

## Geographic aspects of the Canadian oil industry - 1961

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## NOTES ET NOUVELLES

### Geographic aspects of the Canadian oil industry — 1961 <sup>1</sup>

#### *The overall problem*

Canada can produce more oil than she uses. But virtually all of her oil production is land-locked in the West while most of her population is in the East near the sea and accessible to cheap overseas oil. Consequently she imports a great deal of oil and leaves over half of her producing capacity idle.

Canada's oil producing capacity, 1.4 million barrels per day, greatly exceeds domestic consumption of oil, about 883,000 barrels per day in 1961. Canada, a country already burdened with an unfavorable import-export balance, produced only about 634,000 barrels per day in 1961 and in turn imported 45% of the crude oil used by her refineries (Table I).

TABLE I

BALANCE SHEET OF CANADIAN OIL (1961)	
	bbls/day
Crude oil production capacity . . . . .	1,400,000
Actual crude oil production . . . . .	633,650
Exports of crude oil . . . . .	184,365
Canadian crude used in Canada . . . . .	449,285
Imports of crude oil . . . . .	369,020
Total crude consumed . . . . .	818,305
Net imports of refined products . . . . .	64,350
Total apparent consumption, crude and imported products . . . . .	882,655
Refining capacity, crude oil . . . . .	968,600

<sup>1</sup> This note is a brief analysis of the information and data contained in *Oil and Gas 1961*, a special section of *The Financial Post*, December 2, 1961, pp. 49-62. Except where another work is cited, all data of a specific factual nature have been taken from this source.

This unhappy status of the Canadian petroleum industry results from three factors : (1) practically all of Canada's oil production is in the Prairies in the interior of western Canada while the bulk of Canada's population and more than two thirds of her refining capacity are located east of Lake Superior ; (2) the world oil market is currently glutted ; (3) oil production costs in Canada are relatively high. As a result of the first factor, long and costly pipelines are required for Canadian crude oil to reach eastern population centers. As a result of the three factors combined, overseas crude oil is cheaper in Montréal than Canadian crude. Consequently, all of the crude oil used by the refineries in Québec and the Maritime Provinces is imported. Western producers find themselves with a great surplus producing capacity and the difficult problem of finding export markets.

The petroleum industry is a very important segment of Canada's economy. If transportation, refining, and marketing are included, the petroleum industry is more important than any other industry in Canada except agriculture and perhaps the pulp-paper industry.<sup>2</sup> In the world oil picture, however, the role of Canada's petroleum industry is not a big one. Canadian production in 1961 was only about 2.8% of the world total and Canadian consumption only 3.9% of the world total demand for crude oil (Table II). Canadian crude oil reserves represent about 1.4% of known world reserves.

TABLE II

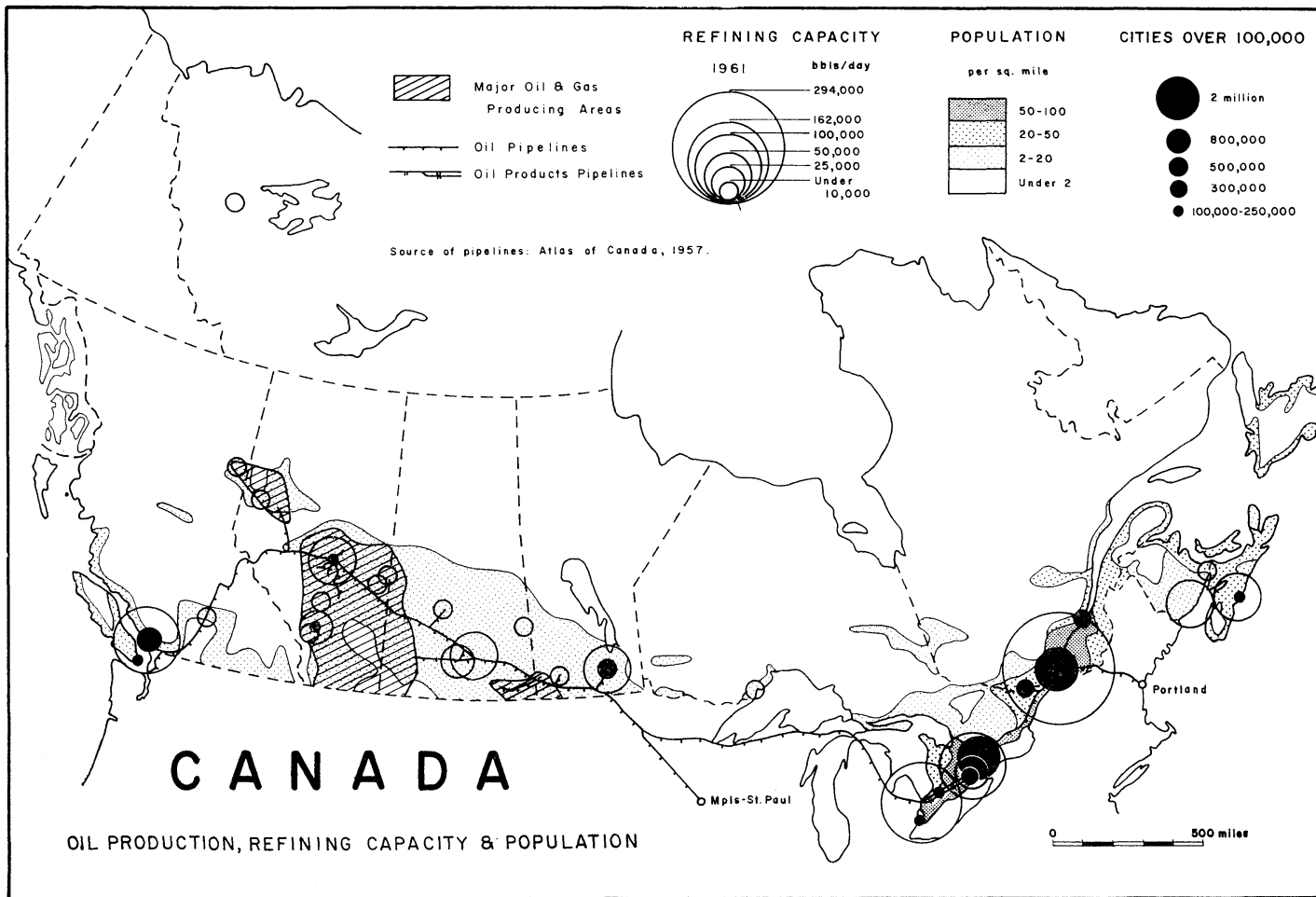
CANADA IN THE WORLD OIL PICTURE			
(end of 1960)			
	RESERVES bil. bbls.	PRO- DUCTION thsnds bbls/day	CON- SUMPTION thsnds bbls/day
Canada . . . . .	3.7	524	860
United States . . . . .	31.6	7,035	9,677
Venezuela . . . . .	17.3	2,846	164
Western Europe . . . . .	1.5	266	4,540
Middle East . . . . .	162.9	5,273	589
Soviet Union . . . . .	24.0	2,952	2,500
Far East . . . . .	9.6	581	1,655

#### *Oil production in the Prairie Provinces*

The pattern of Canadian oil production is shown on the map in Figure I. The two largest producing areas stretch in an arc from the Montana border to the Peace River district. Alberta straddles this arc, which includes part of

<sup>2</sup> DAVIS, John, *Les perspectives énergétiques du Canada*. Ottawa, Commission royale d'enquête sur les perspectives économiques du Canada, 1957, 414 pages, figures.

FIGURE I



western Saskatchewan and overlaps into British Columbia. In this discussion we shall include the British Columbia producing area, and the refinery at Taylor (near Fort St. John), with the Prairie Provinces. A third producing area is located in the southeastern corner of Saskatchewan and adjacent Manitoba.

Production statistics confirm the pattern on the map. Canadian crude oil production is given by provinces in Table III. Alberta leads by a wide margin. Saskatchewan ranks second, and Manitoba follows far behind. Production in British Columbia is small and that in the Northwest Territories and eastern Canada is practically negligible. In fact, the entire crude oil production of all of Canada east of Lake Superior would scarcely supply the needs of one of the smallest of Canada's 44 refineries. Canadian oil production is clearly — and almost exclusively — in the Prairie Provinces, principally within the inhabited parts of Alberta and Saskatchewan.

TABLE III

CANADIAN CRUDE OIL PRODUCTION		
bbls/day		
	1961	1960
Alberta.....	459,300	377,294
Saskatchewan.....	151,735	143,685
Manitoba.....	12,515	13,017
British Columbia.....	5,500	5,565
Northwest Territories.....	1,400	1,244
Eastern Canada.....	3,200	2,784
Total.....	633,650	543,589

This pattern of oil production is not an old one. It is a pattern which for the most part has developed since the discovery of the Leduc field near Edmonton in 1947. Prior to that time little oil was produced in Canada, and in 1947 less than one tenth of Canada's needs was supplied by domestic oil.<sup>3</sup> The historical pattern of Canadian oil production reflects developments since the 1947 discoveries (Table IV). In 1961 production was about 634,000 barrels per day.

Canadian oil production increased about 18% from 1960 to 1961. This increase is accounted for mainly by the fact that exports jumped 60%. The marked increase in exports is attributed to the action of the Federal government, which will be discussed later. Due in large part to the increased production, profits of most producing companies rose markedly in 1961.

<sup>3</sup> *Ibid.*, p. 126.

TABLE IV

CANADIAN OIL PRODUCTION AND CONSUMPTION (thousands of bbls/day)					
	1920	1930	1940	1950	1955
Canadian crude oil production . . . . .	1	4	23	80	355
Total Canadian consumption, all types of products . . . . .	39	104	158	367	633

*Source* : DAVIS (see footnote 2), pp. 139, 141.

*Predominance of eastern Canada in refining*

Refining capacity is shown by graduated circles on the map in Figure I. Where two or more refineries are located in the same town or metropolitan area, their capacities have been combined and shown as one circle. For example, the circle for Montréal represents the combined capacities of six refineries, that at Edmonton three refineries.

The pattern of refining capacity, like practically all other patterns of human geography in Canada, is broken in two at Lake Superior where the margin of the Canadian Shield extends across the international boundary into the American states of Minnesota and Wisconsin. Thus, we have the refineries of eastern Canada and those of western Canada. The combined capacity of the refineries east of Lake Superior is about 663,000 barrels of crude per day, more than twice that of the refineries west of Lake Superior, which is about 306,000 (Table V). The outstanding predominance of the East in refining is immediately clear.

The pattern of refining capacity is to a large extent a pattern of population. On the map in Figure I, population density is shown by shade patterns and large metropolitan areas by proportional dots. Most Canadian refineries have been built near the major population centers, which are the main consuming areas. This is in accordance with the current world trend for refineries to be located near the markets rather than in the producing areas.

The refineries of the country can be grouped into a number of refining areas : Montréal, southern Ontario, the Maritimes, the Prairies, and Vancouver. These areas correspond to the major population concentrations of Canada : the St. Lawrence Valley, the Ontario Peninsula, coastal areas of the Maritimes, the Prairies, and the Vancouver-Victoria area. The combined capacity of each of the refining areas designated above is given in Table V.

When one examines the pattern of refining capacity in more detail, it becomes necessary to refine the statement that it is for the most part a pattern of population. The distribution of refining capacity represents a compromise between proximity to consuming centers and access to crude oil transportation facilities.

The refining capacity at Montréal is greater than that at any other Canadian city or in any other province. The main population concentration of the St. Lawrence Valley continues from Montréal to the city of Québec, but all of the refineries of the province are in the Montréal metropolitan area, at the terminus of the crude-oil pipeline from Portland, Maine. Harbor facilities at Portland are ice free throughout the year ; the ports of the Province of Québec are closed to ocean tanker service during a few months each winter.

TABLE V

REFINING CAPACITY BY REFINING AREAS (end of 1961)			
	bbls/day		
Maritimes . . . . .	106,800		
Montréal . . . . .	294,000		
Total Québec and Maritimes . . . . .			400,800
Southern Ontario . . . . .	262,250		
Total Eastern Canada . . . . .		663,050	
Prairie Provinces . . . . .	206,400		
Vancouver . . . . .	89,000		
Other . . . . .	10,150		
Total Southern Ontario and Western Canada . . . . .			567,800
Total Western Canada . . . . .		305,550	
	968,600	968,600	968,600

The refineries in the Maritime provinces are in or near the four principal cities of those provinces : Halifax, St. John (New Brunswick), Moncton, and St. John's (Newfoundland). All are accessible to tanker service most or all of the year.

The southern Ontario refining area ranks second to Montréal in refining capacity. The refineries of the province are located in two places : near Toronto, the great metropolis of the province, and at Sarnia. Those near Toronto are along the shore of Lake Ontario between Toronto and Hamilton. Sarnia has three large refineries and as a single refining center ranks second to Montréal. Sarnia is the terminus of the Interprovincial pipeline and the first port of call between the upper Great Lakes and Ontario population centers.

In the Prairies the string of refineries from Winnipeg to Edmonton to Calgary corresponds to the population crescent — not to the producing areas. Winnipeg — St. Boniface, Regina, Moose Jaw, Edmonton, and Calgary all have moderately large refining capacities. Saskatoon, the only other large city of the Prairies, has a small refinery. A number of small refineries are scattered between these major population centers. There are two small refineries in the Peace River district.

All of the refineries of southwestern British Columbia are in the metropolitan area of Vancouver, which ranks next to Sarnia as a single refining center.

In addition there are small refineries at Fort William, Kamloops, and Norman Wells (included as "other" in Table V), which do not fall in any of the major refining areas as designated in this article.

Total capacity of Canadian refineries at the end of 1961 was 968,600 barrels of crude per day. Refinery runs in 1961 averaged about 820,000 barrels per day, leaving a spare refining capacity of 10%-15%. Three new refinery projects are under way in Ontario. A new refinery is to be constructed near Hamilton. Additions are being made to the capacities of existing refineries at Port Credit (near Toronto) and Sarnia. It can be noted that these new construction projects will not change the pattern of refineries in Canada. They will merely increase the predominance of the East in refining and probably bridge the gap between the southern Ontario refining area and the Montréal area, thereby making Ontario the leading refining province. Canadian refiners find themselves in a tight competitive squeeze which is made worse by the spare refining capacity.

#### *Imbalance in the industry and the transportation problem*

We have seen that practically all of Canada's oil is produced in the Prairies while most of the population and refining capacity are situated a few thousand miles away in the East. The Prairies have virtually all of the oil and less than  $\frac{1}{5}$  of the population. The East has practically no oil and nearly  $\frac{3}{4}$  of the population. In the West all of the oil is produced east of the Rockies while  $\frac{1}{3}$  of the population of western Canada lies across the mountains in British Columbia.

This imbalance between the producing and consuming ends of Canada's petroleum industry presents an enormous transportation problem and has resulted ultimately in two things: (1) long and costly pipelines have been constructed to supply Canadian crude to southern Ontario and Vancouver; (2) Québec and the Maritimes continue to utilize only foreign oil. Consequently, there are two nearly independent systems of supply, refining, and consumption within the Canadian oil industry: (1) Québec and the Maritimes, whose refineries are supplied with overseas oil; and, (2) most of Ontario and the rest of Canada, which use Canadian crude. The Montréal — Maritimes system is the smaller, but the two systems are not vastly different in size (Table V). The two separate systems are not entirely independent. Products pipelines link Montréal with Toronto and Ottawa (Figure I), and a certain quantity of refined products moves into Ontario from Montréal.

The backbone of the transportation system which brings Canadian crude to the refineries which do not use imported crude is two major pipelines, both of which originate at Edmonton (Figure I). Alberta oil fields are linked with Sarnia by the Interprovincial pipeline, which passes south of Lake Superior and Lake Huron through the United States. This pipeline was initially completed to Lake Superior port facilities at Duluth-Superior. It was later extended to Sarnia, and Sarnia became the base point for the determination of price. Refined products move from Sarnia to the Toronto area by means of two oil-products pipelines.

The Trans-Mountain pipeline carries Canadian crude to the important refining area at Vancouver and enroute serves the small refinery at Kamloops.



Alberta oil has been supplying all of the Vancouver market. A 550-mile pipeline is now under construction from the Peace River district to Kamloops, where it will connect with the Trans-Mountain. This pipeline will open the large Vancouver market to B. C. crude.

The reason that refineries in Québec and the Maritimes use foreign rather than Canadian crude oil is a matter of prices — prices which reflect the imbalance in the Canadian oil industry and the status of the world oil market. Production and transportation costs are two of the most important elements affecting prices of crude oil. Production costs in Canada are high by Middle East standards. The cost of exploration and production is about one dollar per barrel in Canada. In the Middle East, where average output per well is the highest in the world, it is only 20-30 cents.<sup>4</sup> The principal problem for Canadian producers, however, is transportation costs due to the great distances that domestic oil must be transported over land to reach major consuming centers. The cost of transporting crude oil from Alberta to southern Québec was about 90 cents per barrel in 1957; from the Middle East or Venezuela to Montréal it was about 38 cents.<sup>5</sup>

Thus, oil from the Middle East and Venezuela is cheaper than Canadian oil at Montréal and farther east because it can be produced and transported cheaper. Products refined from Canadian crude encounter competition at Toronto. Davis<sup>6</sup> predicted that Canadian petroleum would commence to reach Montréal in a rather considerable volume about 1960. This has not materialized, and refineries at Montréal continue to be supplied with imported crude.

#### *Resulting import-export situation*

Only enough crude oil is imported to supply the needs of refineries in Montréal and the Maritimes. But the capacities of these refineries account for such a large proportion of the total Canadian capacity that 45% of all crude oil used by Canadian refineries in 1961 was imported. Canada imported about 369,000 barrels per day and used about 449,000 barrels per day of her own crude (Table I). The amounts of imported and domestic crude used by Canadian refineries over the years is given in Table VI. Canadian oil imports have increas-

TABLE VI

IMPORTED AND DOMESTIC CRUDE USED BY CANADIAN REFINERIES (thousands of bbls/day)					
	1920	1930	1940	1950	1955
Imported.....	30	79	117	224	238
Domestic.....	1	4	23	72	292
Total used.....	31	83	140	296	530

Source : DAVIS (see footnote 2), p. 141.

<sup>4</sup> *Ibid.*, p. 114.

<sup>5</sup> *Ibid.*, p. 137.

<sup>6</sup> *Ibid.*, p. 138.

ed steadily ever since the automobile became common. However, since Prairie production commenced on a grand scale, the proportion of oil imported has declined.

The sources of oil imported by Canada in 1961 are given in Table VII. Venezuela became the principal supplier during the war when American military needs ended large-scale imports from the United States. Only a very small amount of crude oil was imported from the United States in 1960 and none in 1961. The Middle East became an important source only after World War II.

TABLE VII

SOURCES OF IMPORTED CRUDE OIL (1961)	
	bbls/day
Venezuela .....	222,950
Near and Middle East .....	137,200
Trinidad .....	8,870
Total imports .....	369,020

Canadian oil producers, unable to compete with imported oil east of Ontario, seek export markets in order to utilize more of their surplus capacity. Exports in 1960, all to the United States, were about 18% of production. In an effort to partially solve the problem of the unused oil capacity, the Federal government intervened, set production targets, and formulated a national oil policy which contains two principal proposals: (1) increased refining in Ontario using domestic crude and a corresponding decrease in product transfers from Montréal to Ontario; and, (2) increased crude-oil exports. Under Ottawa's urge to find markets, exports jumped 60% in 1961, from about 114,000 to about 184,000 barrels per day (Table VIII). The greatly increased exports amounted to 29% of Canadian crude production.

All of the additional exports went to the United States (Table VIII), principally into the Pacific Northwest by means of the pipeline from the Vancouver area to Puget Sound and into the Midwest via the Interprovincial and a branch pipeline to Minneapolis - St. Paul (Figure I).

#### *The outlook for Canadian oil*

*Prospects for exports to the United States.* Without drastic government controls, Canadian crude cannot compete with overseas oil east of Ontario. In view of the glut of the world market and high Canadian production costs, overseas shipments are virtually out of the question. The United States is the only feasible export market for Canadian oil. Consequently, the degree to which Canadian crude is able to find markets in neighboring parts of the United States is one of the primordial factors in further expansion of Canadian oil production.

Davis in his 1957 report was very optimistic about new and expanding markets for Canadian crude in the United States. The government's production goals certainly reflect optimism. One company, with the consent of the

Canadian government, is making plans to build a 100-mile pipeline and export to the Buffalo area. The present writer feels that both Davis and the Canadian government have been overly optimistic.

It is very unlikely that exports can experience in 1962 an increase similar to that of 1961. At present U.S. imports of Canadian oil by land are not affected by the same regulations which control imports from overseas. Canadian officials obtained agreement from U. S. cabinet officials for a "gradual increase" in Canadian oil shipments. Instead of increasing gradually, exports to the United States zoomed in 1961. U. S. Department of Interior officials are displeased by what they consider Ottawa's broken promise. Probably the United States will not restrict the present level of imports from Canada, at least those into the Puget Sound area. But American officials are more than mildly concerned about the movement of Canadian oil into the Midwest where it comes into

TABLE VIII

DESTINATIONS OF CRUDE OIL EXPORTS		
bbls/day		
	1961	1960
U. S. West Coast .....	92,100	49,361
U. S. Midwest .....	92,150	65,011
Montana .....	115	55
Total exports .....	184,365	114,427

competition with U. S. oil. Further drastic increases of Canadian shipments there are very likely to evoke U. S. restrictions.

*The problem posed by the international oil market.* The various aspects of the world oil glut — oversupply, new North African production, cut-rate Russian oil, and a surplus of tankers and refining capacity — all mean cheaper oil. The price problem is made worse by the fact that most of the excess producing capacity is in countries where oil is cheap to produce, notably in the Middle East.

Most oil experts see little letup in the situation in the foreseeable future. The French have big plans for increased production in North Africa.<sup>7</sup> Exports to the free world of Russian crude and products, which increased from 58 million barrels in 1955 to 242 million barrels in 1960, are making a tremendous impact on the world market. Since for the Soviets oil is an instrument of political policy, there seems little likelihood that they will miss any future opportunity to disrupt world oil trade in order to further communist objectives. Idle tankers in 1961 and orders with shipyards to build more tankers suggest that the excess tanker problem will not improve soon.

<sup>7</sup> MIKESSELL, Marvin W., *Algeria*. In *Focus*, Vol. XI, No. 6 (February 1961), pp. 1-5.

*The immediate future.* The effect of the world oil glut upon the Canadian oil industry is to restrict expanded production in the Prairies. The gloomy world oil picture dims the hopes of Canadian producers to sell in Montréal and farther east, and it virtually eliminates the possibility of making overseas shipments from the West Coast. What are the alternatives?

The principal realistic hopes for Canadian oil producers in the immediate future are : (1) to capture more, perhaps all, of the Ontario market ; (2) to grow with the increase in Canadian demand ; and, (3) to continue exporting to the United States with only moderate increases.

1. Displacement of foreign products by domestic products in Ontario will probably continue, and Canadian producers will gain thereby a larger share of the Canadian market. All current refinery construction projects are in Ontario, and these projects are in keeping with the national oil policy.

2. Canadian oil consumption will undoubtedly continue to increase, although probably at a less rapid rate than during the decade following the 1947 discoveries (Table IV). Greatest population growth will most likely be in the Ontario Peninsula and St. Lawrence Valley. Since Canadian producers have most of the southern Ontario market, they will receive a proportional share of market growth.

3. Exports to the United States will probably make only moderate gains in 1962 with most of the increase in the Puget Sound area. Prospects are good for growth of this market because : (1) U. S. West Coast cities are growing faster than the rest of the country ; and, (2) Canadian oil does not come into direct competition with U. S. oil there as in the Midwest.

Regarding the outlook in refining, the spare refining capacity combined with surplus capacity in other countries indicates that severe competition will continue in the refining and marketing end of the Canadian petroleum industry. Increased refining in Ontario will require new investment outlays and will tend to cause a relative decline of Montréal as a refining center.

John M. CROWLEY

### À propos d'ouvrages récemment publiés aux États-Unis sur la géographie soviétique

En Occident, la littérature traitant de la géographie soviétique avait été, jusqu'à la dernière guerre, assez maigre. À cette époque, la géographie occidentale n'avait eu accès que dans une mesure bien faible à la documentation soviétique. De plus, la géographie elle-même d'un pays jusqu'alors si hermétique n'avait pas réussi à retenir l'intérêt des géographes occidentaux.

Depuis quelques années, de nombreux ouvrages et même des périodiques ont en partie corrigé cette ignorance assez lamentable de la géographie de l'U.R.-S.S., entretenue chez les géographes occidentaux autant par le mutisme de l'administration soviétique que par la cécité volontaire de bien des hommes de science du monde capitaliste. Depuis la dernière grande guerre, et plus particulièrement depuis une décennie, les soviétiques ont levé le voile sur toute une documentation autrefois jalousement gardée ; d'autre part, plusieurs géographes occidentaux ont cessé de regarder la géographie soviétique comme les théologiens regardent le péché.

C'est en France, qui avait entretenu de façon continue des relations scientifiques avec l'U.R.S.S., qu'on s'est d'abord intéressé à la géographie soviétique.