Highly cited *Geology* papers (2000–2010)—What were they and who wrote them?

Reviewers for *Geology*, most often experts in their field, are asked if the submitted manuscript is "novel, provocative, and of broad interest." The Science Editors (also full-time academics) try to balance the reviewers' various views on these criteria to publish manuscripts that have the potential to become highly influential papers. The question is: How successful are we, as a scientific community, at recognizing these manuscripts during the review process? This article addresses this question by presenting mean annual citation rates for the 3208 papers published in *Geology* between 2000 and 2010. The data come from Web of Knowledge (http://wokinfo.com; all databases) and are averaged over the number of years since publication; i.e., 2010 citation totals are divided by 2, 2009 by 3, etc. The data were extracted by Science Editor P.A. Cowie in October 2012.

TABLE 1. THE TOP THREE MOST-HIGHLY-CITED PAPERS PUBLISHED IN GEOLOGY BETWEEN 2000 AND 2010 IN RANK ORDER ACCORDING TO WEB OF KNOWLEDGE (ALL DATABASES; * DENOTES FEMALE FIRST AUTHOR)

2010	1. Schoene, B., Guex, J., Bartolini, A., Schaltegger, U., and Blackburn, T.J., 2010, Correlating the end-Triassic mass extinction and flood basalt volcanism at the 100 ka level: Geology, v. 38, p. 387–390, doi:10.1130/G30683.1
	2. Bentley, M.J., Fogwill, C.J., Le Brocq, A.M., Hubbard, A.L., Sugden, D.E., Dunai, T.J., and Freeman, S.P.H.T., 2010, Deglacial history of the West Antarctic Ice Sheet in the Weddell Sea embayment: Constraints on past ice volume change: Geology, v. 38, p. 411–414, doi:10.1130/G30754.1
	3. Okay, A.I., Zattin, M., and Cavazza, W., 2010, Apatite fission-track data for the Miocene Arabia-Eurasia collision: Geology, v. 38, p. 35–38, doi:10.1130/G30234.1
2009	1. Xu, X., Wen, X., Yu, G., Chen, G., Klinger, Y., Hubbard, J., and Shaw, J., 2009, Coseismic reverse- and oblique-slip surface faulting generated by the 2008 Mw 7.9 Wenchuan earthquake, China: Geology, v. 37, p. 515–518, doi:10.1130/G25462A.1
	2. Ries, J.B., Cohen, A.L., and McCorkle, D.C., 2009, Marine calcifiers exhibit mixed responses to CO_2-induced ocean acidification: Geology, v. 37, p. 1131–1134, doi:10.1130/G30210A.1
	3. Ouimet, W.B., Whipple, K.X, and Granger, D.E., 2009, Beyond threshold hillslopes: Channel adjustment to base-level fall in tectonically active mountain ranges: Geology, v. 37, p. 579–582, doi:10.1130/G30013A.1
2008	1. Milliken, R.E., Swayze, G.A., Arvidson, R.E., Bishop, J.L., Clark, R.N., Ehlmann, B.L., Green, R.O., Grotzinger, J.P., Morris, R.V., Murchie, S.L., Mustard, J.F., and Weitz, C., 2008, Opaline silica in young deposits on Mars: Geology, v. 36, p. 847–850, doi:10.1130/G24967A.1
	2. *Lear, C.H., Bailey, T.R., Pearson, P.N., Coxall, H.K., and Rosenthal, Y., 2008, Cooling and ice growth across the Eocene-Oligocene transition: Geology, v. 36, p. 251–254, doi:10.1130/G24584A.1
	3. Yang, J.-H., Wu, F.-Y., Wilde, S.A., Belousova, E., and Griffin, W.L., 2008, Mesozoic decratonization of the North China block: Geology, v. 36, p. 467–470, doi:10.1130/G24518A.1
2007	1. Li, Z.-X., and Li, X.-H., 2007, Formation of the 1300-km-wide intracontinental orogen and postorogenic magmatic province in Mesozoic South China: A flat-slab subduction model: Geology, v. 35, p. 179–182, doi:10.1130/G23193A.1
	2. Pearson, P.N., van Dongen, B.E., Nicholas, C.J., Pancost, R.D., Schouten, S., Singano, J.M., and Wade, B.S., 2007, Stable warm tropical climate through the Eocene Epoch: Geology, v. 35, p. 211–214, doi:10.1130/G23175A.1
	3. Davidson, J., Turner, S., Handley, H., Macpherson, C., and Dosseto, A., 2007, Amphibole "sponge" in arc crust?: Geology, v. 35, p. 787–790, doi:10.1130/G23637A.1
2006	1. *Chu, M.-F., Chung, S.-L., Song, B., Liu, D., O'Reilly, S.Y., Pearson, N.J., Ji, J., and Wen, D.-J., 2006, Zircon U-Pb and Hf isotope constraints on the Mesozoic tectonics and crustal evolution of southern Tibet: Geology, v. 34, p. 745–748, doi:10.1130/G22725.1
	2. Zheng, J.P., Griffin, W.L., O'Reilly, S.Y., Zhang, M., Pearson, N., and Pan, Y.M., 2006, Widespread Archean basement beneath the Yangtze craton: Geology, v. 34, p. 417–420, doi:10.1130/G22282.1
	3. Kharaka, Y.K., Cole, D.R., Hovorka, S.D., Gunter, W.D., Knauss, K.G., and Freifeld, B.M., 2006, Gas-water-rock interactions in Frio Formation following CO_2 injection: Implications for the storage of greenhouse gases in sedimentary basins: Geology, v. 34, p. 577–580, doi:10.1130/G22357.1
2005	1. *Clark, M.K., House, M.A., Royden, L.H., Whipple, K.X, Burchfiel, B.C., Zhang, X., and Tang, W., 2005, Late Cenozoic uplift of southeastern Tibet: Geology, v. 33, p. 525–528, doi:10.1130/G21265.1
	2. Kump, L.R., Pavlov, A., and Arthur, M.A., 2005, Massive release of hydrogen sulfide to the surface ocean and atmosphere during intervals of oceanic anoxia: Geology, v. 33, p. 397–400, doi:10.1130/G21295.1
	3. Wang, Q., McDermott, F., Xu, J.F., Bellon, H., and Zhu, Y.T., 2005, Cenozoic K-rich adakitic volcanic rocks in the Hohxil area, northern Tibet: Lower-crustal melting in an intracontinental setting: Geology, v. 33, p. 465–468, doi:10.1130/G21522.1
2004	1. Zhang, P.Z., Shen, Z., Wang, M., Gan, W.J., Burgmann, R., and Molnar, P., 2004, Continuous deformation of the Tibetan Plateau from global positioning system data: Geology, v. 32, p. 809–812, doi:10.1130/G20554.1
	2. Hoffmann, K.H., Condon, D.J., Bowring, S.A., and Crowley, J.L., 2004, U-Pb zircon date from the Neoproterozoic Ghaub Formation, Namibia: Constraints on Marinoan glaciation: Geology, v. 32, p. 817–820, doi:10.1130/G20519.1
	3. Coleman, D.S., Gray, W., and Glazner, A.F., 2004, Rethinking the emplacement and evolution of zoned plutons: Geochronologic evidence for incremental assembly of the Tuolumne Intrusive Suite, California: Geology, v. 32, p. 433–436, doi:10.1130/G20220.1
2003	1. Chung, S.L., Liu, D.Y., Ji, J.Q., Chu, M.F., Lee, H.Y., Wen, D.J., Lo, C.H., Lee, T.Y., Qian, Q., and Zhang, Q., 2003, Adakites from continental collision zones: Melting of thickened lower crust beneath southern Tibet: Geology, v. 31, p. 1021–1024, doi:10.1130/G19796.1
	2. Miller, C.F., McDowell, S.M., and Mapes, R.W., 2003, Hot and cold granites? Implications of zircon saturation temperatures and preservation of inheritance: Geology, v. 31, p. 529–532, doi:10.1130/0091-7613(2003)031<0529:HACGIO>2.0.CO;2
	3. Amthor, J.E., Grotzinger, J.P., Schroder, S., Bowring, S.A., Ramezani, J., Martin, M.W., and Matter, A., 2003, Extinction of *Cloudina* and *Namacalathus* at the Precambrian-Cambrian boundary in Oman: Geology, v. 31, p. 431–434, doi:10.1130/0091-7613(2003)031<0431:EOCANA>2.0.CO;2

(*Continued*)

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2002	1. Xu, J.F., Shinjo, R., Defant, M.J., Wang, Q., and Rapp, R.P., 2002, Origin of Mesozoic adakitic intrusive rocks in the Ningzhen area of east China: Partial melting of delaminated lower continental crust?: Geology, v. 30, p. 1111–1114, doi:10.1130/0091-7613(2002)030<1111:OOMAIR>2.0.CO;2
	2. Li, Z.X., Li, X.H., Zhou, H.W., and Kinny, P.D., 2002, Grenvillian continental collision in south China: New SHRIMP U-Pb zircon results and implications for the configuration of Rodinia: Geology, v. 30, p. 163–166, doi:10.1130/0091-7613(2002)030<0163:GCCISC>2.0.CO;2
	3. Huber, B.T., Norris, R.D., and MacLeod, K.G., 2002, Deep-sea paleotemperature record of extreme warmth during the Cretaceous: Geology, v. 30, p. 123–126, doi:10.1130/0091-7613(2002)030<0123:DSPROE>2.0.CO;2
2001	1. Kennedy, M.J., Christie-Blick, N., and Sohl, L.E., 2001, Are Proterozoic cap carbonates and isotopic excursions a record of gas hydrate destabilization following Earth's coldest intervals?: Geology, v. 29, p. 443–446, doi:10.1130/0091-7613(2001)029<0443:APCCAI>2.0.CO;2
	2. *Rubatto, D., and Hermann, J., 2001, Exhumation as fast as subduction?: Geology, v. 29, p. 3–6, doi:10.1130/0091-7613(2001)029<0003:EAFAS>2.0.CO;2
	3. *Williams, H., Turner, S., Kelley, S., and Harris, N., 2001, Age and composition of dikes in Southern Tibet: New constraints on the timing of east-west extension and its relationship to postcollisional volcanism: Geology, v. 29, p. 339–342, doi:10.1130/0091-7613(2001)029<0339:AACODI>2.0.CO;2
2000	1. *Clark, M.K., and Royden, L.H., 2000, Topographic ooze: Building the eastern margin of Tibet by lower crustal flow: Geology, v. 28, p. 703–706, doi:10.1130/0091-7613(2000)28<703:TOBTEM>2.0.CO;2
	2. Gutscher, M.A., Maury, R., Eissen, J.P., and Bourdon, E., 2000, Can slab melting be caused by flat subduction?: Geology, v. 28, p. 535–538, doi:10.1130/0091-7613(2000)28<535:CSMBCB>2.0.CO;2
	3. Zheng, H.B., Powell, C.M., An, Z.S., Zhou, J., and Dong, G.R., 2000, Pliocene uplift of the northern Tibetan Plateau: Geology, v. 28, p. 715–718, doi:10.1130/0091-7613(2000)28<715:PUOTNT>2.0.CO;2

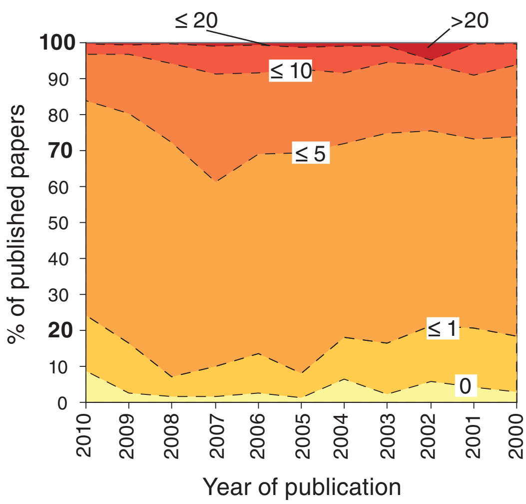

Figure 1. Cumulative percentage of papers published in a given year, for the period 2000 to 2010, versus the average number of times cited since publication (averaged over number of years since publication). This graph shows that <5% of papers have not yet been cited at all. Approximately 10–15% have been cited on average once per year, a rate that could be attributed to self citation by the authors themselves. Most papers (50–60%) have been cited on average between 1 and 5 times per year. Approximately 20% of the papers published have been cited on average between 5 and 10 times per year, while <10% have been cited >10 times per year (see Fig. 2). Variations between years, particularly for more recent years (e.g., 2009–2010) could be due to natural variability, the shorter time window of averaging, or the effect of the launch of *Nature Geoscience* in 2008.

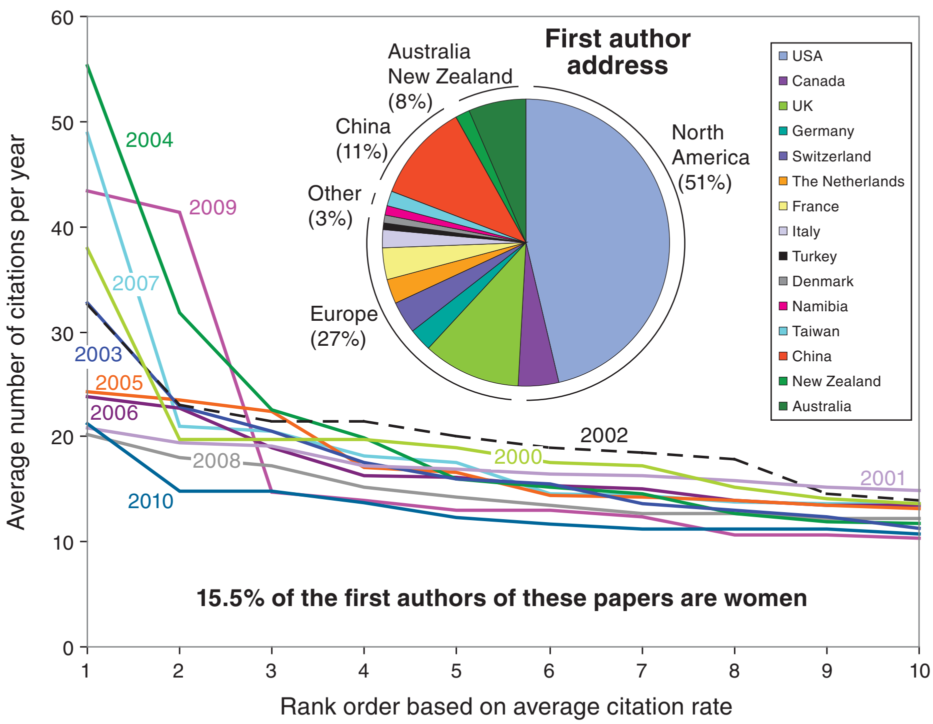

Figure 2. Average number of citations since publication (averaged over number of years since publication) versus the rank order of the top ten most highly cited *Geology* papers in the period 2000–2010. Pie chart indicates the country where the first author resided when the paper was published. Note that 15.5% of the first authors of these 110 papers are women; i.e., a gender ratio of 6.5:1. This graph shows that there are typically two or three papers published in each year that attract exceptional citation rates of ≫10–20 citations per year on average. In the time window 2000–2010, two of these highly influential papers were first-authored by the same person: Marin Clark. This graph also shows that papers that make it into the top 10 are typically cited at least 12–15 times per year. An attempt to analyse these papers for subject area proved futile, as many of them are strongly interdisciplinary, and the titles speak for themselves.

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