

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health
Department of Biostatistics

Veronica J. Berrocal, assistant professor of biostatistics, Department of Biostatistics, School of Public Health, is recommended for promotion to associate professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.

Academic Degrees:

Ph.D (Statistics)	2007	North Carolina State University
M.Sc. (Statistics)	2002	Michigan State University
D.E.A. (Mathématiques)	1998	Université Joseph Fourier
Laurea (Matematica)	1996	Università “La Sapienza”

Professional Record:

2010-present	Assistant Professor, Department of Biostatistics, University of Michigan
2009-2010	Post-doctoral Fellow, SAMSI
2008-2010	Post-doctoral Fellow, Department of Statistics, Duke University
2007-2008	NRC Post-doctoral Research Associate, Environmental Protection Agency

Summary of Evaluation:

Teaching: Professor Berrocal is consistently one of our top teachers, with outstanding course evaluations in teaching assignments that few others in the department could muster. She has taught our Masters level course on applied Bayesian inference (BIOSTAT 682, three times), and developed and taught our courses on spatial statistics (BIOSTAT 696, five times – including three where the course was cross-listed as BIOSTAT 896) and a course on modern statistical methods in epidemiologic studies (BIOSTAT 698, once). It is important to emphasize that BIOSTAT 696/896 and BIOSTAT 698 are important offerings that were developed by Professor Berrocal. Overall, her teaching evaluation scores have averaged 4.63 (Q1: “This is an excellent course”) and 4.77 (Q2: “The instructor is an excellent teacher”).

Professor Berrocal is already active in doctoral student advising. Although none of her doctoral students have graduated yet, she has co-authored papers with doctoral students and is a highly sought-after member for doctoral thesis committees, where she contributes her energy and unique knowledge of spatial, environmental, and Bayesian statistics as well as computation.

Research: Professor Berrocal has an excellent research record. She is a world leader in the application of Bayesian models to spatial and environmental data, having developed elegant and computationally tractable models for modeling the climate, air pollution, brain imaging and other spatial processes. A common challenge in the analysis of spatial data is that the variables that are being studied (for example, air-population and birthweight for newborn infants) are often “mismatched” because they are not measured in the same places and time-points. Naive analyses are thus impossible or misleading (for example, because they require measurements to be averaged over very broad geographic areas to allow comparison or because they can only use

a small subset of available data) and the application of well-considered and carefully developed statistical models is essential.

Professor Berrocal's papers are all quite substantive. They combine statistical innovations and ideas with the analysis of "meaty" and challenging datasets. She is especially well known for her work on spatial temporal down-sampling (which enables spatial-temporal information with different resolution to be combined) and for her work on fusion modelling (which enables statistical models to include different sources of related information). The applications of her statistical expertise have ranged from modeling weather [for example, to predict optimal road maintenance schedules], to modeling air population [for example, to study its relationship with the health of newborn infants], to, most recently, modeling of brain imaging data.

She has 22 published articles (including ten as first author). Among her publications, nine are in absolutely top journals – whether for biostatistics in general (*Journal of the American Statistical Association*, *Biometrics*, *Annals of Applied Statistics*) or for her chosen application areas (*Environmetrics*, *Journal of Agricultural, Biological and Environmental Statistics*). Eight of her papers (including six where Professor Berrocal is first author) have already received >25 citations, which is an accomplishment given the relatively slow pace of publication and citation for methodological papers in biostatistics and related fields.

Service: Professor Berrocal's service also easily meets our expectations for promotion. She has an excellent record of service to the department. Among numerous assignments, she has served on faculty search committees (2012 – 2013), on the qualifying exam committee (2011-2012, 2014-2015), and helped develop new courses through her service on the curriculum committee (2011-2012, 2013-2015) and the new statistical theory course development committee (2013-2014). In addition, Professor Berrocal has been a key contributor to the profession both through efforts to establish the university as a leader in the area of atmospheric sciences, serving as the director of the local node of the National Science Foundation (NSF) funded STATMOS (Statistical Methods for the Atmospheric and Oceanic Sciences) research network, as an organizer of a local workshop on high performance computing, and as a leader in professional activities in the area of environmental and spatial statistics (she is currently chair-elect of the American Statistical Association's Section on Statistics and the Environment).

Professor Berrocal is exceptionally energetic and her contributions to the profession are wide-ranging and unusually deep for someone early in their career. In addition to her leadership position within STATMOS, it is worth highlighting that she has served on advisory panels for the United States Environmental Protection Agency, on the program committee for the prestigious International Biometrics Conference, as associate editor for the *Journal of Agricultural, Biological and Environmental Statistics*, as a referee for many other journals, and in many other important service roles for various professional associations.

Recent and Significant Publications:

V.J. Berrocal, P. Craigmile, and P. Guttorp. (2012). Regional climate model assessment using statistical upscaling and downscaling techniques. *Environmetrics* 23, 482-492.

- V.J. Berrocal, A.E. Gelfand, and D.M. Holland. (2010a) A spatio-temporal downscaler for output from numerical models. *Journal of the Agricultural, Biological and Environmental Statistics* 15, 176-197.
- V.J. Berrocal, A.E. Gelfand, and D.M. Holland. (2010b) A bivariate space-time downscaler under space and time misalignment. *Annals of Applied Statistics* 4, 1942-1975.
- V.J. Berrocal, A.E. Gelfand, D.M. Holland, J. Burke, and M.L. Miranda. (2011). On the use of a PM2.5 exposure simulator to explain birthweight. *Environmetrics* 22, 553-571.
- V.J. Berrocal, A.E. Raftery, and T. Gneiting. (2008) Probabilistic quantitative precipitation field forecasting using a two-stage spatial model. *Annals of Applied Statistics* 2, 1170-1193.

External Reviewers:

Reviewer A: “There are several excellent papers, and two especially illustrate the point I made previously about Professor Berrocal’s ability to do technically difficult work that solves general problems, enabling better methodology for a broad class of applications.”

Reviewer B: “Dr. Berrocal’s research career is one of high energy and activity across a broad collection of important problems in statistical methods and application, especially as related to spatially- and temporally-oriented data. I do think she would merit promotion to associate professor with tenure in my department.”

Reviewer C: “Veronica’s publications are of high quality, and they have had a great impact in the way statistical methodology is being developed and implemented in the presence of correlated data. I strongly recommend her for the promotion to Associate Professor with tenure.”

Reviewer D: “I do work in the area of spatial and spatio-temporal methodology and believe the quality and impact of her research has been evidenced by her recent American Statistical Association, Section on Statistics and the Environment, Young Investigator Award (2015) and her award for the best paper published in JABES during years 2010-2011, 2012.”

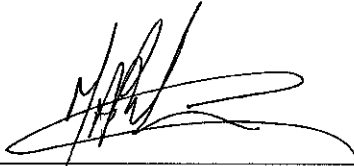
Reviewer E: “Well-written papers demonstrate a tremendous depth and thoroughness in methodological development and scientific evaluation, frequently showing improvement over other state of the art methods used in the literature. She already has the profile of an Associate Professor, and I recommend her promotion with tenure most strongly.”

Reviewer F: “These kinds of Bayesian hierarchical models are considered cutting edge in statistical methodology and Veronica is clearly an expert in their development and application. Based on this perspective, I feel that Veronica merits promotion to Associate Professor with tenure.”

Reviewer G: “Based on these and other papers on her CV, my assessment of her research output would be that it is *outstandingly strong*. I believe that based on her overall publication and funding record, she would indeed be promoted with tenure at [my institution].”

Summary of Recommendation:

Professor Berrocal is an excellent biostatistician and easily deserving of promotion. She has made important contributions, particularly in the development of methods for analysis of spatial and environmental data. She is an excellent teacher, who has developed new courses and received consistently outstanding evaluations. She is also active in service to her profession. I am pleased to recommend Veronica J. Berrocal for promotion to associate professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.



Martin A. Philbert
Dean, School of Public Health

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