

VÉRONIQUE DELOUILLE

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Nationality: Belgian
Date of Birth: 3 September 1974

Research Interests

Solar image processing (segmentation, multiscale and multifractal analysis, super-resolution algorithms), compression, denoising, functional data analysis.

Education

- | | |
|--------------|---|
| 2002 | Ph.D. in Sciences (orientation: Statistics), Université catholique de Louvain (UCL) |
| Thesis | <i>Nonparametric Stochastic Regression using Design-adapted Wavelets</i> |
| Grade | The Greatest Distinction with Congratulations of the Jury |
| 1999 | D.E.A. in Statistics, UCL, Belgium |
| Dissertation | <i>Nonparametric Regression Estimation using Design-adapted Wavelets</i> |
| 1998 | M.Sc. in Statistics, University of Kent at Canterbury, United Kingdom |
| Dissertation | <i>Bayesian Variable Selection with Related Predictors using the Gibbs Sampler</i> |
| 1997 | B.Sc. in Applied Mathematics (engineer degree), UCL, Belgium |
| Dissertation | <i>Plans d'Expérience Optimaux pour l'Estimation de Modèles Non Linéaires.</i> |

Professional experience

Research

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|---------------|---|
| 2004-present | Assistant in the Solar Physics Department, Royal Observatory of Belgium |
| May-June 2005 | Invited teacher, Institut supérieur d'Informatique, de Modélisation et de leurs Applications, Université de Clermont-Ferrand II, France |
| 2003-2004 | Post-doctoral research associate in the Electrical and Computer Engineering Department, Rice University, USA |
| 1999-2003 | Assistant for the National Fund of Scientific Research (FNRS), Belgium |

Supervising activities

- From October 2007 Co-Supervisor for a Phd thesis on “Statistical Modeling and Prediction of Solar Eruptions,” in collaboration with the Université catholique de Louvain, Belgium
- April-Sept 2006 Supervisor for a 6-month training (2nd year engineer) on “Implementation of a super-resolution algorithm with applications to sub-pixel analysis of solar images and magnetic loop extraction” in collaboration with the Université de Clermont-Ferrand, France
- March-Sept 2004 Co-supervisor for an MSc thesis on “Wavelet Analysis in solar physics,” Department of Physics, UCL, Belgium

Teaching activities

- March 2005 “Multiscale statistical approach with applications in astronomy and solar physics,” Short Course, doctoral school, Institut de Statistique, UCL, Belgium
- 2003-2004 Co-instructor for “Advanced Digital Signal Processing: Graphical Models and Learning Algorithms,” post-graduate level, Rice University, USA
- 1999-2003 Teaching assistant for “Théorie de la mesure et probabilité,” 3rd year study level, UCL, Belgium

Journal papers

Solar Physics

- J12* V. Delouille, P. Chainais, J.-F. Hochedez (2008) “Spatial and Temporal Noise in Solar EUV Observations,” *Solar Physics*, In press.
- J11* V. Barra, V. Delouille, J.-F. Hochedez (2007) “Segmentation of Extreme Ultraviolet Solar Images via Multichannel Fuzzy Clustering,” *Advances in Space Research*, In press.
- J10* P. Fryzlewicz, V. Delouille, G.P. Nason (2007) “GOES-8 X-ray sensor variance stabilization using the multiscale data-driven Haar-Fisz transform,” *Journal of the Royal Statistical Society, Series C*, **56**, pages 99–116.
- J9* J.-F. Hochedez, W. Schmutz, Y. Stockman, U. Schühle, A. BenMoussa, S. Koller, K. Haenen, D. Berghmans, J.-M. Defise, J.-P. Halain, A. Theissen, V. Delouille, V. Slemzin, D. Gillotay, D. Fussen, M. Dominique, F. Vanhellemont, D. McMullin, M. Kretzschmar, A. Mitrofanov, B. Nicula, L. Wauters, H. Roth, E. Rozanov, I. Rüedi, C. Wehrli, A. Soltani, H. Amano, R. Van der Linden, A. Zhukov, F. Clette, S. Koizumi, V. Mortet, Z. Remes, R. Petersen, M. Nesládek, M. D’Olieslaeger, J. Roggen and P. Rochus (2006) “LYRA, a solar UV radiometer on Proba2”, *Advances in Space Research*, **37**(2), pages 303-312.
- J8* A. BenMoussa, A. Theissen, F. Scholze, J.-F. Hochedez, U. Schühle, W. Schmutz, K. Haenen, Y. Stockman, A. Soltani, D. McMullin, R.E. Vest, U. Kroth, C. Laubis, M. Richter, V. Mortet, S. Gissot, V. Delouille, M. Dominique, S. Koller, Z. Remes, R. Petersen, M. D’Olieslaeger, J.-M. Defise (2006) “Performance of diamond detectors for VUV applications,” *Nuclear Instruments and Methods A* **568**, pages 398-405.

- J7* **V. Delouille**, J. de Patoul, J.-F. Hochedez, L. Jacques, J.-P. Antoine (2005) “Wavelet spectrum analysis of EIT/SoHO images,” *Solar Physics*, **228**(1), pages 303-323.

Sensor Networks

- J6* **V. Delouille**, R. Neelamani, R. G. Baraniuk (2006) “Robust distributed estimation using the embedded subgraphs algorithm,” *IEEE Transactions on Signal Processing*, **54**(8), pages 2998- 3010
- J5* **V. Delouille**, R. Neelamani, R. Baraniuk “Robust distributed estimation in sensor networks using the embedded polygons algorithm,” in *Third International Symposium on Information Processing in Sensor Networks, 2004. IPSN 2004*, pages 405–413

Wavelet Methods

- J4* **V. Delouille**, M. Jansen, R. von Sachs (2006) “Second generation wavelet denoising methods for irregularly spaced data in two dimensions,” *Signal Processing*, **86**(7), pages 1435 - 1450.
- J3* **V. Delouille**, R. von Sachs (2005) “Estimation of nonlinear autoregressive models using design-adapted wavelets,” *Annals of the Institute of Mathematical Statistics*, **57**(2), pages 235–253
- J2* **V. Delouille**, J. Simoens, R. von Sachs (2004) “Smooth design-adapted wavelets for nonparametric stochastic regression,” *Journal of the American Statistical Association*, **99**, pages 643–658
- J1* **V. Delouille**, J. Franke, R. von Sachs (2001) “Nonparametric stochastic regression with design-adapted wavelets,” *Special issue of Sankhya on Wavelet Methods in Statistics, Series A (Theory)*, **63**(3), pages 328–366

Proceedings

Solar Physics

- P11* P. Chainais, **V. Delouille**, J.-F. Hochedez (2007) “Modeling images of the Quiet Sun in the extreme ultra-violet,” *SPIE meeting, Wavelets XII* (San Diego)
- P10* V. Barra, **V. Delouille**, J.-F. Hochedez (2007) “Segmentation of Extreme Ultraviolet Solar Images using a Multispectral Data Fusion Process,” *Proceedings of the IEEE Conference on Fuzzy Systems*, (London), pages 211–216.
- P9* P. Chainais, **V. Delouille**, J.-F. Hochedez (2007) “Modélisation des images de Soleil calme dans l’extrême ultra-violet,” *Proceedings GRETSI*, (Troyes), 2007.
- P8* V. Barra, **V. Delouille**, J.-F. Hochedez (2007) “Segmentation of Extreme Ultraviolet Solar Images using a Multispectral Data Fusion Process,” *Proceedings of the IEEE Conference on Fuzzy Systems*, (London), pages 211–216.
- P7* V. Barra, **V. Delouille**, J.-F. Hochedez, P. Chainais (2005) “Segmentation of EIT Images Using Fuzzy Clustering: a Preliminary Study,” *Proceedings of the 11th European Solar Physics Meeting ”The Dynamic Sun: Challenges for Theory and*

Observations” (ESA SP-600), Leuven, Belgium. Editors: D. Danesy, S. Poedts, A. De Groof and J. Andries. Published on CDROM., p.77.1

P6 A.C. Katsiyannis, D. Berghmans, J.-F. Hochedez, B. Nicula, G. Lawrence, J.-M. Defise, A. Ben-Moussa, **V. Delouille**, M. Dominique, J.-H. Lecat, W. Schmutz, A. Theissen, V. Slemzin (2005) “SWAP: An EUV imager for solar monitoring on board of PROBA2,” *SPIE*, **5901**, 236.

P5 P. Fryzlewicz, **V. Delouille** (2005) “A data-driven Haar-Fisz transform for multiscale variance stabilization,” *IEEE/SP 13th Workshop on Statistical Signal Processing*, (Bordeaux), pages 539–544.

Sensor Networks

P4 R. Wagner, **V. Delouille**, R. Baraniuk (2006) “Distributed Wavelet De-Noising for Sensor Networks,” invited paper, *IEEE Conference on Decision and Control* (San Diego)

P3 R. Wagner, **V. Delouille**, H. Choi, R. Baraniuk (2005) “Distributed wavelet transform for irregular sensor network grids,” *IEEE Statistical Signal Processing Workshop* (Bordeaux)

P2 **V. Delouille**, R. Neelamani, V. Chandrasekaran, R. G. Baraniuk (2003) “The embedded triangles algorithm for distributed estimation in sensor networks,” in *IEEE Statistical Signal Processing Workshop*, (St. Louis), pages 357–360

Wavelet Methods

P1 **V. Delouille**, J. Simoens, R. von Sachs (2003) “Design-adapted wavelet estimator for two-dimensional tensor product irregular designs,” in *SPIE meeting, Wavelet Applications in Signal and Image Processing*, (San Diego), volume 5207, pages 880–891

Submitted Work

- **V. Delouille**, P. Chainais, J.-F. Hochedez (2007) “Quantifying and containing the curse of high resolution coronal imaging,” Submitted to *Annales Geophysicae*

Scientific presentations

Conferences

2007 *SOHO 20 - Transient Events on the Sun and in the Heliosphere*, Ghent, Belgium, “Quantifying and containing the curse on high resolution coronal imaging,” *poster*

2007 *5th SECCHI Consortium Meeting*, Paris, France, “B2X: Flare recognition in Solar EUV Images,” *contributed talk*

2006 *European Space Weather week 3*, Brussels, Belgium “Automatic flare detection and tracking of active regions in EUV images,” *contributed talk*

2006 *FNRS-ROB Contact Group ‘Wavelets and applications’*, Brussels, Belgium “Enhanced resolution of EUV images in solar physics,” **invited talk**

2006 *Royal Statistical Society meeting*, Belfast, UK

- “Distributed wavelet denoising for sensor networks,” **invited talk**
- 2006 *Solar Image Processing workshop III*, Dublin, Ireland
 “Enhanced resolution of EUV images,” *contributed talk*
- 2006 *SOHO-17: “10 Years of SOHO and Beyond,”* Taormina, Italy
 “Segmentation of EIT Images using fuzzy clustering,” *poster*
- 2006 *Fifth IAP workshop “Flexible Statistical Analysis Adapted to Complex Data Structures”*, Louvain-la-Neuve, Belgium, “Statistical signal processing of solar corona images,” *poster*
- 2005 *FNRS Contact Group “Wavelets and Applications”*, Brussels, Belgium
 “Multifractal analysis of extreme ultraviolet solar images,” *contributed talk*
- 2005 *Belgian Statistical Society meeting*, Corsendonk, Belgium
 “A data-driven Haar-Fisz transform for multiscale variance stabilization,” *contributed talk*
- 2005 *11th-Solar Physics Meeting*, Leuven, Belgium
 “Segmentation of EIT Images using fuzzy clustering: a preliminary study,” *poster*
- 2005 *IEEE Statistical Signal Processing Workshop*, Bordeaux, France,
 “A data-driven Haar-Fisz transform for multiscale variance stabilization,” *poster*
- 2005 *EGU Meeting*, Vienna, Austria
 “LYRA: The Large Yield Radiometer onboard the ESA PROBA2,” *poster*
- 2004 *Solar Image Processing Workshop II*, Annapolis, US,
 “Wavelet spectrum analysis of EIT-SoHO observations,” *contributed talk*
- 2004 *Wavelet and Multifractal Analysis, summer school*, Cargèse, France,
 “Continuous wavelet analysis of the solar activity observed by SoHO/EIT,” *poster*
- 2002 *Workshop: Statistical Modeling and Inference for Complex Data structures*, Louvain-la-Neuve, Belgium, “Second generation wavelet transforms for irregularly spaced data in two dimensions,” *poster*
- 2002 *XXXIVèmes Journées de Statistique*, Brussels, Belgium,
 “Estimation de modèles autorégressifs non linéaires au moyen d’ondelettes adaptées au plan d’expérience,” **invited talk**
- 2001 *Meeting of the FNRS Contact Group “Wavelets and Applications,”* Brussels, Belgium,
 “Nonparametric stochastic regression with design-adapted wavelets,” *contributed*
- 2001 *Ninth Belgian Statistical Society meeting*, Ostende, Belgium,
 “Nonparametric stochastic regression with design-adapted wavelets,” *contributed talk*
- 2001 *Times Series Workshop*, Luminy, France,
 “Nonlinear autoregression using design-adapted wavelets,” **invited talk**

Invited talks

- 2006 Institut de Statistique, UCL, Belgium, “Multifractal analysis of extreme ultraviolet images and motion detection using optical flow”
- 2005 Lilly Development Center, Mont-St-Guibert, Belgium, “Wavelet methods for signal analysis with applications in astronomy”
- 2004 Department of Electrical and Computer Engineering, Rice University, US, “Wavelet spectrum analysis of EIT-SoHO observations”
- 2003 Department of Statistics, Texas A&M, US, “Second generation wavelet estimation for irregularly spaced data in one and two dimensions”
- 2003 Department of Statistics, Rice University, US, “Second generation wavelet estimation for irregularly spaced data in one and two dimensions”
- 2002 Fachbereich Mathematik, Universität Kaiserslautern, Germany, “Second-generation wavelet transforms for irregularly spaced data in one and two dimensions ”
- 2001 Department of Electrical and Computer Engineering, Rice University, US,

- “Nonparametric stochastic regression with design-adapted wavelets”
- 2001 Statistics Department, The Wharton School, University of Pennsylvania, US
- “Nonparametric stochastic regression with design-adapted wavelets”
- 2000 German National Research Center for Information Technology, GMD First, Intelligence Data Analysis group, Germany, “Introduction to wavelets”
- 2000 Weierstrass Institute, Germany, “Regression with design-adapted wavelets using the lifting scheme to improve unbalanced Haar wavelets”

Grants

- 2007 Tournesol Grant (scientific cooperation between France and Belgium)
- Project on ‘Couronne Solaire, Segmentation et Modélisation d’Images par des Cascades’
- 2003-2004 Postdoctoral research grant from Rice University, US.
- 1999-2003 Ph.D. Scholarship from the National Fund of Scientific Research (FNRS), Belgium
- 1998-1999 Ph.D. Scholarship from Walloon Government, Belgium
- 1997-1998 M.Sc. Scholarship from the Engineering and Physical Sciences Research Council, United Kingdom

Miscellaneous

- Collaborateur scientifique, Institut de Statistique, UCL, Belgique.
- Fellow of the Royal Statistical Society (UK)
- Member of the Belgian Statistical Society
- Reviewer for *Solar Physics Journal*, *Annales Geophysicae*, *Journal of Royal Statistical Society*, *Biometrika*, *Journal of Multivariate Analysis*, *Journal of Computational and Graphical Statistics*, *IEEE Transactions on Signal Processing*, *ACM Transactions on Sensors Networks*, *Signal Processing*, *Pattern Recognition Letters*, *Quantitative Finance*