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TRACKING TRENDS & PERFORMANCE IN BASIC RESEARCH

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Analyses : Featured Analyses : 2009 Nov/Dec - Warming Planet, Hot Research

FEATURED ANALYSIS, November/December 2009

Warming Planet, Hot Research

by Christopher King, Editor



The 2009 United Nations Summit on Climate Change, which attracted more than 100 world leaders, including the heads of state of both the United States and China, is only one recent manifestation of the growing international concern over human impact on climate. The political and economic implications of the topic, of course, are vast. Here, *Science Watch*[®] confines itself to assessing the body of research.

To examine highly cited research on climate change over the last decade, *Science Watch* turned to a special extraction of Thomson Reuters-indexed literature, based on such keywords as "global warming," "climate change," "human impact," and other pertinent terms, in journal articles published and cited between 1999 and the spring of 2009. This search produced upwards of 28,000 papers. From this set, *Science Watch* identified the most-cited institutions, authors, and journals.

Table 1a and table 1b below rank institutions according to two separate measures: first, by total citations, second, by average citations per paper (among those institutions that published at least 100 papers in the climate-change database). Highly cited authors (table 2) and journals (table 3) are also listed.

The most-cited paper in the survey is a 2002 *Nature* report, "Ecological responses to recent climate change," (G.R. Walther, *et al.*, 416: 389-95, 2002), now cited approximately 1,100 times. The nine co-authors include three names from the list of highly cited scientists: Annette Menzel of the Technical University of Munich, Ove Hoegh-Guldberg of the University of Queensland, and Camille Parmesan of the University of Texas, Austin. Parmesan, in fact, also contributed to another high-visibility *Nature* report, now approaching 1,000 citations (C. Parmesan, G. Yohe, "A globally coherent fingerprint of climate change impact across natural systems," 421: 37-42, 2003).

Nature also accounts for the survey's #2 most-cited paper, which tops 1,050 citations: "The genetic legacy of the Quaternary ice ages" (G. Hewitt, 405: 907-13, 2000). *Science*, meanwhile, chips in with the third-most-cited paper, which examines broader aspects of assessing how species and ecosystems adapt to human disruption (J.B.C. Jackson, *et al.*, "Historical overfishing and the recent collapse of coastal ecosystems," 293: 629-38, 2001; with just over 1,000 citations). Contributors to this report include featured authors Jeremy B.C. Jackson of UC San Diego, Terry P. Hughes of James Cook University, and John M. Pandolfi of the University of Queensland.

The survey's most-cited author (and also the contributor to the highest number of papers in this climate-change dataset, with 57) is F. Stuart (Terry) Chapin of the University of Alaska. His top paper, with more than 800 citations, is from *Science*: "Biodiversity: Global biodiversity scenarios for the year 2100," (O.E. Sala, *et al.*, 287: 1770-4, 2000).

Among institutions, the National Center for Atmospheric Research, based in Boulder, Colorado, registers the highest citation total: more than 11,000 collective cites to 360-plus papers, the most cited of which is a *Science* paper on climate change and its impact on coral reefs. This paper, now cited more than 450 times, also includes



Ove Hoegh-Guldberg

previously mentioned authors Hughes, Jackson, Hoegh-Guldberg, and Pandolfi. (T.P. Hughes, *et al.*, 301: 929-33, 2003).

Among the organizations whose authors contributed to the coral-reef report is the Smithsonian Institution, which emerges at #1 by the measure of impact, or cites per paper, with 136 papers and a per-paper average exceeding 40 (with the above-mentioned blockbuster on historical overfishing providing a healthy boost).

As for journals: the multidisciplinary heavyweights *Nature* and *Science* post comparable citation tallies for their climate-themed papers, while *Global Change Biology* earns top citation honors among specialty journals devoted to climate change and related topics.

For more information and interviews on highly cited research on this subject, *ScienceWatch.com* looks at the literature on **Climate Change** (including four Research Front Maps) over the past decade and over the past two years. ■

Table 1a

Climate Change Research: Institutions Ranked by Citations		
Rank	Institution	Citations 1999-2009
1	Natl. Ctr. for Atmospheric Res.	11,341
2	NASA	10,731
3	Natl. Oceanic & Atmospheric Admin.	10,609
4	Columbia University	10,600
5	Max Planck Society	9,925
6	Met Office (U.K.)	9,667
7	University of Colorado	9,078
8	University of Oxford	8,622
9	University of East Anglia	8,386
10	University of Washington	8,153
11	University of Alaska	8,098
12	U.S. Geological Survey	7,976
13	Univ. Calif., Berkeley	7,811
14	Pennsylvania State University	6,981
15	Univ. Calif., San Diego	6,951
16	Stanford University	6,907
17	CSIRO (Australia)	6,665
18	Univ. Calif., Santa Barbara	6,417
19	University of Wisconsin	6,271
20	Colorado State University	5,946
21	Chinese Academy of Sciences	5,612
22	Princeton University	5,519
23	Smithsonian Institution	5,512
24	Oregon State University	5,346
25	Duke University	5,345

SOURCE: Thomson Reuters *Web of Science*®



Table 1b

Climate Change Research: Institutions Ranked by Citation Impact

Rank	Institution (≥ 100 papers)	Impact 1999-2009
1	Smithsonian Institution	40.53
2	James Cook University	33.93
3	NASA	32.32
4	Natl. Ctr. for Atmospheric Res.	31.33
5	Rutgers University	30.99
6	Met Office (U.K.)	30.88
7	Univ. Calif., Santa Barbara	30.70
8	Stanford University	30.03
9	Livermore National Lab	29.21
10	Univ. Calif., San Diego	29.08
11	Duke University	28.28
12	Max Planck Society	27.88
13	Pennsylvania State University	27.59
14	University of Miami	27.38
15	Oak Ridge National Lab	27.00
16	University of East Anglia	26.62
17	Princeton University	26.53
18	Columbia University	25.73
19	Woods Hole Oceanographic Inst.	25.72
20	University of Oxford	25.66
21	Natl. Oceanic & Atmospheric Admin.	25.26
22	Stockholm University	24.70
23	Univ. Calif., Santa Cruz	24.67
24	University of New Hampshire	24.65
25	Univ. Calif., Davis	24.53

SOURCE: Thomson Reuters *Web of Science*®



Table 2

Highly Cited Authors in Climate Change Research, 1999-2009 (Ranked by total citations)

Rank	Name	Institution	Department/ Concentration	Papers	Citations
1	F. Stuart Chapin	University of Alaska	Arctic Biology	57	3,365
2	Camille Parmesan	Univ. Texas, Austin	Integrative Biology	7	2,794
3	Ove Hoegh-Guldberg	University of Queensland	Marine Science	30	2,612
4	Phil Jones	University of East Anglia	Climatic Research	39	2,480
5	A. Townsend Peterson	University of Kansas	Biodiversity/Ecology	45	2,341

6	Peter M. Cox	University of Exeter	Climate System Dynamics	31	2,176
7	I. Colin Prentice	University of Bristol	Plant Ecology	36	2,172
8	Terry P. Hughes	James Cook University	Coral Reef Ecology	10	2,144
9	Antoine Guisan	University of Lausanne	Ecology/Evolution	26	2,040
10	Mike Hulme	University of East Anglia	Climate Change	32	2,024
11	Richard A. Betts	Met Office/Hadley Centre	Climate Impacts	25	2,000
12	Wilfried Thuiller	CNRS, Grenoble	Ecology/Biostatistics	48	1,894
13	Chris D. Thomas	University of York	Ecology/Evolution	28	1,884
14	Eric Post	Pennsylvania State University	Ecological Dynamics	22	1,852
15	Martin T. Sykes	Lund University	Physical Geography	33	1,839
16	Gerald A. Meehl	NCAR	Climate and Global Dynamics	39	1,778
17	Jeremy B.C. Jackson	Univ. Calif., San Diego	Oceanography	5	1,744
18	John M. Pandolfi	University of Queensland	Paleoecology	5	1714
19	Mark New	University of Oxford	Climate Science	14	1,711
20	Annette Menzel	Tech. University of Munich	Ecoclimatology	28	1,691
21	Myles R. Allen	University of Oxford	Climate Dynamics	48	1,686
22	Andrew J. Weaver	University of Victoria	Earth/Ocean Science	43	1,644
23	Peter A. Stott	Met Office/Hadley Centre	Climate Monitoring	46	1,614
24	Stephen Sithch	University of Leeds	Earth Systems	27	1,576
25	John F.B. Mitchell	Met Office/Hadley Centre	Climate Science	27	1,538

SOURCE: Thomson Reuters *Web of Science*®



Table 3

Most-Cited Journals in Climate Change Research, 1999-2009 (Ranked by citations to papers published and cited between 1999 and 2009)		
Rank	Institution	Citations 1999-2009
1	Nature	22,952
2	Science	21,791
3	Global Change Biology	12,013
4	Journal of Climate	11,778
5	Geophysical Research Letters	10,500
6	J. Geophysical Research Atmospheres	9,826
7	Climatic Change	8,423
8	PNAS	7,484

9	Climate Dynamics	5,761
10	Quaternary Science Reviews	5,470
11	Ecological Applications	4,252
12	Ecology	4,041
13	Int. J. Climatology	3,650
14	Earth & Planetary Science Letters	3,554
15	Ecological Modelling	3,482

SOURCE: Thomson Reuters *Web of Science*®

Christopher King is the Editor of the *Science Watch*® Newsletter, Thomson Reuters.

KEYWORDS: CLIMATE CHANGE, GLOBAL WARMING, CLIMATE SCIENCE, CLIMATE DYNAMICS, GLOBAL CHANGE, NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, SMITHSONIAN INSTITUTION, TERRY CHAPIN, CAMILLE PARMESAN.

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