. 2). At the first stage we made an estimation of the Canadian seas from the point of view of the usage of their transport and communication qualities. The list of year-round navigable waters includes: the coast of the Pacific Ocean (port Vancouver, Prince Rupert) and the south coast of Newfoundland and New Scotland (ports St. John's, Saint John and Halifax). The total length of the coasts of these fully free from icing waters does not exceed 10% from the whole country coastline.

**Picture 1.** Transport geographical continentality of Canadian city population, %

**Graph 1** – allocation of Canadian population regarding seas and oceans with year-round navigation

**Graph 2** – allocation of Canadian population regarding seas and oceans with year-round navigation including inner water ways available for sea vessels



On the next stage we calculated the index of transport geographical continentality<sup>5</sup>, which took into account, not only transport access to sea but also the extent of population of a zone. This circumstance shall allow estimating the maritimeness of the location not only for some zone, but also for the most populated regions. For the analysis we chose Canadian

<sup>4</sup> Bezrukov L.A. Kontinental'no-okeanicheskaja dihotomija v mezhdunarodnom i regional'nom razvitii (Continental-oceanic dichotomy in the international and regional development), Novosibirsk: Akademicheskoe izd-vo «Geo», 2008, pp. 369 (Rus)

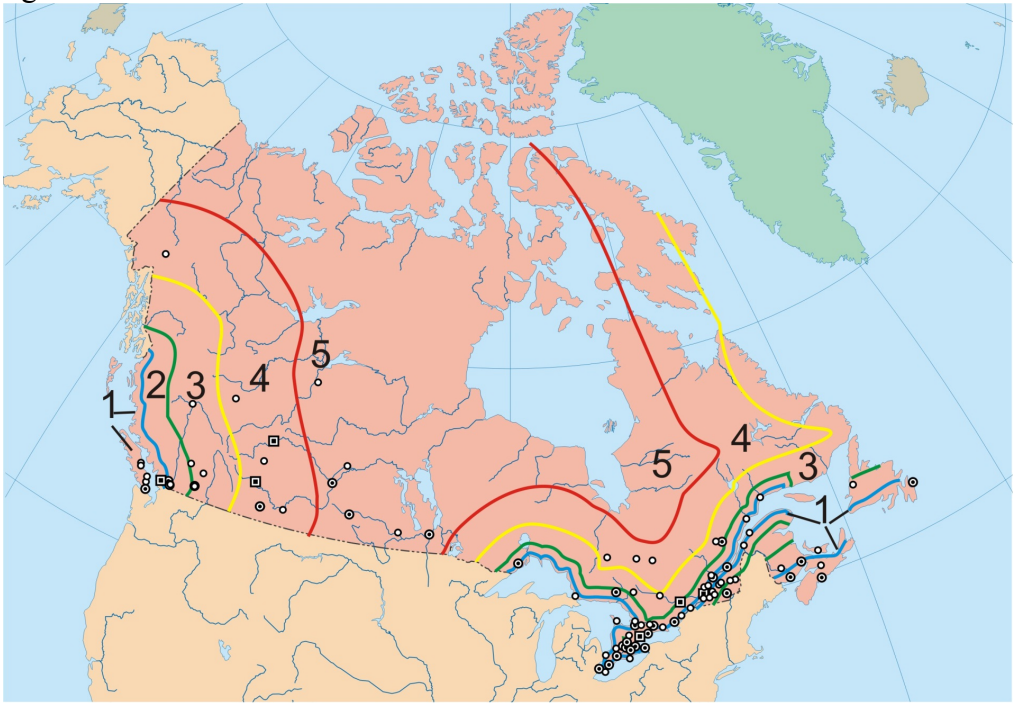
<sup>5</sup>  $Ctg = 0,01P_{(I\ zone)} + 0,05P_{(II\ zone)} + 0,14P_{(III\ zone)} + 0,3P_{(IV\ zone)} + 0,6P_{(V\ zone)}$

Ctg – extent of transport geographical continentality; P – part of population in a zone (%) [By L. Bezrukov]

towns with population of more than 20 thousand people. Total population of these 105 towns is nearly 22 million people, or 70% of the whole number of citizens.

According to our calculations, the index of extent of the transport geographical continentality of Canada equals to 24 (This is rather high, comparing with Iran's 24 but is almost two times less than Russia's 42). The basic reason for high extent of Canadian continentality is the position of this giant country in the northern part of the North American continent. The Arctic formally called seashores have continental features in respect to transport, i.e. vessels cannot reach them during the bigger part of the year. That is what predefined its limits to ice-free sea access as well as huge inner space with giant land distances. Canada has no significant ports in its northern coast. Even from the number of local seasonal ports it is worth mentioning only Tuktoyaktuk (Port Brabant), Churchill, Mousoni.

**Picture 2.** Allocation of Canadian cities by zones of remoteness from year-round sea shipping routes.



On the following stage of estimation of maritime location of Canada we took into consideration inner significant waterways (navigable rivers, lakes and channels) available for sea vessels and possessing a possibility of year-round (or shortly discontinuous) navigation. In Canada this list includes the Great Lakes, the St Lawrence River and deep-water shipping

route of the same name. This deep-water shipping route allowed sea vessels going 3.000 km far inland towards the industrial center of the North American continent. Year-round navigation became possible since 1969 and is provided by icebreakers up to the port of Montreal, while navigation on the Great Lakes and channels is interrupted from the beginning of January till the end of March. Besides the seasonal break in navigation along the deep-water seaway there is also a limit as to sizes of vessels. However, these peculiarities do not belittle those advantages of maritime location given by the seaway to the local territories. It is proved by 10 out of 17 greatest ports of Canada located on the deep-water seaway and on the banks of St Lawrence River. The total freight turnover for Canadian ports in the inner seaways exceeded 135 million tons (that is 30% of the total figure), and volume of American-Canadian lake trade went over 45 million tons (50% of the volume of American-Canadian sea trade)<sup>6,7</sup>.

#### **Features for zones of remoteness**

The made zoning of Quebec allows getting more detailed perception of territorial distinctions as to maritimeness and continentality of its separate regions.

Analysis showed, that **the maritime zone** occupies 10% of the total territory and accommodates more than 75% of population. A peculiar feature of allocation of Canadian population in this zone is that of its concentration not on the ocean coasts, but alongside the inner water system of the Great Lakes and St Lawrence River. It is the opening of navigation on this ways that made the greatest Canadian cities of Toronto, Hamilton, Montreal and Quebec maritime; in fact they became seaports (pic. 1).

The deep-water seaway became an important part of territory, thus accumulating all the advantages of maritime position. 18 out of 40 Canadian agglomerations with population of more than 100 thousand people are located here. They all form part of an ample urban zone called "*Corridor Quebec – Winsor*" located alongside the deep-water seaway. It owes water transport system of St Lawrence and the Great Lakes its development.

The economic center of the Canadian pacific named Great Vancouver region is located in the immediate ocean coasts. The industrial boom of the Southeast Asia in the last quarter of the XX century lead to a drastic increase of navigation in the Pacific Ocean, which gave birth to dynamic urban and economical development of Vancouver as the main port directed

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<sup>6</sup> Les Transports au Canada 2011 – <http://www.tc.gc.ca/fr/politique/rapport-aca-anre2011-index-3010.htm>

<sup>7</sup> Institut de la statistique du Canada. – <http://www.stat.gouv.qc.ca>

towards Asian-Pacific region. In 2009 the freight turnover of the port went over 100 million tons. Nowadays it is the only *world port* of Canada.

In the Atlantic maritime zone the agglomerations of Halifax, Saint John, Cape-Bretton, St. John's and Moncton are located. Their dynamic urban and economical development is provided mostly by use of resources and transport possibilities of the ocean for realizing external and internal links by sea. At the same time their marginal position and remoteness from the economic center restrain development.

**The continental zone**, which forms 40% of the territory, accommodates 16% of population. Such millionaire agglomerations as Edmonton and Calgary are situated in the continental zone. Their rise in the last quarter of the XIX century is connected with railways arrival, and modern dynamic development is due to oil and gas production and export. This region is one of the most sustained in development and wealthy in Canada. As a positive factor a fact of positive inner neighborhood supported by high level of open frontiers and their transport transparency could be mentioned. However, the main channel of export is an ample net of pipelines, not railways and highways. All this allows Alberta compensating its inner position and successfully competing in the market of fuel resources.

**The ultracontinental zone** occupies more than half of Canadian territory, accommodates only 7% of its population. Such large cities as Winnipeg, Saskatoon and Regina are located there. The biggest agglomeration of this zone is Winnipeg, capital of Manitoba. These are railways that created Winnipeg, which got its central importance and became a gate to a huge inland: all the goods arriving from the East are allocated here, and all the good from the West are delivered here for further shipment to the other regions. Uniqueness of its transport geographical position consists in the fact of being the only city between Vancouver and Thunder Bay with direct railway service with the USA. Emerson railway points results as having the biggest turnover in its inland transition on the 59<sup>th</sup> parallel<sup>8</sup>.

Analysis of allocation of big cities shows mainly maritime character of that in Canada, but it is necessary to make a reservation and add that it is not only due to influence of the seas and connected with it inner waterways. First, this "movement towards the sea" was greatly influenced by historical peculiarities for the colonization of the Canadian territory (but could it be considered accidental that it was the Atlantic region and banks of the St Lawrence River where the settlement and developing began). Secondly, the influence of the complex climatic

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<sup>8</sup> Institut de la statistique du Canada. – <http://www.stat.gouv.qc.ca>

and geographical reasons, which determined concentration of the population in the south of the country (middle territorial temperature in Canada is -4,4 Celsius, middle demographical<sup>9,10</sup> - +5,5). Finally, the concentration of the demographic and economic potential in seaside (and conditional seaside) zone is amplified by its position nearby the USA border: as the US is the principal trade partner of Canada.

The study suggests the "multidimensionality" of seaside position of Canada. For Canada, an interesting mix of "coastal states" is typical: a high degree of continentality of the territory, and at the same time "shift to the sea" of the population, not to ocean coasts, but to the anthropogenical-maritime regions of St. Lawrence River and the Great Lakes. Perhaps it is the study of the consequences of this "controversial" transport and geographical position relative to the sea that generates even greater interest, its impact on the economy and in particular on the territorial organization of the economy of Canada. To do this, we analyzed the placement of mining industries by the zones of remoteness from year-round shipping routes and ports.

### **Continentality of the extracting industries**

The choice of the resource sector as a subject to analysis of allocation of its industries as to being place in the zones of remoteness from the year-round transport routes and ports is defined by its importance for Canadian economy. Firstly, sectoral structure of Canadian economy is typical for postindustrial countries; nearly 30% of GDP is formed by material production sector. At the same time, comparing with other principal market economy countries, we can mark the quota of the "first" sector industries in Canadian material production, e. d. industries, connected with extraction and initial handling of raw materials and utilities together with production of industrial goods. The resource sector quota in GDP during 2000-2013 was less than 12%. In particular, the quota of oil and gas industry together with coal extraction was 4%<sup>11</sup>. The importance of resource sector is also great for Canadian exportation. Despite the presence of significant structural shifts after the NAFTA agreement (during the first decade of the functioning of this agreement the resource export quota decreased from 50% to 35%), in the first decade of the XXIst century the resource export quota increased again reaching 45% in 2013.

Secondly, the analysis of allocation of industries and export of the most mass (those of large tonnage) types of raw materials – coal, oil and ironstone – by the zones of remoteness

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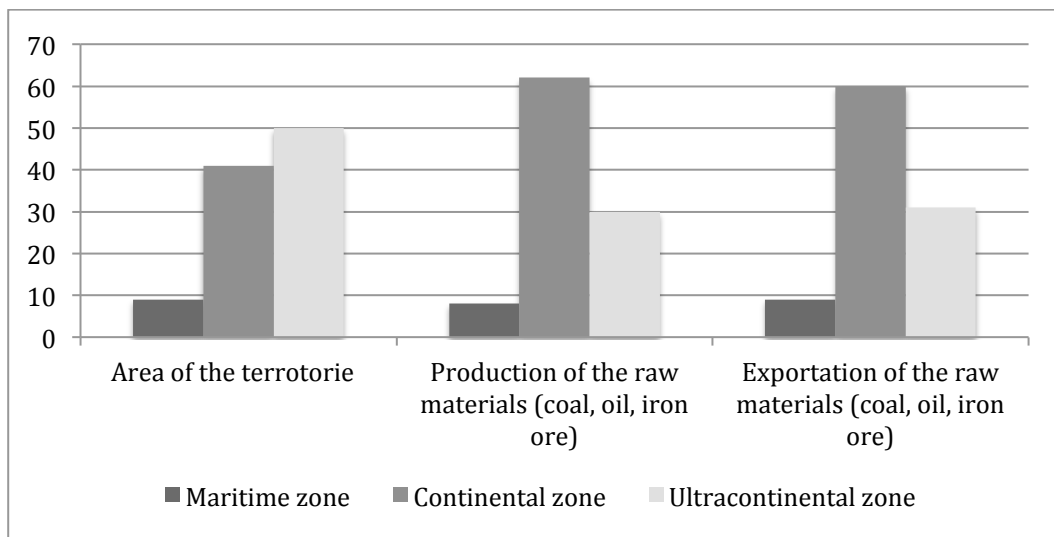
<sup>9</sup> The average temperature for the area with the majority of the population of Canada.

<sup>10</sup> Trejvish A.I., Gorod, rajon, strana i mir. Razvitie Rossii glazami stranoveda (Town, region, nation and world. Development of Russia view by regional geographer), M.: Novyj hronograf, 2009, pp. 369 (Rus)

<sup>11</sup> Institut de la statistique du Canada. – <http://www.stat.gouv.qc.ca>



from sea shows the volumes of economic activity and extent of adaptation of the country's economic systems to their intercontinental functioning. As it was showed before, the territory of Canada is mostly continental and ultracontinental. This means that these are its own producers who would bare the significant part of transport costs when delivering the goods to the international market from the country's continental parts. They pay the most expensive part of the route, e. d. land transportation of the goods to the seaports and frontiers<sup>12</sup>. It is curious if it means the absence of advantages or lack of competitiveness for Canada worldwide in connection with high continental transportation costs. Firstly, this may influence large tonnage mass cargos including raw oil in particular. In spite of oil being considered as the most expensive raw material (at the price of 110 USD for a barrel a ton is 814 USD), a lot of other ores and metals (bauxites, lead etc), round wood, cotton, rice etc. have the same price. This fact renders oil, coal and ironstone relatively lowtransportable<sup>13</sup>, hence their transportation to long distances is significantly limited.



**Picture 3.** The shares of different zones of the distance from the sea routes

However, it could be seen from the world exporters and producers of the main types of raw materials ratings that Canada does not yield its positions in their production but takes notables positions in export. Thus, during the first decade of the XXIst century Canada saved its positions in the top ten oil and ore extracting countries (6<sup>th</sup> and 9<sup>th</sup> correspondently) and

<sup>12</sup> According to basis of export, the Sellers are to effect (e. d. to pay) the transportation of the goods up to the frontier of the importing country. This means, that the Sellers pay delivery to the seaport and loading on board the ship according to FOB, or transportation to the defined point at frontier according to DAF. Further transportation costs for delivering the goods to their destination country including sea and land types of it, are to be borne by the Buyers.

<sup>13</sup> Bezrukov L.A. Kontinental'no-okeanicheskaja dihotomija v mezhdunarodnom i regional'nom razvitiij (Continental-oceanic dichotomy in the international and regional development), Novosibirsk: Akademicheskoe izd-vo «Geo», 2008, pp. 369 (Rus)

was 13<sup>th</sup> in coal production. Canadian positions as to exporting countries rating are even more considerable – it is the 4<sup>th</sup> place in coal export, 5<sup>th</sup> in ironstone export, 10<sup>th</sup> in oil export. This situation causes a question: what is the real allocation of resource and export potentials by the zones of remoteness from the seas? How does Canada manage to come over and to adapt to inner continental functioning?

The effected analysis shows the continental and ultracontinental zones, forming 90% of the territory, contain in its interior nearly 90% of the most important types of resources (pic. 3). These are the ultracontinental zones where the unique by its productivity deposits and provinces are situated – West Canadian sedimentary basin and ironstone belt of Labrador Peninsula. West Canadian sedimentary basin is a giant resource province whose interiors contain 90% of Canadian oil and coal potential. 95% of the Canadian oil richness arises from the bituminous sands of West Canadian sedimentary basin. After all, Canada yields to Saudi Arabia and Venezuela its place in the proved oil reserves rating – 179 billion barrels as estimated in 2007 ( $28 \cdot 10^9 \text{ m}^3$ )<sup>14</sup>. In the same place we have 90% of coal, whose reserves exceed 8,5 billion of tons (8<sup>th</sup> in the world). The ironstone belt of Labrador is a unique deposit differing by both size (length up to 1000 km) and iron containing (up to 65%). 2/3 of the reserves are accumulated here, and they exceed 5,5 billion of tons of ore. As a result, minerals of the sedimentary cover and the Canadian platform shield are significantly remote from seaports and seaways with year-round navigation together with deposits of rugosity zones framing Canada from east and West.

At the same time producing and export potentials of minerals' deposits depend on a number of parameters of the resources, on the prime cost of extraction, world prices on resources and on ways of their delivery to consumer. Maritime zones have the most preferable transport facilities. After all, freight fees of the maritime transport are more than lower than average income rates of rail transport and more than 100 or even 150 lower than those of automobile transport<sup>15</sup>. This explains higher quota of the maritime zone in production and export of raw materials, which is typical worldwide. Thus, the quota of the maritime zone in production of medium, reduced and low transportability goods as a rule exceeds 50%

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<sup>14</sup> The World Factbook, chiffres 2012 // Central Intelligence Agency <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2244rank.html>

<sup>15</sup> Bezrukov L.A. Kontinental'no-okeanicheskaja dihotomija v mezhdunarodnom i regional'nom razvitii (Continental-oceanic dichotomy in the international and regional development), Novosibirsk: Akademicheskoe izd-vo «Geo», 2008, pp. 369 (Rus)

reaching 60-95% in the world export. Vice versa, ultracontinental zones' quota in world export of reduced and low transportability goods equals to 2-11% (by type of product)<sup>16</sup>.

Maritime zone of Canada, including conditionally maritime, gives less than 8% of the most important raw material types produced (pic. 3), which is contrary to world practice. Among raw material produced here we are to notify principally shelf oil deposits near Newfoundland (Hibernia, Terra Nova, White Rose) and New Scotland (isle of Sable), which provide 400 thousand barrels per day, e. d. nearly 10% in Canadian annual production. The total volume of extraction keeps reducing together with the quota of the region in Canadian extraction in connection with the high extent of workout of deposits. Part of oil extracted in the mentioned deposits is exported. Total quota of the maritime zone in Canadian oil export is 6%. This figure includes also insignificant oil export to China from port Vancouver.

Production of other types of raw materials in the maritime zone is extremely insignificant. Ironstone extraction is effected by Craigmont Mines Ltd Company, which also produces magnetite from final tailings of copper containing minerals of the Craigmont deposit (British Columbia). 70 thousand ton of this raw material is produced here annually, which barely equals to 1% of Canadian ironstone production.

The main coal reserves of Canadian coal are found in North Appalachian mountains and the basin of Vancouver island. 3 out of 22 coalmines like Quinsam (British Columbia), Minto (New Brunswick) and Stellarton (New Scotland) which gave about 0,7 mln tons of coal in total up to 2009 when the extraction here was suspended are situated in the maritime zone of Canada.

Despite the maritime zones possess the most favorable transport facilities, their quota in Canadian raw materials' production and export is quite low. Insignificant volumes of industrial mineral reserves could explain it. Out of the extracted minerals only oil is exported, however, most of it.

Inner continental regions are deprived of these favorable transport facilities. Producer and exporters located in inner continental territories are to overcome huge land distances which leads to inevitable and drastic increase in price and reduction of competitiveness of the goods worldwide. After all, picture 2 shows continental and ultracontinental zones which form 90% of the country's territory to produce more than 90% of the most important types of raw material including 2/3 of the continental zone. Here the raw materials of the greatest importance are produced in considerable volumes. In particular, nearly 90% of Canadian

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<sup>16</sup> *Ibid.*

extraction is accumulated here: Alberta (72%), Saskatchewan (15%), British Columbia and Manitoba (1%).

Slightly more than 30% is extracted in continental zone, while 60% is extracted in ultracontinental. Such a proportion has been defined recently – the increase in prices of 2003 made working the bituminous sands of Athabasca (Alberta) profitable. Instead of expected decrease in the first decade of the XXIst century we could notice a persistent increase in Canadian oil extraction from 2,8 to 3,5 mln barrels per day and, as a result, a significant amplification of its export having sustained volume of import.

At the same time inner continental location of the principal oil deposits does not impede Canada to be one of the most prominent exporters of this important raw material. Canada exported 95 mln tons of oil in 2010 against 60 mln tons in 2000. Canada possesses an ample network of pipes that correspond a lot better with those of the USA than those of the eastern provinces; also, the distance to American markets is considerably smaller than that to the main refining regions<sup>17</sup>. Unlike the extraction regions situated in the west of the country, the main centers of refining are situated in the east – in Ontario and Quebec, and also in several Atlantic Provinces. Taking into account their significant remoteness from the extraction regions and insufficient development of inner facilities (low pipe capacity), it is logic that Canada buys high volumes of oil. As a result the powerful refining complexes are used fully (Levi, Montreal) or partially (Sarnia, Saint Jean) on imported raw materials (in 2000s Canadian import was equal to 40-45 mln tons). Getting profit from their maritime location, these refining plants get oil from the North sea and Northern Africa (which is 10% cheaper than inner continental raw materials) and dispatch part of their production by sea as well.

Canadian oil industry managed to compensate its disadvantageous inner continental location by benefiting from neighborhood. However, the increase in extraction has lead to full pipe capacity, and Canada has to increase it together with searching for new markets. After all, the second question is a more urgent agenda as the USA are highly against “filthy” bituminous oil. Nevertheless, the new client of Canada has been already disclosed – this is China, who has invested in workings in Athabasca. It is evident than dispatches are possible only from the maritime zone, and Canada does already have variants for placing such a terminal (Prince Rupert, Churchill etc.). This makes us conclude that unlike classic oil whose

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<sup>17</sup> We may speak of three main pipelines used for exporting oil from Canada to the USA. The largest of them is Enbridge Pipelines Inc. (2/3 of the total export volume), the two others – Trans mountain pipeline Inc. and Express Pipeline Ltd. – bare 1/3 of deliveries. They begin in Alberta (Edmonton and Hardisty), keeping to the Great Lakes district, to the Pacific coast, to the south of the USA correspondingly.

export is marvelously adopted to inner continental functioning, new workings in the ultracontinental zone would face the disadvantages of their location.

### **Transport and economic continentality of the extracting industries**

Unlike oil extraction, other producers of the raw materials being analyzed cannot use relatively cheap pipeline transport. They have to cover large land distances paying big. The main way to make deliveries to the world market cheaper for them is use of sea transport. That is why the production for export comes from continental and ultracontinental regions to seaports. Nearly 100% of coal and ironstone for export are shipped from Canadian port terminals.

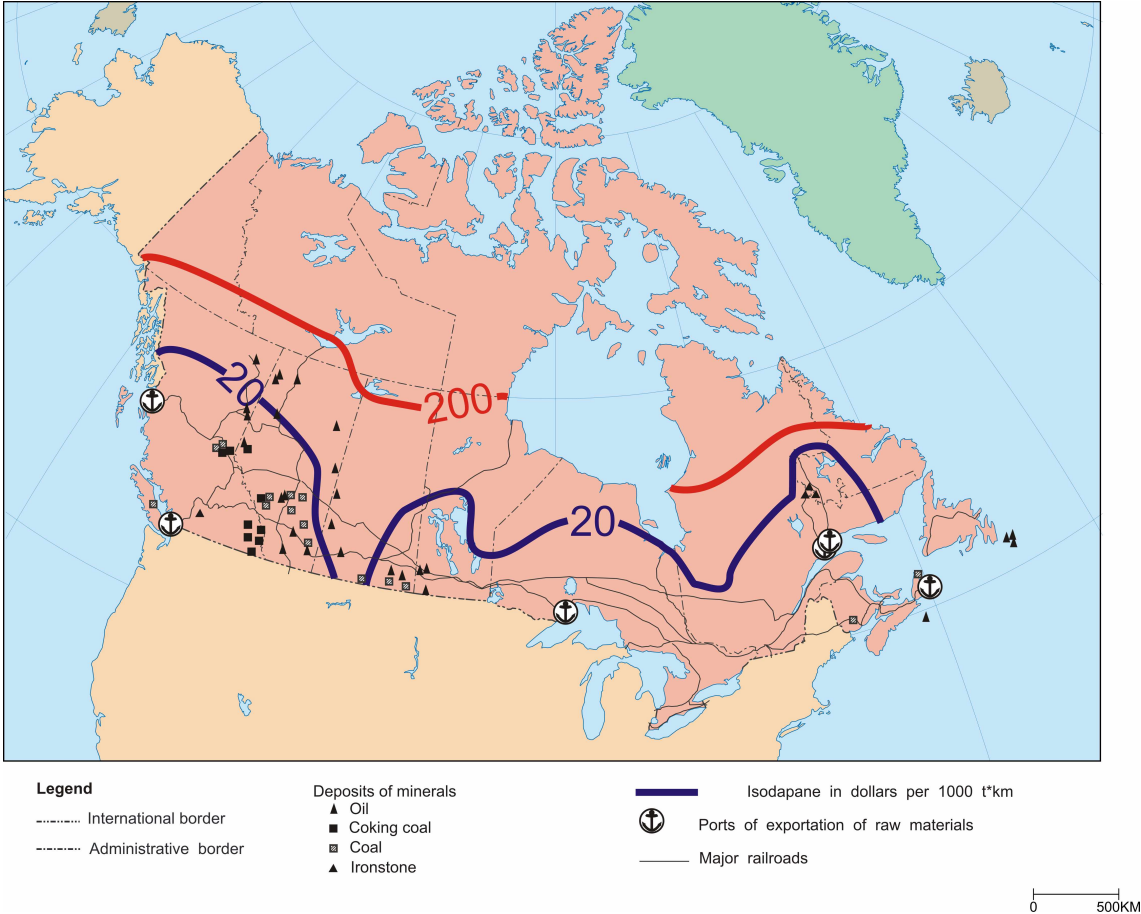
16 out of 22 Canadian coalmines are situated in continental zone. During the first decade of the XXIst century Canada produced 65-70 mln tons of energetic and technological coal at the average, given Alberta produces half of coal (30 mln tons) and British Columbia – one third (more than 20 mln tons). Unlike energetic coal, which is used in local power plants, coking coal is mainly exported. Its main volume is worked out in the continental zone in five deposits of the south of British Columbia, which belong to Elk Valley Coal Corporation. In total they dispatch more than 25 mln tons of coal. Alberta exports a bit less – about 5 mln tons. Canada yields only to Australia in volumes of technological coal export. Rail road transportation up to dispatch port – Vancouver and Prince Rupert (per 1000 km at the average) and further deliver to the world market using the cheapest sea transport are more profitable than delivering the goods to domestic market (transport and economic remote market).

Almost all the working Canadian deposits of ironstone are located in the continental zone – in Quebec (Fire Lake and Mont Wright), Newfoundland and Labrador (Wabush) – however delivery to domestic market is effected through maritime zone. Extraction regions are connected to ports of shipment by special ore transporting railways. The hugest ironstone Canadian ports Sept-Îles and Port-Cartier process 35-40 mln tons of ironstone annually. Part of the raw material is dispatched to metallurgy plants of Canada, but more than 75% of the ironstone dispatched is forwarded to the USA to the plants of the Great Lakes district and to Western Europe. As it is seen, sea transport has no alternative here. First of all, it is so because of absence of other types of transport in the region that could be suitable for mass cargos. Secondly, a potential opportunity of a special railroad construction is not profitable, as the expenses of transporting the ironstone materials will not be worth the money.

The analysis of the activities showed that the Canadian case (as in case of Russia) is out of the world practice. In this Canadian “anomaly” case production and export in

continental and ultracontinental zones are extremely high. In the beginning of the XXIst century minerals' extraction has moved deeper into the continental regions. However, expenses of these movements from sea and ocean coasts into the continent are not proportionate to physical distances. We can logically assume that the difference of the transport costs shall be influenced by existence in this or that region of a particular type of transport together with the difference in tariffs of the latters. Taking into account these factors would allow estimating transport and economic remoteness of various regions and of deposits in particular from ports with year-round navigation.

**Picture 4. Transport-economic continentality (TEC) of Canadian deposits of minerals**



Made by author

The skeleton map of **transport and economic continentality (TEC)** of Canada shows isodapane 20 dol. per 1000 km, which is considerate as separating zone of insignificant remoteness from sea shipping routes from that of significant<sup>18</sup>. As it can be seen from the

<sup>18</sup> Bezrukov L.A. Kontinental'no-okeanicheskaja dihotomija v mezhdunarodnom i regional'nom razvitii (Continental-oceanic dichotomy in the international and regional development), Novosibirsk: Akademicheskoe izd-vo «Geo», 2008, pp. 369 (Rus)

skeleton map (pic. 4), the zone of insignificant and average transport and economic remoteness from the year-round sea routes forms a wide stripe in the southern part of Canada from the Pacific Ocean to the Atlantic Ocean. This stripe coincides with the so-called Canadian “Ecumene”: 90% of population, 90% of GDP is allocated here, as well as the greatest density of transport network. Transcontinental railways of sublatitudinal direction – these are Pacific and National railways, form the basis of multimodal transport network. These transport axes provide connection between inland and ultracontinental regions with the ports of the Pacific and Atlantic oceans, serving as a transcontinental trade and transport corridor between the oceans at the same time.

Use of railways with relatively low tariffs allows reducing the effect of disadvantages of inland position of some provinces like Alberta and Manitoba essentially. It is confirmed by a significant displacement of isodapane 20 dol./t from the seashores to inlands on the skeleton map. Effect of the railways is also seen in a rather low gradient of the extent of continentality in the southern part of Canada.

In the eastern part of Canada the zone of insignificant remoteness from sea shipping routes is displaced to inlands. This is the evidence for the constant influence of the Great Lakes and St Lawrence deep-water shipping route, where the rates of profit are 7 times less than those of railways and 70 times less than those of autocars. Ultracontinental transport and economic zone is essentially narrowed from east and west, which is explained by low transport rates of profit (tariffs) on transcanadian transport corridor railways.

At the same time greater part of Canada, about 70%, pertains to the zone of significant transport and economic remoteness. This zone includes Far and Middle North and several territories of the Saskatchewan province not pertaining to the North. This coincidence does not seem to be accidental.

Firstly, the Northern territories, although characterized by having a wide access to the seashores, are essentially distant from the “effective” waters, which can be used for year-round navigation.

Secondly, high level of the transport and economic remoteness is defined by pertaining of these territories to the socio-economic zone of the North. The entire complex of reasons of natural (inclement climatic conditions, permafrost soils) and economic-geographical character (poor populated territory, insufficient saturation for basic funds and infrastructure) defines higher costs in context of transport developing of territory. These regions can be characterized by low extent of provision with transport ways in comparison with the previously developed

regions, which does not allow compensating known losses from continentality of their position.

The territory of Saskatchewan province is also characterized by significant transport and economic remoteness from seaports. Isodapane 20 dol./t borders the province of Saskatchewan from East and West. Overcoming of significant land distances of 1,5 thousand kilometers to the nearest ports – Thunder-Bay or Vancouver – even by railways does not allow compensating its inland position.

As we see, the case of Canada (as well as Russia, however) is out of the global patterns. To compensate for the unfavorable "landlocked" location of production facilities Canada, firstly, takes advantage of its neighbor's position. Secondly, actively uses relatively cheap pipeline to send oil from the inland areas. Finally, it is rail transport that played the crucial role to overcome significant overland distances. This universal transport network associates the most remote fields of coal and iron ore with the coast. Rail service allows to "extend" the transport-geographical (or rather transport-economic) benefits of the coastal regions in the landlocked territories. At the same time it is the sea transport that means to reduce the cost of raw materials supplies to the world market, and that means that development of all inland areas "leads to the coast."

As a result more than 25% of Canada traffic falls on sea transport, as well as 30% of the freight<sup>19</sup>. This is the high role of the low cost sea transport in cargo traffic that makes the transport fee part relatively low in respect to prime cost and final price of production (at the average it does not exceed 5-10% in developed maritime countries, according to S. Shlihter<sup>20</sup>).

The ratio between transport and production is shown by the figure of **transportation's share of economy**, which is calculated as a mere ratio of the total cargo traffic to GDP. It also mirrors the sizes and the configuration of the economical territory and constitutes a standard for transport functioning "space" effectiveness. The well-known transport geography specialist S. Shlihter marks the key influence of branch production structure together with a country's social and economic model on the figure of transportation share<sup>21</sup>. According to our calculations it equals to 0,5 tkm per 1 US dollar for Canada (table 1), which is higher than the averages in Germany (0,35) and can be compared to Japan (1,03) or Great Britain (1,02).

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<sup>19</sup> [Les Transports au Canada 2011 – http://www.tc.gc.ca/fra/politique/rapport-aca-anre2011-index-3010.htm](http://www.tc.gc.ca/fra/politique/rapport-aca-anre2011-index-3010.htm)

<sup>20</sup> Lipec Ju.G., Puljarkin V.A., Shlihter S.B., Geografija mirovogo hozjajstva, (Geography of the world economy), M.: Gumanit. izd. Centr VLADOS, 1999, pp. 400 (Rus)

<sup>21</sup> Ibid.



This data is a mere evidence of the Canada branch economical structure and “heavy” (raw material) branches key significance for the transportation share.

**Table 1. Calculation of transportation share and of adducted transportation share of Canadian economy in 2013**

GDP, bln US PPP	1 490
Total cargo traffic (without gas pipeline), bln tkm	763
Transportation share of economy, tkm/USD	0,5
Sea and inner water transport ratio in the total cargo traffic, %	25
Total adducted cargo traffic of transport (without gas pipeline), bln. tkm	627
Adducted transportation share of economy, tkm/USD	0,4
Savings from transport work owing to sea and inner water transport, times	1,25

Made by author

Also, it is worth admitting that in case of Canada the figure of transportation share is not fully representative. This is connected with the low costs for sea transport, whose importance for the country is high indeed. In order to take this circumstance into account we calculated the figure of “**adducted transportation share of economy**”, elaborated and used for the first time by L. Bezrukov. For these authentic figures of the most economic means of transport – i. e. sea and inland water – with the help of special reducing factors were adducted to the authentic figures for land transport<sup>22</sup>.

According to our calculations, the real transportation share of Canadian economy equals to 0,4 tkm per 1 US dollar, which is 25% less than its authentic figure. Given this figure of transport functioning (and transport costs) quantity we can classify Canada as the maritime type of countries. Although Canada’s figure is higher than that of “classic” maritime countries (Great Britain – 0,22), it is anyway significantly lower than that of continental countries (Russia – 1,8)<sup>23</sup>.

This is the adducted transportation share of economy figure that characterizes the plenitude of a country’s macroposition realization in respect to sea, as it takes into account the mere structure of cargo traffic and savings from transport functioning owing to the effective use of sea and inner water transport. The effected calculations are evidence of such an effective use of the macroposition in respect to the sea by the economy of the country.

<sup>22</sup> For adduction of the authentic figures for sea transport cargo traffic to those of land the reducing factor of 0.1 is taken; for inner water transport – 0,5 [By L. Bezrukov]

<sup>23</sup> Bezrukov L.A. Mirovoe hozjajstvo v kontekste kontinental'no-okeanicheskoj dihotomii (The world economy in the context of kontinental-oceanic dichotomy), Izvestija RAN. Ser. geogr., 2008, № 6, pp. 7–18 (Rus)

In classical works devoted to economic and geographical position it was mentioned more than once that economic and geographical position is potential and changeable in character, and, moreover, a territory itself could create it. Example of Canada presents just another proof. Here there is an interesting mix of giant inland spaces and vast seaside regions, which in combination with the natural geographic and socio-economic factors leads to a "multidimensional" maritime position and curious territorial organization of economy and population distribution.

Adaptation to the controversial transport-geographic situation of Canada observed in different processes: the expansion of the effective sea coasts and the "shift to the sea" of demo-economic potential of the country. As a result, Canadians were able to "build" the length of effective coasts and increase the degree of "maritimnesse" of territories and population. Simultaneously, socio-economic factors, aimed at the development of the coastal regions, enable to "extend" their benefits on the adjoining areas, lacking in direct access to the sea.

At the same time continentality was not compensated entirely: it would demand an ample transport construction in the northern regions of Canada (for compensating transport and economic continentality) and development of year-round navigation in Arctic (construction of a force icebreaking fleet, of several systems for satellite monitoring of ices). All these aspects are hardly possible in conditions of nidal development of the northern territories and of absence of a wide range of "cargo generators."