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**Publication and Citation within  
Norwegian Geosciences**

A bibliometric analysis

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## Foreword

This report presents a bibliometric analysis of Norwegian research in *Geosciences*. The report is divided in two sections. The first part, written by Terje Bruen Olsen, gives a picture of the overall publication activity and visibility of Norwegian research in *Geosciences* compared to other countries. The second part concentrates on aspects dealing with the structure of the Norwegian publications in *Geosciences*, for example, the important journals for Norwegian geoscientists, collaboration with other countries emerging from co-authorship patterns, etc.

The report is the result of a project commissioned by the Research Council of Norway, Area of Science and Technology, as a contribution to the national evaluation exercise of Norwegian *Geosciences*.

Oslo, February 1998

Berit Mørland  
Director

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# *Part I: Publication and Citation within Geosciences in Norway*

A comparison between Norway and other countries, based on the *National Science Indicators On Diskette (NSIOD)*

by *Terje Bruen Olsen*

## **1 Introduction**

Bibliometric R&D indicators measure the extent of 1) *publishing* in international scientific journals and 2) the extent to which these articles have been referred to or *cited* in other articles in the same journals. The *National Science Indicators On Diskette (NSIOD)* is a database with aggregated publication and citation statistics which cover 95 countries through the period 1981-1996. The articles are classified in 24 fields of science, most of these belong to the natural sciences and technology, however, there are some few in the social sciences. NSIOD is published by the *Institute for Scientific Information, ISI*, in Philadelphia, USA, a commercial enterprise which also publishes the *Science Citation Index* and the *Social Science Citation Index* as well as several other bibliometric products on scientific publishing, etc.

All the fields of science in the NSIOD database are listed below:

<i>Agricultural Sciences</i>	<i>Law</i>
<i>Astrophysics</i>	<i>Materials Science</i>
<i>Biology &amp; Biochemistry</i>	<i>Mathematics</i>
<i>Chemistry</i>	<i>Microbiology</i>
<i>Clinical Medicine</i>	<i>Molecular Biology &amp; Genetics</i>
<i>Computer Science</i>	<i>Multidisciplinary</i>
<i>Ecology/Environment</i>	<i>Neuroscience</i>
<i>Economics &amp; Business</i>	<i>Pharmacology</i>
<i>Education</i>	<i>Physics</i>
<i>Engineering</i>	<i>Plant &amp; Animal Science</i>
<i>Geosciences</i>	<i>Psychology/Psychiatry</i>
<i>Immunology</i>	<i>Social Sciences, general</i>

A field of science is defined by the journals which are classified under that field. Each journal is generally classified under *one* field<sup>1</sup>. All articles in a journal are regarded as belonging to that journal's field of science<sup>2</sup>. In the database which is the foundation for this

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<sup>1</sup> A few journals have, however, been classified under two fields, see Annex 2.

<sup>2</sup> There are also exceptions here, see the introduction to Annex 3.

analysis, it is not possible to split up the fields of learning into more narrow categories<sup>3</sup>. The data are aggregated at a national level which makes it possible to do comparisons between countries for different fields of science. Using NSIOD it is not possible to break down national data to individual institutions or institutes<sup>4</sup>.

The number of articles can be viewed as an indicator of productivity. The number of citations can be an expression of the extent to which the publication has been recognised by, or made visible to, research colleagues. There is general agreement among bibliometricians that extreme care should be given to interpreting publication and citation frequencies as an expression of research *quality*. On the other hand, bibliometric data can be useful as background data in connection with the evaluation of a field of learning or research unit.

In the following - with the help of tables and figures - we will present a survey of the extent of Norwegian publishing within the *Geosciences*, and compare it to publishing activities in a selection of other countries. We will also present data on citation indicators *Citation impact* or *Relative citation impact*, see p. 12.

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<sup>3</sup> We have used the standard version of NSIOD. There is also a "deluxe" version where the fields of learning are more narrowly defined in 102 categories. However, NIFU has not bought the "deluxe" version. In Annex 2 we show the relation between the two classification systems.

<sup>4</sup> ISI has databases where this is possible, inter al. for all universities in USA. NIFU has built up a special database with basic data from the *Science Citation Index*, which covers all *Norwegian* publications from 1990ff. On the basis of this, Norwegian researchers' publication patterns can be analysed at an institutional, institute and personal level. In addition, this contains information about which journal the articles are published in and about co-authorship, i.e. who publishes with whom.



## 2 The total period 1981-1996

During the period 1981-1996, more than 8.5 million articles were published in the journals included in the database. Of these, 49,000 had one or more authors with a Norwegian address. About 3,000 articles, or 6 per cent of all the Norwegian articles were published in journals assigned to *Geosciences*. This corresponds to the worldwide percentage which is 2.5 per cent. The percentages in Sweden, Denmark and Finland are all below 2. In Iceland, on the other hand, the *Geosciences* represent as much as 13 per cent of the total articles.

Table 1 Norwegian articles by field of science, 1981-1996

Field of Science	Number of Norwegian articles	Percentage Norwegian articles of all articles in the field	The field's percentage of all Norwegian articles	The field's percentage of all articles in the world
Agricultural Sciences	1,047	0.43	2.13	2.83
Astrophysics	383	0.39	0.78	1.13
Biology & Biochemistry	4,129	0.54	8.39	8.78
Chemistry	3,988	0.36	8.10	12.61
Clinical Medicine	15,947	0.80	32.39	23.06
Computer Science	341	0.34	0.69	1.16
Ecology/Environment	1,858	1.01	3.77	2.11
Economics & Business	633	0.49	1.29	1.50
Education	91	0.21	0.18	0.51
Engineering	2,688	0.39	5.46	7.95
Geosciences	2,862	1.29	5.81	2.55
Immunology	1,576	1.11	3.20	1.64
Law	12	0.04	0.02	0.35
Materials Science	779	0.28	1.58	3.15
Mathematics	707	0.47	1.44	1.75
Microbiology	1,248	0.59	2.54	2.45
Molecular Biology & Genetics	1,140	0.51	2.32	2.58
Multidisciplinary	540	0.34	1.10	1.81
Neuroscience	1,940	0.61	3.94	3.65
Pharmacology	1,396	0.60	2.84	2.68
Physics	2,920	0.30	5.93	11.25
Plant & Animal Science	5,028	0.80	10.21	7.21
Psychology/Psychiatry	1,318	0.52	2.68	2.94
Social Sciences - general	1,860	0.59	3.78	3.61
Total <sup>1)</sup>	49,227	0.57	..	..

<sup>1)</sup> The number of articles for the fields sums up to more than the total and the percentages to more than 100 because some of the journals are classified under more than one field.

Source: National Science Indicators/Institute for Scientific Information

Table 1 shows Norwegian articles within *all fields of science in the database*. In Table 2 we look more closely at the *Geosciences*, and compare the data for Norway with other countries. The following indicators are presented in the Table:

- *All articles* in absolute figures
- Of these, the number of *cited* articles in absolute figures
- Cited articles as a percentage of all articles
- Number of citations in absolute figures
- The *Citation impact*, which is the number of citations divided by the number of articles
- The *Relative citation impact* shows the relation between the field's *Citation impact* in individual countries and the *Citation impact* for the field worldwide when all countries are included (the *Impact base* in the Table). The relative impact for a field in a particular country thus has the value of 1 if the country's articles are cited to the same extent as all of the articles worldwide in the field.

As Table 2 shows, Norway ranks in the middle of the countries on the absolute number of articles within the *Geosciences*. A number of 2,862 articles were published with the address of at least one Norwegian author through the 16-year period, which is 183 articles per year on average. On average, three of four of these articles were cited in later articles. The Norwegian number of articles is slightly below that of Sweden, but twice as high as Denmark and three times as high as Finland. The number of articles of a country is, of course, related to its size. Figure 1 shows article production per million inhabitants. Except for Iceland, Norway is ahead of all the other countries on this indicator. In 1996, Norway had 67 articles per mil. inhabitants. Sweden had only half as many, and Denmark and Finland *less* than half. Iceland comes out on top with about 100 articles per mil. inhabitants. Figure 2 shows the articles in *Geosciences* as a percentage of each country's total number of articles. For Norway, this is about 6 per cent, which is higher than all the other countries except Iceland. The *relative citation impact*, however, is lower for Norwegian articles than for the other countries with the exception of Sweden and Finland, see Figure 3. Despite the high production of Norwegian articles in *Geosciences*, these articles are, on average, not highly cited compared to the articles from the other countries. The relative citation impact for Norway for the 1981-96 period is 0.85, which means that Norwegian articles are cited less frequently than the average article in *Geosciences* in the total database. Articles from Iceland and the USA are cited most frequent of all the countries.

However, the *Geosciences* have a prominent position in the overall publication profile of Norway. See Figure 4 which shows the relative publication index for selected fields of science in the Nordic countries. A relative publication index value of 1 means that the field's share of the total number of articles in a country corresponds to the fields' share of the world total. As shown in Figure 4 Norway has 2½ times

as many articles in the *Geosciences* as “expected” from the total database. For Norwegian articles this score is the highest among all the fields. It is also considerably higher than the corresponding index for *Geosciences* in all the other Nordic countries except for Iceland.

Table 2 Articles and citations within *Geosciences* for selected countries, 1981-1996

Country	Number of articles	Cited articles	% cited articles	Number of citations	Citation impact	Relative citation impact	Impact base
USA	90,105	71,894	79.8	1,114,996	12.37	1.47	8.41
UK	22,112	17,070	77.2	213,323	9.65	1.15	8.41
Canada	20,874	15,268	73.1	157,516	7.55	0.90	8.41
France	15,612	11,628	74.5	136,119	8.72	1.04	8.41
Germany	12,479	8,987	72.0	96,843	7.76	0.92	8.41
Australia	10,084	8,002	79.4	99,073	9.82	1.17	8.41
Japan	8,238	6,163	74.8	52,693	6.40	0.76	8.41
Italy	4,527	3,262	72.1	24,189	5.34	0.63	8.41
Netherlands	3,873	2,859	73.8	29,077	7.51	0.89	8.41
Sweden	2,903	2,159	74.4	19,862	6.84	0.81	8.41
Switzerland	2,897	2,194	75.7	27,912	9.63	1.15	8.41
Norway	2,862	2,101	73.4	20,421	7.14	0.85	8.41
New Zealand	2,528	1,984	78.5	17,396	6.88	0.82	8.41
Spain	2,049	1,315	64.2	8,194	4.00	0.48	8.41
Denmark	1,499	1,158	77.3	12,071	8.05	0.96	8.41
Belgium	1,364	1,015	74.4	11,162	8.18	0.97	8.41
Greece	1,074	645	60.0	3,950	3.68	0.44	8.41
Austria	993	684	68.9	5,037	5.07	0.60	8.41
Finland	920	641	69.7	4,909	5.34	0.63	8.41
Ireland	542	418	77.1	3,639	6.71	0.80	8.41
Iceland	281	237	84.3	3,490	12.42	1.48	8.41
Portugal	257	159	61.9	843	3.28	0.39	8.41

Source: National Science Indicators/Institute for Scientific Information

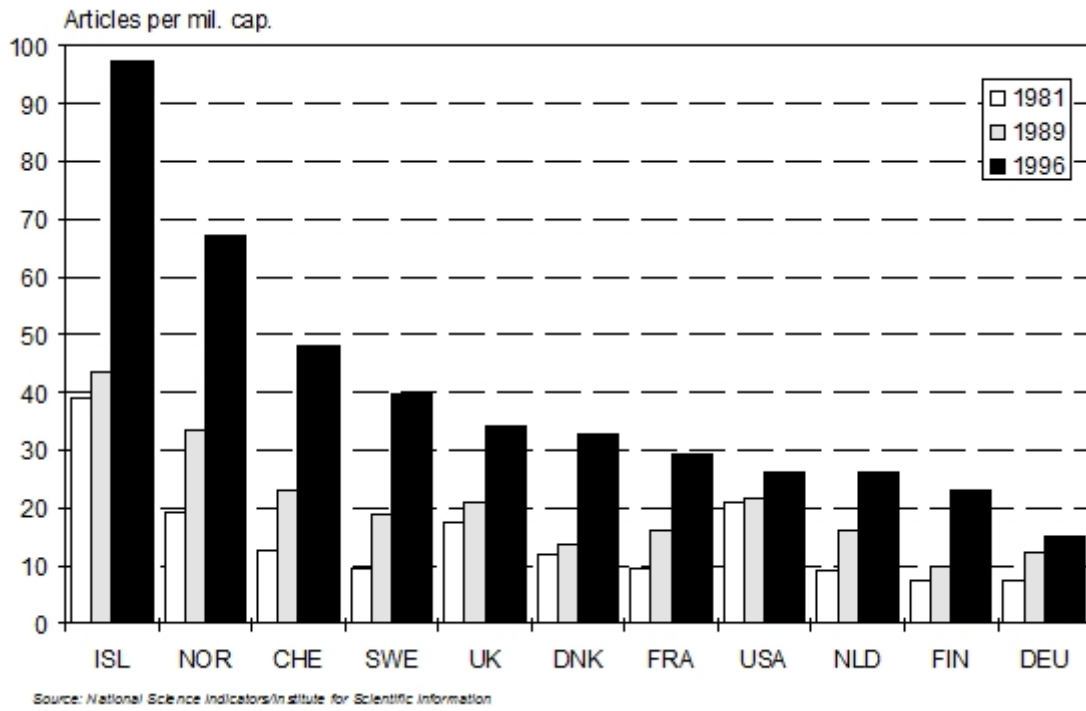


Fig. 1 Articles per mil. inhabitants within *Geosciences* in selected countries, 1981, 1989 and 1996

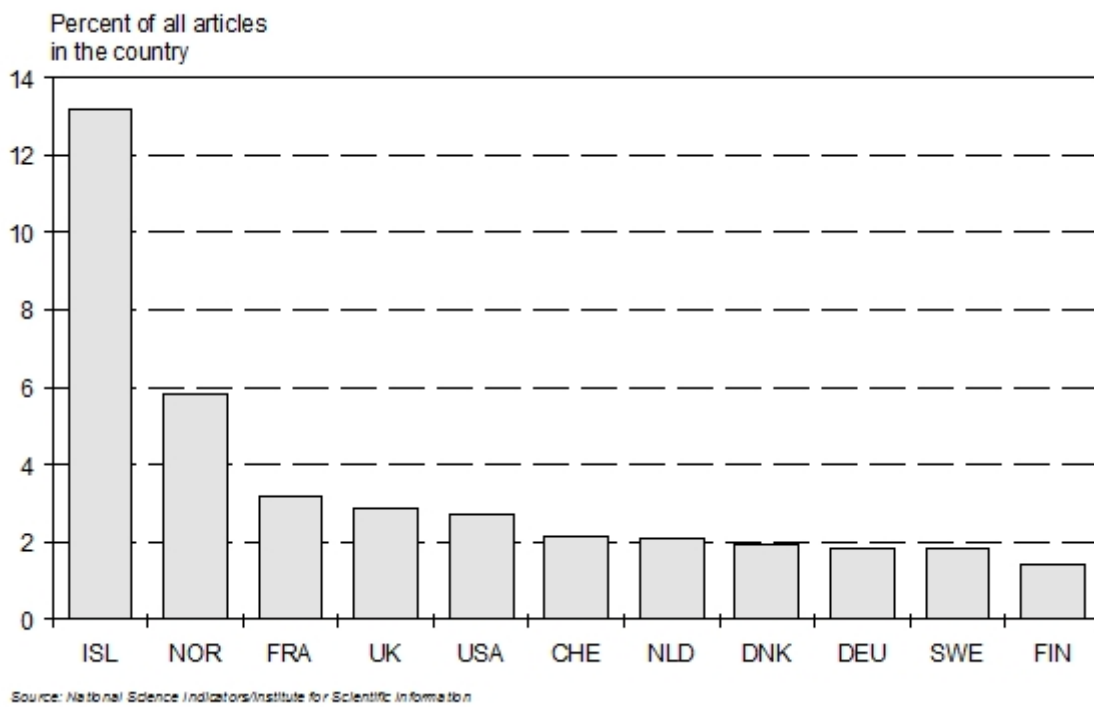


Fig. 2 Articles within *Geosciences* as a percentage of each country's total articles, 1981-96

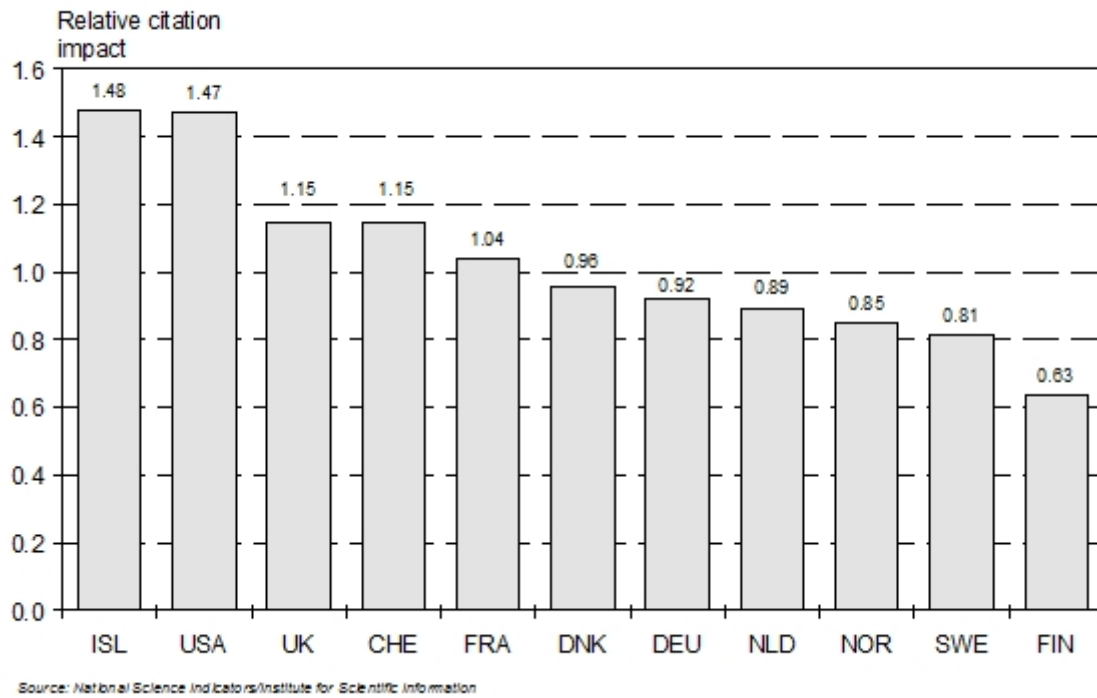


Fig. 3 Relative citation impact within *Geosciences* in selected countries, 1981-96

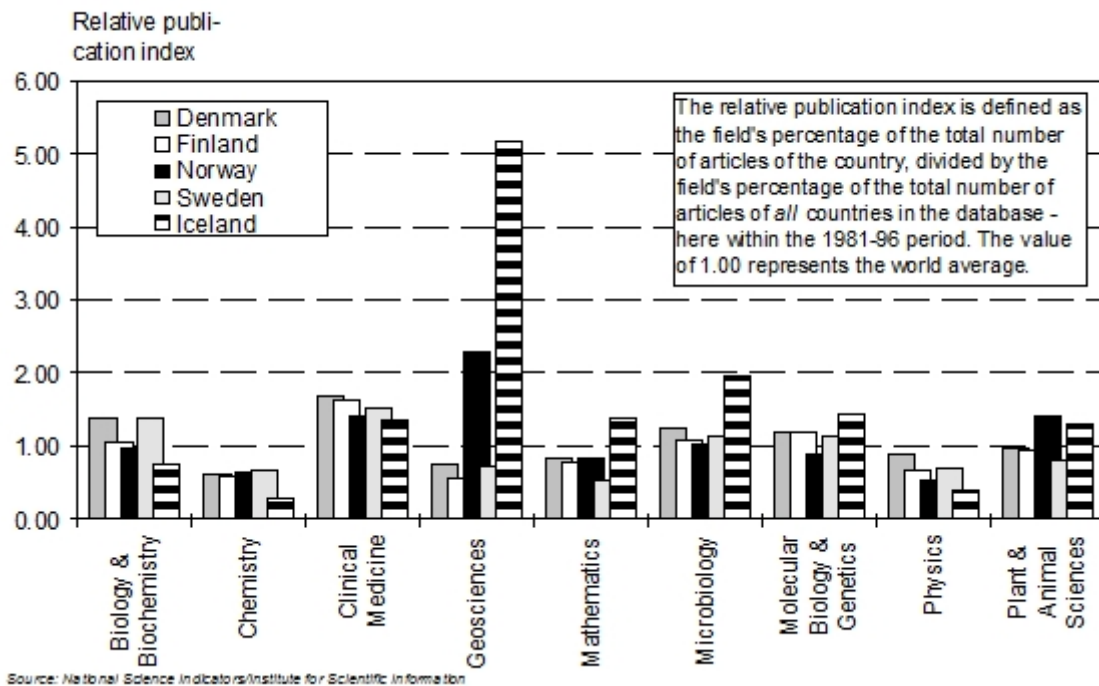


Fig. 4 Relative publication index within selected fields of science in the Nordic countries, 1981-96

### 3 Development over time

Figures 5-8 show the development in Norway for the 16-year period 1981-1996. In order to avoid focus on coincidental outcomes, we have chosen to present accumulated figures for 5-year periods.

The number of Norwegian articles in the *Geosciences* increased during the period from below 100 in 1981 to about 300 in 1996, cf. Figures 5 and 6. The citation frequency in the *Geosciences*, however, shows that Norway scores below the world average and even has had a weak decreasing - or almost stable - tendency from the middle of the eighties.

In Figure 6 we compare *Geosciences* with other natural science fields. There are fewer Norwegian articles in journals which are classified under *Geosciences* and *Physics* than under *Chemistry*. However, *Geosciences* and *Physics* show considerable growth from the middle of the 15-year period 1981-1995. At the end of the period, the number of Norwegian articles is about the same in all three fields. Within *Mathematics*, in contrast, the level is about the same during the whole period. The development in the *Relative citation impact* for the same fields is shown in Figure 7.

Figures 8A-8B show the development of the *Relative citation impact* in all the countries we have compared Norway to from 1981 to 1996.

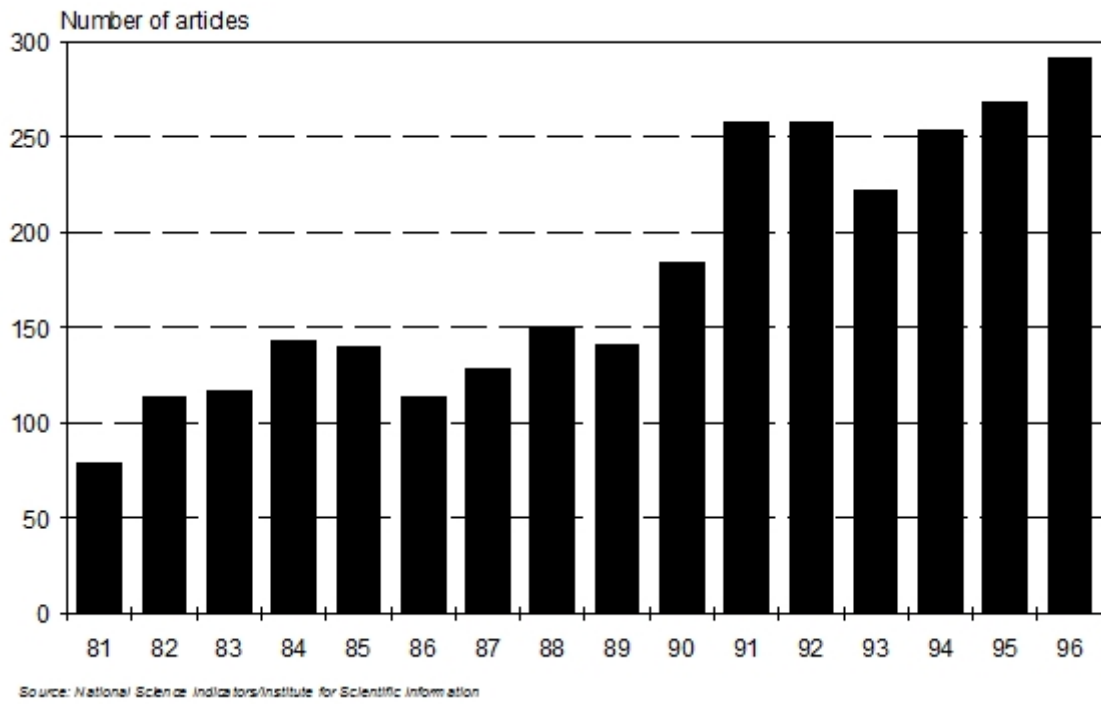


Fig. 5 Norwegian articles within *Geosciences*, 1981-96

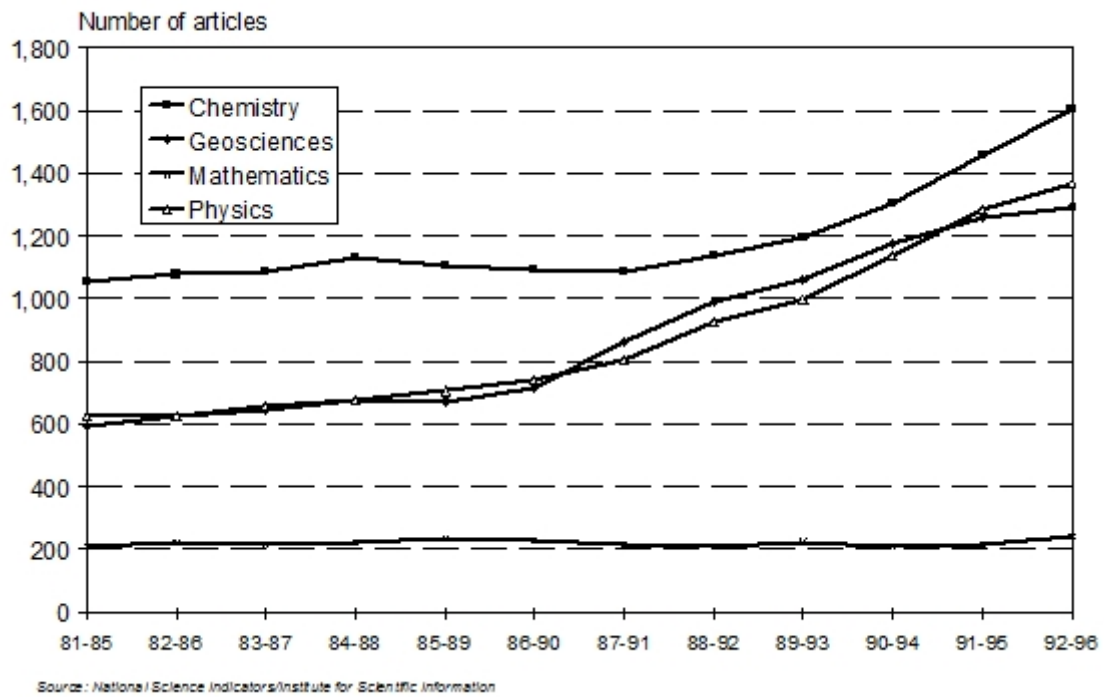


Fig. 6 Norwegian articles within *Chemistry*, *Geosciences*, *Mathematics* and *Physics*, 1981-96 Accumulated figures for overlapping 5-year periods

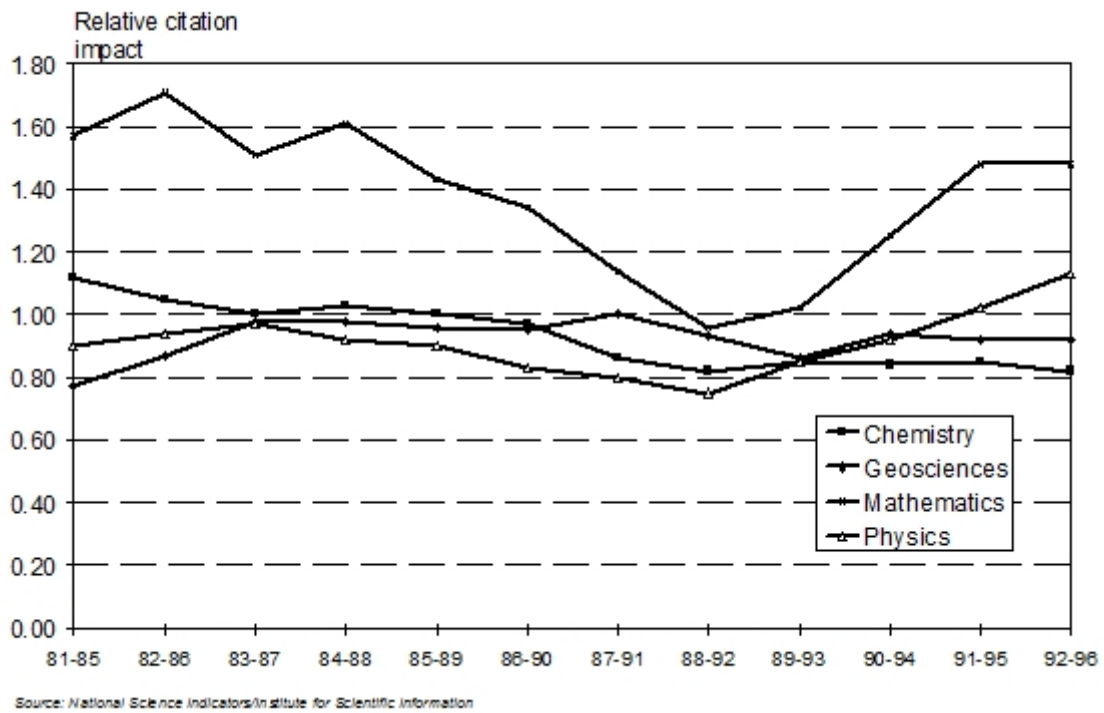


Fig. 7 Relative citation impact for Norwegian articles within *Chemistry*, *Geosciences*, *Mathematics* and *Physics*, 1981-96. Accumulated figures for overlapping 5-year periods

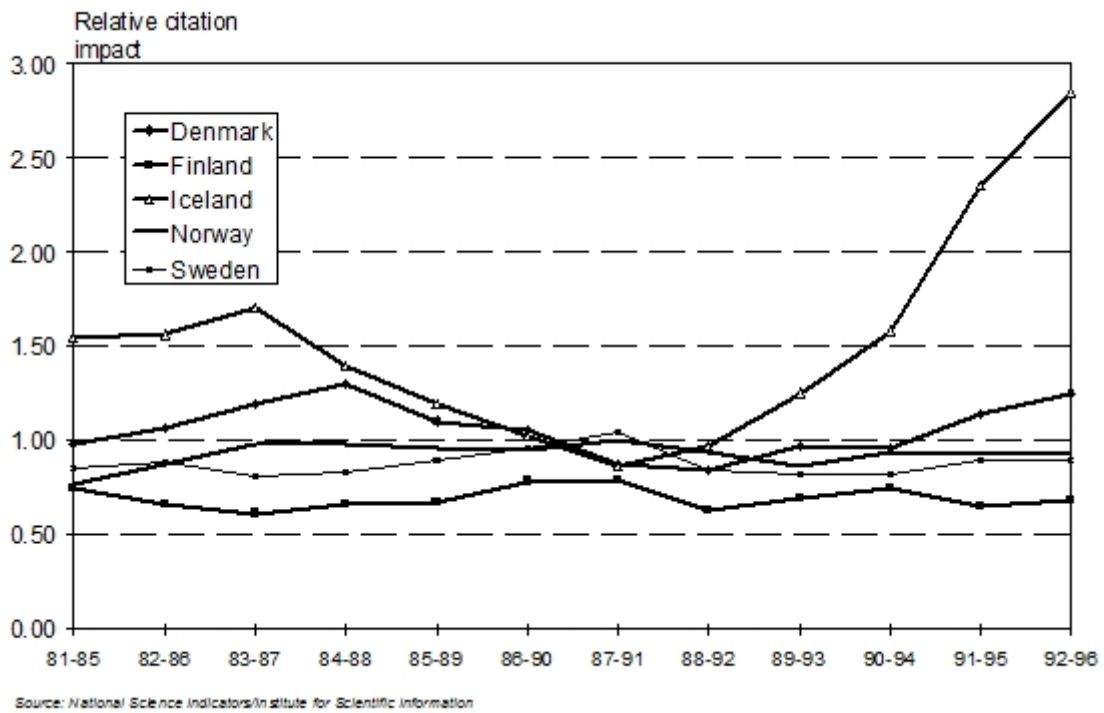


Fig. 8A Relative citation impact within *Geosciences* for the Nordic countries, 1981-96. Accumulated figures for overlapping 5-year periods



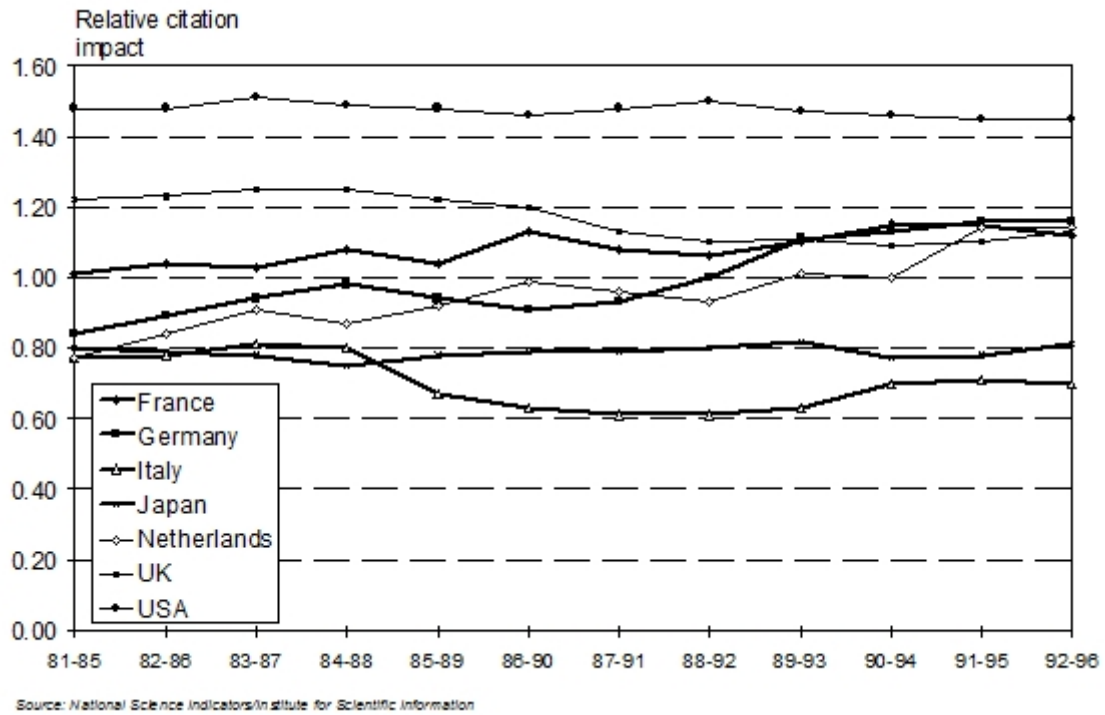


Fig. 8B Relative citation impact within *Geosciences* for the selected countries, 1981-96. Accumulated figures for overlapping 5-year periods



*Part II: Publication Analysis of Norwegian Research  
within Geosciences*

by **Aris Kaloudis**

## **1 Introduction**

This part of the report presents the results of a study undertaken by NIFU for the Research Council of Norway to give a more detailed picture of publication patterns within Norwegian *Geosciences*. Part II should be viewed as an extension of the analysis on publishing and citation patterns in Part I of this report. That analysis describes the *national* scientific publishing activity in *Geosciences* over a 16-year period as such with comparisons of corresponding publishing activity in other countries.

In this part of the report we are concerned about three different questions: What is the range of Norwegian researchers' publication activity? What are the most important international journals for Norwegian researchers to publish in? What is the collaboration pattern of the Norwegian researchers in *Geosciences*? The answers to these questions can give us a more detailed picture of the Norwegian research in *Geosciences*.

## 2 Data and methods

The basis of our analysis in this part is again the American database *Science Citation Index (SCI)* prepared by the *Institute for Scientific Information (ISI)* in Philadelphia, USA. In this study the data are handled with the help of data programmes for detailed bibliometric studies of *SCI* and the *Social Science Citation Index, SSCI*, developed by NIFU during the period 1994-1996.

The following information about publication is included in the SCI database for publications which are registered there: the article's title, the names of authors and co-authors, the title of the journal, the number and year of publication, the work address of the authors, the number of references to other publications, the language of the article, and the type of publication (i.e. whether it is a research article, a discussion article, a working paper, etc.) A printout of a typical Norwegian article in *Geosciences* in the SCI CD- ROM is listed below.

Authors: Bondevik-S Gusiakov-VG Kurbatov-A Minoura-K Oda-T  
Svendsen-JI Takeuti-S

Title: Tsunami Sedimentation Associated with the 1923 Kamchatka  
Earthquake

Source: SEDIMENTARY GEOLOGY  
1996, Vol 106, Iss 1-2, pp 145-154

Language: English

Document type: Article

Cited references: 0

Addresses:

UNIV BERGEN, INST GEOL, N 5007 BERGEN, **NORWAY**

TOHOKU UNIV, FAC SCI, INST GEOL & PALAEONTOLOGY, SENDAI, MIYAGI 980,  
JAPAN

RUSSIAN ACAD SCI, NOVOSIBIRSK CTR COMP, NOVOSIBIRSK 630090, RUSSIA

RUSSIAN ACAD SCI, INST VOLCANOL, PETROPAVLOVSK KAMCHATSKI 68300,  
RUSSIA

SAITO HOON KAI MUSEUM NAT HIST, SENDAI, MIYAGI 980, JAPAN

With this information in mind, we checked the SCI database for the period 1992-1996 for all the articles which contain the word "NORWAY" in the address and are published in journals classified by ISI as journals publishing mainly scientific work within *Geosciences* (see Annex 3 for a list of these journals). This collection of articles is defined as *Norwegian SCI 92-96 articles in Geosciences*.

Table II.1: Important journals for Norwegian Geosciences, SCI 1992-1996

Journal with Norwegian publications in SCI 1992-1996	No. publications	Cumulative %
NORSK GEOLOGISK TIDSSKRIFT	92	8.58
GEOPHYSICAL JOURNAL INTERNATIONAL	42	12.50
GEOPHYSICAL RESEARCH LETTERS	40	16.23
JOURNAL OF ATMOSPHERIC AND TERRESTRIAL PHYSICS	39	19.87
GEOPHYSICS	37	23.32
ORGANIC GEOCHEMISTRY	36	26.68
POLAR RESEARCH	35	29.94
TECTONOPHYSICS	32	32.93
GEOLOGY	30	35.73
GEOPHYSICAL PROSPECTING	30	38.53
JOURNAL OF PETROLEUM TECHNOLOGY	29	41.23
BOREAS	26	43.66
MARINE AND PETROLEUM GEOLOGY	23	45.80
GLOBAL AND PLANETARY CHANGE	22	47.85
JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES	22	49.91
MARINE GEOLOGY	22	51.96
JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS	20	53.82
<b>Total</b>	<b>1072</b>	<b>100</b>

### 3 Norwegian publishing activity in international journals

Where Norwegian research results are published is an important issue in an overview of the scientific production of Norwegian *Geosciences*. Some journals have a more international profile and they are more "influential" than others. A journal's specific profile, its publishing philosophy and publishing strategies are decisive to a certain extent for the kind of audience it will reach and perhaps the probability that an article will be cited in other publications.

In this study we have registered 125 journals which have published at least one Norwegian article in the 5-year period 1992-1996. For the same period, the total number of Norwegian SCI publications identified is *1,072 items that is an average 8.5 publications per journal*.

It is important to bear in mind, however, that a few key journals cover a very large percentage of Norwegian scientific articles in *Geosciences* in this period: *17 journals (14 per cent of the total number of journals) publish more than 50 per cent of all the Norwegian publications in Geosciences*. The list below contains the 17 journals ranked by the number of Norwegian articles they publish. The list also contains the cumulative percentages of the number of articles which are published in these 17 journals.

Do Norwegian geoscientists publish their work also in other journals which are not classified as '*Geosciences*' by ISI? The answer is "yes". A substantial number of publications of Norwegian geoscientists is often published in journals which are

not classified as geoscience journals.

In order to study this issue we designed the following search in the SCI database: We identified all Norwegian publications in the SCI database (this time for the period 1990-1996) with at least one of the following abbreviations of institutional addresses<sup>5</sup>: 'BERGTEK', 'BERGTEKN', 'BERGTEKNIKK', 'GEO', 'GEOCARE', 'GEOCEAN', 'GEOCHEM', 'GEOCHIM', 'GEODESIA', 'GEODYNAM', 'GEOFYS', 'GEOG', 'GEOINST', 'GEOL', 'GEOLAB', 'GEOLOG', 'GEOMAGNET', 'GEOMAGNETISM', 'GEOMAR', 'GEOMARINE', 'GEOMECH', 'GEOMINERO', 'GEOMORPHOL', 'GEOPHYS', 'GEORESOURCES'.

All these abbreviations signalise institutions which should performing the main body of their research in *Geoscience* related subjects. The question is now to find whether all SCI publications from these institutions are in journals falling within ISI's '*Geoscience*' category or not. Based on the set of the abbreviated words of institutional addresses listed above, we identified about 1,090 publications in journals with the following distribution by research field as defined in ISI's classification system:

GEOSCIENCES	817
ECOLOGY/ENVIRONEMENT	63
PLANT & ANIMAL SCIENCES	52
MULTIDISCIPLINARY	48
ENGINEERING	28
ASTROPHYSICS	27
PHYSICS	15
BIOLOGY & BIOCHEMISTRY	13
CHEMISTRY	8
CLINICAL MEDICINE	8
MATERIALS SCIENCES	5
AGRICULTURAL SCIENCES	4
MICROBIOLOGY	3
COMPUTER SCIENCES	2
MOLECULAR BIOLOGY	1

In other words, about 25 per cent of the publications (N= 273) in SCI produced by the geoscience research institutions captured in our search are published in non-geoscience journals.

Of course, there are many other abbreviated words which we could have added in

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<sup>5</sup> All addresses in SCI are always abbreviated according to ISI's standard registration system.

our list to also retrieve publications produced by institutions in oceanography or meteorology or other important subfields in *Geosciences*. However, the search performed is used as an example to demonstrate that by only using the ISI's classification of '*Geosciences*' one can omit many publications published by geoscientists (perhaps, as a result of a common multidisciplinary effort between geoscientists and researchers of other disciplines) in journals classified under other disciplines in ISI's statistics. This set of non-geoscience publications involving geoscience research institutions from a country is an interesting object of study. It can give us an indication of whether the ISI classification is meaningful for a certain country's research, as is the case of Norwegian geoscience here. It can also help us to understand the level, the nature and the actors of multidisciplinary research performed in Norwegian geoscience institutions.

## 4 Norwegian institutions publishing in *Geosciences*

We identified all the Norwegian institutions in the *SCI 1996* publications in *Geosciences*. From 225 identified Norwegian *SCI* publications of this year we counted 417 different addresses of which 198 are from Norway and 219 from other countries. Many of the Norwegian addresses originated from the same institutions. A standardisation of these addresses is not always easy and it may generate some errors about the publication activity of institutions.

Norwegian universities are, as expected, the dominant institutions in this set of publications. The University of Bergen is represented with 54 publications, University of Oslo with 50, University of Tromsø with 39, and NTNU with 16 publications. From the Norwegian research institutes the most represented ones are the Geological Survey of Norway with 20 publications, the IKU Petroleum Research with 18 and the Norwegian Institute of Air Research with 9 publications. In total we identified 17 different research institutes with publication in *Geosciences* in *SCI 1996*. Also companies are active producers of scientific publications in Norway. STATOIL published 26 articles, Norsk Hydro had 7 and Saga Petroleum 4 publications in 1996 in *Geosciences*.



## 5 International co-authorships in Norwegian *Geosciences*

About 50 per cent of all Norwegian publications in *Geosciences* (SCI 1992-1996) are co-authored with researchers from other countries. This is a high percentage compared to 35 per cent of the international co-authored publications of all Norwegian publications in SCI for the same period.

The US, UK and Germany are the countries with which Norwegian researchers in *Geosciences* co-operate the most when producing international publications. Figure II.1 shows the most important countries for Norwegian *Geosciences* measured by the number of co-authored publications.

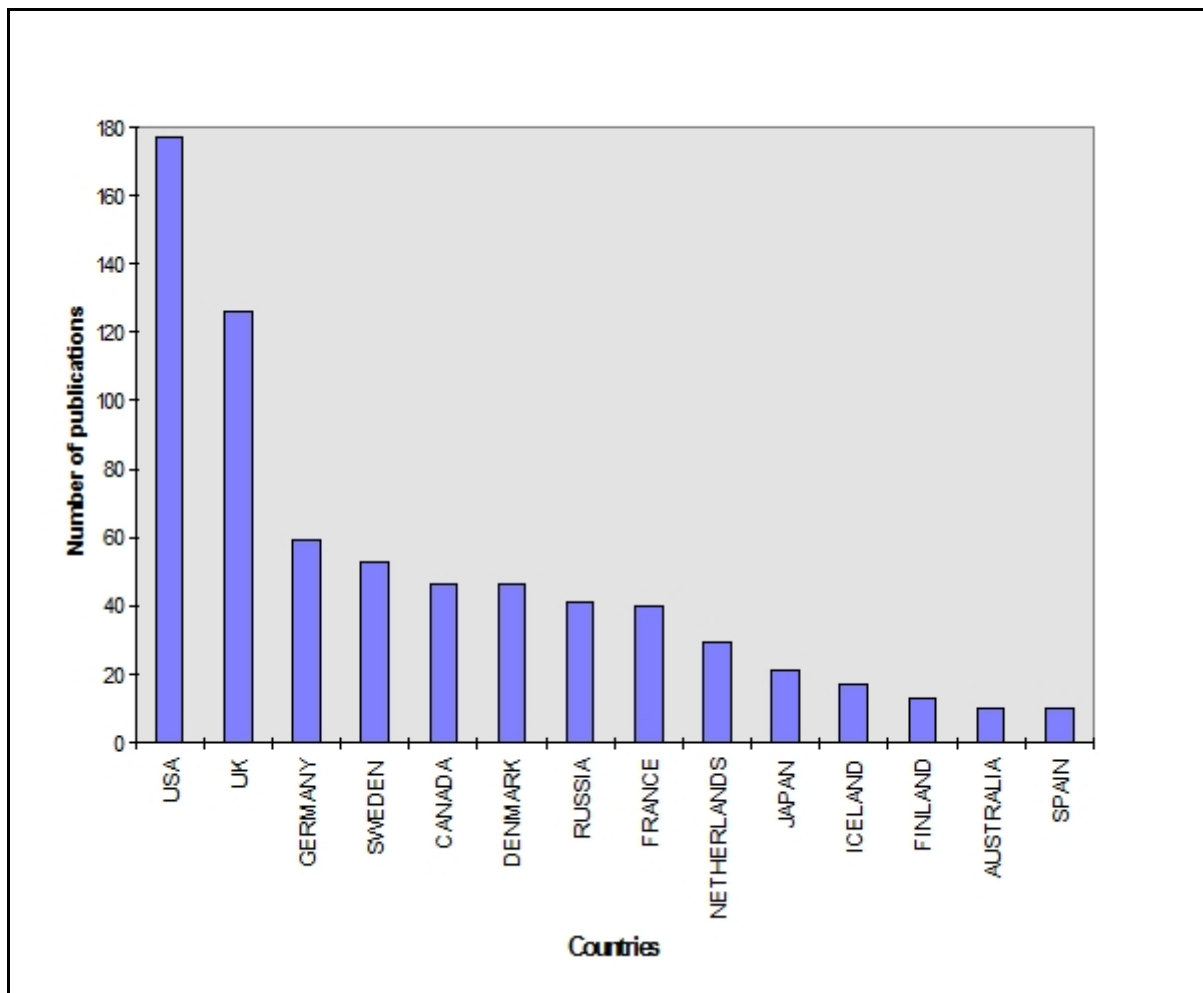


Fig II.1: Number of Norwegian internationally co-authored publications by country.  
 Source: SCI 1992-1996

## Part III: Conclusions

The main conclusions of this study are:

1. The *Geosciences* have a prominent position in the overall publication profile in Norway. Norway produces more than twice as much as the expected number of publications in this field and is the country with the highest production of publications per capita in *Geosciences* after Iceland (see Part I).
2. Norwegian scientific publications in *Geosciences* are cited less frequently than the average. The citation frequency even has a weak decreasing tendency from the middle of the 80s.
3. A small number of journals concentrate the bulk of the Norwegian publications in *Geosciences*. The journal 'Norsk Geologisk Tidsskrift' is the most important journal for Norwegian visibility in this field.
4. The Norwegian publication profile in *Geosciences* is quite internationally oriented. About 50 per cent of all Norwegian publications in *Geosciences* (SCI 1992-1996) are co-authored with researchers from other countries. The US, UK and Germany are the countries with which Norwegian researchers co-operate the most.
5. There is considerable publication activity in non-geoscience fields involving Norwegian institutions in *Geosciences*.



## Annex 1 Data and tables in NSIOD

The National Science Indicators On Diskette - NSIOD - is a database from the Institute for Scientific Information (ISI) which contains publication and citation data from the whole world. The description below concerns the standard version<sup>6</sup>.

### *Time frame*

The data cover the period 1981-1996. The database is updated annually.

### *Content*

- Total number of articles by individual countries
- Total number of cited articles
- Total number of citations
- Citation impact, i.e. the average number of citations per article

Aggregate data for individual fields of science and world totals are also available.

### *Fields of science*

All data can be broken down into 24 fields of science. Specifications exist for each field about the journals in which the articles are published.

### **Data specifications:**

#### *Fields within the individual country:*

- A. Number of articles
- B. Number of citations
- C. Citation impact, i.e. the number of citations per article (B/A)
- D. Number of cited articles
- E. Percentage of articles which are cited (D% of A)
- F. Relative citation impact for fields of science, i.e. the citation impact of a field for a particular country divided by the citation impact of the field for all countries together (C/N)
- G. Relative citation impact for countries, i.e. the citation impact of a field for a particular country divided by the citation impact of the country for all fields together (C/V)
- H. Percentage of articles of the number of articles for all countries together (A% of L)
- I. Percentage of articles of the number of articles for all fields together (A% of

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<sup>6</sup> There is also a "Deluxe version" which contains data from 96 countries as well as 3 geographic regions (*Asia Pacific, European Union, and Latin America*). The division by fields of learning is much finer and contains 102 categories including the humanities.

- T)
- J. Relative citation rate for fields of science, i.e. the percentage of cited articles of a field for a particular country divided by the percentage of cited articles of the field for all countries together (E/P)
- K. Relative citation rate for countries, i.e. the percentage of cited articles of a field for a particular country divided by the percentage of cited articles of the country for all fields together (E/X)

*Fields for all countries together*

- L. Number of articles
- M. Number of citations
- N. Citation impact, i.e. the number of citations per article (M/L)
- O. Number of cited articles
- P. Percentage of articles which are cited (O% of L)
- Q. Relative citation impact, i.e. the citation impact of a field divided by the world's citation impact for all fields together (N/AC)
- R. Percentage of articles of all articles in the world (L% of AB)
- S. Relative citation rate, i.e. the percentage of cited articles of a field divided by the percentage of cited articles for all fields and countries together (P/AD)

*Countries for all fields together*

- T. Number of articles
- U. Number of citations
- V. Citation impact, i.e. the number of citations per article (U/T)
- W. Number of cited articles
- X. Percentage of articles which are cited (W% of T)
- Y. Relative citation impact, i.e. the citation impact of a country divided by the world's citation impact for all countries together (V/AC)
- Z. Percentage of articles of all articles in the world (T% of AB)
- AA. Relative citation rate, i.e. the percentage of cited articles of a country divided by the percentage of cited articles for all fields and countries together (X/AD)

*Totals for all countries and for all fields together*

- AB. Number of articles
- AC. Citation impact, i.e. number of citations per article
- AD. Percentage of cited articles

*Time periods*

1. 5-year overlapping periods, i.e. 1981-1985, 1982-1986, 1983-1987, etc.
2. 1-year periods cited to present, i.e. data for individual years, 1982, 1983 ...1996
3. Cumulative 16-year periods
4. Most recent 5-year period, i.e. 1992-1996



## Annex 2 Fields and journals in NSIOD

Every journal is classified in relation to the categories in the list below which correspond to the categories in *Current Contents*. *Current Contents* is a database of tables of contents of scientific journals in which bibliographic information for individual articles is given. *Current Contents* is published weekly in seven different sections. Each section covers journals from related fields. The relation between the NSIOD codes (standard version) and the *Current Contents* codes can be seen below.

A detailed survey of the journals which are included in the database in *Geosciences* is given in Annex 3.

A journal only appears once within one and the same *Current Contents Product Code*. However, a journal may appear under two or more product codes, e.g., if a journal is relevant for both areas it may appear under *Life Sciences* as well as under *Agriculture, Biology & Environmental Sciences*.

Many articles are authored by persons from more than one country. This is a further source of double counting, as the article will be included for each individual country.



### Classification of fields of science (NSIOD 1996 standard version)

National Science Indicators (NSIOD)		Current Contents (CC)	
Abbr.	Description	Abbr.	Description
AGD	Agricultural Sciences	A/A	A=Agriculture, Biology & Environmental Sciences Agriculture/Agronomy
AGD	Agricultural Sciences	CMA	A=Agriculture, Biology & Environmental Sciences Agricultural Chemistry
AGD	Agricultural Sciences	F	A=Agriculture, Biology & Environmental Sciences Food/Nutrition
ASD	Astrophysics	SP	S=Physical, Chemical and Earth Sciences Space Science
BID	Biology & Biochemistry	BIL	P=Life Sciences Biochemistry & Biophysics
BID	Biology & Biochemistry	BIO	A=Agriculture, Biology & Environmental Sciences Biology, General
BID	Biology & Biochemistry	BTC	A=Agriculture, Biology & Environmental Sciences Biotechnology & Applied Microbiology
BID	Biology & Biochemistry	END	P=Life Sciences Endocrinology, Nutrition & Metabolism
BID	Biology & Biochemistry	EXP	P=Life Sciences Experimental Biology
BID	Biology & Biochemistry	PSL	P=Life Sciences Physiology
CHD	Chemistry	ANL	(Inactive category) Analytical, Inorganic & Nuclear Chemistry
CHD	Chemistry	CME	T=Engineering, Technology & Applied Sciences Chemical Engineering
CHD	Chemistry	CML	P=Life Sciences Chemistry & Analysis
CHD	Chemistry	CMP	S=Physical, Chemical and Earth Sciences Chemistry
CHD	Chemistry	ORG	S=Physical, Chemical and Earth Sciences Organic Chemistry/Polymer Science
CHD	Chemistry	PHC	S=Physical, Chemical and Earth Sciences Physical Chemistry/Chemical Physics
CLD	Clinical Medicine	AIC	C=Clinical Medicine Anesthesia & Intensive Care
CLD	Clinical Medicine	CVS	P=Life Sciences Cardiovascular & Hematology Research
CLD	Clinical Medicine	CAR	C=Clinical Medicine Cardiovascular & Respiratory Systems
CLD	Clinical Medicine	INF	C=Clinical Medicine Clinical Immunology & Infectious Disease
CLD	Clinical Medicine	PSY	C=Clinical Medicine Clinical Psychology & Psychiatry
CLD	Clinical Medicine	DEN	C=Clinical Medicine Dentistry/Oral Surgery & Medicine
CLD	Clinical Medicine	DER	C=Clinical Medicine Dermatology
CLD	Clinical Medicine	NUT	C=Clinical Medicine Endocrinology, Metabolism & Nutrition
CLD	Clinical Medicine	SOC	C=Clinical Medicine Environmental Medicine & Public Health
CLD	Clinical Medicine	GAS	C=Clinical Medicine Gastroenterology & Hepatology
CLD	Clinical Medicine	GNC	C=Clinical Medicine General & Internal Medicine
CLD	Clinical Medicine	HEM	C=Clinical Medicine Hematology
CLD	Clinical Medicine	DGX	P=Life Sciences Medical Research, Diagnosis & Treatment
CLD	Clinical Medicine	MGN	P=Life Sciences Medical Research, General Topics
CLD	Clinical Medicine	OGS	P=Life Sciences Medical Research, Organs & Systems
CLD	Clinical Medicine	NEU	C=Clinical Medicine Neurology

### Classification of fields of science (NSIOD 1996 standard version)

National Science Indicators (NSIOD) Current Contents (CC)

Abbr.	Description	Abbr.	Current Contents Product Code	Description
CLD	Clinical Medicine	CGX	P=Life Sciences	Oncogenesis & Cancer Research
CLD	Clinical Medicine	ONC	C=Clinical Medicine	Oncology
CLD	Clinical Medicine	OPH	C=Clinical Medicine	Ophtalmology
CLD	Clinical Medicine	ORT	C=Clinical Medicine	Ortopedics & Sports Medicine
CLD	Clinical Medicine	OTO	C=Clinical Medicine	Otolaryngology
CLD	Clinical Medicine	PED	C=Clinical Medicine	Pediatrics
CLD	Clinical Medicine	PMC	C=Clinical Medicine	Pharmacology & Toxicology
CLD	Clinical Medicine	RAD	C=Clinical Medicine	Radiology, Nuclear Medicine & Imaging
CLD	Clinical Medicine	REP	C=Clinical Medicine	Reproductive Medicine
CLD	Clinical Medicine	MED	C=Clinical Medicine	Research/Lab Medicine & Medical Technology
CLD	Clinical Medicine	RHU	C=Clinical Medicine	Rheumatology
CLD	Clinical Medicine	SUR	C=Clinical Medicine	Surgery
CLD	Clinical Medicine	URO	C=Clinical Medicine	Urology
CSD	Computer Sciences	CTA	T=Engineering, Technology & Applied Sciences	Computer Engineering, Technology & Applications
CSD	Computer Sciences	CIE	(Inactive category)	Communication/Information/DP
CSD	Computer Sciences	IST	T=Engineering, Technology & Applied Sciences	Informations Technology & Communications Systems
ECD	Economics & Business	ECO	B=Social & Behavioral Sciences	Economics
ECD	Economics & Business	MGT	B=Social & Behavioral Sciences	Management
EDD	Education	EDU	B=Social & Behavioral Sciences	Education
END	Engineering	AER	T=Engineering, Technology & Applied Sciences	Aerospace Engineering
END	Engineering	ARA	T=Engineering, Technology & Applied Sciences	AI, Robotics & Automatic Control
END	Engineering	CIV	T=Engineering, Technology & Applied Sciences	Civil Engineering
END	Engineering	EL	T=Engineering, Technology & Applied Sciences	Electrical & Electronics Engineering
END	Engineering	GNE	T=Engineering, Technology & Applied Sciences	Engineering Management/General
END	Engineering	EMA	T=Engineering, Technology & Applied Sciences	Engineering Mathematics
END	Engineering	ECE	(Inactive category)	Environmental/Civil
END	Engineering	EEE	T=Engineering, Technology & Applied Sciences	Environmental Engineering/Energy
END	Engineering	I/C	(Inactive category)	Instrumentation/Control
END	Engineering	I/M	T=Engineering, Technology & Applied Sciences	Instrumentation/Measurement
END	Engineering	MEC	T=Engineering, Technology & Applied Sciences	Mechanical Engineering
END	Engineering	NCL	T=Engineering, Technology & Applied Sciences	Nuclear Engineering
END	Engineering	SIA	S=Physical, Chemical and Earth Sciences	Spectroscopy/Instrumentation/Analytical Science

### Classification of fields of science (NSIOD 1996 standard version)

National Science Indicators (NSIOD)		Current Contents (CC)		
Abbr.	Description	Abbr.	Current Contents Product Code	Description
EVD	Ecology/Environment	ENV	A=Agriculture, Biology & Environmental Sciences	Environment/Ecology
GED	Geosciences	EAR	S=Physical, Chemical and Earth Sciences	Earth Sciences
GED	Geosciences	GPM	T=Engineering, Technology & Applied Sciences	Geo/Petro/Mining Engineering
IMD	Immunology	IMM	P=Life Sciences	Immunology
LAD	Law	LAW	B=Social & Behavioral Sciences	Law
MBD	Molecular Biology & Genetics	CEL	P=Life Sciences	Cell Biology
MBD	Molecular Biology & Genetics	MBG	P=Life Sciences	Molecular Biology & Genetics
MCD	Microbiology	MCB	P=Life Sciences	Microbiology
MSD	Materials Science	MTR	T=Engineering, Technology & Applied Sciences	Materials Science & Engineering
MSD	Materials Science	MET	T=Engineering, Technology & Applied Sciences	Metallurgy
MTD	Mathematics	MTH	S=Physical, Chemical and Earth Sciences	Mathematics
OTH	Multidisciplinary	MUL		Multidisciplinary
NED	Neurosciences	BEH	P=Life Sciences	Neurosciences & Behavior
PHD	Physics	APP	S=Physical, Chemical and Earth Sciences	Applied Physics/Condensed Matter/Materials Sciences
PHD	Physics	O/A	T=Engineering, Technology & Applied Sciences	Optics & Acoustics
PHD	Physics	PHS	S=Physical, Chemical and Earth Sciences	Physics
PLD	Plant & Animal Sciences	AN	P=Life Sciences	Animal & Plant Sciences
PLD	Plant & Animal Sciences	AS	A=Agriculture, Biology & Environmental Sciences	Animal Sciences
PLD	Plant & Animal Sciences	AQU	A=Agriculture, Biology & Environmental Sciences	Aquatic Sciences
PLD	Plant & Animal Sciences	ENT	A=Agriculture, Biology & Environmental Sciences	Entomology/Pest Control
PLD	Plant & Animal Sciences	PL	A=Agriculture, Biology & Environmental Sciences	Plant Sciences
PLD	Plant & Animal Sciences	VET	A=Agriculture, Biology & Environmental Sciences	Veterinary Medicine/Animal Health
PMD	Pharmacology	PHM	P=Life Sciences	Pharmacology/Toxicology
PSD	Psychology/Psychiatry	PSI	B=Social & Behavioral Sciences	Psychiatry
PSD	Psychology/Psychiatry	PSO	B=Social & Behavioral Sciences	Psychology
SSD	Social Sciences, General	COM	B=Social & Behavioral Sciences	Communication
SSD	Social Sciences, General	GEO	B=Social & Behavioral Sciences	Environmental Studies, Geography & Development
SSD	Social Sciences, General	LIB	B=Social & Behavioral Sciences	Library & Information Science
SSD	Social Sciences, General	POL	B=Social & Behavioral Sciences	Political Science & Public Administration
SSD	Social Sciences, General	PUB	B=Social & Behavioral Sciences	Public Health & Health Care Science
SSD	Social Sciences, General	REH	B=Social & Behavioral Sciences	Rehabilitation

### Classification of fields of science (NSIOD 1996 standard version)

National Science Indicators (NSIOD) Current Contents (CC)

Abbr.	Description	Abbr.	Current Contents Product Code	Description
SSD	Social Sciences, General	S/I	B=Social & Behavioral Sciences	Social Work & Social Policy
SSD	Social Sciences, General	S/A	B=Social & Behavioral Sciences	Sociology & Anthropology

## Annex 3 Journals in Geosciences in NSIOD

The alphabetical list below contains all the journals which are categorised under *Geosciences* in the NSIOD database (the 1996 standard version). The database also includes articles in the *Geosciences* from journals with a wider coverage such as NATURE, SCIENCE and the PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA.

AAPG BULLETIN-AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS	RESEARCH PAPERS
ACTA PALAEONTOLOGICA POLONICA	DEEP-SEA RESEARCH PART II-TOPICAL STUDIES IN OCEANOGRAPHY
ALCHERINGA	DYNAMICS OF ATMOSPHERES AND OCEANS
AMERICAN JOURNAL OF SCIENCE	E&MJ-ENGINEERING AND MINING JOURNAL
AMERICAN MINERALOGIST	EARTH AND PLANETARY SCIENCE LETTERS
ANNUAL REVIEW OF EARTH AND PLANETARY SCIENCES	EARTH SURFACE PROCESSES AND LANDFORMS
APPLIED GEOCHEMISTRY	EARTH-SCIENCE REVIEWS
ATLANTIC GEOLOGY	ECLOGAE GEOLOGICAE HELVETIAE
ATMOSPHERE-OCEAN	ECONOMIC GEOLOGY AND THE BULLETIN OF THE SOCIETY OF ECONOMIC GEOLOGISTS
ATMOSPHERIC ENVIRONMENT	ENGINEERING GEOLOGY
ATMOSPHERIC RESEARCH	EPISODES
AUSTRALIAN JOURNAL OF EARTH SCIENCES	EUROPEAN JOURNAL OF MINERALOGY
AUSTRALIAN METEOROLOGICAL MAGAZINE	EXPLORATION AND MINING GEOLOGY
BASIN RESEARCH	FACIES
BOREAS	FIZIKA ZEMLI
BOUNDARY-LAYER METEOROLOGY	GEO-MARINE LETTERS
BULLETIN DE LA SOCIETE GEOLOGIQUE DE FRANCE	GEOBIOS
BULLETIN DES CENTRES DE RECHERCHES EXPLORATION-PRODUCTION ELF AQUITAINE	GEOCHEMICAL JOURNAL
BULLETIN OF CANADIAN PETROLEUM GEOLOGY	GEOCHIMICA ET COSMOCHIMICA ACTA
BULLETIN OF THE AMERICAN METEOROLOGICAL SOCIETY	GEODINAMICA ACTA
BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA	GEOGRAFISKA ANNALER SERIES A-PHYSICAL GEOGRAPHY
BULLETIN OF VOLCANOLOGY	GEOGRAPHIE PHYSIQUE ET QUATERNAIRE
CANADIAN GEOTECHNICAL JOURNAL	GEOKHIMIYA
CANADIAN JOURNAL OF EARTH SCIENCES	GEOLOGICA CARPATHICA
CANADIAN MINERALOGIST	GEOLOGICAL JOURNAL
CANADIAN MINING JOURNAL	GEOLOGICAL MAGAZINE
CARBONATES AND EVAPORITES	GEOLOGICAL SOCIETY OF AMERICA BULLETIN
CHEMICAL GEOLOGY	GEOLOGIE EN MIJNBOW
CHEMIE DER ERDE-GEOCHEMISTRY	GEOLOGISCHE RUNDSCHAU
CIM BULLETIN	GEOLOGY
CLAY MINERALS	GEOLOGY OF ORE DEPOSITS
CLAYS AND CLAY MINERALS	GEOMAGNETIZM I AERONOMIYA
CLIMATE DYNAMICS	GEOMORPHOLOGY
CLIMATIC CHANGE	GEOPHYSICAL JOURNAL INTERNATIONAL
COMPTES RENDUS DE L ACADEMIE DES SCIENCES SERIE II FASCICULE A-SCIENCES DE LA TERRE ET DES PLANETES	GEOPHYSICAL PROSPECTING
COMPUTERS & GEOSCIENCES	GEOPHYSICAL RESEARCH LETTERS
CONTRIBUTIONS TO MINERALOGY AND PETROLOGY	GEOPHYSICS
CRETACEOUS RESEARCH	GEOSCIENCE CANADA
DEEP-SEA RESEARCH PART I-OCEANOGRAPHIC	GEOSTANDARDS NEWSLETTER
	GEOTECHNIQUE
	GEOTEXTILES AND GEOMEMBRANES
	GEOTIMES
	GFF
	GLOBAL AND PLANETARY CHANGE
	GLOBAL BIOGEOCHEMICAL CYCLES
	HOLOCENE
	IN SITU

- INTERNATIONAL JOURNAL FOR NUMERICAL AND ANALYTICAL METHODS IN GEOMECHANICS
- INTERNATIONAL JOURNAL OF CLIMATOLOGY
- INTERNATIONAL JOURNAL OF COAL GEOLOGY
- INTERNATIONAL JOURNAL OF MINERAL PROCESSING
- INTERNATIONAL JOURNAL OF REMOTE SENSING
- INTERNATIONAL JOURNAL OF ROCK MECHANICS AND MINING SCIENCES & GEOMECHANICS ABSTRACTS
- IZVESTIYA AKADEMII NAUK FIZIKA ATMOSFERI I OKEANA
- JOURNAL OF AFRICAN EARTH SCIENCES
- JOURNAL OF APPLIED GEOPHYSICS
- JOURNAL OF APPLIED METEOROLOGY
- JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY
- JOURNAL OF ATMOSPHERIC AND TERRESTRIAL PHYSICS
- JOURNAL OF ATMOSPHERIC CHEMISTRY
- JOURNAL OF CANADIAN PETROLEUM TECHNOLOGY
- JOURNAL OF CLIMATE
- JOURNAL OF FORAMINIFERAL RESEARCH
- JOURNAL OF GEOCHEMICAL EXPLORATION
- JOURNAL OF GEODESY
- JOURNAL OF GEODYNAMICS
- JOURNAL OF GEOLOGY
- JOURNAL OF GEOMAGNETISM AND GEOELECTRICITY
- JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES
- JOURNAL OF GEOPHYSICAL RESEARCH-OCEANS
- JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH
- JOURNAL OF GLACIOLOGY
- JOURNAL OF MARINE SYSTEMS
- JOURNAL OF METAMORPHIC GEOLOGY
- JOURNAL OF MICROPALAEONTOLOGY
- JOURNAL OF MINING SCIENCE
- JOURNAL OF PALEONTOLOGY
- JOURNAL OF PETROLEUM GEOLOGY
- JOURNAL OF PETROLEUM TECHNOLOGY
- JOURNAL OF PETROLOGY
- JOURNAL OF PHYSICAL OCEANOGRAPHY
- JOURNAL OF PHYSICS OF THE EARTH
- JOURNAL OF QUATERNARY SCIENCE
- JOURNAL OF SEDIMENTARY RESEARCH
- JOURNAL OF SEISMIC EXPLORATION
- JOURNAL OF SOUTH AMERICAN EARTH SCIENCES
- JOURNAL OF SOUTHEAST ASIAN EARTH SCIENCES
- JOURNAL OF STRUCTURAL GEOLOGY
- JOURNAL OF THE ATMOSPHERIC SCIENCES
- JOURNAL OF THE GEOLOGICAL SOCIETY
- JOURNAL OF THE GEOLOGICAL SOCIETY OF INDIA
- JOURNAL OF THE METEOROLOGICAL SOCIETY OF JAPAN
- JOURNAL OF THE SOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY
- JOURNAL OF VERTEBRATE PALEONTOLOGY
- JOURNAL OF VOLCANOLOGY AND GEOTHERMAL RESEARCH
- LETHAIA
- LITHOS
- MARINE AND PETROLEUM GEOLOGY
- MARINE CHEMISTRY
- MARINE GEOLOGY
- MARINE GEOPHYSICAL RESEARCHES
- MARINE GEORESOURCES & GEOTECHNOLOGY
- MARINE MICROPALAEONTOLOGY
- MATHEMATICAL GEOLOGY
- METEORITICS & PLANETARY SCIENCE
- METEOROLOGY AND ATMOSPHERIC PHYSICS
- MICROPALAEONTOLOGY
- MINERALIUM DEPOSITA
- MINERALOGICAL MAGAZINE
- MINERALOGY AND PETROLOGY
- MINERALS ENGINEERING
- MONTHLY WEATHER REVIEW
- NATURAL HAZARDS
- NEFTYANOE KHOZYAISTVO
- NEUES JAHRBUCH FUR MINERALOGIE-ABHANDLUNGEN
- NEUES JAHRBUCH FUR MINERALOGIE-MONATSFESTEN
- NEW ZEALAND JOURNAL OF GEOLOGY AND GEOPHYSICS
- NORSK GEOLOGISK TIDSSKRIFT
- OIL & GAS JOURNAL
- OIL SHALE
- OKEANOLOGIYA
- ORE GEOLOGY REVIEWS
- ORGANIC GEOCHEMISTRY
- PALAEOGEOGRAPHY PALAEOCLIMATOLOGY PALAEOECOLOGY
- PALAEONTOLOGY
- PALAIOS
- PALEOCEANOGRAPHY
- PERMAFROST AND PERIGLACIAL PROCESSES
- PETROLEUM GEOSCIENCE
- PETROLOGY
- PHYSICAL GEOGRAPHY
- PHYSICS AND CHEMISTRY OF MINERALS
- PHYSICS OF THE EARTH AND PLANETARY INTERIORS
- POLAR RESEARCH
- PRECAMBRIAN RESEARCH
- PROCEEDINGS OF THE GEOLOGISTS ASSOCIATION
- PROCEEDINGS OF THE INDIAN ACADEMY OF SCIENCES-EARTH AND PLANETARY SCIENCES
- PROGRESS IN OCEANOGRAPHY
- PROGRESS IN PHYSICAL GEOGRAPHY
- PURE AND APPLIED GEOPHYSICS
- QUARTERLY JOURNAL OF ENGINEERING GEOLOGY
- QUARTERLY JOURNAL OF THE ROYAL METEOROLOGICAL SOCIETY

QUATERNARY INTERNATIONAL  
QUATERNARY RESEARCH  
QUATERNARY SCIENCE REVIEWS  
RADIOCARBON  
REMOTE SENSING OF ENVIRONMENT  
REVIEWS OF GEOPHYSICS  
REVISTA GEOLOGICA DE CHILE  
REVUE DE L INSTITUT FRANCAIS DU PETROLE  
ROCK MECHANICS AND ROCK ENGINEERING  
SCHWEIZERISCHE MINERALOGISCHE UND  
PETROGRAPHISCHE MITTEILUNGEN  
SCIENCE IN CHINA SERIES D-EARTH SCIENCES  
SCOTTISH JOURNAL OF GEOLOGY  
SEDIMENTARY GEOLOGY  
SEDIMENTOLOGY  
SOUTH AFRICAN JOURNAL OF GEOLOGY  
SPE FORMATION EVALUATION  
SPE RESERVOIR ENGINEERING  
STRATIGRAPHY AND GEOLOGICAL  
CORRELATION  
SURVEYS IN GEOPHYSICS

TECTONICS  
TECTONOPHYSICS  
TELLUS SERIES A-DYNAMIC METEOROLOGY AND  
OCEANOGRAPHY  
TELLUS SERIES B-CHEMICAL AND PHYSICAL  
METEOROLOGY  
TERRA NOVA  
THEORETICAL AND APPLIED CLIMATOLOGY  
TRANSACTIONS OF THE INSTITUTION OF  
MINING AND METALLURGY SECTION  
A-MINING INDUSTRY  
TRANSACTIONS OF THE INSTITUTION OF  
MINING AND METALLURGY SECTION  
B-APPLIED EARTH SCIENCE  
TRANSACTIONS OF THE ROYAL SOCIETY OF  
EDINBURGH-EARTH SCIENCES  
WEATHER AND FORECASTING  
ZEITSCHRIFT FUR GEOMORPHOLOGIE

