July 20, 2005

CURRICULUM VITAE

Name:	Jonathan Richard Morley Hosking
Date of birth:	April 13, 1955
Place of birth:	Blandford Forum, Dorset, England
Citizenship:	United Kingdom (Resident Alien of the United States of America)

Employment history

1986 to date	Research Staff Member, IBM Research Division, Thomas J. Watson Research Center, Yorktown Heights, New York.
1983–1986	Senior Scientific Officer, Institute of Hydrology, Wallingford, Oxon., England.
(Jun–Nov 1986)	Visiting Scientist, IBM Research Division, Thomas J. Watson Research Center, Yorktown Heights, New York.
(Feb–Jun 1984)	Visiting Associate Professor, Mathematics Research Center, University of Wisconsin, Madison, Wisconsin.
1979–1983	Higher Scientific Officer, Institute of Hydrology, Wallingford, Oxon., England.

Academic studies

1976–1979	Faculty of Mathematical Studies, University of Southampton, Southampton, England. Ph.D., "Tests of time-series model specification", 1979 (thesis advisor: Prof. T. M. F. Smith).
1973–1976	Sidney Sussex College, Cambridge University, Cambridge, England. B.A. (class I), Mathematics, 1976. M.A., 1980.

Professional experience — highlights

Risk modeling and risk management

- For IBM Business Continuity and Recovery Services, analyzed risk exposures and developed algorithms and software that enabled BCRS to estimate risk for individual customers and determine the inventory levels required to satisfy likely customer demands. [1998–2003]

- For Deutsche Bank, developed a statistical method of market risk (Value At Risk) estimation, that allowed for heavy tails in distributions of returns on financial instruments. This potentially enabled the bank to significantly reduce its capital set-asides to accommodate adverse market movements. [1998–2000]

- For the U.S. Army Corps of Engineers, provided statistical methods for the U.S. National Drought Atlas. The Atlas estimates drought risk and precipitation frequency in the U.S. using data from over 1000 measuring sites. [1991–1995]

Forecasting

- For IBM Microelectronics Division, developed a statistical demand forecasting method capable of forecasting monthly demand for several thousand products. Forecast accuracy improved by 35% over existing methods. [2001–03]

- For a major automobile manufacturer, developed a procedure to estimate demand for options and option packages on vehicles. Forecast accuracy improved by 30% over existing methods. [2002]

Research

- Invented *L*-moments, a method of summarizing probability distributions and data samples, and of fitting distributions to data. *L*-moments are analogous to ordinary moments (skewness, kurtosis, etc.), but have much superior statistical properties. They are well suited to estimating the frequency of extreme events, and have found applications in environmental sciences and finance. [1986 to date]

- With J. R. Wallis, developed regional frequency analysis using *L*-moments as an effective method for frequency estimation of rare events in the environmental sciences. These methods are used by researchers in many countries, and have been adopted by government agencies in the U.S. (National Drought Atlas, 1995) and U.K. (Flood Estimation Handbook, 1999). [1983–97]

- Invented (simultaneously with, but independently of, C. Granger) the "fractional ARIMA" model for long-range dependence in time series, and established its properties. Long-range dependence is a phenomenon, in which observations a long time span apart are statistically correlated. It has become an important research area, particularly in hydrology, economics, and signal processing. My 1981 paper "Fractional differencing" has been cited over 400 times. [1979–94]

- Investigated relationships between data mining and classical statistics; developed a method for selecting explanatory variables for use in classification procedures. [1995–97]

Awards and Honors

IBM Invention Achievement Award (First Plateau), 2003.

Designated by the Institute for Scientific Information as one of the 250 most highly cited researchers in mathematics for publications in the period 1981-1999 (see `http://www.isihighlycited.com`), 2003.

Elected Fellow of the American Statistical Association, 1999.

IBM First Patent Application Invention Achievement Award, 1998.

IBM Outstanding Innovation Award, 1992.

Editors' Citation for Excellence in Refereeing, *Water Resources Research*, 1989.

Research Studentship, Science Research Council, 1976–79.

Professional activities

Associate Editor, *Technometrics*, 2001 to date.
Member, L-moment Applications Working Group, National Weather Service, 2001.
Member, Program Committee, KDD 2001 (7th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining), 2001.
Associate Editor, *Methods and Computing in Applied Probability*, 1998 to date.
Member, Technical Advisory Group, Upper Mississippi Basin Flood Frequency Study, U.S. Army Corps of Engineers, 1997–2000.
Member, Program Committee, 11th International Symposium on Forecasting, New York, 1991.
Member, Editorial Advisory Board, *Earth in Space*, 1988–90.

Membership of professional organizations

Fellow, Royal Statistical Society.
Member, American Geophysical Union.
Fellow, American Statistical Association.

Books

Hosking, J. R. M., and Wallis, J. R. (1997), *Regional Frequency Analysis: An Approach Based on L-moments*," Cambridge, England: Cambridge University Press.

Research papers

Hosking, J. R. M. (1978), "A Unified Derivation of the Asymptotic Distributions of Goodness-Of-Fit Statistics for Autoregressive Time-Series Models," *Journal of the Royal Statistical Society, Series B*, **40**, 341–349.

Hosking, J. R. M. (1979), "The Asymptotic Distribution of R^2 for Autoregressive-Moving Average Time-Series Models when Parameters Are Estimated," *Biometrika*, **66**, 156–157.

Hosking, J. R. M. (1980), "The Asymptotic Distribution of the Sample Inverse Autocorrelations of an Autoregressive-Moving Average Process," *Biometrika*, **67**, 223–226. Correction: *Biometrika*, **69** (1982), 491.

Hosking, J. R. M. (1980), "The Multivariate Portmanteau Statistic," *Journal of the American Statistical Association*, **75**, 602–608.

Hosking, J. R. M. (1980), "Lagrange-Multiplier Tests of Time-Series Models," *Journal of the Royal Statistical Society, Series B*, **42**, 170–181.

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Hosking, J. R. M. (1981), "Equivalent Forms of the Multivariate Portmanteau Statistic," *Journal of the Royal Statistical Society, Series B*, **43**, 261–262. Correction: *Journal of the Royal Statistical Society, Series B*, **51** (1989), 303.

Hosking, J. R. M. (1982), "Some Models of Persistence in Time Series," in *Time Series Analysis: Theory and Practice 1*, ed. O. D. Anderson, Amsterdam: North-Holland, pp. 641–653.

Hosking, J. R. M. (1983), "Lagrange-Multiplier Tests," in *Encyclopedia of Statistical Sciences, Vol. 4*, eds. S. Kotz and N. L. Johnson, New York: Wiley, pp. 456–459.

Hosking, J. R. M., and Reed, D. W. (1983), "Communication on 'Development and Operational Strategies for Water Resource and Supply Systems' by T. Kitson," *Journal of the Institute of Water Engineers and Scientists*, **37**, 72–74.

Hosking, J. R. M. (1984), "Testing Whether the Shape Parameter is Zero in the Generalized Extreme-Value Distribution," *Biometrika*, **71**, 367–374.

Hosking, J. R. M. (1984), "Contribution to the Discussion of 'A Model Fitting Analysis of Daily Rainfall Data' by R. D. Stern and R. Coe," *Journal of the Royal Statistical Society, Series A*, **147**, 20–21.

Hosking, J. R. M. (1984), "Modeling Persistence in Hydrological Time Series Using Fractional Differencing," *Water Resources Research*, **20**, 1898–1908.

Hosking, J. R. M. (1985), "Algorithm AS215: Maximum-Likelihood Estimation of the Parameters of the Generalized Extreme-Value Distribution," *Applied Statistics*, **34**, 301–310.

Hosking, J. R. M., Wallis, J. R., and Wood, E. F. (1985), "An Appraisal of the Regional Flood Frequency Procedure in the UK Flood Studies Report," *Hydrological Sciences Journal*, **30**, 85–109.

Hosking, J. R. M. (1985), "Comment on 'A Correction for the Bias of Maximum Likelihood Estimators of Gumbel Parameters' by M. Fiorentino and S. Gabriele," *Journal of Hydrology*, **78**, 393–396.

Hosking, J. R. M., Wallis, J. R., and Wood, E. F. (1985), "Estimation of the Generalized Extreme-Value Distribution by the Method of Probability-Weighted Moments," *Technometrics*, **27**, 251–261.

Hosking, J. R. M. (1985), "Fractional Differencing Modelling in Hydrology," *Water Resources Bulletin*, **21**, 677–682.

Hosking, J. R. M. (1986), "Portmanteau Test," in *Encyclopedia of Statistical Sciences, Vol. 7*, eds. S. Kotz and N. L. Johnson, New York: Wiley, pp. 119–121.

Hosking, J. R. M. (1986), "Quenouille's Test," in *Encyclopedia of Statistical Sciences, Vol. 7*, eds. S. Kotz and N. L. Johnson, New York: Wiley, pp. 476–477.

Arnell, N. W., Beran, M., and Hosking, J. R. M. (1986), "Unbiased Plotting Positions for the General Extreme Value Distribution," *Journal of Hydrology*, **86**, 59–69.

Beran, M., Hosking, J. R. M., and Arnell, N. (1986), "Comment on 'Two-Component Extreme Value Distribution for Flood Frequency Analysis' by Fabio Rossi, Mauro Fiorentino, and Pasquale Versace," *Water Resources Research*, **22**, 263–266.

Hosking, J. R. M., and Wallis, J. R. (1986), "Paleoflood Hydrology and Flood Frequency Analysis," *Water Resources Research*, **22**, 543–550.

Hosking, J. R. M., and Wallis, J. R. (1986), "The Value of Historical Data in Flood Frequency Analysis," *Water Resources Research*, **22**, 1606–1612.

Hosking, J. R. M., and Wallis, J. R. (1987), "Parameter and Quantile Estimation for the Generalized Pareto Distribution," *Technometrics*, **29**, 339–349.

Hosking, J. R. M. (1988), "Van Montfort-Otten Test," in *Encyclopedia of Statistical Sciences, Vol. 9*, eds. S. Kotz and N. L. Johnson, New York: Wiley, pp. 461–462.

Hosking, J. R. M. (1988), "*L*-Moments: Data Analysis Using Linear Combinations of an Ordered Sample (Appendix to 'Catastrophes, Computing, and Containment: Living with Our Restless Habitat' by J. R. Wallis)," *Speculations in Science and Technology*, **11**, 316–324.

Hosking, J. R. M., and Wallis, J. R. (1988), "The Effect of Inter-Site Dependence on Regional Flood Frequency Analysis," *Water Resources Research*, **24**, 588–600.

Hosking, J. R. M., and Wallis, J. R. (1988), "Comment on 'Estimating the Upper Tail of Flood Frequency Distributions' by J. A. Smith," *Water Resources Research*, **24**, 625–627.

Hosking, J. R. M. (1990), "*L*-Moments: Analysis and Estimation of Distributions Using Linear Combinations of Order Statistics," *Journal of the Royal Statistical Society, Series B*, **52**, 105–124.

Hosking, J. R. M., and Clarke, R. T. (1990), "Rainfall-Runoff Relations Derived from the Probability Theory of Storage," *Water Resources Research*, **26**, 1455–1463.

Wu, L. S.-Y., Ravishanker, N., and Hosking, J. R. M. (1991), "Forecasting for Business Planning: A Case Study of IBM Product Sales," *Journal of Forecasting*, **10**, 579–595.

Hosking, J. R. M. (1992), "Moments or *L*-Moments? An Example Comparing Two Measures of Distributional Shape," *The American Statistician*, **46**, 186–189.

Wu, L. S.-Y., Hosking, J. R. M., and Doll, J. M. (1992), "Business Planning Under Uncertainty: Will We Attain Our Goal?" *International Journal of Forecasting*, **8**, 545–557.

Guttman, N. B., Wallis, J. R., and Hosking, J. R. M. (1992), "Spatial Comparability of the Palmer Drought Severity Index," *Water Resources Bulletin*, **28**, 1111–1119.

Wu, L. S.-Y., Ravishanker, N., and Hosking, J. R. M. (1993), "Reallocation Outliers in Time Series," *Applied Statistics*, **42**, 301–313.

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Hosking, J. R. M., and Ravishanker, N. (1993), "Approximate Simultaneous Critical Values for Residual Autocorrelations of Autoregressive Moving-Average Time Series Models," *Journal of Time Series Analysis*, **14**, 19–26.

Hosking, J. R. M., and Wallis, J. R. (1993), "Some Statistics Useful in Regional Frequency Analysis," *Water Resources Research*, **29**, 271–281. Correction: *Water Resources Research*, **31** (1995), 251.

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Guttman, N. B., Hosking, J. R. M., and Wallis, J. R. (1994), "The 1993 Midwest Extreme Precipitation in Historical and Probabilistic Perspective," *Bulletin of the American Meteorological Society*, **75**, 1785–1792.

Hosking, J. R. M. (1994), "The Four-Parameter Kappa Distribution," *IBM Journal of Research and Development*, **38**, 251–258.

Hosking, J. R. M. (1994), "Moments of Order Statistics of the Cantor Distribution," *Statistics and Probability Letters*, **19**, 161–165.

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Wu, L. S.-Y., Pai, J. S., and Hosking, J. R. M. (1996), "An Algorithm for Estimating Parameters of State-Space Models," *Statistics and Probability Letters*, **28**, 99–106.

Hosking, J. R. M., Pednault, E. P. D., and Sudan, M. (1997), "A Statistical Perspective on Data Mining," *Future Generation Computer Systems*, **13**, 117–134.

Hosking, J. R. M. (1997), "Discussion of 'Selection of Parameter-Estimation Method for LP3 Distribution' by B. Naghavi and F. X. Yu," *Journal of Irrigation and Drainage Engineering*, **123**, 227.

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Hosking, J. R. M. (1998), "*L*-Estimation," in *Order Statistics and Their Applications*, Handbook of statistics, vol. 16, eds. C. R. Rao and N. Balakrishnan, Amsterdam: North-Holland, forthcoming.

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Coppersmith, D., Hong, S. J., and Hosking, J. R. M. (1999), "Optimal Partitioning of Nominal Attributes in Decision Trees," *Data Mining and Knowledge Discovery*, **3**, 197–217. An earlier version was published in *Intelligent Data Engineering and Learning*, Proceedings of the 1st International Symposium, IDEAL '98, ed. L. Xu, L. W. Chan, I. King and A. Fu, Singapore: Springer-Verlag, pp. 393–400, 1998.

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Hosking, J. R. M. (2004), "On the characterization of distributions by their L-moments", *Journal of Statistical Planning and Inference*, accepted for publication.

Research reports (selected)

Hosking, J. R. M. (1986), "The Theory of Probability Weighted Moments," *Research Report RC12210*, IBM Research Division, Yorktown Heights, N.Y., 160 pp.

Willeke, G. E., Guttman, N. B., Hosking, J. R. M., and Wallis, J. R. (1994), "The National Drought Atlas (draft)," *IWR Report 94-NDS-4*, Institute for Water Resources, U.S. Army Corps of Engineers, Fort Belvoir, Va., 587 pp.

Hosking, J. R. M., and Wallis, J. R. (1996), "The U.S. National Electronic Drought Atlas: Statistical Data Analysis with GIS-Based Presentation of Results," *Research Report RC20499*, IBM Research Division, Yorktown Heights, N.Y.

Hosking, J. R. M. (1996), "Fortran Routines for Use with the Method of *L*-Moments, Version 3," *Research Report RC20525*, IBM Research Division, Yorktown Heights, N.Y.

Hosking, J. R. M. (1999), "*L*-moments and Their Applications in the Analysis of Financial Data," *Research Report RC21466*, IBM Research Division, Yorktown Heights, N.Y.

Hosking, J. R. M. (2000), "Maximum-Entropy Characterization of the Logistic Distribution Using *L*-Moments", *Research Report RC21691*, IBM Research Division, Yorktown Heights, N.Y.

Hosking, J. R. M. (2003), "Maximum Entropy, *L*-Moments, and Order Statistics," *Research Report RC22960*, IBM Research Division, Yorktown Heights, N.Y.

Heching, A., Hosking, J. R. M., and Leung, Y. T. (2004), "Forecasting demand for IBM semiconductor products", *Research Report RC23407*, IBM Research Division, Yorktown Heights, N.Y.

Patents

Coppersmith, D., Hong, S. J., and Hosking, J. R. M. (2000), "Method for Finding a 'Best' Test for a Nominal Attribute for Generating a Binary Decision Tree," U.S. Patent no. 6,101,275.

Gung, R., Hosking, J. R. M., Lin, G., and Tajima, A. (2004), "Demand Planning for Configure-to-Order and Building Blocks-Based Market Environment," U.S. Patent no. 6,816,839.