A MESSAGE FROM THE PRESIDENT

by Sylvia Richardson
ISBA President
sylvia.richardson@imperial.ac.uk

I am delighted to be able to give up updates of activities during the last couple of months. First of all, the Board has formally approved the creations of Sections within ISBA. Groups of normally at least 30 ISBA members may thus petition the Board to be designated as a Section. The petition has to outline the initial bylaws of the section, its purpose and how it fits within the overall aim of ISBA. All the details regarding the creation of a Section will be given on the web site. I hope that this process will encourage the constitution of a number of active groups under the ISBA umbrella, and that subsequent issues of the Bulletin will be able to report the creation of Sections and their activities.

Election to the nominating committee has also taken place recently and I am delighted to report that Guido Consonni, Dipak Dey, Chris Holmes, Daniel Peña, Fabrizio Ruggeri, and Jon Wakefield have been duly elected. I extend my warmest congratulations to them.

The first issue of Bayesian Analysis is scheduled for August. Rob Kass and all the editorial board have worked very hard and we all look forward to reading the journal. Many thanks to them. Thoughts are currently being given to finding ways of including our journal into a bundle for libraries. I would like to encourage potential authors to send their work to Bayesian Analysis.

As usual, meetings are an essential part of our activities. Active preparations are underway for the next joint Valencia / ISBA World meeting in 2006. The ISBA programme is being developed under the lead of Kerrie Mengersen, the Chair of the Programme Council. It has been decided that the ISBA sessions will be held in the afternoons of the conference, and will consist of a single stream of contributed talks, while the morning sessions are organised by the Valencia programme committee and consist of invited plenary talks, followed by ample time for discussion. More details on the meeting are given in this Bulletin in page 8 and I take this opportunity to thank Kerrie and her colleagues on the Programme Council for their important contribution to the activities of ISBA.

An important award will be made at ISBA 2006, the Mitchell prize. This prize recognises an outstanding paper that describes how a Bayesian analysis has solved an important applied problem. The 2006 Prize committee members are Tony Oagan (Chair), Dave Higdon and Marina Vanucci. Details and the call for entries can be found in this issue of the bulletin. This award has been created and maintained through the active solidarity of many Bayesian colleagues in ISBA, from the Mitchell Prize Founderscommittee, and by the ASA section on Bayesian Statistical Science, and we are all grateful for their commitment to this endeavour. I thus conclude my message by encouraging our community to actively seek nominations to this prestigious award. For people in the northern hemisphere: Have a good summer!

A MESSAGE FROM THE EDITOR

by J. Andrés Christen
jac@cimat.mx

Again I wish to remind you to please feel free to participate in the Bulletin, by sending me articles or suggestions for columns. Also please suggest topics to discuss or people to invite to write columns, either to the corresponding AE or to me directly. I hope you like reading this issue of the ISBA Bulletin!
Statistical Models Reconstruct Ancient Climates

by John Haslett
John.Haslett@tcd.ie

Climate change is widely considered to be one of the most severe forms of the many environmental changes taking place globally. The development of sophisticated climate models calls for close collaboration between scientists from various fields including palaeo-environmentalists, ecologists, atmospheric scientists, oceanographers, and climate modellers. Researchers in the Statistics Department of Trinity College Dublin, led by Professor John Haslett, are collaborating with botanists in Durham University in the UK, led by Professor Brian Huntley, and with Professor Alan Gelfand of Duke University (the ISBA President-Elect) on Bayesian statistical methods in the reconstruction of past climates from fossil pollen found in lake sediment.

The team’s previous work was focused on the palaeo-climate at one site in Ireland, Glendalough. Current much more ambitious work concerns the climate of Europe during the Holocene. General information about the science may be found at the HOLIVAR (http://www.geog.ucl.ac.uk/ercr/holivar/) and PAGES (http://www.pages.unibe.ch/) websites. One specific aspect of such work is that better knowledge of the palaeo-climate will provide a better basis for evaluating on-going research into climate change. This is the focus of the Paleoclimate Modelling Intercomparison Project (PMIP); see http://www-pcmdi.llnl.gov/pmp/

The essential idea in pollen based palaeo-climate reconstruction is that climate drives changes ecology. Since fossil pollen grains in lake sediment can provide quantitative information on past ecologies, information is thus indirectly available on past climates. In Ireland, the end of the Ice Age (circa 11,000 years ago) was extremely rapid, and involved an arctic tundra landscape suddenly warming - perhaps over a decade. The pollen records show rapid colonization by Betula (birch) and Juniperus (juniper) followed over the succeeding millennium by Corylus (hazel), Pinus (pine), Ulmus (elm) and Quercus (oak). Knowledge of their favoured ecologies from modern data leads to information on the past development of the climate. The basic data are pollen assemblages - counts of the numbers of pollen grains for several (typically greater than 30) different taxa. The identification and counting of these pollen grains is difficult and error prone; see Figure 1 for examples of pollen grains that have not been degraded either by the passage of several millennia nor by the laboratory processes necessary to recover pollen from the silt. At Glendalough, a 15m core of sediment yields 150 samples (at regular depths but irregular times). There are several hundred such cores across Europe.

The Bayesian formulation for this problem involves several aspects. These include: the uncertainty in dating the sample - radio-carbon dating is not as simple as is generally thought; the probability distribution of multivariate counts - we consider mixtures of multinomials; the way this distribution responds to climate - we use multivariate non-parametric smoothing; the temporal variation in climate, which is mostly smooth in time (at a resolution of several decades), but is subject to occasional changes - we use a random walk with long-tailed increments.

MCMC may be thought of as permitting the generation, by random sampling, of past climates that are consistent with the pollen record. We regard frequently generated climates as those most probable, given the data. Figure 2 shows, for each of the 150 sections of a sampled core from Glendalough each corresponding to a time slice from the past, a summary of 1000 reconstructions of ‘degree days above 5 degrees’, measure of the length of the growing season, at Glendalough. Thus for climates since the ice-age, GDD5 values of approximately 1500 seem most probable given the data. However, previous values around 500 are more likely.

The main advantage of this methodology over others in the literature is that it provides meaningful statements on the uncertainty associated with such reconstructions. It is this feature that permits the joint use of the multiplicity of records that are available. At Glendalough there are 150 samples, and climate is reconstructed en bloc as coherent (joint) temporal histories. The Holocene project aspires to provide realisations of past climate as joint spatio-temporal reconstructions. Pollen is just one of several climate proxies: dendrochronology (tree-rings) is another well known example. The approach extends to the simultaneous joint use of the many different types of information about the palaeo-climate. The disadvantage is that the work is computationally challenging in the extreme, involving implementation on parallel processing clusters. Typical Markov chain Monte Carlo runs take many days and sometimes weeks even on simple versions of the problem. Papers and links may be found at http://www.tcd.ie/
Statistics/JHpersonal/research.htm

Figure 1: Pollen Grains: *Quercus* (Oak) - left, *Betula* (Elm) - right

Figure 2: Climate Reconstruction at Glendalough - Growing Days Above 5 Degrees

**ISBA Bulletin, 12**(2), June 2005

**ANNOTATED BIBLIOGRAPHY**

**BAYESIAN METHODS FOR WAVELET-BASED MODELING**

by Claudia Angelini and Marina Vannucci

c.angelini@iac.cnr.it and
mvannucci@stat.tamu.edu

Wavelets are families of functions that can accurately describe other functions in a parsimonious way. Because of their time-frequency properties, wavelets have become a powerful tool for dimension reduction and extraction of important features of curves. Wavelets are defined as translations and dilation of a basis function $\psi$, called wavelet mother,

$$\psi_{j,k}(x) = 2^{j/2} \psi(2^j x - k).$$  \hspace{1cm} (1)

Given a vector of observations of a function at equispaced points, fast wavelet transforms allow to calculate empirical wavelet coefficients that describe feature of the data at different locations and scales. This bibliography is restricted to Bayesian contributions to wavelet-based statistical modeling and, due to space limitation, it is not exhaustive.

**Wavelet Shrinkage**

Pioneer work on classical wavelet shrinkage was done by Donoho and Johnstone in early 90’s. This technique allows the recovery of a signal from noisy data by shrinking empirical wavelet coefficients according to some optimal criteria.

1. Vidakovic, B. (1998),“Non-linear wavelet shrinkage with Bayes rules and Bayes factors”, *J. American Statistical Association*, 93, 173–179. This is the first contribution to the development of Bayesian approaches to wavelet shrinkage. Prior models are imposed on the wavelet coefficients and Bayes rules are constructed that achieve non-linear thresholding via Bayesian hypothesis testing. The significance of each wavelet coefficient is independently tested by imposing a prior that assigns non zero probability to the null
hypothesis.


5. Clyde, M. & George, E.I. (2000), “Flexible empirical Bayes estimation for wavelets”, *J. Royal Statistical Society, Series B*, 62, 681–698. Empirical Bayes methods are proposed to aid prior specifications. These are developed for standard normal error models as well as heavier tailed error models, such as Student-t.

6. Vidakovic, B. & Ruggeri, F. (2001), “BAMS method: theory and simulations”, *Sankhyā, Series B*, 63, 234–249. The prior on each wavelet coefficient is chosen as a mixture of a point mass at zero and a double exponential, conditionally on the noise variance. The prior on the noise variance is chosen as exponential. This results in a Bayes rule that achieves level-dependent shrinkage.


**Relaxing Assumptions**

Extensive work has been done on extensions of wavelet shrinkage techniques. Efforts have been in relaxing particular model assumptions and in improving the prior models.

5. Clyde, M. & George, E.I. (2000), “Flexible empirical Bayes estimation for wavelets”, *J. Royal Statistical Society, Series B*, 62, 681–698. Empirical Bayes methods are proposed to aid prior specifications. These are developed for standard normal error models as well as heavier tailed error models, such as Student-t.

6. Vidakovic, B. & Ruggeri, F. (2001), “BAMS method: theory and simulations”, *Sankhyā, Series B*, 63, 234–249. The prior on each wavelet coefficient is chosen as a mixture of a point mass at zero and a double exponential, conditionally on the noise variance. The prior on the noise variance is chosen as exponential. This results in a Bayes rule that achieves level-dependent shrinkage.


### Functional Data

The following references concern the use of wavelets in the modeling of multiple curves.


### Other Statistical Modeling

Here we list wavelet-based approaches on a number of different statistical modeling contexts.


Asymptotical optimality of the estimator is proven.


**Image Analysis**


**Books and Review Papers**

Reviews of Bayesian modeling in the wavelet domain are addressed in:


**Software and Web Links**


---

**The 2006 Mitchell Prize**

The Mitchell Prize committee invites nominations for the 2006 Mitchell Prize. The Prize is currently awarded every other year in recognition of an outstanding paper that describes how a Bayesian analysis has solved an important applied problem. The Prize is jointly sponsored by the ASA Section on Bayesian Statistical Science (SBSS), the International Society for Bayesian Analysis (ISBA), and the Mitchell Prize Founders’ Committee, and consists for 2006 of an award of $1000 and a commemorative plaque. The 2006 Prize selection committee members are Tony O’Hagan (chair), Dave Higdon and Marina Vannucci. This information is reproduced from [http://www.bayesian.org/awards/mitchell.html](http://www.bayesian.org/awards/mitchell.html) where more details may be found.
CALL FOR DISSERTATION ABSTRACTS

by Robert B. Gramacy
rbgramacy@ams.ucsc.edu

Have you recently completed your Ph.D? Send your dissertation abstract to the email address above and have it published in this bulletin. This is one of the main features of the Student Corner section, and an important service to the community. However, this service depends on the active participation of our student members. Faculty, please encourage your students to participate. As fellow Ph.D candidates, or young researchers and students, we all benefit from exposure to the work of our peers. Potential employers and future colleagues can get a glimpse into the interests of young researches, and possibly even spark collaborations. I am sure that we all know someone who has recently graduated or will be graduating soon. I look forward to hearing from you before the next edition of this bulletin. Please feel free to provide a link to the full thesis, or a link to a technical report, which can be published along with the abstract.

NEWS FROM THE WORLD

by Alexandra M. Schmidt
alex@im.ufrj.br

I would like to encourage those who are organizing any event around the World, to get in touch with me to announce it here.

Events

Bayesian Hierarchical Models in Biostatistics, University of New South Wales, Sydney, Australia. 18 - 19 July 2005.

The School of Mathematics, UNSW, proudly presents a two day workshop on Bayesian Hierarchical Models in Biostatistics to be held at UNSW on 18 - 19 July 2005. It is a satellite course to the AMSI sponsored Recent Advances in Biostatistics, Bioinformatics and Markov chain Monte Carlo.

The course instructors will be: Prof. Sylvia Richardson (Imperial College, London, UK) Prof. Peter Green (Bristol University, UK).

This course will be of interest to researchers in statistics and biostatistics or those involved in quantitative applications in epidemiology, medicine, biological sciences and environmental science, plus individuals with a general interest in understanding and applying advanced quantitative Bayesian methods. There is a sizable practical component to this course with time for hands-on data analysis. The course assumes a good grasp of basic statistics, including linear and generalized linear regression analysis. For further details please visit http://www.maths.unsw.edu.au/~scott/symposium/workshop-pjgsr.html.

Seminar on Bayesian Inference in Econometrics and Statistics (SBIES), Washington University in Saint Louis, St. Louis, MO, USA. August 1-2, 2005.

The 2005 edition of the Seminar on Bayesian Inference in Econometrics and Statistics (SBIES) will be held at Washington University in Saint Louis on August 1 - 2, 2005.

The idea is to have a focused meeting concentrated on a few topics (say model choice, computation, and financial econometrics, but not necessarily restricted to these topics) and if possible limit the attendance to about 65 people. To ensure a place in the meeting it is important, therefore, to register as soon as possible. To facilitate participation in the meeting, some limited funding support to cover expenses related to travel and accommodations is available. If such support is necessary, please request it when you register. For further details please visit the conference web page http://www.olin.wustl.edu/faculty/chib/sbies.

Conference on Bayesian Applications and Methods in Marketing


The conference and tutorial will bring together leading practitioners and scholars in marketing that use Bayesian statistical methods. The intent of the meeting is fourfold:

1. To provide training to students and practitioners on both basic and new Bayesian techniques.
2. To discuss current problems faced by practitioners and data are available for solving these problems.
3. To discuss new marketing methods and models.
4. To expose researchers in marketing to new advances in Bayesian methods.

More information is available at

The Eighth Workshop on Case Studies of Bayesian Statistics will take place on September 16th and 17th 2005 at Carnegie Mellon University, Pittsburgh, PA. The Workshop will feature in-depth presentations and discussions of substantial applications of Bayesian statistics to problems in science and technology, poster presentations of contributed papers on applied Bayesian work and, new this year, contributed presentations by young researchers. In conjunction with the workshop, the Department of Statistics’ Eighth Morris H DeGroot memorial lecture will be delivered by Donald Rubin.

Selected case studies for the eighth workshop include “Does the Effect of Micronutrient Supplementation on Neonatal Survival Vary with Respect to the Percentiles of the Birth Weight Distribution?” by Francesca Dominici, Johns Hopkins University, and “An Assessment of Climate Change in the Ocean” by Michael Levine, Duke University. In addition, there will be a panel discussion on “Subjectivism and Objectivism: Two Views of Bayesian Analysis” led by Jim Berger and Michael Goldstein and moderated by Susie Bayarri. There will also be a short course on proteomics.

Contributed paper abstracts for posters will be due September 1, 2005.

The organizing committee of the Eighth Workshop includes Emery Brown, Alicia Carriquiry, Elena Erosheva, Constantine Gatsonis, Rob Kass, Herbie Lee, and Isa Verdinelli.

Please submit abstracts via the webpage [http://www.stat.cmu.edu/bayesworkshop](http://www.stat.cmu.edu/bayesworkshop) which contains additional information, including abstracts of previous, successful case studies.

If you have questions, please contact Rob Kass at kass@stat.cmu.edu, or any of the other organizers.


This is the first announcement of the Eighth Valencia Meeting, which is co-sponsored by the University of Valencia and the International Society for Bayesian Analysis. The 8th Valencia International Meeting on Bayesian Statistics and the 2006 World Meeting of the International Society for Bayesian Analysis will be jointly held in Benidorm (Alicante, Spain) from Friday June 2nd to Tuesday June 6th, both inclusive.

Programme Committee:

Susie Bayarri (Universitat de València, Spain)
James O. Berger (Duke University, USA)
José M. Bernardo (Universitat de València, Spain)
A. Philip Dawid (University College London, UK)
David Heckerman (Microsoft Research, USA)
Adrian F. M. Smith (Queen Mary, University of London, UK)
Mike West (Duke University, USA)
ISBA Programme Committee:

Kerrie Mengersen (QUT, Australia)
Peter Müller (MD Anderson Centre, USA)
Jose M. Bernardo (Universitat de València, Spain)
Local Organizer: José M. Bernardo (Universitat de València, Spain).

Venue: Delegates are expected to arrive on the evening of Thursday June 1st (the opening lecture will be early in the morning of June 2nd) and depart on the morning of Wednesday, June 7th (the gala dinner will be on the evening of June 6th). As in previous occasions, this will be a residential conference in a coastal resort. On this occasion the venue is Gran Hotel Bali, a four star hotel with an appropriate purpose built large auditorium, built in the south end of Benidorm (50 km north from Alicante and 140 km south from Valencia). The closest airport is Alicante (ALC), well connected to Madrid, Barcelona and many European cities, by both conventional and low-cost airlines. Given the timing of the conference early flight bookings are strongly recommended.

Tutorials: The Conference will be preceded by a one-day set of tutorials, intended to provide a short review of the main ideas in Bayesian Statistics. The tutorials will be delivered by members of the programme committee and will take place through Thursday June 1st. Those planning to attend the tutorials should arrive to the conference venue on the evening Wednesday, May 31st.

Scientific Programme: The scientific programme will include (i) a set of 20 plenary thirty minute talks, followed by a discussion initiated by an invited discussant, which is being organized by the Valencia meeting scientific committee and will take place in the mornings, (ii) a set of selected plenary contributed talks organised by ISBA will take place in the afternoons, and (iii) a set of plenary poster sessions which will take place in the evenings. The language of the conference will be English.

Proceedings: Authors of both invited and contributed papers will be asked to submit their final versions by May 1st, 2006 in a purpose built LaTeX style which will be posted at the conference website. These proceedings will be printed in pdf format in a CD-ROM, which will be dis-
tributed at the conference. Post-conference publication plans will later be announced. All contributed papers selected for the published proceedings will automatically be considered for the the Lindley Prize, awarded for innovative research in Bayesian statistics: see http://www.bayesian.org/awards/LindleyPrize.html. Registration: The registration fee (which will include the farewell dinner) will be 225/100 Eur (about 290/130 US$) for delegates or accompanying persons. The accommodation fee for the full period, (6 nights) with breakfast and dinner (including beer or wine), but not lunch, will be 650/450 Eur (about 840/580 US$) on single/double occupancy basis. The cost of the use of the auditorium and that of the required electronic and internet facilities has been distributed in fees quoted above. Registration forms will eventually be posted at the conference website: http://www.uv.es/valenciameeting. Grants: The organizing committee is submitting grant proposals for travel support to junior researchers and colleagues from developing countries. Applications forms for financial support will be posted at the conference website.