Geoscience Canada

Pyroclasts:
The Distribution of NSERC Funds

Volume 13, Number 4, December 1986

URI: https://id.erudit.org/iderudit/geocan13_4fea01

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Publisher(s)

The Geological Association of Canada

ISSN

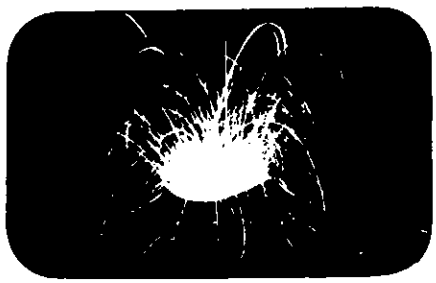
0315-0941 (print)
1911-4850 (digital)

Explore this journal

Cite this article

(1986). Pyroclasts:: The Distribution of NSERC Funds. *Geoscience Canada*, *13*(4), 266–269.

Features



Pyroclasts

The Distribution of NSERC Funds

From a Grantee *

* *Author's identity withheld upon request.*

Every year, NSERC (1986) publishes a list of Scholarships and Grants In Aid of Research. I do not know how widely this volume is circulated. For the last several years, I have analyzed the list for "internal consumption" to see how the average per capita Operating Grant varies from department to department. Despite obvious limitations, this is probably one fairly reliable way of comparing departments, because most workers rely on NSERC for a major part of their research funding. Thus the granting levels form a reasonable basis for comparison across Canada; the data are public and readily available.

This year, my analysis was more thorough than usual, and I will share the results with you without any editorial comment. Perhaps my analysis of the data will give rise to a few Pyroclasts.

Table 1 shows the average Operating Grant (total $$ divided by number of recipients) given to all Universities by Committee 10 (Earth Sciences). This committee covers Geology, Geophysics, Geography, Oceanography and a few Earth Science-related grants given to a few workers in departments of Biology, Zoology, Mathematics, etc. To enable comparisons to be made within the core of Geology and Geophysics (hereafter abbreviated as the "GG core"), I recalculated the figures (Table 2) excluding grants to faculty listed in departments outside the GG core (i.e. omitting Oceanography, Geography, etc.), and excluding supplements to University Research Fellows. The GG core covers about 69 percent of the money disbursed by Committee 10.

As a further comparison, to identify granting levels on a *Departmental* basis rather than an individual basis, I divided the total $$ not by the number of grantees, but by the *total number of faculty* in each GG core department (Table 3). The numbers were derived from the 1985 AGI Directory of Geology Departments, and include *only* faculty listed under the titles of Professor, Associate Professor, Assistant Professor or "on leave". I did not include Emeritus Professors, adjunct professors, lecturers, research assistants, etc. Exact head counts are difficult in some cases, and Guelph is omitted because of the difficulty of categorizing people within Land Resource Science.

The mean value of the grant is almost the same in Tables 1 and 2 — $22864 for all departments, and $23553 for the GG core. Individual grants in the GG core are plotted in a histogram in Figure 1, and approximate a truncated normal distribution. There are very few grants below $10000, the modal class is $7750-12250, and the high tail extends to $107270. Individuals holding grants of $50000 or more are listed in Table 4. I also include here the number of times their work was cited in 1985, which is the last year for which Science Citations Index is complete. These numbers must be read with caution because (1) not all journals are surveyed by SCI; (2) only papers of which the grantee is first author are listed; (3) some sub-disciplines of the GG core are small and cited less frequently than other; (4) the list includes self-citations; and (5) authors of popular reviews will tend to be frequently cited. With these warnings in mind, I find that the average number of citations for the $50000 + group is 52.2 (N = 16; Table 4).

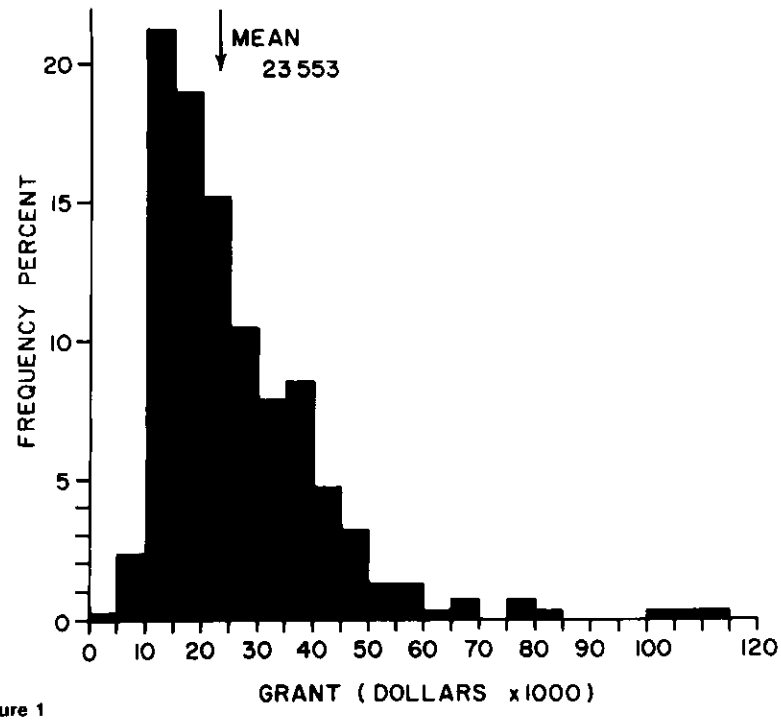


Figure 1

In order to estimate the frequency of citation for an "average" grantee, I identified those (N = 16) whose grants were within $1000 of the GG core mean ($23553). Their average number of citations was 18.8, with a range of 1 to 93. As a check, I identified 77 grantees whose grants were within $5000 of the mean, and randomly selected 15 of them. The average number of citations was 18.7, range 2 to 82. Despite the imperfections of the method, it appears that overall, the work of the $50000 + group is noticed and used (cited) more than that of the "average grant" group.

As well as Operating Grants, NSERC's Strategic Grants program is available to workers in the Earth Sciences, particularly in the fields of Energy, Environmental Toxicology, Oceanography and "Open". Recipients of Strategic funds are shown in Table 5, where I have included the GG core and Physical Oceanography (PO), but have omitted Biological Oceanography (this necessitated some value judgements based on very abbreviated grant titles, and I apologize to anyone who feels left out of the tabulation). The percentages show the amounts given to the GG core + PO in each strategic area. About 4.89 percent of all strategic funds go to the GG core + PO.

Finally, I estimate that about 150 NSERC Scholarships were awarded in the overall field covered by Committee 10. However, the fields of study of these Scholars are described in various ways, and again, one or two value judgements had to be made about inclusion or exclusion of particular individuals. The total number of Scholars is about 2418; our 150 represents 6.2 percent. If we argue that the percentage of NSERC Scholars should be roughly the same as the percentage of Operating funds received by Committee 10 (which is about 7.4 percent), then the difference between 6.2 and 7.4 percent represents a shortfall of about 30 Scholarships. The distribution of Scholarships by department is shown in Tables 1 and 2.

Finally, among all of these dry numbers, I am amazed to note that one recipient of an NSERC Scholarship has chosen to study Oceanography at the University of Kansas.

Table 1 Average per capita grant awarded by Committee 10

University	Average Grant ($)	Total Number of NSERC Scholars
McMaster	32 909	8
Western Ontario	30 360	5
British Columbia	29 366	16
Dalhousie	28 492	6
Toronto	27 920	9
Alberta	27 913	6
Memorial	26 510	3
Saskatchewan	24 968	2
Victoria	23 929	2
Montreal	23 842	5
Manitoba	23 793	5
Waterloo	23 675	10
York	22 152	3
École Polytechnique	20 388	3
McGill	20 759	4
Guelph	20 525	
New Brunswick	20 211	
Laurentian	20 000	
Lakehead	19 969	1
Ottawa	19 229	4
U.Q. à Montréal	19 229	1
Calgary	19 047	7
St. Mary's	19 000	
Queens	18 355	10
Simon Fraser	17 722	
Winnipeg	17 500	
U.Q. à Rimouski	17 340	2
Sherbrooke	16 933	3
Acadia	16 678	
Carleton	16 426	6
Windsor	15 159	1
Regina	15 000	1
Laval	13 633	7
U.Q. à Chicoutimi	13 490	1
I.N.R.S.	12 643	1
Trent	12 300	1
St. Francis Xavier	12 000	
Concordia	10 000	
Brandon	9 200	
Mt. Allison	9 000	
Lethbridge	8 000	
Cape Breton	7 000	

References

NSERC, 1986, List of scholarships and grants in aid of research (appendix to the report of the President): Minister of Supply and Services, Canada, 797 p.

Science Citation Index, 1985 Annual, 1986: Institute for Scientific Information, Philadelphia, Pennsylvania, Part 1, Citation Index, A-Z, 7 volumes.

Accepted 11 November 1986.

Table 2 Average per capita grant awarded in GG Core

Geology/Geophysics Department	Average Grant ($)	Number of Grantees	NSERC Scholars (%) **
McMaster	35 936	11	38
Western Ontario	35 177	15	17
Saskatchewan	31 135	8	13
British Columbia	30 745	22	27
Memorial	28 186	23	6
Alberta	27 872	18	26
Toronto	27 563	30	18
Montreal	26 595	10	8
Waterloo	25 160	15	42
Guelph	25 031	5	
Manitoba	24 502	10	25
McGill	22 692	18	25
École Polytechnique	21 869	6	19
Dalhousie	20 977	12	14
New Brunswick	20 456	9	
Laurentian	20 000	2	
Lakehead	19 969	4	14
U.Q. à Montréal	19 683	6	6
Ottawa	19 925	13	23
St. Mary's	19 000	3	
Queens	18 624	14	41
Carleton	18 138	11	27
Calgary	17 075	20	29
Acadia	16 678	6	
Windsor	15 610	7	10
Regina	15 000	3	14
Brock	14 100	4	
U.Q. à Chicoutimi	13 490	7	13
Laval	12 514	7	21
St. Francis Xavier	12 000	1	
Concordia	10 000	1	
Brandon	9 200	1	
Mt. Allison	9 000	1	
Cape Breton	7 000	1	

** Number of NSERC Scholars normalized to a percentage of department size. Here, Department size is **not** expressed as the number of grantees, but the total number of faculty listed in the 1985 AGI Directory. Only Professors, Associate Professors, Assistant Professors and "on leave" faculty were included.

Table 3 Average grant per Department, GG Core

Geology/Geophysics Department	Average Grant † ($)	Number of Faculty
McMaster	30 408	13
Western Ontario	22 941	23
McGill	22 692	14 ‡
British Columbia	22 546	30
Montréal	22 162	12
Alberta	21 813	23
Toronto	21 761	38
Waterloo	19 863	19
Memorial	19 645	33
Ottawa	19 295	11 ‡
Dalhousie	17 980	14
Saskatchewan	16 605	15
St. Mary's	14 500	4
Acadia	14 295	7
Calgary	14 229	24
New Brunswick	14 162	13
Carleton	13 301	15
Manitoba	12 251	20
U.Q. à Chicoutimi	11 804	8
Queens	11 582	22
Lakehead	11 411	7
Windsor	10 928	10
École Polytechnique	8 201	16
Brock	8 057	7
Cape Breton	7 000	1 ?
U.Q. à Montréal	7 381	16
Regina	6 429	7
Laval	6 257	14
Laurentian	4 444	9
St. Francis Xavier	2 400	5
Brandon	2 300	4
Mt. Allison	2 250	4
Concordia	1 667	6

† Number of faculty counted in the 1985 AGI Directory of Geology Departments, and includes only Professors, Associate Professors, Assistant Professors and faculty listed as "on leave".

‡ McGill and Ottawa have apparently received more grants than the number of faculty listed in the AGI Directory, as defined above.

Guelph is not listed because of the difficulty of counting GG Core faculty in the Department of Land Resource Science.

Table 4 Grantees receiving $50,000 and higher

Grantee	Grant ($)	Number of Citations
Fyfe, W.S.	107 270	83
Strangway, D.W.	103 180	14
James, N.P.	98 705	64
Naldrett, A.J.	80 800	52
Strong, D.F.	72 500	56
Williams, H.	66 000	84 *
Nisbet, E.G.	63 000	61
Walker, R.G.	61 100	114
Greenwood, H.J.	57 198	32
Veizer, J.	56 400	78
Fritz, P.	53 981	43
Carroll, R.L.	53 647	48
Hillaire-Marcel, C.	53 100	14
Westermann, G.E.G.	51 198	18
Mereu, R.F.	51 000	12
Shaw, D.M.	50 000	61
For comparison:		
Polanyi, J.C. (Chemistry, U of Toronto)	165 000	113

* Harold (Memorial) and Harold (USGS) were very difficult to separate in Citations Index. In one or two other cases, judgement was used as to which citations to include.

Table 5 Strategic Grant Awardees, GG Core and PO †

Area	Awardee	Univ., Dept.	very abbreviated title	Grant ($)
Energy	Toth	Alberta, Geology	Hydrogeologic approach to oil exploration	105 020
	Walker	McMaster, Geology	Reservoir geometry	57 350
Environmental Toxicology	Freeze *et al.*	UBC, Geology	Waste management sites	48 000
	Kramer, Kershaw	McMaster, Geol & Bio	Al chemistry and toxicity	64 000
				31 330 EQ
Oceanography	Beaumont, Keen	Dalhousie, Ocean.	Continental margin basins	64 580
	Emery *et al.*	UBC, Ocean.	NE Pacific circulation	81 100
				41 623 EQ
	Ingram *et al.*	McGill, Ocean.	Micro-algae under sea ice	155 880
	LeBlond	UBC, Ocean.	Wave generation	23 300
	Louden, Judge	Dalhousie, Ocean.	Arctic heat flow	89 300
	Muehlenback, Nesbitt	Alberta, Geology	Hydrothermally altered oceanic crust	38 444
	Ruddick	Dalhousie, Ocean.	Salt finger and diffusive fluxes	22 400
	Scott *et al.*	Toronto, Geology	Young seamounts	128 400
	Wangersky	Dalhousie, Ocean.	Size distribution of particles in ocean	108 094
Open	Cherry *et al.*	Waterloo, Earth Sci.	Hydrogeology	140 000
	Gale *et al.*	Memorial, Earth Sci.	Ground water flow	115 600
	Kerrich, Hodder	U. Western Ont., Geol.	Hydrothermal aluminous deposits	50 000
	Schwarcz, Kramer	McMaster, Geology	Stable isotope tracing of acid rain	40 000
	Young, Hutchins	Queens, Geol. Sci.	Rock bursts	60 000
				123 289 EQ

† Geology and Geophysics Core plus Physical Oceanography; **EQ** is an Equipment Grant