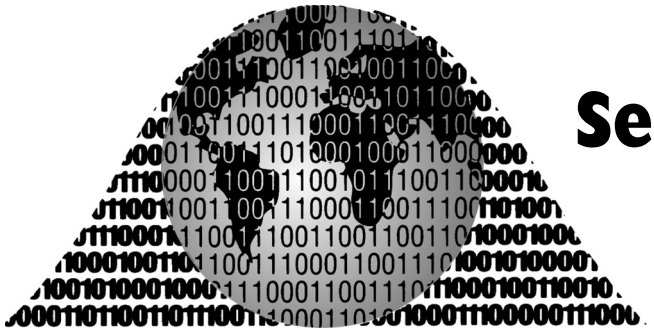

*American Statistical Association*

# Section on Statistics & the Environment

*Newsletter*

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## Notes from the Chair

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It's February and I am sitting on my sun porch listening to the weather reports. We just had record low temperatures here in north central Florida (although today is lovely), the Midwest was recently pounded with major blizzards and the northeast is girding for severe weather. Florida just had a serious bout of tornados in the central part of the state, New Orleans, still recovering from Katrina, was just hit with more flooding from excessive rains, and the world-wide average January temperature was the warmest on record. Parts of the U.S. government have finally admitted that there may be something to human-induced global warming and the Working Group I of the Intergovernmental Panel on Climate Change has just released a report (Climate Change 2007: The Physical Basis, Summary for Policy Makers; see *http://www.ipcc.ch/* for a copy of the report) in which they state "Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* [their emphasis] due to the observed increase in anthropogenic greenhouse gas concentrations…Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns." While the general consensus has more-or-less coalesced around the finding that climate change has a large man-made component, three major areas are still being hotly debated: the drivers of anthropogenic effects, the effect of climate change on our environment, economies, and quality of life, and the appropriate mitigation efforts required to reduce those effects.

You are probably reading this and thinking, so what does this have to do with ENVR? As statisticians with interest in environmental issues it is incumbent on us to be involved in ensuring that

*See* **Chair**, *page 9*

## Notes from the Editor

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Unlike Mary (Notes from the Chair) who was sitting in the sun in February in Florida, I am sitting in my office in Minnesota in mid-April watching the snow accumulate on the window sill. Where is a little global warming when you really want it? Nevertheless, with this topic in mind, I am most grateful to Richard Smith (UNC) for his article in this issue of the ENVR Newsletter summarizing the 2006 JSM late-breaking session on the role of statisticians in the associated public policy debate. Thanks to an innovative proposal by Peter Guttorp, the then ENVR program chair-elect, the 2006 JSM featured the new Coffee Roundtables as alternatives to the very expensive Luncheon Roundtables. Thanks to Gretchen Moisen for her article, "Coffee, anyone?" that follows on from the Coffee Roundtable session she organized on the topic of the relevance of statistical research in production environments. As

*See* **Editor**, *page 9*

## Inside

# The role of statisticians in public policy debates over climate change

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The past year has been a busy one for statisticians interested in climate change. In February this year, the Intergovernmental Panel on Climate Change (IPCC) issued the Summary for Policymakers of its Fourth Assessment Report, which included IPCC's strongest statement yet about human influence being "very likely" a direct cause of observed global warming. The U.S. government's Climate Change Science Program (CCSP) is in the midst of producing 21 "special assessment reports" on different aspects of climate change as it applies to North America. And in 2006, several statisticians were involved in a well-publicized controversy over the so-called "hockey-stick curve". This controversy was the central feature of a late-breaking session entitled "What is the Role of Statistics in Public Policy Debates about Climate Change?" that was organized jointly by Edward Wegman (George Mason University) and myself at the 2006 Joint Statistical Meetings. The session took place in front of a standing-room-only audience and was chaired by Doug Nychka (National Center for Atmospheric Research).

The three speakers were Ed Wegman, J. Michael Wallace of the Department of Atmospheric Sciences, University of Washington, and myself. Ed and Mike both talked about the hockey stick reconstruction. Ed focused on statistical flaws that, in his view, render much of the current literature on this subject of doubtful validity. Mike presented the broader findings of a recent NRC panel that, while acknowledging the statistical issues of Wegman's report, defended the hockey stick curve based on a broader scientific context. The final talk of mine was on a different subject, how another important climate controversy had recently been resolved, where I also offered some personal perspectives on the role of statisticians in this kind of review.

Ed Wegman's talk was entitled "The Kyoto Accord, the 2001 IPCC Third Assessment Report, and the Academic Papers Underlying Them." In this talk, Ed described his work as part of a pro bono committee (the other members were David W. Scott of Rice University and Yasmin H. Said of Johns Hopkins University) that had been commissioned by Representative Joe Barton (R-Texas), at that time chair of the House Committee on Energy and Commerce.

The background to this committee's report was a series of papers authored by Michael Mann, Raymond Bradley and Malcolm Hughes that used paleoclimate methods to reconstruct a curve of the earth's temperature for the millennium from 1000–2000 AD.

The first IPCC report (1990) included a graph that depicted a "Medieval Warm Period" from about 1100-1400 AD, followed by a "Little Ice Age" from 1600-1800, followed by a rise during the twentieth century. By the time of the Third IPCC Report in 2001, this had been replaced by the curve derived by Mann, Bradley and Hughes, which showed steady or slightly decreasing temperatures from 1000-1900 followed by a sharp rise in the twentieth century, widely called the "hockey stick curve" and, in Ed's own words, "a poster child for theories of human-induced climate change." However, critiques by Steve McIntyre and Ross McKitrick (2003-2005) had raised questions about the Mann et al. methodology, and the main purpose of the Wegman, Scott and Said report was to make an independent assessment of the statistical assumptions underlying this controversy.

Ed began his talk by referring to various newspaper reports in the 1970s that presaged a major cooling of the earth with the possibility of another ice age. He then described some of the basics of paleoclimate reconstruction. Numerous sources of proxy data have been assembled, the best known being tree rings, ice cores and corals. These have been assembled into a large data matrix, each column representing one time series of proxy data. Mann et al. used "climate field reconstruction" (CFR), a variation of the method of principal components, to reconstruct the earth's temperature average over the millennium.

At the core of the controversy is an incorrect use by Mann et al. of principal components (PCs). Ed gave a brief overview of PC analysis, which uses the eigenvalues and eigenvectors of the sample covariances of a data matrix X. However as most commonly applied in large data sets, the actual calculation begins with a singular value decomposition of X itself, after subtracting the sample mean vector. A typical analysis by Mann et al. used a complete data record from 1902-1980 as a training data set to reconstruct temperatures from proxies for 1400-1995. However, the sample means they subtracted were based only on the data from 1902-1980, instead of the full series 1400-1995. This induced a bias in the first PC, and also biased the variances in a direction which gave greater weight to the first PC than a correct analysis would have done. To illustrate the point, a number of simulations were performed in which the true temperature series was represented by a stationary time series with no trend but red-noise autocorrelations, and the Mann et al. technique applied to estimate the trend in these series. There was a strong tendency for the simulations also to show the hockey-stick shape, mimicking the actual curves produced by Mann et al.

A number of other commentators have acknowledged the flaws in the Mann reconstruction but have argued that this does not matter because the answers have been verified by other analyses. Ed's own response to that was given in the equation

In other words, the fact that the answer may have been

Method Wrong + Answer Correct = Bad Science.

correct does not justify the use of an incorrect method in the first place.

Ed also touched on some of the other controversies in Mann's work. Some of the proxies had been criticized as inappropriate. For example, bristlecone pines are known to be $CO_2$ fertilized, creating a possible confounding problem if they are used in temperature reconstruction. A figure from Mann's own website suggested that the medieval warm period reappeared if bristlecone pines were excluded from the reconstruction. Other studies had shown a "discomforting array of different results" in the reconstructions obtained with minor methodological variations.

Ed then went on to a different aspect of his analysis, the "social network" of researchers in paleoclimatology that Mann worked with. The central finding here was the existence of a network of just seven researchers (including Mann, Bradley and Hughes) who largely collaborated with each other and, by implication, were likely responsible for reviewing each others' work.

Finally Ed outlined the principal conclusions of his report. First, there should be more comprehensive guidelines for disclosure of data generated under federal funding –"Federally funded data including code should be made available to other researchers upon reasonable request." Second, there should be procedures for statistical review of grant applications "when public health [or] substantial amounts of monies are involved...based on statistical assessments," as is already the case in many FDA procedures. Third, the emphasis in federal funding of climate change should be "on interdisciplinary teams and avoid narrowly focused discipline research."

Mike Wallace's talk was about the "National Research Council Report on the 'Hockey Stick Controversy'." Mike began by outlining the background of this report, which originated from a request made by Rep. Sherwood Boehlert (R-New York) to the National Academy of Sciences to seek an independent assessment of the science behind the hockey stick curve. The NRC put together a panel of twelve members including two statisticians (Doug Nychka and Peter Bloomfield) and others representing paleoclimate, climate modeling and general climate science. The charge to the committee, was "to summarize current information on the temperature records for the past millennium, describe the main areas of uncertainty and how significant they are, describe the principal methodologies used and any problems with these approaches, and explain how central is the debate over the paleoclimate record within the overall state of knowledge on global climate change." This was deliberately framed to give a broader overview than the charge to the Wegman committee, which was specifically focused on Michael Mann's papers and the critiques of those papers.

In Mike's view, the two reports were complementary, and to the extent that they overlapped, the conclusions were quite consistent. Regarding the methodology of temperature reconstructions, the NRC report gives a long list of "limitations," including both instrumental uncertainties and those of a more statistical nature, such as the possibility of nonstationarity in the relationships between temperatures and proxies. Given these limitations, it is difficult to quantify the uncertainties in terms of formal error bars, but what seems certain is that any such attempt is a lower bound on actual uncertainty. Given that, the validity of the hockey-stick curve cannot be determined either positively or negatively by statistical evidence alone.

The NRC report reviewed a number of other reconstructions of the temperature record based on proxy observations and believed that the Mann et al. claim that the last two decades were the warmest of the last 1000 years was entirely plausible. This assertion was also backed up by climate model runs using best available reconstructions of solar fluctuations and volcanic activity over the past 1000 years, and the evidence in actual events concerning melting of polar ice caps, the retreat of glaciers in mountain regions around the world, and evidence from Greenland and Antarctic ice cores.

Despite all this evidence, the NRC report phrased its conclusions cautiously, concluding it was no more than "plausible" (2:1 odds in favor) that the temperatures of the last few decades were unprecedented in recorded history. This is somewhat more cautious than IPCC's summary statement in 2001, but one could be deceived by the actual published figure of Mann et al. into thinking the level of confidence was considerably higher than even IPCC of 2001 had indicated. It was possible that this had attracted Congressman Barton's attention concerning IPCC's "reliance and promotional use" of the hockey stick reconstruction.

Concerning the "social network" aspects of the Wegman report, the NRC's written report did not directly address that issue but concluded that this field of research is moving forward in a healthy manner. No doubt social networks exist in the climate research field but there is no evidence that these result in publication bias in this field of research any more than they do in any other field. As for the alleged lack of involvement by statisticians in paleoclimate research, Mike noted the following points: that there was a long history of statisticians being involved in this and other areas of climate research; that the Wegman report underestimated the degree of statistical expertise that already exists in this community; and that while there is undoubtedly scope for statisticians to play a larger role in paleoclimate research, the large investment of time needed to become familiar with the scientific background is likely to deter most statisticians from entering this field.

In the end, it's important not to lose sight of the forest for the trees, where the "forest" refers to the totality of scientific evidence for global warming.

The third talk was my own, entitled "The CCSP Report on Temperature Trends in the Lower Atmosphere". I began with a short description of CCSP and its 21 reports *(http://www.climatescience.gov)*. Report 1.1 was the first of these to be published, and centered around one of the major controversies of climate research. Beginning in the early 1990s, two atmospheric scientists from the University of Alabama at Huntsville, John Christy and Roy Spencer, published a series of papers showing a slight cooling of temperatures in the troposphere, in contradiction to all physical theories of global warming (which have correctly predicted a cooling of temperatures in the stratosphere, but not the troposphere). Data underlying these reports came from both radiosondes and satellites, but there were known biases in the radiosonde data so most of the attention had gone to satellite measurements. From early in the present decade, other groups started reanalyzing the raw satellite data, paying particular attention to the method of recalibration when one satellite was replaced by another. These studies had different conclusions from Christy and Spencer, that did show an increasing trend in the troposphere, consistent with the projections of climate models. The team writing this CCSP report included representatives of both the main research groups involved in the debate, and reached a consensus that the new analyses were largely correct, thus resolving an issue that had been at the center of scientific debates over global warming since the original Christy-Spencer papers.

My own role in this was as a member of an NRC panel that was asked to review the first draft of the CCSP report. The main statistical issue that had arisen during our discussions was the assessment of trends in time series, and their standard errors.

When I read the first draft of the CCSP report, I could find very little information about the statistical methods employed; for example, it was not even clear whether the standard error calculations allowed for autocorrelation. It turned out that they did, through a method that essentially assumed the residuals from a linear regression were AR(1) and multiplied the estimated variances from an ordinary least squares regression analysis by (1+r)/(1-r) where r is the first-order autocorrelation coefficient of the residuals. In my talk, I illustrated this formula on some representative time series, concluding that the method was not optimal, but probably gave roughly correct results in practice.

I concluded my talk by asking "What is the role of statisticians in this kind of process?" I felt pleased to be invited to join the NRC review panel and that our input had positively impacted the CCSP report—for example it led to the addition of a statistical appendix that gave details of the methods actually employed. Nevertheless, I feel that official reports by organizations such as CCSP and IPCC could benefit from the more direct involvement of statisticians at an earlier stage of the process.

As a footnote to this, I would like to mention that subsequent to the discussion at the JSM, I was invited to join the lead author team for another CCSP report (3.3: Weather and Climate Extremes in a Changing Climate), while another statistician with considerable expertise in climate science, Claudia Tebaldi of NCAR, is a member of the NRC review team for that report.

Following the three talks, there was a very lively discussion that ended only when we were obliged to vacate the room for the start of the next session. Among topics brought up by audience members were the extent to which statisticians speaking on public policy issues were likely to find their words distorted for political ends; the availability of data in climate and related areas of research; and how other governments such as Australia have responded to similar issues.

To conclude this report, I will mention two follow-up activities. First, we plan a special issue of Statistical Science, including specially invited papers from Professors Wegman and Wallace and a number of discussants. This will allow more detailed airing of the issues behind the Wegman report and how both statisticians and climate scientists view them. Second, there will be an ASA workshop of invited participants whose purpose is to establish "A Statistical Consensus on Global Warming," organized by Dr. David Marker, Chair of the ASA Science and Public Affairs Advisory Committee, and Dr. Mary Christman, Chair of the ASA Section on Statistics and the Environment, with the sponsorship of the ASA Board and the co-sponsorship of the Section on Statistics and the Environment. This workshop is planned for the fall of 2007 and should deliver its report by early 2008.

# Coffee, anyone?

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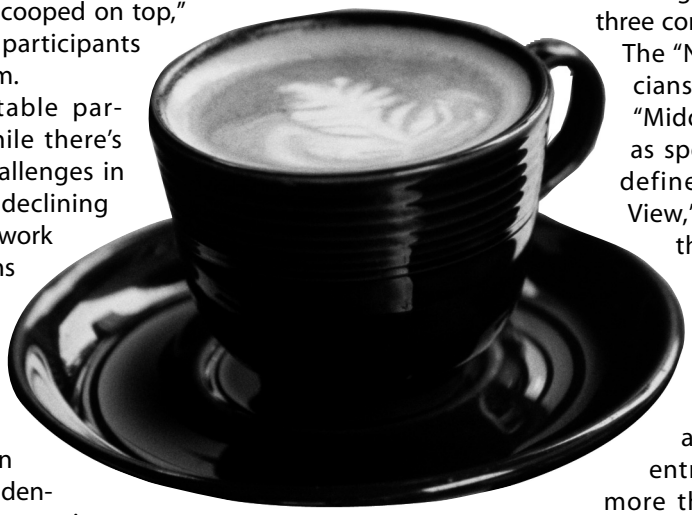
One would expect that given the choice between attending a 7 a.m. statistical discussion and sleeping in, any rational human being would choose to snooze. But that wasn't the decision of the many participants in the coffee roundtable discussions at the last JSM in Seattle. Among them were seven arguably rational individuals who gathered to discuss "Keeping our jobs: the relevance of statistical research in a production environment", sponsored by ENVR. Armed with Starbuck's "venti / 5 shot / nonfat / extra hot / 1 pump chocolate / extra foamy free pour / with extra foam scooped on top," or even just simple tea, the participants delved into the topic full steam.



The bright-eyed roundtable participants all agreed that while there's no shortage of statistical challenges in environmental applications, declining budgets for natural resource work threaten cuts in both positions and entire research projects unless they are deemed relevant by parent organizations. The statisticians discussed focusing their critical analysis skills on their own positions and organizations, identifying a number of common questions we need to be continually asking ourselves: Are we solving the most critical problems? Are we investing our efforts in the areas that promise to maximize impact for effort? Are we effectively marketing our services? What are the most effective ways to communicate our services and contributions? What are the most effective ways to educate our colleagues and clients about our services so we maximize our effectiveness? Are our proposed solutions being considered? How do we get these solutions adopted by our organizations? Are they being transitioned into the production stream? How can we facilitate organizational change? What are our metrics for success?

The discussion explored these and other intriguing questions as we shared experiences and strategies from both the civil and private sector. But these questions are in no way new. In fact, the evolving role of the statistician has been a topic of frequent debate throughout ASA's 160+ year existence. A tremendous amount of rich advice has been given through the years. In what follows, we offer a small, dare we say, sample of that wisdom to hopefully promote further discussions on the relevance of statisticians in the environmental workplace.

Despite the historic depth of the topic, we begin our tour by going back just 30 years, when Bross (1974) asked what a statistician's role should be, scientist or shoe clerk? The easiest and most narrow role is that of the shoe clerk, playing neutral and passive, aiming to please, sometimes giving statistical blessings to foregone conclusions. In contrast, the broadest and most difficult role is one in which we are willing to accept both the "responsibilities and hazards of a scientist" and are "willing to risk unpopularity and even unemployment to achieve a study with a good scientific plan." In either case, statisticians have to resolve conflicting loyalties and have to decide if they are serving the principles of good statistical practice, the collaborative team, the funding agency, the taxpayer, themselves, or perhaps all of the above.

Marquardt offered the idea of "entrepreneur" in his 1986 Presidential Address to the Annual American Statistical Meetings in Chicago. He elaborated three common views of statisticians. The "Narrow View" sees statisticians as compilers of data. The "Middle View" sees statisticians as specialists or consultants for defined problems. The "Wider View," which he advocated, sees them as providing "full service guidance" to diagnose and solve a problem in any area of application and at any level of detail or abstraction. Marquart argued that operating as entrepreneurs requires much more than just data analysis. As entrepreneurs, we are responsible for identifying the collaborative team's needs and convincing them to tackle the right problems. We must actively participate in developing potential solutions, explain why these solutions should be implemented, and help control costs. Further, we must monitor the solution's performance over the long term, assessing the need for and identifying revisions.

Marquardt's "Wider View" was strongly promoted by Wild (1994), who partitioned the investigative process into four areas: mental habits, data collection, data analysis, and communication. The last three are self explanatory; "mental habits" deals with the idea of statistical thinking and bridging the gap between it and technical statistical knowledge. Good mental habits include asking the right questions, articulating the problem, helping investigators identify and assess assumptions. He argues that "we should consciously decide to make statistics the

study of the process of scientific inquiry", a view furthered by Efron (2004). This is an especially important perspective that those of us working outside of academia must continually promote and demonstrate to our clients and non-statistical colleagues.

But what is this "statistical thinking," really? Snee (1990) defined it as "thought processes which recognize that variation is all around us and present in everything we do; all work is a series of interconnected processes; and identifying, characterizing, quantifying, controlling, and reducing variation provide opportunities for improvement." Wild and Pfannkuch (1990) explore at length the concept of statistical thinking in empirical inquiry. Likening statistical thinking to breathing, they challenge the statistics profession to teach people to "breathe more effectively" through the development of a framework upon which experiences can be built. Under the authors' own framework, the statistical thinker operates in four dimensions simultaneously. These four dimensions are the investigative inquiry, the types of thinking, the interrogative cycle, and the dispositions. Dispositions are the qualities people possess that affect their performance in a statistical thinking mode. The authors emphasize the importance of the dispositions of skepticism, imagination, curiosity, openness, a propensity to seek deeper meaning, being logical, engagement, and perseverance. One of many take home messages from Wild and Pfannkuch's work is that "real statistics is less about the pursuit of the 'correct' answer in some idealistic sense than about doing the best one can within constraints."

If that is truly our job, much work is needed not only to change the roles we assume in the workplace, but also to change public perceptions. Sometimes we are seen as "biomagicians" pulling specialized tricks out of our hats; other times we are seen as an impediment to the process, or worse, as Cassandra, harbinger of doom (Wild and Pfannkuch). In this sense the role of the statistician in environmental applications is just like that in other fields. One way of improving a vast number of people's understanding of the value of statistics is through the ubiquitous introductory courses and textbooks. Billard (1998) and others have emphasized this tremendous opportunity. But what can we do in the environmental workplace now? Wild describes the "rule of 100": for every theoretical statistician, we need 100 applied statisticians; for every applied statistician, we need 100 non-statisticians who know when they need to call an applied statistician. This is a good start that we can all work on in our interactions with colleagues, continually emphasizing a component of pedagogy in our meetings, reports, and presentations.

Reading through the STATS "day-in-the-life" articles, where statisticians from a variety of fields describe the nature of their work, reveals a number of common threads. Most boast an exciting new challenge every day. They find themselves on quite large interdisciplinary, often inter-regional, teams. The roles people serve in a variety of applications span the entire scientific and project management process including: design, data management, analysis and policy recommendations. In an example from an ecological research project, Spurrier (1990) described a collaborative 5 step process to include planning and experimental design, construction and calibration, data collection and editing, data analysis, and oral and written presentation of results. In a slightly different example, Hahn (2006) described the responsibilities of an industrial statistician, including: helping design the best possible product; guiding the transition from design to manufacturing; ensuring the company builds a consistently excellent product; evolving strategies for providing optimum service and avoiding problems; and, finally, leveraging the information on past failures to avoid future ones. Overall, these examples all highlight the need for statisticians to be proactive scientists rather than reactive shoe clerks.

In the 2001 Presidential address to the Royal Statistical Society, Lievesley (2001) takes this proactive stance a giant step further by describing the role of the international statistician. In this setting, the statistician is responsible for very diverse activities, including translating development goals into measurable indicators, and tracking changes in those indicators; fostering the collection and dissemination of comparable data across nations, then analyzing these data; improving the quality of international and national statistics; building the technical capacity in different countries; advocating the sharing of data; forming strong partnerships for development; and the list continues. The responsibilities of the environmental statistician are often quite similar, but perhaps at a smaller scale.

Mason (2004) asked if the statistics profession had an identity crisis? He suggested a number of practices to "promote our statistical identity and ensure the long-term survival of our profession," including improving communication skills, being more proactive, publicizing successes, bridging the gap with other disciplines, becoming better advocates of statistics in public policy decisions, and improving statistics education. Brookmeyer (2005), in an article on the role of statisticians in the biosecurity arena, emphasized that statisticians should be at the forefront in assisting policy makers in the use of the best available science in their decision-making.

It is clear from both the literature's advice and our roundtable discussion that as statisticians in production environments we have to do more to demonstrate our unique value to the organization. At that early hour last summer, we explored ways in which we can make sure we're performing a real service, that we're giving perceived and understood value, and that we're truly contributing to the success of our organization. We recognized that a statistician in any collaborative environment must have a unique set of skills to be a valuable member of interdisciplinary teams. These include not only quantitative abilities, statistical knowledge, and current

computational skills, but perhaps most importantly, the ability to communicate to both technical and managerial audiences.

The last point cannot be emphasized enough. An all too familiar obstacle is the language barrier between environmental scientists and managers and the statistician. Like it or not, it falls on the shoulders of the statistician to learn to speak the others' languages and explain our statistical concepts and tools in ways that don't involve use of specific statistical terms. Communication is also critical as an effective statistician is often a translator between multiple disciplines. Wild used the phrase "English in, English out." We may not be able to communicate the technical details of a statistical idea perfectly in lay terms, but often all that is needed is the "flavor" of the idea, the underlying concept. So we draw pictures to explain an estimation process, build decision-support tools that make sense to people, run simulations to demonstrate a phenomenon, and hopefully become an invisible but critical pathway in the production system. And with baby steps in a non-threatening way, we continually market the scientific method and the art of statistical thinking to our parent organizations. What great jobs we have! Now, if we could just keep doing all this, but make the shift from the invisible to the visible and acknowledged critical pathways in environmental workplaces.

In her 2006 presidential address, Sallie Keller-McNulty reminded us that "At the end of the day, it's about decision-making." We're no longer just purveyors of the scientific method (a huge job in and of itself), but guardians of a broader scientific process that links the scientific method with the decision. We've been discussing our jobs for well over a century, and there is plenty more to debate, more tips to share and successes to advertise. So, is anyone up for coffee at the next JSM? By the way, you won't find a Starbucks on every corner, and a venti-5 shot will take some explaining, but you can in fact find a great cup of coffee in Salt Lake City[1].

## Acknowledgements

Many thanks to the other early-risers (Ron McRoberts, Richard Kasul, Rose Ray, Vicente Monleon, and Nancy Gove) for participating in a stimulating roundtable discussion. Tamre Cardoso actually drinks those venti-5 shots (sometimes wimping out with 3 shots of decaf), and kindly shared her secret recipe. Also, a note of appreciation goes out to Rich Guldin and Greg Reams for a dialogue on how we might keep our jobs.

## References

Billard, L. (1998), "The Role of Statistics and the Statistician," *The American Statistician,* 52, 4, 319-324.

Brookmeyer, R. (2005), "Editorial: Biosecurity and the Role of Statisticians," *Journal of the Royal Statistical Society A,* 168, 2, 263-266.

Bross, I.D.J. (1974), "The Role of the Statistician: Scientist or Shoe Clerk," *The American Statistician,* 28, 4, 126-127.

Efron, B. (2004). "But what do statisticians do?," *President's Corner,* AmStat News, April 2004.

Hahn, G. (2006), "Never a Dull Day: The Life of an Industrial Statistician!," *STATS.*

Lievesley, D. (2001), "Making a Difference: A Role for the Responsible International Statistician," *The Statistician,* 40, 4, 367-406.

Marquardt, D.W. (1987), "The Importance of Statisticians," *Journal of the American Statistical Association,* 82, 397, 1-7.

Mason, R.L. (2004), "Does the Statistics Profession Have an Identity Crisis," *Journal of the American Statistical Association,* 99, 465, 1-6.

Snee, R. (1990), "Statistical Thinking and its Contribution to Quality," *The American Statistician,* 44, 116-121.

Spurrier, J.D. (1990), "A Statistician's Role in an Ecological Research Project," *STATS,* Spring.

Wild, C.J. (1994), "Embracing the 'Wider View' of Statistics," *The American Statistician,* 48, 2, 163-171.

Wild, C.J. and Pfahnnkuch, M. (1994), "Statistical Thinking in Empirical Enquiry," *International Statistical Review,* 67, 3, 223-265.

### [1]A few of the downtown Salt Lake City coffee shops

A Cup of Joe - 353 West 200 South

Beans & Brews Coffee House - 906 South 500 East

Cocoa Caffe - 282 East 900 South

Coffee Under The Bridge - 511 West 200 South Apt 307

Java Hut - 214 South 700 East

Java Jo's - 401 1st Avenue

Keep It Brewing - 651 South Main Street

Millcreek Coffee Roasters - 657 South Main Street

Nostalgia - 248 East 100 South

Salt Lake Coffee Break - 430 East 400 South

Starbucks Coffee - 655 East 400 South

Starbucks Coffee - The Gateway Mall

Starbucks Coffee - 220 South State Street

The Salt Lake Roasting Co - 210 South 400 East

Toasters - 151 West 200 South

Urban Grind - 435 South 400 West

You are invited to the JSM

# First-time Attendee

## orientation and reception

Salt Palace Convention Center, Ballroom B
Sunday, July 29, 6:00 p.m.–7:30 p.m.

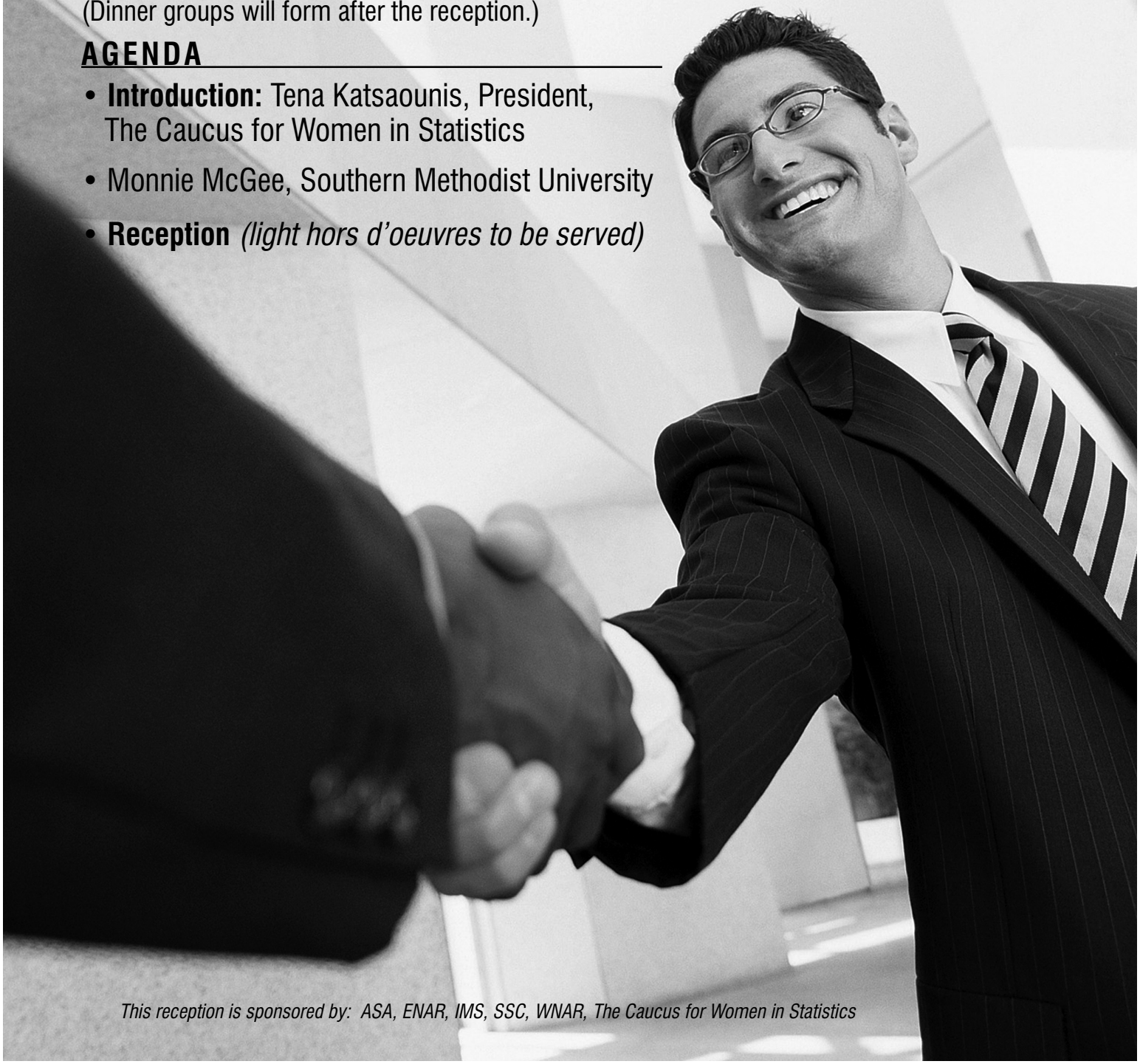
Learn more about how to get the most out of your 1st JSM experience, meet new people, and network.

# Open to All

(Dinner groups will form after the reception.)

**AGENDA**

- **Introduction:** Tena Katsaounis, President, The Caucus for Women in Statistics
- Monnie McGee, Southern Methodist University
- **Reception** *(light hors d'oeuvres to be served)*



*This reception is sponsored by: ASA, ENAR, IMS, SSC, WNAR, The Caucus for Women in Statistics*

**Notes from the Chair** *from page 1*

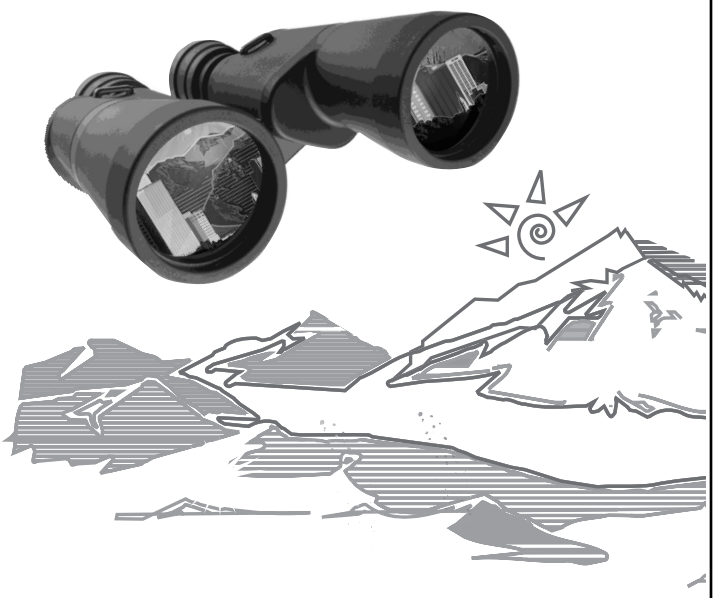
the science behind any conclusions regarding the contribution of human activities, and that the predictions of future impacts on climate and weather patterns be objective and include the major sources of uncertainty. To that end, members of ENVR, Doug Nychka, Richard Smith, and I, are working with David Marker, chair of the ASA Scientific and Public Affairs Advisory Committee (SPA), to organize a two-day meeting this fall, bringing together 15-20 leading statisticians and atmospheric scientists. The mission of the meeting is to develop a statement on the level of consensus on statistical issues related to global warming and to identify priority areas for new efforts by statisticians. The National Center for Atmospheric Research in Boulder, Colorado will be hosting the event. The conference is timed for late October so that the statement will benefit from the three Working Group reports being prepared for the IPCC Fourth Assessment Report (AR4). AR4 is planned for a November 2007 release, so the workshop statement should be released shortly after that event.

In addition to working with SPA on this important area, ENVR has been active in other areas as well. For example, ENVR held its biennial workshop in October 2006 on "Multivariate Methods in Environmetrics" at the Center for Integrating Statistical and Environmental Science (CISES) in the Department of Statistics, University of Chicago. Alan Gelfand taught a short course on Multivariate Spatio-Temporal Modeling for Environmental Data Analysis that was completely booked. As has been the history with our biennial workshops, this one was again a huge success. We thank Marc Genton for his organizational skills in arranging the conference and all of the members of the committee who worked so hard to make it a success, including Linda Barrows, David Brillinger, William Christensen, Doug Nychka, Tony Olsen, Eric Smith, Michael Stein, Melanie Wall, Hao Zhang, Jun Zhu, and Jim Zidek. ENVR is soliciting recommendations for future workshops and locations; contact any member of our executive committee with your recommendations.

And speaking of the executive committee, this year your officers are myself as chair, Lance Waller as chair-elect, Brent Pulsipher as Secretary, David Umbach as Treasurer, Devin Johnson as Publications chair, Peter Guttorp as Program chair, Andrew Lawson as Program chair-elect, and Marcia Gumpertz as our Council of Sections representative. In addition to our elected officers we also have several appointed members of the executive committee as well. I want to especially thank Ron McRoberts for agreeing to continue as Newsletter Editor, Jean Opsomer continuing as Webmaster, Estelle Russek-Cohen for agreeing to organizing our Continuing Education activities for next year, and Don Stevens for agreeing to be this year's liaison to TIES, WNAR and any other organization with interests in environmental statistics. In addition, the chairs of our award committees include Jim Zidek on the Distinguished Achievement awards, Jenise Swall on the student awards and travel fellowships, and Jean Opsomer on the ASA Fellows committee.

Without our officers ENVR would not be able to function as effectively as it has in the past and which I hope will continue in the future. Of course, here's the annual pitch which I cannot avoid — the organization is only as good as its members. We need your help and input in order to be effective as an organization that provides services for its members and as your representative to the ASA. If you want to be involved as a member of a committee or in organizing sessions at the annual meetings or if you have ideas for projects, continuing education sessions, or other activities that fit in with the mission of the section, please do not hesitate to contact any of our officers.

Finally, we look forward to seeing you at the business meeting on Monday evening July 30th at the JSM in Salt Lake City. Come visit with friends, find out who the winners are of our various awards, get an update on ENVR activities, and score a few munchies before dinner. See you in Salt Lake City!



**Notes from the Editor** *from page 1*

I have noted previously, it is always an interesting exercise to decide whom to invite to write articles for the ENVR Newsletter. My primary source of ideas come from perusing the previous year's JSM, but I welcome suggestions, so don't be shy. One of the most rewarding aspects of this exercise is the overwhelmingly positive response I receive from those whom I invite. Thank you, one and all.

American Statistical Association
Section on Statistics
**& the Environment**

**AT**

Salt Lake City JSM07
Statistics Harnessing the Power of Information

## JSM 2007–Continuing Education

### Sunday, July 29

**8:30 – 5:00 Modeling and Data Analysis for Complex Surveys–***Jay Breidt,* Colorado State University; Jean Opsomer, Iowa State University

## JSM 2007–Coffee Roundtables

### Monday, July 30

**7:00 am –8:15 am**

**Hierarchical spatial models bridging ecology and public health–***Lance Waller,* Emory University

**What's the future for point process modeling in ecology?–***Philip Dixon,* Iowa State University

### Wednesday, August 1

**7:00 am – 8:15 am**

**Multivariate environmental health surveillance–***Andrew Lawson,* University of South Carolina

**Bayesian disease mapping methods and applications: past, present and future***–Ying McNab,* University of British Columbia

## JSM 2007–Invited Sessions

### Sunday, July 29

**2:00pm –3:50 pm**

***Time series studies of air pollution and health–****Western North American Region,* International Biometrics Society

**4:00 pm – 5:50 pm**

***Design- and model-based sampling and inference***

**Design-based, model-based and model-assisted sampling and inference in natural resources–***Mary C. Christman,* University of Florida

**Optimal spatial sampling: design-based or model-based–***Don L. Stevens, Jr.,* Oregon State University

**Design-based and model-based issues in natural resource inventories–***Ronald E. McRoberts,* U.S. Forest Service

***Discussant:*** *Timothy G. Gregoire,* Yale University

### Monday, July 30

**10:30 am – 12:20 pm**

***Spatial surveillance for adverse environmental health outcomes***

**Optimal methods in surveillance–***Marianne Frisén,* Göteberg University

**Bayesian modeling and surveillance for adverse MRDD outcomes associated with soil chemical exposures–***Ji-In Kim,* University of South Carolina

**Assessing spatial performance of surveillance systems –***Lance Waller,* Emory University

**2:00 pm – 3:50**

**Invited poster session–***Marc Genton, Stephan Sain, Zepu Zhang, Doug Nychka, Bo Li, Chave Zibman, Souparno Ghosh, Peter Guttorp, Hae-Ryong Song, Thomas Lumley* and *Li Chen*

### Tuesday, July 31

**8:30am –10:20 am**

***Using environmental information for rational decisionmaking***

**Virus and indicator occurrence in ground water sources of public drinking water–***Michael J. Messner,* U.S. Environmental Protection Agency

**A Bayesian Approach to EPA's Data Quality Objectives Process–***Paul K. Black,* Neptune and Company, Inc.

**Strengthening environmental decision making through data quality objectives–***John Warren,* U.S. Environmental Protection Agency

***Discussant:*** *William F. Hunt, Jr.,* North Carolina State University

**10:30am –12:20 pm**

***Statistical analysis and forecast of space-time wind power data–***Institute for Mathematical Statistics

**10:30 am – 12:20 pm**

***Recent developments of statistics in forest, wildlife, fisheries and ecological research–***Western North American Region, International Biometrics Society

**10:30 am – 12:20 pm**

***The national children's study: the challenges and promises of a follow-up study of a randomly selected cohort of 100,000 pre- and post-conception women and their offspring through 21 years of life–***Eastern North American Region, International Biometrics Society

### Wednesday, August 1

**10:30 am – 12:20pm**
***Remote sensing in environmental statistics***

**Markov random fields, remote sensing, and predicting crop yields–***Stephan Sain,* National Center for Atmospheric Research

**Nonstationary covariance models for TOMS ozone data–***Mikyoung Jun,* Texas A&M University

**Understanding large-scale structure in massive remote sensing data sets–***Amy Braverman,* Jet Propulsion Laboratory

**Space-time modeling of biomass burning and regional aerosols in southeast Asia–***Catherine Calder,* Ohio State University
***Discussants:*** *Eric D. Kolaczyk,* Boston University; *Bin Yu,* University of California, Berkeley

**2:00 pm – 3:50 pm**
***Multi-criteria prioritization and ranking with partial order without compositing multiple indicators into an index in social, environmental, and infrastructure work–***Environmental and Ecological Statistics

## JSM 2007–Topic-Contributed Sessions

### Sunday, July 29

**4:00 pm – 5:50 pm**
**Spatial statistics: methods and applications–**Institute for Mathematical Statistics

**4:00 pm – 5:50 pm**
**Analyzing time series data with time-varying frequencies–**ASA Section on Physical and Engineering Sciences

### Monday, July 30

**10:30am – 12:20 pm**
**Spatial statistics applied to the environment–**Institute for Mathematical Statistics

### Tuesday, July 31

**2:00pm –3:50 pm**
**Application of Bayesian inference in wildlife ecology–**ASA Section on Bayesian Statistical Science

**2:00 pm – 3:50 pm**
**The role of statistics in ecological and climate modeling–**ASA Section on Statistics and the Environment

### Thursday, August 2

**8:30 am – 10:20am**
**Nonparametric approaches to regression and spatial modeling–**Institute for Mathematical Statistics

**10:30 am –12:20 pm**
**GIS, map accuracy, and statistics–**ASA Section on Statistics and the Environment

## OTHER CONFERENCES

### June 19 –21, 2007

**TIES 2007: North American Regional Meeting of the International Environmetrics Society**
Climate change and its environmental effects: monitoring, measuring, and predicting — University of Washington, Seattle
***Keynote speakers:*** *Paul Switzer,* Stanford University, and *David Brillinger,* University of California, Berkeley
*http://www.stat.washington.edu/peter/TIES%20NA07.html*

### July 9 –13, 2007

**International Graduate Institute on Modeling Environmental Space-Time Processes** — University of Washington, Seattle
The Institute is designed for graduate or post-doctoral students in the statistical sciences as well as others with a solid background in statistics and probability. The Institute will include a course of lectures on basic theory as well as current hot research topics. Afternoons will be devoted to labs on modeling and analyzing data from space-time processes.
*http://pims.math.ca/science/2007/07mestp/*

### August 16 –20, 2007

**TIES 2007: 18th Annual Meeting of the International Environmetrics Society** — Mikulov, Czech Republic
*http://www.math.muni.cz/ties2007/*

### August 22 –29, 2007

**ISI 2007: International Statistics Institute 56th Session of the ISI** — Lisbon, Portugal
*http://www.isi2007.com.pt/isi2007/index.php*


American Statistical Association

Section on Statistics & the Environment

***NEWSLETTER***

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**Submissions, questions, and comments welcome!**

*www.pnl.gov/ststatenvi*

***Section on Statistics & the Environment Newsletter***
**American Statistical Association**
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Salt Lake City
JSM07

# Opening Mixer

Sunday, July 29
8:00 p.m.–10:30 p.m.
Location TBD