



***Polish Polar Research* as a medium of international scientific communication 1996–2002**

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ABSTRACT: The multidisciplinary journal *Polish Polar Research* is bibliometrically analysed as a medium of international scientific communication in light of current citation data from SCI Ex 1996–2002. Despite its world-wide distribution and distinctive visibility in the polar society, the journal's two-years impact factor is invariably not very high (below 0.35) because the cited papers are mostly from the 1980s. The increasing participation of foreign (co)authors in the Polish quarterly, paired with the slowly growing number of citing articles in SCI Ex are already promising steps to the immediate information transfer and subsequently improved brief-term journal impact. Citation links with polar investigators from Germany, and also from Great Britain, Spain and the USA are clearly manifested, especially in fields of marine Antarctic ecology and biology. Even if *Polish Polar Research* may successfully compete with several low-rated journals from different countries indexed in SCI Ex in related categories, its continuing internationalization is urgently required.

Key words: Polish Polar Research, scientific communication, bibliometrics, journal impact factor, citation indicators.

Introduction

The international visibility and utility of scientific journals as communication means may be tested in different qualitative and quantitative ways (see Zitt and Bassecoulard 1998, Martín-Sempere *et al.* 1999), but the most distinguished calculations are based on citation. This is an obvious record of the truly world-wide circulation of a journal, paired with the proven utility of published results (Garfield 1979, 1990), *i.e.*, increased success in the “competition for attention” in modern science (Franck 1999). The most comprehensive and reliable source of such data is the system of indexation of science and technology journals created by the Institute for Scientific Information (ISI) in Philadelphia. The ISI® *Science Citation Index Expanded* (SCI Ex) provides access to current and retrospective bibliographic information, authors' abstracts, and cited references found in approximately 5,900 of

the world's leading scholarly science and technical journals covering more than 150 disciplines. The SCI Ex is available worldwide online through the *ISI Web of Science*[®].

Theoretically, to find the position of a journal in the ISI ranking it is enough to consult the annually published statistical database *Journal Citation Reports – Science Edition* (JCR), where bibliometric characters are presented for the source “master” journals (see the ISI Homepage <http://www.isinet.com>). *Polish Polar Research* (PPR), edited by the Committee on Polar Research of the Polish Academy of Sciences since 1980, has not been included in the coverage by ISI and, consequently, has not been formally impact-rated. This quarterly publishes original research articles (up to 30 articles per year; Table 1) presenting the results of international multidisciplinary investigations carried out in polar regions, as well as reviews of articles and book reviews. The main goal of this article is to demonstrate the evolving international impact of PPR in light of current citation data from SCI Ex.

Table 1

Number of papers published in PPR annually since 1994 (as used to the journal impact assessment; Tables 2–3), and their author's scope.

Annual set	Issues of the PPR (according to official dates of printing)	No. of citable items**	% of international articles*
1994	14 (1) – 14 (3), 1993	20	20.0
1995	14 (4), 1993 – 15 (1–2), 1994	17	17.6
1996	15 (3–4), 1994 – 16 (1–2), 1995; 17 (1–2), 1996	18	5.6
1997	16 (3–4), 1995; 17 (3–4) 1996; 18 (1), 1997	28	14.3
1998	18 (2) – 18 (3–4), 1997; 19 (1–2), 1998	17	5.9
1999	19 (3–4), 1998 – 20 (1), 1999	13	29.4
2000	20 (2) – 20 (4), 1999; 21 (1) – 21 (2), 2000	26	23.0
2001	21 (3–4), 2000; 22 (1) – 22 (2), 2001	15	13.3

*Articles by foreign authors or co-authors; ** refer to original articles only, i.e., excluding prefaces, chronicle, book reviews and biographic notes.

Methodological remarks

Of diagnostic significance for international journal quality is the ISI's impact factor (IF), a number which gives the ratio between papers published in a journal and their subsequent citations. It is even asserted that a journal's IF evaluates published works (and thus in directly the quality of research), but this approach is a matter of hot debate (see Garfield 2000, Adams 2002). These JCR data are used to

promote journals in editorial notes (*e.g.*, Fairchild 2000), on their homepages, as well as, *e.g.*, in the Elsevier's newspaper *SedAbstracts*. The journal citation indices influence the subsidizing of scientific institutions in Poland by the State Committee for Scientific Research (KBN) since 1998.

As PPR is excluded from the authorized JCR ranking, its conventional two-year **impact factor** is determined using the standard ISI formula (Garfield 1979, 1990; see discussion in Racki and Baliński 1999):

$$IF_x = \frac{C_{x-1} + C_{x-2}}{A_{x-1} + A_{x-2}}$$

where:

IF_x – impact factor for year x ;

C_{x-1} , C_{x-2} – total number of PPR citations received in year x , including both citations from *Science Citation Index Expanded* and manually counted PPR self-citations for the non-ISI source journal, to source items published in two preceding years, $x-1$ and $x-2$, respectively;

A_{x-1} , A_{x-2} – number of PPR articles published by the journal in years $x-1$ and $x-2$, respectively.

It should be emphasized that ISI considers uncritically all established citations, and therefore, a journal self-citing rate may play a role in the IF calculations (usually up to 30%; see Garfield 1979, Hjortgaard Christensen *et al.* 1997, Stegmann 1999). This bias is shown perfectly for Polish geological non-ISI periodicals (Racki 1997). The kind of citations frequently is linked with an unchanging author set only (see Table 2). Thus, it is essential for the non-JCR periodicals to exhibit their “real” international impact after exclusion of the self-citation counts. This approach is realized by KBN for distinguished non-ISI Polish biology and geoscience journals, ranked by the “**real**” **impact factor** (RIF), calculated exclusively from citation data derived from SCI Ex (see Table 2). Conceptually, this knowledge export was previously focused on the external cited (or reduced) impact factor formula as follow (*cf.* Hjortgaard Christensen *et al.* 1997, see also Racki 1997, Stegmann 1999):

$$RIF_x = \frac{EC_{x-1} + CE_{x-2}}{A_{x-1} + A_{x-2}}$$

where:

RIF_x – external cited impact factor for year x ;

EC_{x-1} , EC_{x-2} – number of PPR “external” citations received in year x , taken from *Science Citation Index Expanded*, to source items published in two preceding years, $x-1$ and $x-2$, respectively;

A_{x-1} , A_{x-2} – number of PPR articles published by the journal in years $x-1$ and $x-2$, respectively.

Table 2
Example of IF calculation for 2001, with specified documentation of PPR citations.

Cited paper from Polish Polar Research 1999–2000 [v. 19 (3–4) – v. 21 (2)] as recorded in SCI Ex	Citing ISI source in 2001	Country affiliation of citing authors
Przybylak R. 1999. PPR 20: 140 Przybylak R. 2000. Influence of cloudiness on extreme air temperatures and diurnal temperature range in the Arctic in 1951–1990. — PPR 19 (1999): 149–173.	Stanhill G. and Cohen S. 2001. Global dimming: a review of the evidence for a widespread and significant reduction in global radiation with discussion of its probable causes and possible agricultural consequences. — <i>Agricultural and Forest Meteorology</i> 107: 255–278	Israel
PPR self-citations (in abbreviated form)		
Salwicka K. and Sierakowski K. 1999. PPR 19 (1998): 231–243. Stonehouse B. 1999. — PPR 20, 65–75.	Salwicka K. and Stonehouse B. 2001. — PPR 21 (2000): 189–197.	Poland – Great Britain
Żmijewska M.I. et al. 2000. PPR 20 (1999): 325–333.	Kittel W. 2001. — PPR 21 (2000): 199–208.	Poland
Rakusa-Suszczewski S. 1999. — PPR 19 (1998): 249–252.	Kittel W. 2001. — PPR 22: 45–70.	Poland
Robakiewicz M. and Rakusa-Suszczewski S. 1999. — PPR 20: 43–58		
Zdzitowiecki K. <i>et al.</i> 1999. — PPR 20: 59–63.	Zdzitowiecki K. 2001. — PPR 22: 159–165.	Poland

$$IF_{2001} = \frac{C_{1999} + C_{2000}}{A_{1999} + A_{2000}} = \frac{5 + 2}{13 + 26} = \frac{7}{39} = 0.179$$

$$RIF_{2001} = \frac{EC_{1999} + CE_{2000}}{A_{1999} + A_{2000}} = \frac{0 + 1}{13 + 26} = \frac{1}{39} = 0.026$$

Both of these key bibliometric indices are calculated for 1996–2001 annals (in factual terms) of *Polish Polar Research* (Table 3), and presented below in a broad citation setting subdivided into two time intervals: 1996–1998 and 1999–2002 (see Fig. 2).

Citation analysis results

In first search step, 223 references matched the query “Pol* Pol* Res*” in SCI Ex, but due to a variety of letter errors in article bibliographies and/or during indexing in ISI (mostly in a number of pages), this ISI record corresponds to 204 PPR articles quoted in international prestigious journals indexed in SCI Ex between January 1996 and September 2002 (Table 3). In summary, the 204 PPR references were cited 520 times in 345 source ISI papers. The weak increasing trend in the

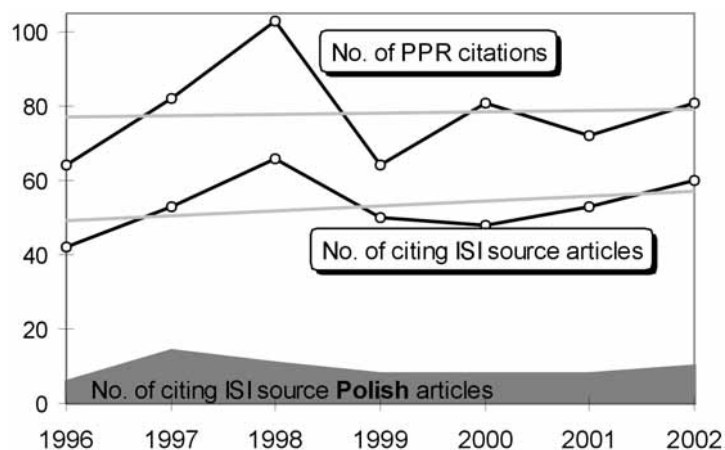


Fig. 1. Annual distribution of citing articles and PPR cites in SCI Ex 1996–2002 (extrapolated from the first nine months of 2002).

number of the citing articles is noteworthy, but total citation numbers are generally stabilised. During the most fruitful 1998 annual set, 78 PPR papers received 103 citations in 66 articles; this was partly related to the higher numbers of ISI articles (co)authored by Polish scientists in 1997–1998, usually (self)citing several PPR items (up to 8). In summary, the Polish co(authors) of 62 articles provided almost 25% of PPR citations. Active biologists are the most effective contributors frequently self-citing PPR papers in ISI source articles (Węśławski, Zdzitowiecki).

Table 3

Citation statistics of PPR articles since 1994, and calculated standard (IF) and real (RIF) impact factors.

SCI Ex annual set	Citing ISI source articles	Cited PPR items	Citations to PPR items (IF citations*)	IF	RIF
1996	42	54	64 (2)	0.108	0.054
1997	53	66	82 (5)	0.286	0.143
1998	66	78	103 (3)	0.348	0.065
1999	50	57	64 (2)	0.089	0.044
2000	48	63	81 (2)	0.167	0.067
2001	53	55	72 (1)	0.179	0.026
I–IX.2002	40	43	54 (2)	–	–

* Cites to the PPR items published in two preceding years, used to the IF estimation (see Table 2).

When looking into the citation rate of the 22 PPR volumes issued from 1980 to 2001 (Table 4), it is obvious that the most quoted articles in 1996–2002 were published in 1986 (55 cites), 1991 (54) and 1980 (52). Notably, 30% of the cites still refer to four oldest PPR volumes (1980–1984). Thus, age determination of the

cited items exhibits a strong predominance of the PPR papers approaching 10 and more years old (Fig. 2). Not very distinctive citation peaks are recognizable for younger articles of 4 and 9 years (1999–2002), or 5 and 7 (the strongest one) years (1996–1998).

Table 4
Citation distribution among the PPR volumes (in nominal terms). Note a cross pattern of the presented data (exemplified by shadowed fields), according to reaching SCI Ex annals.

PPR annual set	SCI Ex 1996	SCI Ex 1997	SCI Ex 1998	SCI Ex 1999	SCI Ex 2000	SCI Ex 2001	SCI Ex I–IX 2002	PPR annual set	Citations to PPR annals
1995	0	0	0	0	1	0	3	2001	3
1994	1	0	1	0	2	1	0	2000	0
1993	2	3	1	1	0	0	1	1999	3
1992	0	4	5	4	1	6	0	1998	2
1991	7	1	11	1	4	1	0	1997	6
1990	5	7	2	6	0	3	0	1996	4
1989	5	6	17	1	5	1	2	1995	14
1988	3	7	3	5	2	2	1	1994	12
1987	4	3	9	5	12	2	4	1993	34
1986	4	7	8	7	3	3	2	1992	12
1985	5	7	6	0	6	7	3	1991	54
1984	2	5	8	3	3	6	5	1990	34
1983	3	6	5	5	3	8	7	1989	47
1982	3	6	2	6	15	9	2	1988	27
1981	7	7	5	1	1	9	3	1987	35
1980	13	7	4	3	2	1	7	1986	55
x	x	6	6	9	5	0	3	1985	26
x	x	x	10	0	5	3	1	1984	14
x	x	x	x	7	4	0	4	1983	29
x	x	x	x	x	7	3	2	1982	30
x	x	x	x	x	x	6	1	1981	28
x	x	x	x	x	x	x	3	1980	52
Citations in year	64	82	103	64	81	72	54	Total citations	520

Renowned articles and themes

Most of the cited PPR articles (55.6%) are quoted in single citing papers only. The two most cited papers (Table 5) are authored by Zieliński (1990) on benthic macroalgae (15 cites), and by Tatur (1989) on ornithogenic soils (14). Merely 14 articles have achieved more than 6 citations *sensu stricto* (without self-citations), i.e. at least 1 cite per year in the SCI Ex. The two biologists are distinctive leaders of the ranking as they each (co)authored the two highest-rated papers.

Fig. 2. Age of the PPR article citations in SCI Ex 1996-IX.2002. Note that the data refer to cumulative citation numbers, and not to particular articles, which were cited in extremely different rates (from 1 to 15 cites).

Almost all distinguished PPR papers were published in the 1980s and cover several biological and ecological aspects of Antarctic marine ecosystems (benthic algae and invertebrates, penguins, mezoplankton), including krill population dynamics (Stępnik; rank 10th). Earth Sciences and Arctic motifs are represented only by Kostrzewski *et al.* (rank 8th), describing denudation processes of Spitsbergen; also related Arctic glacier-hydrochemical questions by Pulina *et al.* (1984) are noteworthy (4 citations) in this geographical context. Among geological matters, 7 articles first-authored by Birkenmajer are a major performance (total of 12 citations; maximal 3). Five citations is highest result for the PPR Argentinian-Polish paleontological contribution (on Paleogene birds; Tambussi *et al.* 1994).

Table 5
The 10 highest cited articles from *Polish Polar Research* in 1996–2002.

Rank*	Cited article from <i>Polish Polar Research</i>	Cites** in SCI Ex
1	Zieliński K. 1990. Bottom macroalgae of the Admiralty Bay (King George Island, South Shetlands, Antarctica). — PPR 11: 95–131	15
2	Tatur A. 1989. Ornithogenic soils of the maritime Antarctic. — PPR 10: 481–532	14
3	Myrcha A. and Tatur A. 1991. Ecological role of the current and abandoned penguin rookeries in the environment of marine Antarctic. — PPR 12: 3–24	13
4	Presler P. 1986. Necrophagous invertebrates of the Admiralty Bay of King George Island (South Shetlands, Antarctica). — PPR 7: 25–61	10
5	Zieliński K. 1981. Benthic macroalgae of the Admiralty Bay (King George Island, South Shetland Islands) and circulation of algal matter between the water and the shore. — PPR 2: 71–94	10
6	Arnaud P.M., Jażdżewski K., Presler P. and Siciński J. 1986. Preliminary survey of benthic invertebrates collected by Polish Antarctic Expeditions in Admiralty Bay (King George Island, South Shetland Islands, Antarctica). — PPR 7: 7–24	8
7	Witek Z., Kittel W., Czykieta H., Żmijewska, M.I. and Presler E. 1985. Mezoplankton in the southern Drake Passage and in the Bransfield Strait during BIOMASS-SIBEX (December 1983 – January 1984). — PPR 6: 95–115	8
8	Kostrzewski A., Kaniecki J., Kapiewski J., Klimczuk R., Stach A. and Zwoliński Z. 1989. The dynamics and rate of denudation of glaciated and non-glaciated catchments, central Spitsbergen. PPR 10: 317–367	7
9	Grelowski A., Majewicz A. and Pastuszek M. 1986. Mesoscale hydrodynamic processes in the region of Bransfield Strait and the southern part of Drake Passage during BIOMASS-SIBEX 1983/1984. — PPR 7: 353–369	7
10	Stępnik R. 1982. All-year populational studies of <i>Euphausiacea</i> (Crustacea) in the Admiralty Bay (King George Island, South Shetland Islands, Antarctica). — PPR 3: 49–68	7

*Articles published later are ranked higher; ** self-citations are excluded.

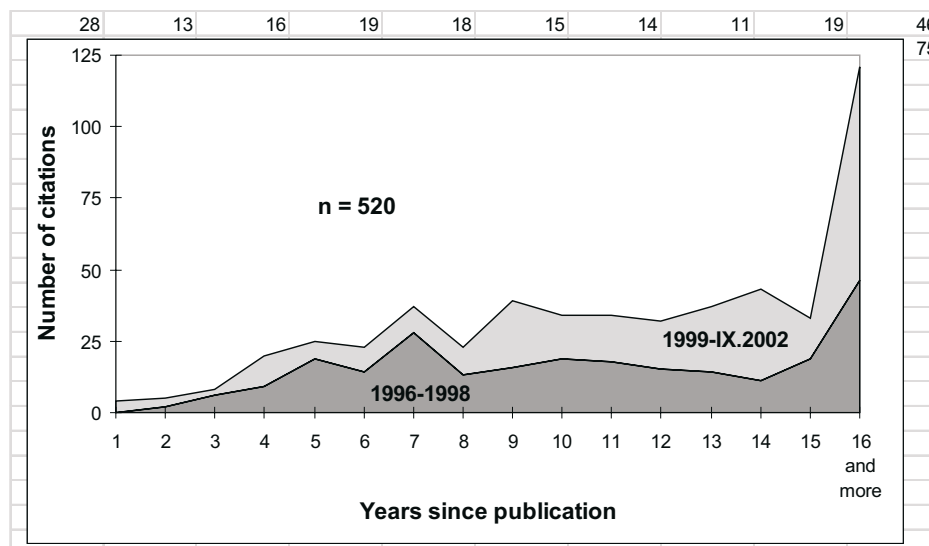


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Impact factors

Newly published PPR articles are infrequently cited in SCI Ex (Table 4), and merely 3.2% of citations are placed in the IF two-year window (Fig. 2). The very long-term impact is a marked feature of PPR (see Fig. 2), whilst, by comparison the rate of citation peaks in the second to fourth years after publication in case of the successful (IF above 2) *Journal of the Geological Society* (Fairchild 2000). Consequently it is not surprising that the PPR impact factor results for the last six years (Table 3) reveal its relatively constant and low level, ranging from 0.089 (1999) to 0.348 (1998). As indicated above, this score is at least doubled due to the high number of the journal self-citations. This bias is exemplified by the highest IF in 1998, where 16 recorded citations include as many as 13 PPR self-citations (see also Table 2). In fact, the RIF is based on a few external citations in SCI Ex (maximally 5; Table 3), and the crucial bibliometric indicator of international status is above 0.1 only in 1997.

Citation geography

Authors from 32 countries and all continents have cited PPR articles, although the significance of Polish co-authors was emphasized above. In exclusively foreign papers (Fig. 3), authors from Germany greatly prevailed, especially those from Alfred Wegener Institute of Polar and Marine Research in Bremerhaven (27 articles). In addition, 37% of the articles contain at least 2 PPR references.

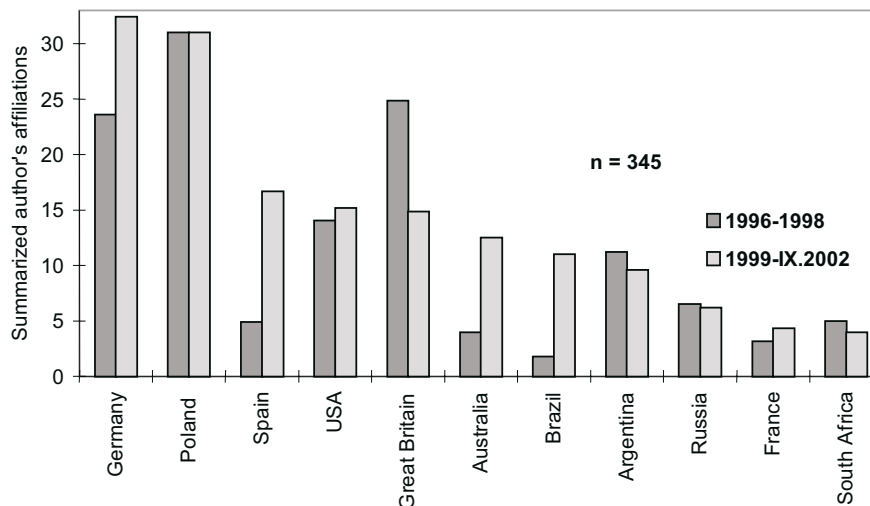


Fig. 3. Nationality of authors of articles citing PPR items, shown in two time intervals for Poland and 10 leading countries. The affiliation data are omitted in the case of presence of Polish co-authors in the citing collective papers (otherwise subdivided according to affiliated institutions in foreign articles).

Thus the expanding Polish-German citation links are difficult to overvalue, although this is not manifested by joint works (2 articles only); more effective are direct author associations with institutions from Norway and the USA.

A noteworthy set of countries, showing dynamically rising interest in the PPR papers since 1999, encompasses Spain, Australia, and Brazil (also Canada). A contrary trend is observed for Great Britain, Argentina, and South Africa. To the authors most frequently citing PPR articles belong, among others, S.D. Emslie (University of North Carolina, USA), A. Hodson (University of Sheffield, England), E.A. Pakhomov (University of Ft Hare, South Africa), and I. Gomez (Alfred Wegener Institute of Polar and Marine Research).

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Citing journals

PPR articles were included in the bibliography of 156 ISI journals in 1996–2002, but most frequently cited in *Polar Biology*, *Antarctic Science* and *Deep-Sea Research* (Table 6). This demonstrates the obvious impact of PPR on European polar literature, perfectly shown by the prominent citation position occupied by the publisher Springer Verlag (*Polar Biology*), containing 65 citing papers. The high posi-

tion of Polish *Acta Parasitologica* is overstated because of the self-citing activity of the parasitologists. On the other hand, there are also dispersed PPR citations in important North American magazines (e.g., *American Zoologist*, *Ecology*, *Bulletin of Marine Science*), as well as in less-known journals from other continents, such as *Acta Geologica Sinica*, *Australian Journal of Soil Research*, *Ameghiniana* (Argentina) and *Brazilian Archives of Biology and Technology*.

Tabela 6
The 12 ISI master journals citing most frequently articles from PPR.

Rank	ISI source ("master") journal	No. of citing articles	ISI research category	Publishing house
1	<i>Polar Biology</i> ; bimonthly	65	Ecology	Springer-Verlag, Germany
2	<i>Antarctic Science</i> ; quarterly	28	Geosciences, Interdisciplinary; Geography, Physical; Environmental Sciences	Cambridge Univ Press, UK
3	<i>Deep-Sea Research</i> ; monthly	18	Oceanography	Pergamon-Elsevier Science Ltd, UK
4	<i>Acta Parasitologica</i> ; quarterly	12	Parasitology	Witold Stefański Inst. Parasitology, Poland
5	<i>Marine Ecology – Progress Series</i> ; monthly	8	Ecology; Marine and Freshwater Biology	Inter-Research, Germany
6	<i>Polar Research</i> ; semiannual	7	Geosciences, Interdisciplinary; Geography, Physical; Oceanography; Environmental Sciences	Norwegian Polar Institute, Norway
7–8	<i>Hydrological Processes</i> ; semimonthly	6	Water Resources	John Wiley & Sons Ltd, UK
	<i>Journal of Marine Systems</i>	6	Oceanography; Geosciences, Multidisciplinary; Marine and Freshwater Biology	Elsevier Science BV, Netherlands
9–12	<i>Hydrobiologia</i> ; semimonthly	5	Marine and Freshwater Biology	Kluwer Academic Publ., Netherlands
	<i>Journal of Experimental Marine Biology and Ecology</i> ; biweekly	5	Ecology; Marine and Freshwater Biology	Elsevier Science BV, Netherlands
	<i>Journal of Zoology</i> ; monthly	5	Zoology	Cambridge Univ Press, UK
	<i>Palaeogeography, Palaeo-climatology, Palaeoecology</i> ; semimonthly	5	Paleontology	Elsevier Science BV, Netherlands

Interdisciplinary links of *Polish Polar Research*

The journal citation interconnections reveal not only on author's geographic representation and subjective preferences, but primarily the scope and aims of the journal. Thus, the citing ISI periodicals are common in references provided by the PPR authors. This is a well-known phenomenon of thematic and conceptual links the scientific results, helpful in identification of evolving discipline content (*e.g.*, Garfield 1979, Schwechheimer and Winterhager 1999). This is also a reliable bibliometric tool to outline a complex research profile of PPR, even if it is difficult task in case of an interdisciplinary periodical, where each science subdivision is debatable.

In fact, the citing journals are highly scattered in many subdisciplines and fields, from analytical chemistry, toxicology, climatology and geophysics to anthropology and environmental sciences (*e.g.*, fishery research). From the citation perspective, however, the most visible in international polar society are PPR articles corresponding to two large ISI categories: Marine and Freshwater Biology and Ecology (see Table 6). Thus, dynamically developing fronts in recent ecology and environmental research are highlighted in PPR, supported especially by key zoological matters. Nevertheless, others aspects of polar ecosystems, coupled with oceanographic and/or geoscience fields (including paleontology), are obviously influential as well. Hydrochemistry of glacier basins (citations in *Hydrological Processes, Earth Surface Processes and Landforms, Quaternary Science Reviews*), fish parasitology (*Systematic Parasitology, Journal of Parasitology*) and pedology (*Soil Science, Catena, Soil Biology and Biochemistry, Pedobiologia*) are other promising PPR specialties.

Final remarks

PPR is a world-wide medium of information transfer within polar society, as manifested by its geographically extensive citation scope. Although its standard impact factor assessment is strongly biased by self-citations (see Table 2), its value is not very high (below 0.35), mainly due to the high prestige of older ("classic") contributions. A major qualitative change is still awaited when the external citations to recent articles will strongly prevail; for example, this rapid "export" contribution is 95% in IF 2001 for *Polar Research*, and 73.7% in the *Indian Journal of Marine Sciences*. Slowly increasing participation of foreign authors in PPR (Table 1), paired with the growing number of citing articles (Fig. 2), are first preliminary steps to improving this short-term communication impact (in the ISI's sense), and an introduction to registration by ISI.

The comparatively low number of PPR citations in the last 6 years (Table 4), combined with the considerable age of PPR article citation (Fig. 2) is evidently

linked with the fact that this journal is not covered by ISI, which results in a considerable delay in citing the PPR articles.

Table 7
Position of *Polish Polar Research* among thematically-related ISI source journals (see also Table 5) ranked by Impact Factors, after *Journal Citation Reports (JCR) Science Edition 2001* (based on the categories Ecology and Marine and Freshwater Biology, supplemented by selected periodicals from Oceanography, Geosciences-Interdisciplinary, Plant Sciences, Zoology and Parasitology; P – Polish periodicals).

Rank	Journal Title	Total cites in 2001	Impact Factor	Articles in 2001
1	<i>Ecology</i>	25310	3.704	276
2	<i>Limnology and Oceanography</i>	13466	3.141	212
3	<i>American Zoologist</i>	3695	2.556	86
4	<i>Oecologia</i>	15242	2.474	280
5	<i>Deep-Sea Research, Part I</i>	2681	2.400	116
6	<i>Aquatic Microbial Ecology</i>	1221	2.376	93
7	<i>Journal of Phycology</i>	3996	2.057	115
8	<i>Marine Ecology – Progress Series</i>	14740	1.903	387
9	<i>Journal of Biogeography</i>	2175	1.497	94
10	<i>Marine Biology</i>	9620	1.473	241
11	<i>Journal of Experimental Marine Biology and Ecology</i>	6787	1.469	167
12	<i>Palaeogeography, Palaeoclimatology, Palaeoecology</i>	3890	1.449	193
13	<i>Journal of Plankton Research</i>	3083	1.259	115
14	<i>Oceanography and Marine Biology</i>	1379	1.231	8
15	<i>Geological Magazine</i>	1896	1.221	41
16	<i>Arctic, Antarctic and Alpine Research</i>	1266	1.214	56
17	<i>Catena</i>	1023	1.200	77
18	<i>Progress in Physical Geography</i>	553	1.190	30
19	<i>Hydrological Processes</i>	1678	1.175	197
20	<i>Journal of Marine Systems</i>	1007	1.141	68
21	<i>Polar Biology</i>	1825	1.133	135
22	<i>Sarsia</i>	726	1.086	25
23	<i>Botanica Marina</i>	1299	1.064	6
24	<i>Acta Oecologica</i>	734	0.979	34
25	<i>Antarctic Science</i>	704	0.940	52
26	<i>Annals of Glaciology</i>	1692	0.935	148
27	<i>Polar Research</i>	409	0.833	25
28	<i>Acta Parasitologica (P)</i>	247	0.732	47
29	<i>Hydrobiologia</i>	8101	0.659	484
30	<i>Pedobiologia</i>	1112	0.605	42

31	<i>Journal of Bryology</i>	373	0.600	40
32	<i>Nova Hedwigia</i>	946	0.598	63
33	<i>Scientia Marina</i>	597	0.547	90
34	<i>Folia Biologica – Kraków (P)</i>	130	0.528	40
35	<i>Marine Ecology – Pubblicazioni della Stazione Zoologica di Napoli</i>	336	0.447	26
36	<i>Ciencias Marinas</i>	171	0.338	33
37	<i>Acta Societatis Botanicorum Poloniae (P)</i>	289	0.235	40
38	Polish Polar Research (P)	72	0.179	15
39	<i>Acta Zoologica Academiae Scientiarum Hungaricae</i>	98	0.152	3
40	<i>Russian Journal of Ecology</i>	179	0.137	80
41	<i>Belgian Journal of Botany</i>	79	0.130	7
42	<i>Indian Journal of Marine Sciences</i>	286	0.127	42
43	<i>Journal of Experimental Animal Science</i>	59	0.121	0
44	<i>Zoologichesky Zhurnal</i>	597	0.107	76
45	<i>Zhurnal Obshchei Biologii</i>	178	0.103	22
46	<i>Pakistan Journal of Botany</i>	65	0.092	12
47	<i>Haseltonia</i>	11	0.077	0
48	<i>Acta Botanica Gallica</i>	79	0.068	8
49	<i>Biocycle</i>	268	0.062	197
50	<i>Journal of Advanced Zoology</i>	24	0.020	0

In absolute bibliometric (especially RIF) properties, the immediate international influence of PPR is low, but comparable with prominent Polish geological journals (see Racki *in press*). Based on the calculations, the rank of PPR can be established in respect to more or less thematically comparable ISI journals (Table 7). The prestigious journals focusing on similar multidisciplinary polar research have IFs 2001 close to 1, as shown by *Antarctic Science* (0.94) and *Polar Research* (0.833). Also the Polish paleontological journal *Acta Palaeontologica Polonica* is similarly rated (IF 2001 = 0.952), but significant progress in its “internationality” and editorial quality began in the early 1990s (Dzik 1995, Racki and Baliński 1999). The topmost ranked (“core”) journals approach IF = 2. On the other hand, PPR successfully competes on the scientific market with several lower-rated journals from different countries, indexed by ISI in related categories; this was a reason for the positive KBN decision concerning a higher parameter evaluation of PPR in 2001.

On the whole, the PPR citation results confirm an overall peripheral position of Polish scientific literature (Racki 1997, *in press*). However, significant progress in recent years has been noted, especially in the editorial quality of these periodicals, well exemplified by the PPR homepage (<http://polish.polar.pan.pl>). The formal prerequisites are paired with increasing publication activity of Polish scientists in the foreign core literature. This is also followed by an expanding set of Polish jour-

nals indexed by ISI (at least 46), confirmed by the recently initiated coverage of *Oceanologia*. Consequently, a rapidly growing citation number of PPR articles should be expected in the near future, even if its further internationalization is still urgently needed.

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Received October 21, 2002

Accepted November 8, 2002