

# Supplementary Information: In science “there is no bad publicity”: Papers criticized in comments have high scientific impact

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## Data collection

### *Physical Review* journals

For the publication period 1958 – 2009, we used the data set directly provided by the editorial office of the American Physical Society (APS, [publish.aps.org/datasets](http://publish.aps.org/datasets)). We identified potential comments as those publications which satisfy one of the following criteria:

1. publications whose title starts with the word “Comment” ;
2. publications classified as “comments” in the APS database, but with title not containing the words “Reply” or “Response”.

We then verified for each element in the list of potential comments whether or not they were effectively comments to previously published papers in journals of the *Physical Review*’s collection. We used two ways to determine this fact and also to associate real comments to commented papers:

1. we parsed the web page of the potential comment, and searched for the associated commented article (the criticized article is referenced in this page as “Original Article”);

2. when the previous information was not present, we read the content of the potential comment and determined if the document was a real comment with an associated criticized paper.

For years 2010 and 2011, we identified potential comments as all documents with title starting with "Comment on" (the search was performed in the search engine of the APS website). We then identified real comments and associated commented articles in the same way as the one described above.

In general, we found that comments were criticizing papers published in the same journal. We found also a small percentage of comments criticizing papers published in other *Physical Review* journals. Mainly comments to *Physical Review Letters* articles published in the period 1970 – 1979 in *Physical Review A-D*, and comments to *Physical Review A* articles published in the period 1993 – 1994 in *Physical Review E* (in 1993 *Physical Review A* was split in *Physical Review A* and in the newly created journal *Physical Review E*).

## *Science*

We identified all comments as the elements published by *Science* in the journal section "Technical Comments" (this list was retrieved at [www.sciencemag.org/cgi/collection/tech\\_comment](http://www.sciencemag.org/cgi/collection/tech_comment) for publications since 1999, and by reading the content of each issue for the previous years). We were able to consider only publications since 1997 because the electronic journal archive covers publications from 1997 on (for previous years, publications are provided only in pdf format). We associated each comment to the criticized paper by parsing the web page of the on-line version of the comment and finding the associated document (the criticized paper is listed after the sentence "The editors suggest the following Related Resources on Science sites"). When this information was not present, we instead read the text of the comment.

## *Nature*

For publication year 2004 and after, we identified all comments as the elements published in *Nature* as "Brief Communications Arising" (such list was obtained by parsing the content of all issues of the journal at [www.nature.com](http://www.nature.com)). For years 1999 to 2003, comments have been instead identified (by reading the text of the publications) among those papers published in the section "Brief Communications" . We were able to consider only publications since 1999 because the electronic journal archive covers publications from 1999 on (for previous years, publications are provided only in pdf format). We associated each comment to the criticized paper by parsing the web page of the on-line version of the comment and finding the associated document (the reference to criticized paper appears at the beginning of the comment after the sentence "Arising from"). When this information was not present, we instead read the text of the comment.

## *New England Journal of Medicine*

We identified as potential comments all the elements published by *New England Journal of Medicine* in the section "Correspondence" (the entire publication list of the correspondence section can be retrieved with the search engine offered at [www.nejm.org](http://www.nejm.org)). We were able to consider only publications since 1990 because the electronic journal archive covers publications from 1990 on (for previous years, publications are provided only in pdf format). We automatically parsed the content of all potential comments, and identified true comments as those publications in which we identified a string of the format "(month day issue) reference". The information contained in this string was also used to identify the criticized papers.

### *Journal of Chemical Physics*

We identified all comments as those publication with title of the format "Comment on {title of the commented paper} [*J. Chem. Phys.* vol., page (year)]". We limited our attention only to publications after 1999 because in previous years we were not able to detect a regular publication rate of comments. The reference to the criticized papers was obtained by parsing the titles of the comments. Data have been collected from the journal web site ([jcp.aip.org](http://jcp.aip.org)).

### *Geology*

We identified all comments as those publications with titles in the format "Comment on {title of the commented article}" or "title of the commented article - Comment". Criticized articles where automatically detected by matching their titles with those appearing in the titles of the comments. Data have been collected from the journal web site ([geology.gsapubs.org](http://geology.gsapubs.org)).

### *Environmental Science & Technology and Water Resources Research*

We identified all comments as those publications with titles in the format "Comment on {title of the commented article}" or "title of the commented article - Comment". Criticized articles where automatically detected by matching their titles with those appearing in the titles of the comments. Data in this case have been retrieved from the Web of Science database.

Journal	Period of observation	$N$	$C$	$P_c$	$T$	$r_c$
<i>Environ. Sci. &amp; Technol.</i>	1981 – 2007	13,626	206	1.51%	152	2.3
<i>Geology</i>	1975 – 2007	7,498	723	9.64%	9	5.8
<i>J. Chem. Phys.</i>	1999 – 2007	23,371	111	0.47%	285	3.7
<i>Nature</i>	1999 – 2007	8,956	182	2.03%	233	1.1
<i>New Engl. J. Med.</i>	1990 – 2007	5,082	2,667	52.48%	5	1.9
<i>Phys. Rev. A</i>	1970 – 2007	47,195	491	1.04%	96	5.0
<i>Phys. Rev. B</i>	1970 – 2007	123,242	748	0.61%	132	6.2
<i>Phys. Rev. C</i>	1970 – 2007	27,203	248	0.91%	176	3.1
<i>Phys. Rev. D</i>	1970 – 2007	48,816	370	0.76%	15	44.0
<i>Phys. Rev. E</i>	1993 – 2007	30,413	209	0.69%	195	3.7
<i>Phys. Rev. Lett.</i>	1970 – 2007	74,157	2,475	3.34%	16	9.4
<i>Science</i>	1997 – 2007	9,762	281	2.88%	74	2.3
<i>Water Resour. Res.</i>	1966 – 2007	9,487	368	3.88%	13	9.9

Table S1: Summary table. For each journal, we report from left to right: the name of the journal, our observation window, the number  $N$  of papers published, the number  $C$  of papers that received at least a comment, the percentage  $P_c$  of commented papers, the rank  $T$  of the fifth most cited commented paper, and the number of commented papers in the top  $T$  most cited papers of the journal divided by the expected number of such commented papers in the hypothetical situation in which commented and commented papers would not differ in the ability to accumulate citations. The latter number is simply calculated as  $r_c = (5 N) / (T C)$  since  $\langle t \rangle = (T C) / N$  is the expected number of commented articles in the top  $T$  most cited papers of the journal.

rank	citations	reference	commented in
1	21,224	<i>Phys. Rev. Lett.</i> <b>77</b> , 3865 (1996)	<b>80</b> , 890 (1998)
3	6,968	<i>Phys. Rev. Lett.</i> <b>56</b> , 930 (1986)	<b>57</b> , 3235 (1986)
5	5,540	<i>Phys. Rev. Lett.</i> <b>55</b> , 2471 (1985)	<b>56</b> , 2656 (1986)
12	3,946	<i>Phys. Rev. Lett.</i> <b>85</b> , 3966 (2000)	<b>87</b> , 249701 (2001) & <b>87</b> , 249703 (2001)
16	3,331	<i>Phys. Rev. Lett.</i> <b>59</b> , 381 (1987)	<b>62</b> , 110 (1989)
2	6,188	<i>Science</i> <b>286</b> , 509 (1999)	<b>287</b> , 2115 (2000)
11	3,644	<i>Science</i> <b>280</b> , 69 (1998)	<b>281</b> , 883 (1998)
53	2,085	<i>Science</i> <b>290</b> , 2319 (2000)	<b>295</b> , 7 (2002)
60	1,956	<i>Science</i> <b>282</b> , 1318 (1998)	<b>287</b> , 1363 (2000)
74	1,690	<i>Science</i> <b>299</b> , 1719 (2003)	<b>307</b> , 1203 (2005)
2	1,730	<i>Water Resour. Res.</i> <b>16</b> , 574 (1980)	<b>17</b> , 768 (1981)
4	1,032	<i>Water Resour. Res.</i> <b>14</b> , 601 (1978)	<b>15</b> , 989 (1979)
5	986	<i>Water Resour. Res.</i> <b>19</b> , 161 (1983)	<b>19</b> , 1641 (1983)
8	645	<i>Water Resour. Res.</i> <b>22</b> , 2069 (1986)	<b>24</b> , 315 (1988) & <b>24</b> , 892 (1988) & <b>24</b> , 1209 (1988)
13	525	<i>Water Resour. Res.</i> <b>11</b> , 725 (1975)	<b>13</b> , 477 (1977)
4	521	<i>Geology</i> <b>19</b> , 598 (1991)	<b>20</b> , 191 (1992)
5	520	<i>Geology</i> <b>19</b> , 547 (1991)	<b>20</b> , 475 (1992)
6	517	<i>Geology</i> <b>10</b> , 70 (1982)	<b>11</b> , 428 (1993)
7	493	<i>Geology</i> <b>19</b> , 425 (1991)	<b>20</b> , 87 (1993)
9	484	<i>Geology</i> <b>14</b> , 99 (1986)	<b>14</b> , 1042 (1986)

Table S2: Top cited papers that received a comment. We report here the five top cited papers, among those that received at least one comment, published in *Physical Review Letters* in the period 1970 – 2007, in *Science* between 1997 and 2007, in *Water Resources Research* in the period 1966 – 2007 and in *Geology* between 1975 and 2007. For each paper, we report the following information: absolute rank based on the raw number of citations accumulated (the ranking includes all publications, either commented and not commented), total number of citations accumulated, reference of the commented publication, reference of the comment(s).

rank	citations	reference	commented in
32	743	<i>Phys. Rev. A</i> <b>29</b> , 2765 (1984)	<b>32</b> , 3135 (1985)
49	609	<i>Phys. Rev. A</i> <b>39</b> , 1665 (1989)	<b>43</b> , 2576 (1991)
65	533	<i>Phys. Rev. A</i> <b>16</b> , 531 (1977)	<b>26</b> , 3008 (1982)
84	479	<i>Phys. Rev. A</i> <b>41</b> , 2295 (1990)	<b>43</b> , 5165 (1991)
96	447	<i>Phys. Rev. A</i> <b>26</b> , 2028 (1982)	<b>36</b> , 5463 (1987)
3	11,090	<i>Phys. Rev. B</i> <b>13</b> , 5188 (1976)	<b>18</b> , 5897 (1978)
16	2,557	<i>Phys. Rev. B</i> <b>26</b> , 4199 (1982)	<b>37</b> , 4795 (1988)
31	1,693	<i>Phys. Rev. B</i> <b>12</b> , 2455 (1975)	<b>16</b> , 4719 (1977)
95	917	<i>Phys. Rev. B</i> <b>4</b> , 3184 (1971)	<b>6</b> , 311 (1972) & <b>6</b> , 3546 (1972)
132	813	<i>Phys. Rev. B</i> <b>20</b> , 624 (1979)	<b>22</b> , 1095 (1980)
24	420	<i>Phys. Rev. C</i> <b>13</b> , 1226 (1976)	<b>16</b> , 885 (1977)
65	277	<i>Phys. Rev. C</i> <b>35</b> , 1678 (1987)	<b>37</b> , 892 (1988)
117	207	<i>Phys. Rev. C</i> <b>1</b> , 769 (1970)	<b>5</b> , 1135 (1972)
141	194	<i>Phys. Rev. C</i> <b>15</b> , 1359 (1977)	<b>18</b> , 573 (1978)
176	177	<i>Phys. Rev. C</i> <b>9</b> , 1018 (1974)	<b>12</b> , 686 (1975)
2	2,916	<i>Phys. Rev. D</i> <b>10</b> , 2445 (1974)	<b>12</b> , 3343 (1975)
3	2,610	<i>Phys. Rev. D</i> <b>2</b> , 1285 (1970)	<b>3</b> , 1043 (1971) & <b>4</b> , 1918 (1971)
4	2,573	<i>Phys. Rev. D</i> <b>7</b> , 1888 (1973)	<b>9</b> , 1129 (1974) & <b>11</b> , 2332 (1975) & <b>11</b> , 3040 (1975)
7	1,984	<i>Phys. Rev. D</i> <b>9</b> , 3471 (1974)	<b>12</b> , 923 (1975) & <b>12</b> , 4006 (1975)
15	1,521	<i>Phys. Rev. D</i> <b>14</b> , 870 (1976)	<b>18</b> , 609 (1978)
32	354	<i>Phys. Rev. E</i> <b>68</b> , 011306 (2003)	<b>70</b> , 043301 (2004)
72	274	<i>Phys. Rev. E</i> <b>48</b> , R29 (1993)	<b>51</b> , 2669 (1995)
131	206	<i>Phys. Rev. E</i> <b>54</b> , 3853 (1996)	<b>60</b> , 1099 (1999)
150	196	<i>Phys. Rev. E</i> <b>65</b> , 041903 (1974)	<b>67</b> , 063901 (2003) & <b>72</b> , 063901 (2005)
195	165	<i>Phys. Rev. E</i> <b>50</b> , 2064 (1994)	<b>53</b> , 2992 (1996)

Table S3: Top cited papers that received a comment. We report here the five top cited papers, among those that received at least one comment, published in *Physical Review A-D* in the period 1970 – 2007, and in *Physical Review E* between 1993 and 2007. For each paper, we report the following information: absolute rank based on the raw number of citations accumulated (the ranking includes all publications, either commented and not commented), total number of citations accumulated, reference of the commented publication, reference of the comment(s).

rank	citations	reference	commented in
1	2, 205	<i>Environ. Sci. Technol.</i> <b>36</b> , 1202 (2002)	<b>36</b> , 4003 (2002) & <b>36</b> , 4005 (2002) & <b>37</b> , 1052 (2003)
2	950	<i>Environ. Sci. Technol.</i> <b>32</b> , 1549 (1998)	<b>33</b> , 369 (1998)
74	328	<i>Environ. Sci. Technol.</i> <b>30</b> , 2432 (1996)	<b>31</b> , 1577 (1997)
122	270	<i>Environ. Sci. Technol.</i> <b>27</b> , 961 (1993)	<b>28</b> , 366 (1994) & <b>28</b> , 367 (1994)
152	251	<i>Environ. Sci. Technol.</i> <b>30</b> , 881 (1996)	<b>30</b> , 3132 (1996)
1	8, 834	<i>New Engl. J. Med.</i> <b>329</b> , 977 (1993)	<b>329</b> , 1661 (1993) & 3 comm. in <b>330</b> , 641 (1994)
2	4, 866	<i>New Engl. J. Med.</i> <b>333</b> , 1301 (1995)	3 comm. in <b>334</b> , 1333 (1996)
3	4, 827	<i>New Engl. J. Med.</i> <b>338</b> , 853 (1998)	<b>339</b> , 405 (1998)
4	4, 676	<i>New Engl. J. Med.</i> <b>346</b> , 393 (2002)	4 comm. in <b>346</b> , 1829 (2002)
5	4, 339	<i>New Engl. J. Med.</i> <b>342</b> , 145 (2000)	4 comm. in <b>343</b> , 64 (2000)
24	457	<i>J. Chem. Phys.</i> <b>114</b> , 5149 (2001)	<b>116</b> , 11039 (2002)
198	149	<i>J. Chem. Phys.</i> <b>123</b> , 164110 (2005)	<b>124</b> , 107101 (2006)
218	144	<i>J. Chem. Phys.</i> <b>119</b> , 12784 (2003)	<b>121</b> , 3347 (2004)
250	135	<i>J. Chem. Phys.</i> <b>119</b> , 2376 (2003)	<b>120</b> , 9427 (2004)
285	129	<i>J. Chem. Phys.</i> <b>122</b> , 204302 (2005)	<b>125</b> , 047101 (2006)
90	1, 260	<i>Nature</i> <b>401</b> , 82 (1999)	<b>406</b> , 367 (2000)
92	1, 231	<i>Nature</i> <b>434</b> , 214 (2005)	<b>437</b> , E3 (2005) & <b>437</b> , E3 (2005)
96	1, 211	<i>Nature</i> <b>427</b> , 145 (2004)	3 comm. in <b>430</b> issue of 1 <sup>st</sup> July, 2004
186	940	<i>Nature</i> <b>425</b> , 944 (2003)	in <b>429</b> issue of 13 <sup>th</sup> May, 2004
233	845	<i>Nature</i> <b>423</b> , 280 (2003)	<b>434</b> , E1 (2005)

Table S4: Top cited papers that received a comment. We report here the five top cited papers, among those that received at least one comment, published in *Environmental Science & Technology* in the period 1981 – 2007, in *New England Journal of Medicine* between 1990 and 2007, in *Journal of Chemical Physics* in the period 1999 – 2007 and in *Nature* between 1999 and 2007. For each paper, we report the following information: absolute rank based on the raw number of citations accumulated (the ranking includes all publications, either commented and not commented), total number of citations accumulated, reference of the commented publication, reference of the comment(s).



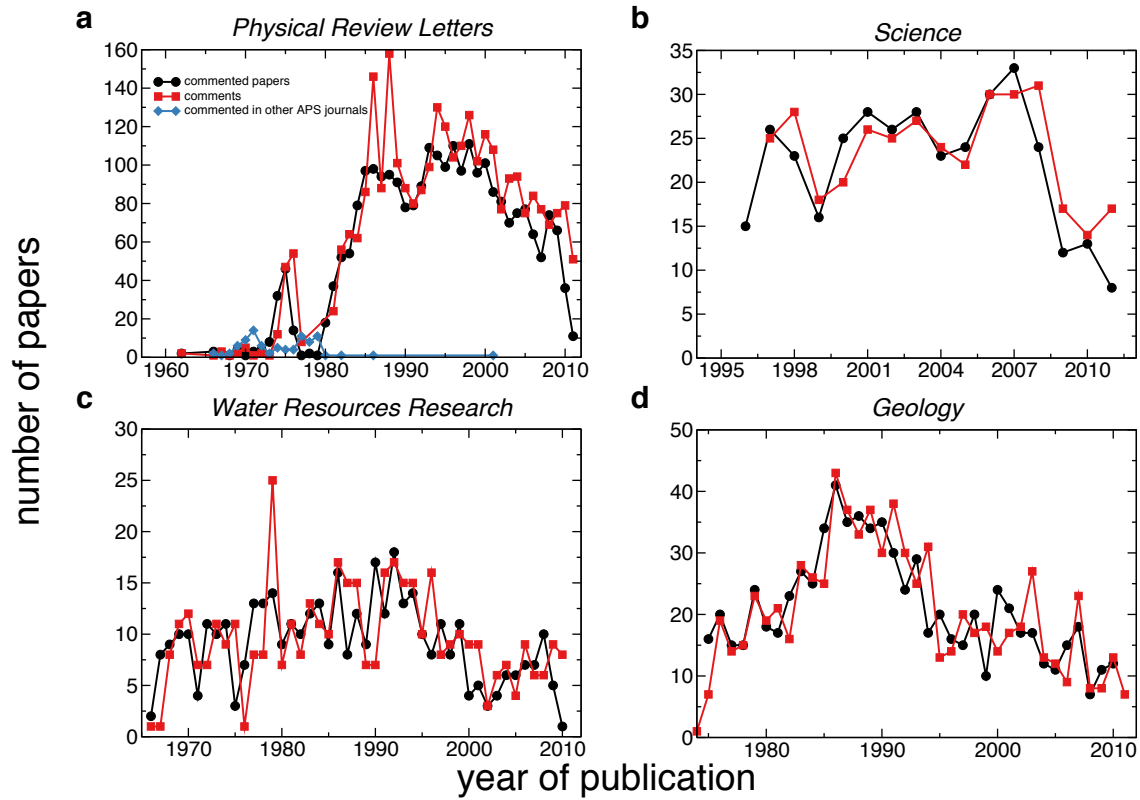


Figure S1: Number of commented papers and comments published in each year. **a.** Number of papers published in *Physical Review Letters* whose comment was published in the same journal (black circles) or in other *Physical Review* journals (blue diamonds) as function of the year of publication. Number of comments published in *Physical Review Letters* (red squares) as a function of the year of publication. **b, c** and **d.** Number of commented papers (black circles) and comments (red squares) published in *Science*, *Water Resources Research* and *Geology*, respectively.

## Physical Review A

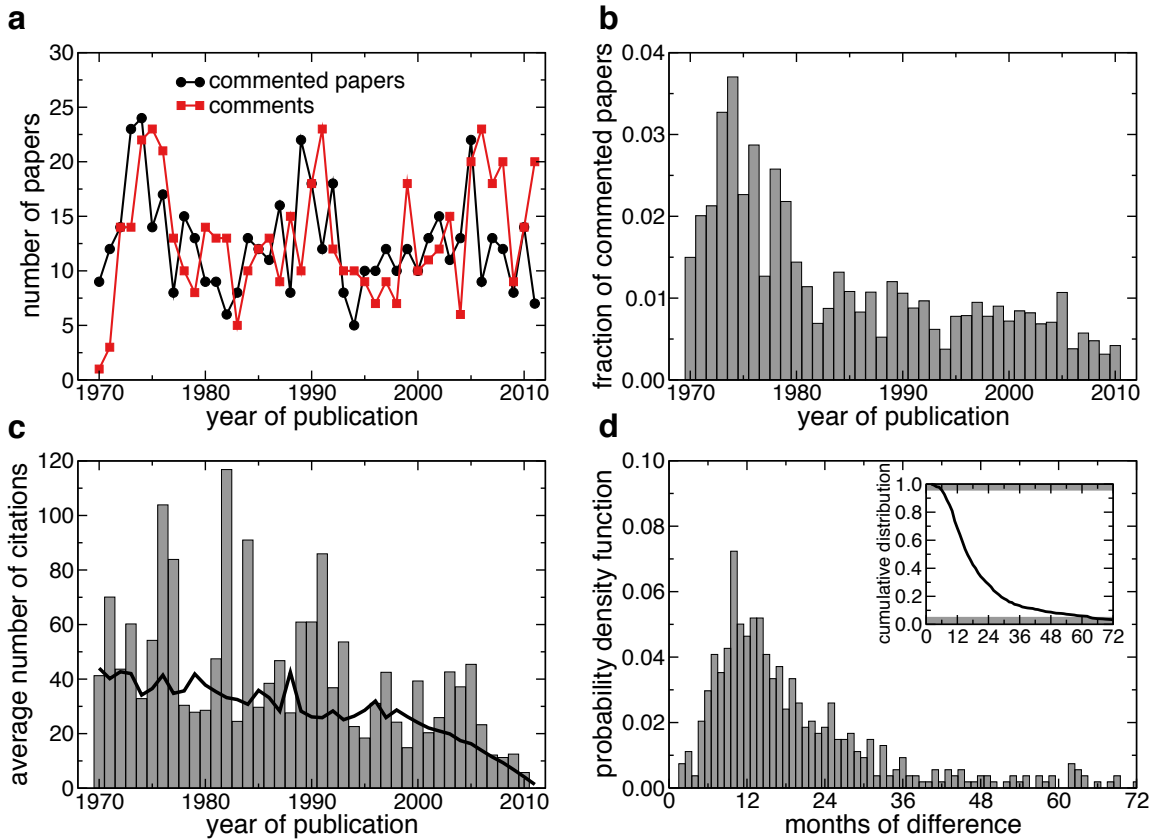


Figure S2: Analysis of the publications in *Physical Review A*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 22.1$  months after commented articles (standard deviation  $\sigma_\tau = 21.4$ ).

## Physical Review B

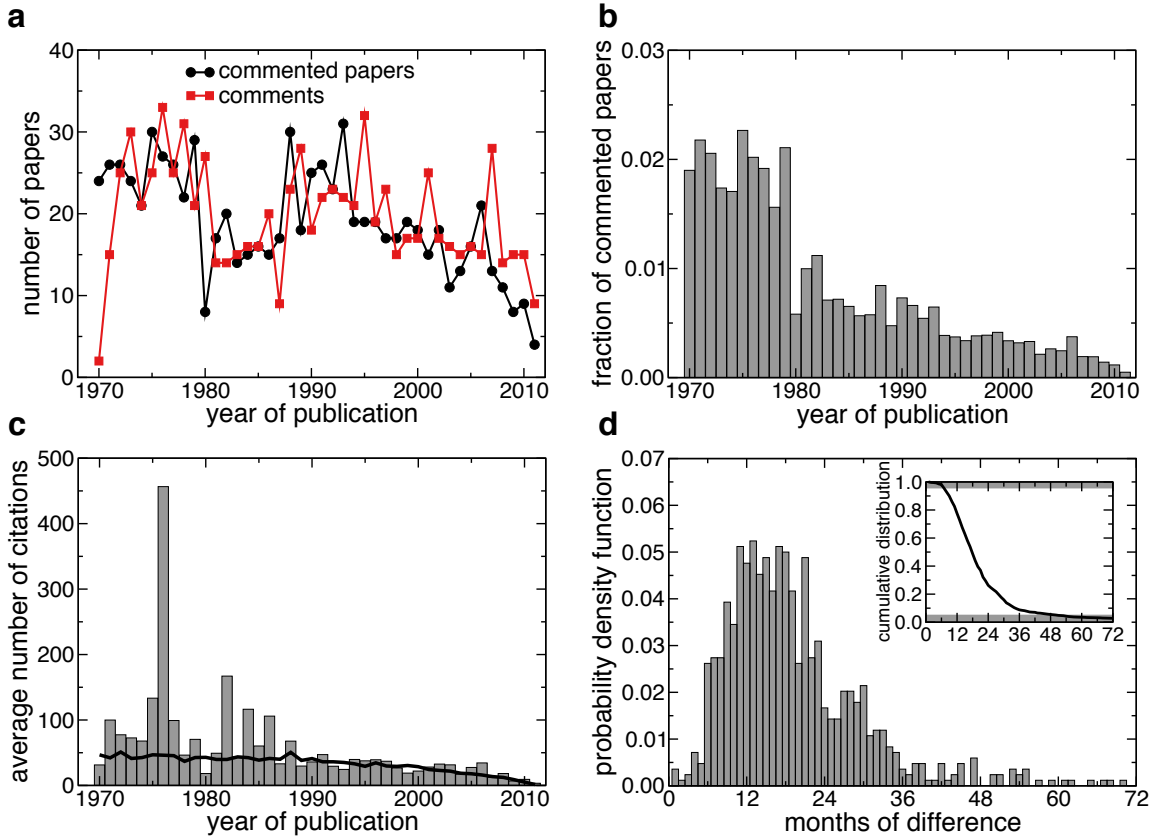


Figure S3: Analysis of the publications in *Physical Review B*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 21.6$  months after commented articles (standard deviation  $\sigma_\tau = 19.4$ ).

## *Physical Review C*

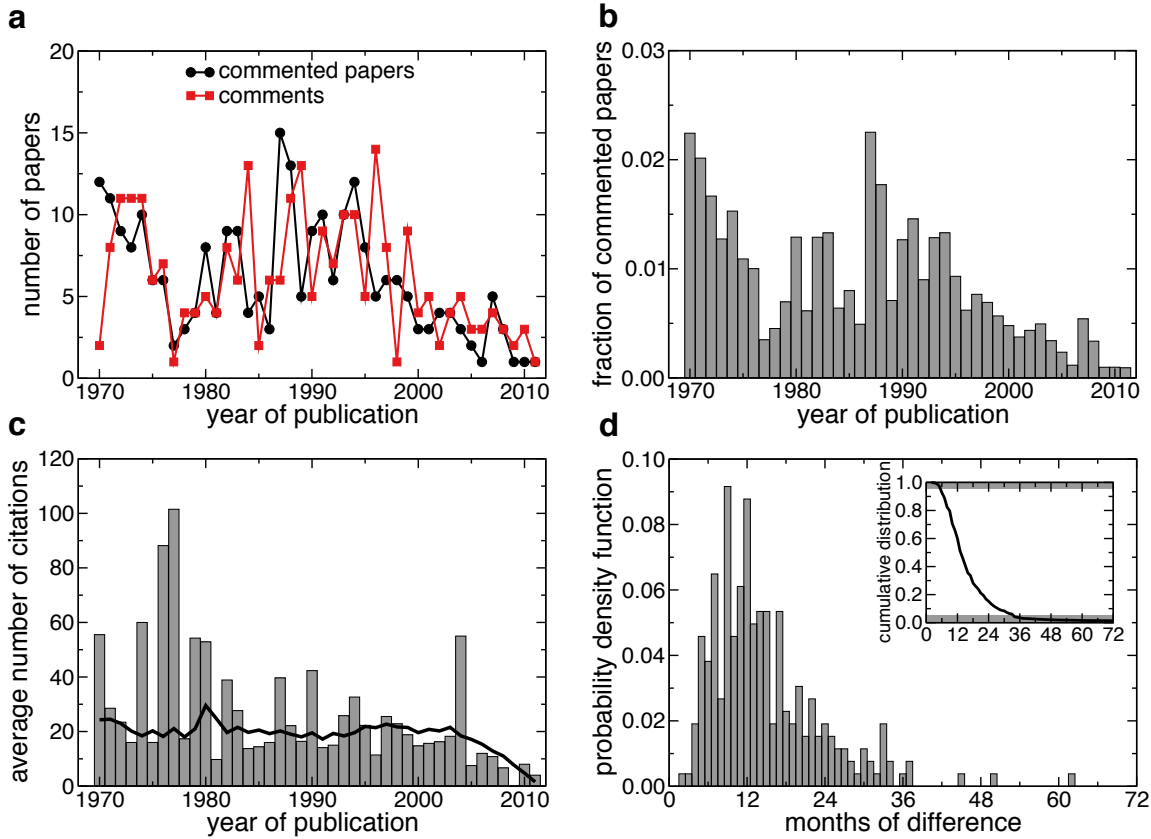


Figure S4: Analysis of the publications in *Physical Review C*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 16.5$  months after commented articles (standard deviation  $\sigma_\tau = 20.8$ ).

## Physical Review D

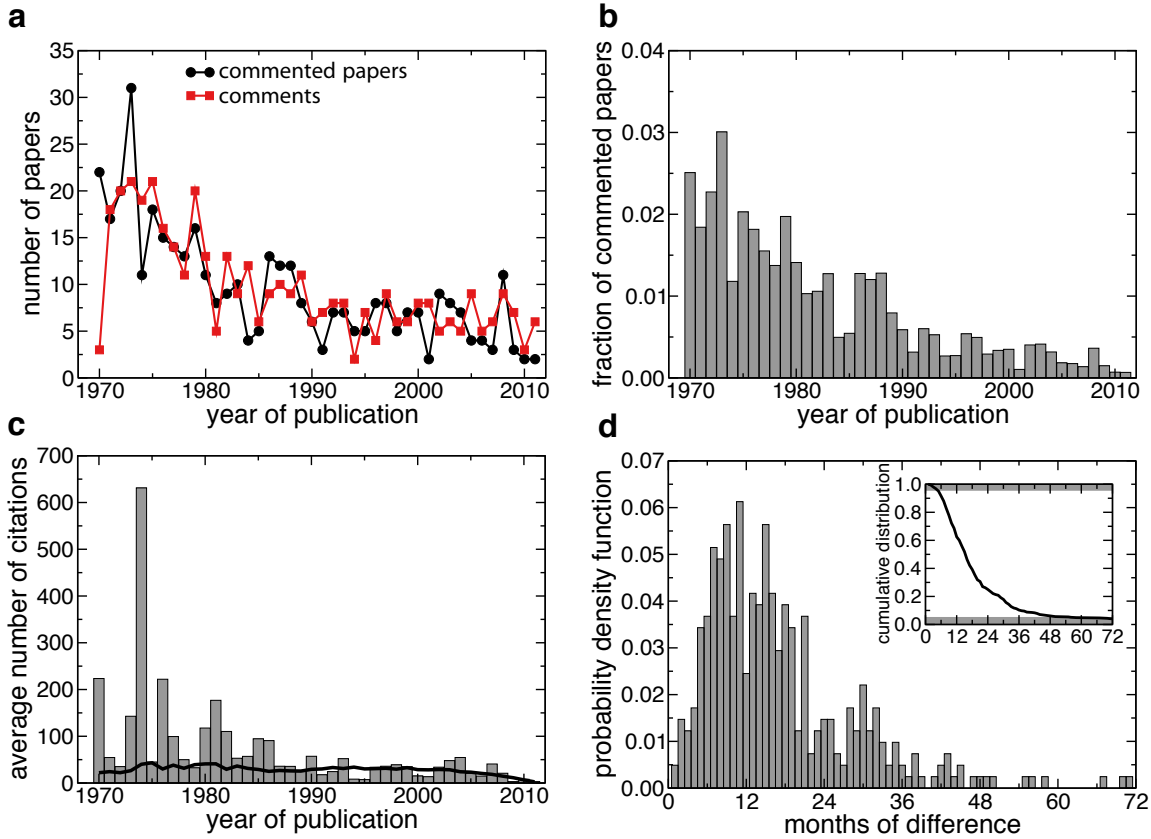


Figure S5: Analysis of the publications in *Physical Review D*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 20.1$  months after commented articles (standard deviation  $\sigma_\tau = 19.6$ ).

## Physical Review E

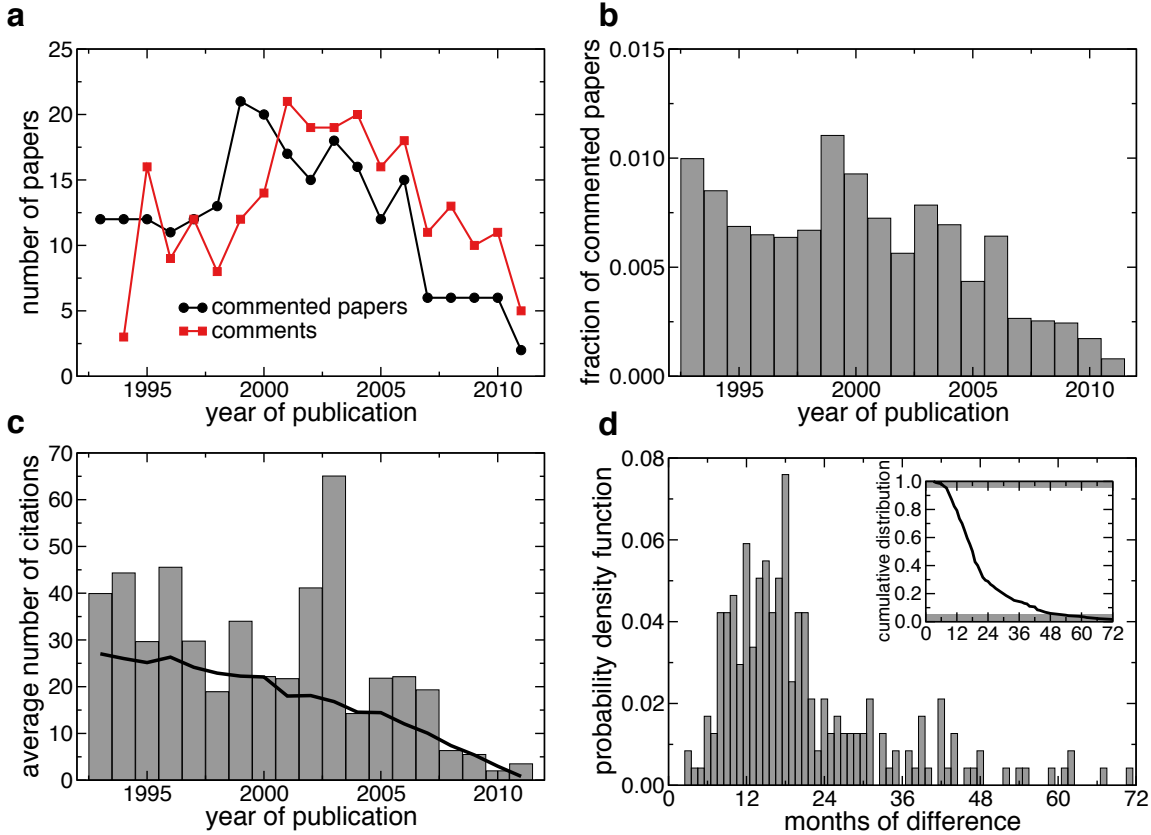


Figure S6: Analysis of the publications in *Physical Review E*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 21.8$  months after commented articles (standard deviation  $\sigma_\tau = 16.4$ ).

## Environmental Science & Technology

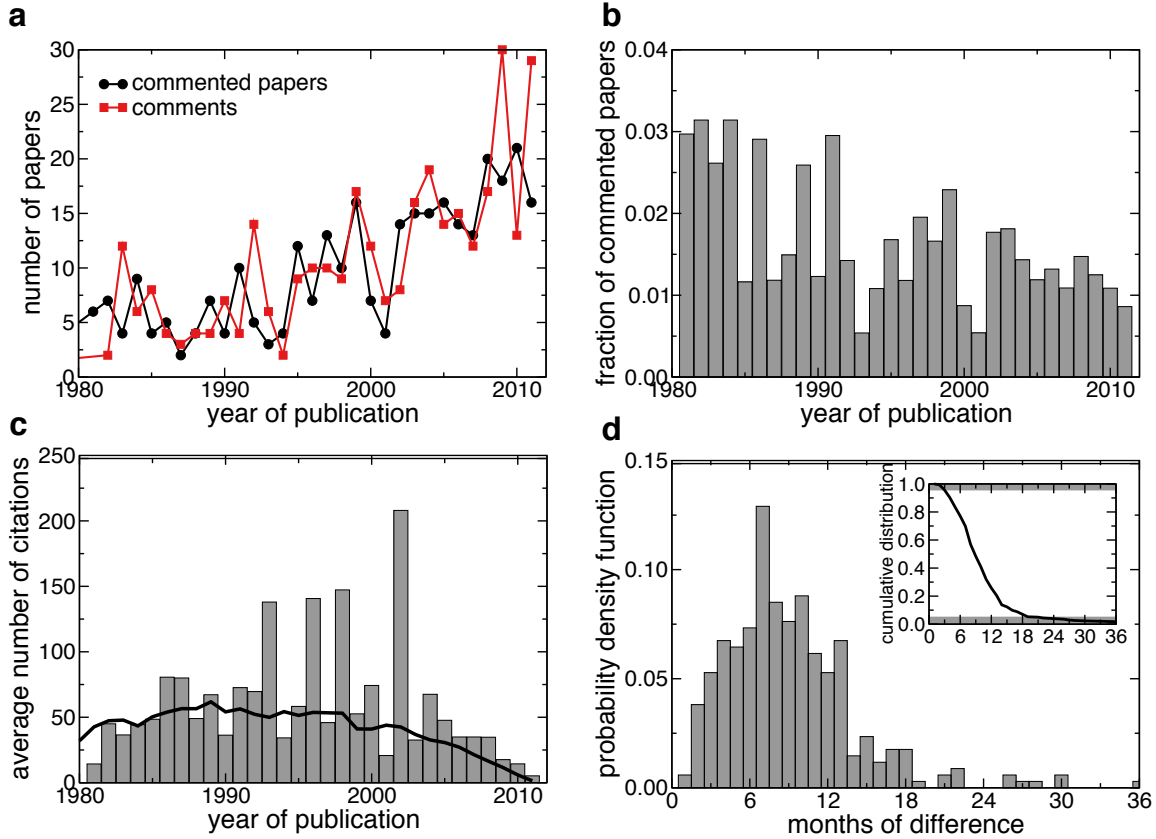


Figure S7: Analysis of the publications in *Environmental Science & Technology*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 9.6$  months after commented articles (standard deviation  $\sigma_\tau = 6.5$ ).

## New England Journal of Medicine

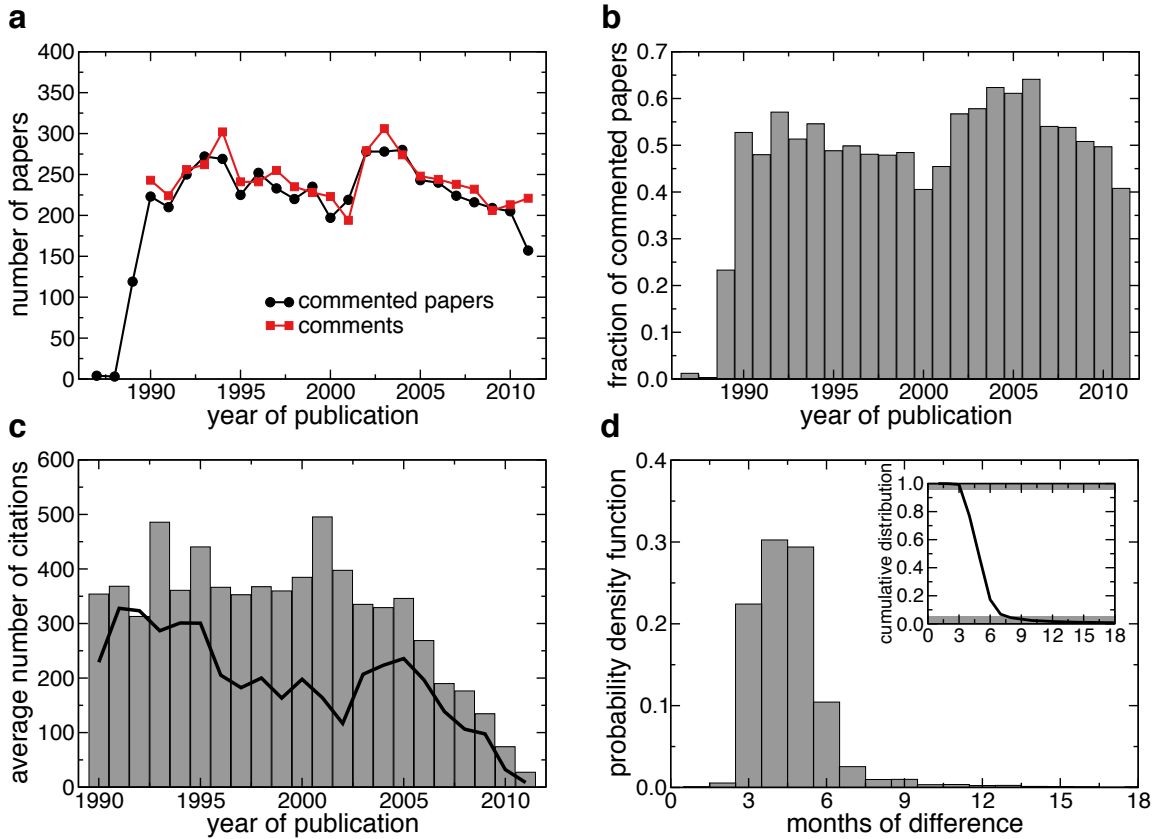


Figure S8: Analysis of the publications in *New England Journal of Medicine*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 4.8$  months after commented articles (standard deviation  $\sigma_\tau = 3.0$ ).



## Journal of Chemical Physics

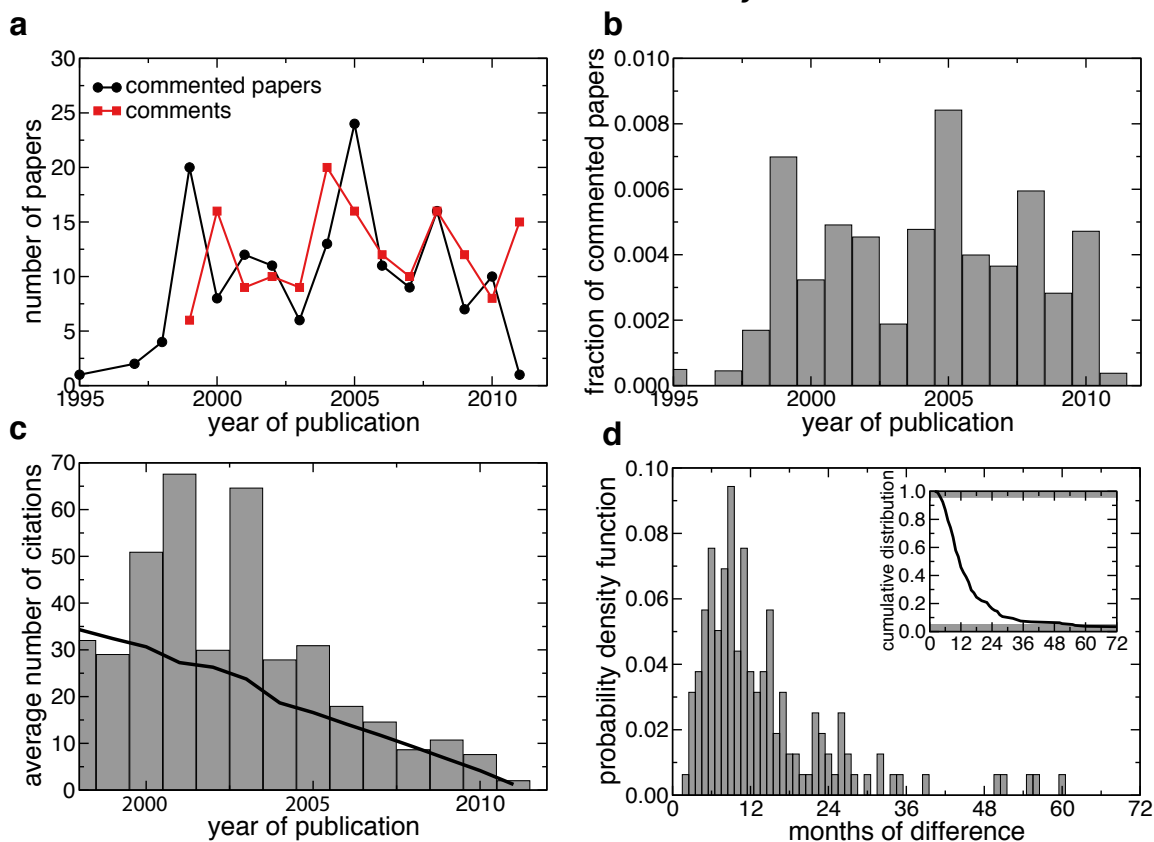


Figure S9: Analysis of the publications in *Journal of Chemical Physics*. **a**. Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b**. Fraction of commented papers as a function of the year of publication. **c**. Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d**. Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 17.6$  months after commented articles (standard deviation  $\sigma_\tau = 26.3$ ).

## Nature

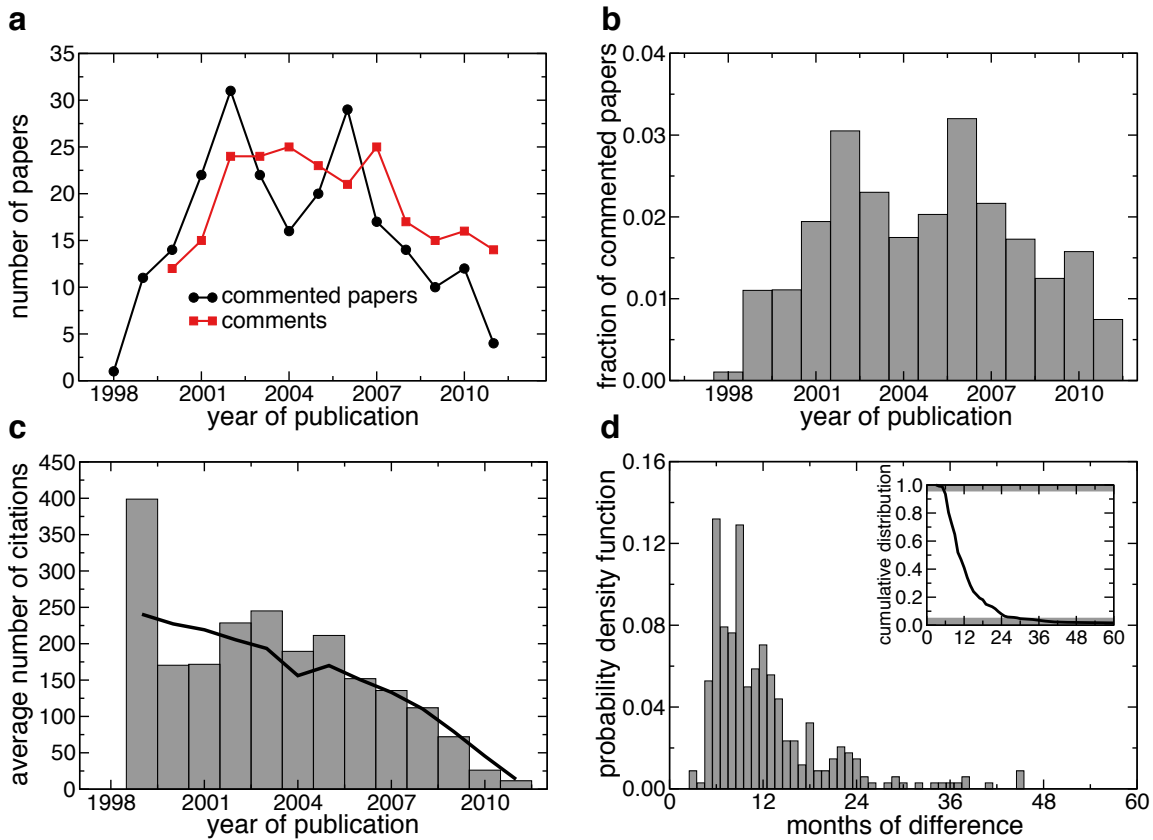


Figure S10: Analysis of the publications in *Nature*. **a.** Number of comments (red squares) and commented papers (black circles) as functions of the year of publication. **b.** Fraction of commented papers as a function of the year of publication. **c.** Average number of citations accumulated by papers published in a given year. Average citation numbers of commented papers (gray bars) are compared to those of non commented papers (black line). **d.** Probability density function (main plot) and cumulative distribution (inset) of the time difference between the publication dates of comments and commented papers. On average, comments are published  $\tau = 13.1$  months after commented articles (standard deviation  $\sigma_\tau = 11.6$ ).

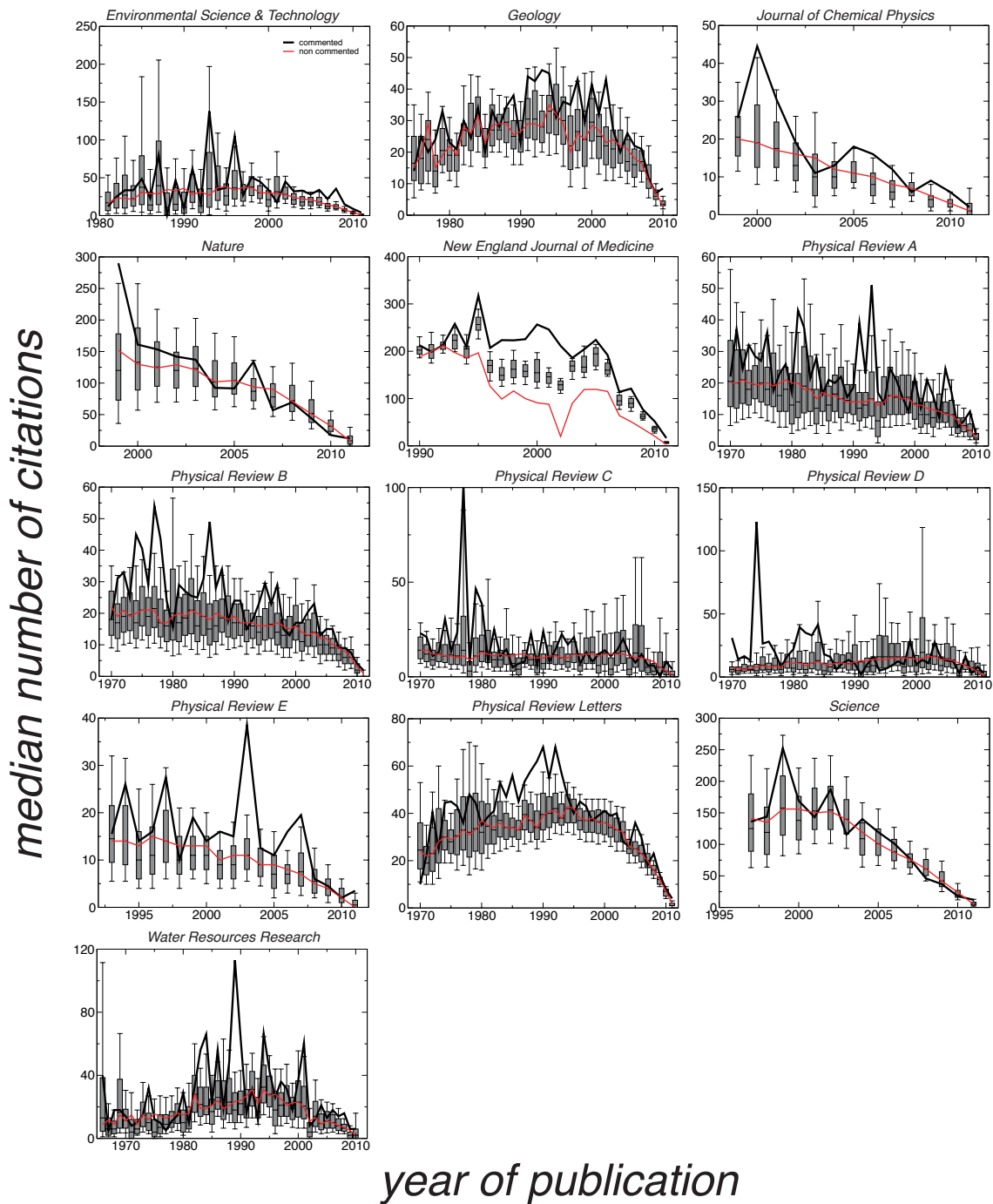


Figure S11: Median number of citations as a function of the publication year of papers. The black line is calculated for commented papers, while the red line for non commented ones. The median value of citations accumulated by commented papers is compared with what expected by chance in the case in which comments are attributed randomly to papers. Boxes delimit the 68.2% confidence intervals (i.e., one standard deviation), while error bars denote the 95.4% confidence intervals (i.e., two standard deviations).

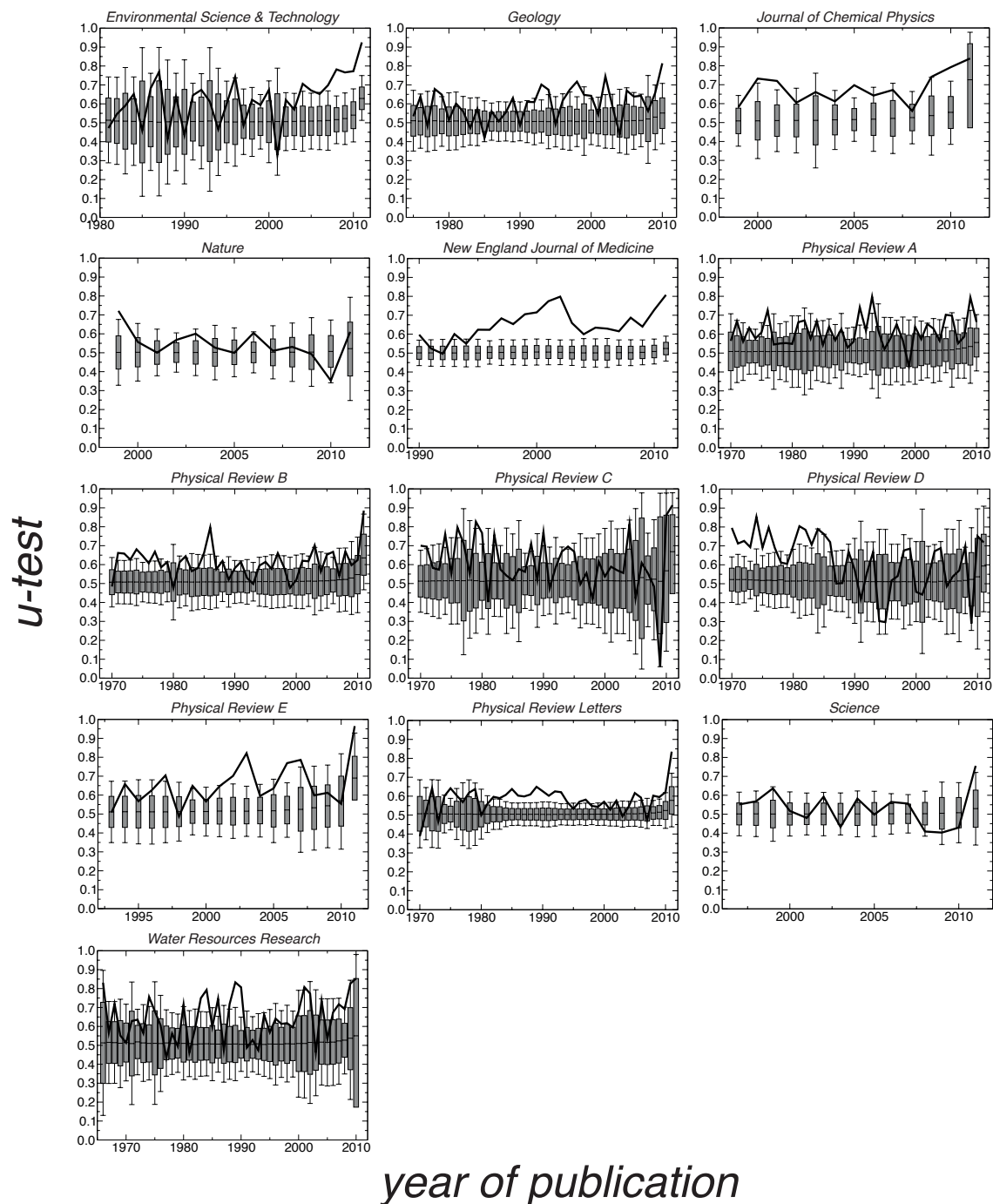


Figure S12: Probability that a commented paper accumulated at least the same number of citations of a non commented paper (u-test). Comparisons are made only between papers published in the same year. Values of the u-test are compared with those expected by chance in the case in which comments are attributed randomly to papers. Boxes delimit the 68.2% confidence intervals (i.e., one standard deviation), while error bars denote the 95.4% confidence intervals (i.e., two standard deviations).

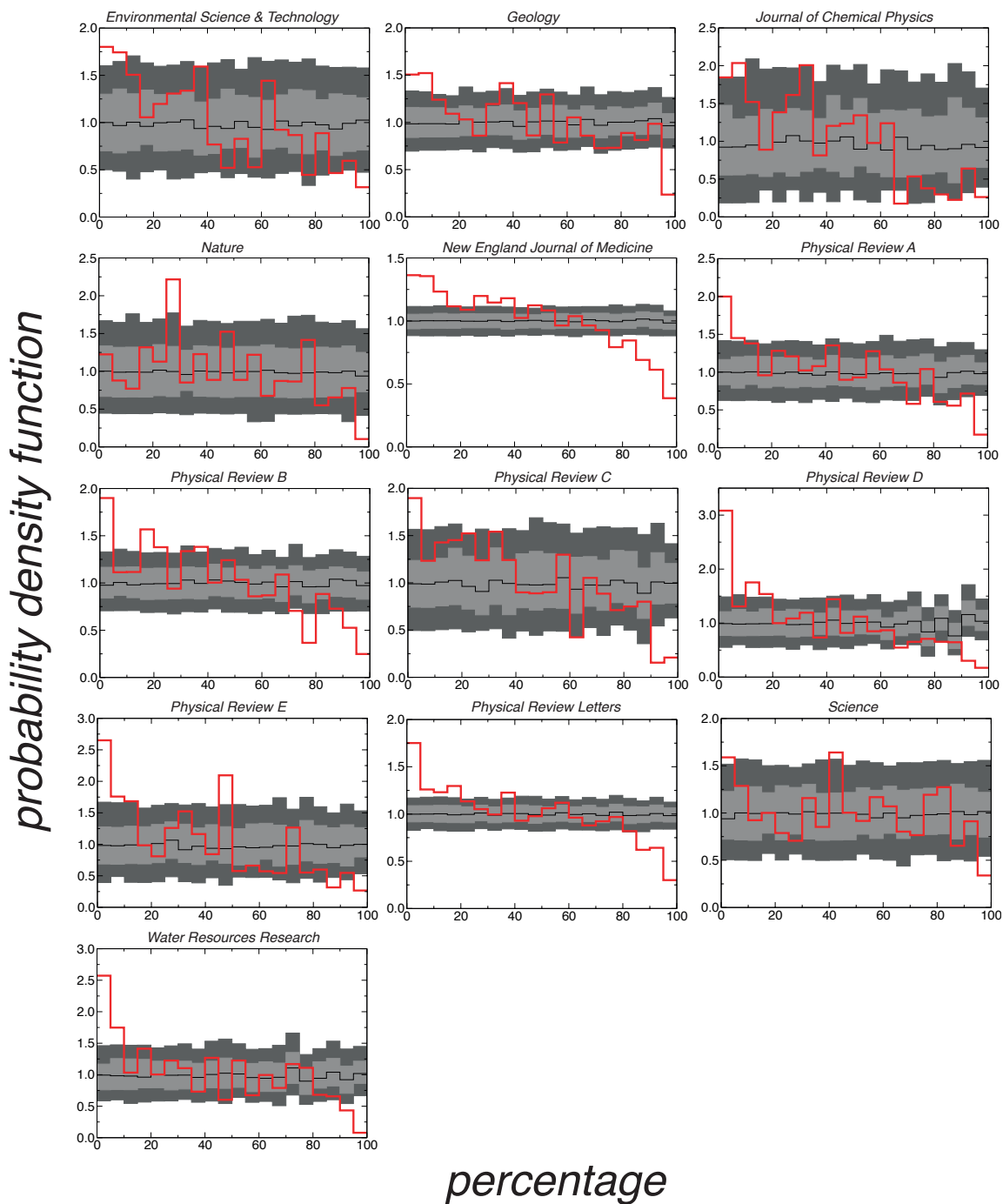


Figure S13: Probability density of commented papers belonging to a given percentage bin of top cited papers (red curve). We used bin length equal to 5%. As a term of comparison, we show also the expected confidence intervals in the case in which comments are attributed randomly to papers. The black line show the median value expected in this case, the light gray region denotes the 68.2% confidence interval (i.e., one standard deviation), while the dark gray region denotes the 95.4% confidence interval (i.e., two standard deviations).