Matthieu Marbac

Assistant Professor

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Presentation

I was appointed Assistant Professor in Statistics at ENSAI/CREST (Bruz, France) in September 2017, after holding postdoctoral fellows at Institut national de la santé et de la recherche médicale (Villejuif, France) then at the University of McMaster (Hamilton, Ontario, Canada) then holding an engineer position at Institut national de recherche en sciences et technologies du numérique (Lille, France). I was awarded my PhD in October 2014 at the University of Lille and my Habilitation thesis in September 2022 at the University of Rennes 1.

I have been working on mathematical aspects in empirical likelihood, mathematical and methodological aspects in clustering and applications of these methods for biostatistics. My work has resulted in the publication/acceptance of 21 papers in international, peer-reviewed journals in fields of mathematical statistics (*The Annals of Statistics*), computational and methodological statistics (*Computational Statistics & Data Analysis*, *Journal of Computational and Graphical Statistics*, *Statistics and Computing*), applied statistics (*Journal of the Royal Statistical Society: Series C* and *The Annals of Applied Statistics*) and epidemiology (*The Annals of Epidemiology*). Results of my work have been presented in many international conferences (*Bernoulli-IMS One World Symposium*, *CMstatistics*, *CompStat*, *EcoSta*, *ICML-workshop*, *SDSS*) and have been implemented in 8 R packages available on *CRAN*. I have etablished international and national collaborations with different departments of statistics (*CREST*, *HEC Montreal*, *Inria*, *University of McMaster*, *Université de Lille*, *UPMC*) and epidemiology (*Institut Pasteur Paris*, *INSERM*).

I am an Associated Editor in *Computational Statistics & Data Analysis* (since April 2021), I belongs to the Scientific Program Committee of the international conference EcoSta 2022 and I have organized different invited sessions for international conferences (EcoSta 2021, Canadian Conference in Applied Statistics 2021, CMstatistics 2022). At a national level, I am a member of the scientific commitee of evaluation of the French Agence of Research for the topic “mathematics, numerical science, bioloy and health" (ANR-AAPG-2022 CES 45) and I gave lectures at the summer school *19èmes Journées d'Étude en Statistique* organized by the french statistical society (SFDS) that will be presented soon into three book chapters (Marbac (2022a); Marbac (2022b); Marbac (2022c)). I have supervised 8 MSc internships and I am supervizing 3 PhD students.

Research Interests

My developments in clustering focus on the study of *mixture models* for complex data (*i.e.,* categorical data (Marbac, Biernacki, and Vandewalle (2016) and Marbac, Biernacki, and Vandewalle (2015)), mixed-type data (Marbac, Biernacki, and Vandewalle (2017)), high-dimensional data (Marbac and Sedki (2017a) and its R package Marbac and Sedki (2016b), and Marbac and McNicholas (2016)).

We have developed two methods for selecting the variables in clustering, by considering parametric mixture models. The first method allows for selecting the model without estimating the model parameters (Marbac and Sedki (2017b)). The second method simultaneously performs the selection of the relevant variables and the parameter estimation (Marbac, Sedki, and Patin (2020)). Both of these methods are implemented in the R package (Marbac and Sedki (2018) and Marbac and Sedki (2020)) and have been extended to the case of multiple partitions (Marbac and Vandewalle (2019)). I also worked on model selection for nonparmetric mixture models. Thus, in Du Roy de Chaumaray and Marbac (2021a), we propose an approach for selecting the subset of relevant variables and the number of components in a semi-parametric mixture model. In addition, in El Kolei, Du Roy de Chaumaray, and Marbac (2022), we propose an approach based on integral operator for estimating the order of an Hidden Markov Model with nonparametric emission distributions.

Some of my developments previously described have been used in epidemiology (Dumas et al. (2021), Saldanha Gomes et al. (2020), Marbac et al. (2018)). Moreover, these collaborations raise new methodological problem such as the use of a clustering results in a predictive model. Such an approach is classical in epidemiology but produces biased results. Hence, in Marbac et al. (2022) and its companion R package (Marbac et al. (2021)), we circumvent this issue by simultanously estimating the clustering and the prediction models. Discussions with epidemiologists encouraged me to develop a visualization method for the clustering output (Biernacki, Marbac, and Vandewalle (2021) and the companion R package Biernacki, Marbac, and Vandewalle (2019)) and methods to cluster data with missingness having a non-ignorable mechanism (Biernacki et al. (2021) and Du Roy de Chaumaray and Marbac (2023) and the compagnion R package Du Roy de Chaumaray and Marbac (2021b)) I have been involved in different projects in *biostatistics* that have led me to extend some statistical methods for high-dimensional data (Marbac, Tubert-Bitter, and Sedki (2016) and the companion R package Marbac and Sedki (2016a)) or to develop new methodologies for clustering functional data (Cheam, Marbac, and McNicholas (2017), Du Roy de Chaumaray, Marbac, and Navarro (2020) and Cheam et al. (2023) and their companion R packages Cheam, Marbac, and McNicholas (2020) and Du Roy de Chaumaray, Marbac, and Navarro (2019)). Thus, I have worked on a method, based on mixture models of hidden Markov chains, allowing data collected by accelerometers to be analyzed without considering arbitrary thresholds (Du Roy de Chaumaray, Marbac, and Navarro (2020)). Moreover, I was involved in a project investigating the geographical disparities of the

COVID-19 deaths. This approach analyses the daily-reports of COVID-19 deaths using wavelet decomposition, semi-parametric regression and mixture models (Cheam et al. (2023)). Moreover, with colleagues from the department of medicine of the University of Lille, I am currently working on *spatial scan statistics*. We have proposed a method for considering functional covariates in scan statistics (Frévent et al. (2021)). Moreover, we are working on a method that allows for multiple cluster detection by avoiding the exhaustive search for clusters detection. Finally, we are conducting research to obtain an explicit form of the asymptotic distribution of the scan statistics. The works on scan statistics permit interactions with other statisticians but also two Professors of Medicine.

Finally, I was interested in *empirical likelihood*. Thus, in Du Roy de Chaumaray, Marbac, and Patilea (2021), we consider parameter inference for a semi-parametric regression model with weakly dependent data (α-mixing).

Keywords: Biostatistics; Clustering; Empirical likelihood; Mixture model; Model selection.

Academic Appointments

09/2017 - now **Assistant Professor**, *ENSAI (Bruz, France)*, Department of Statistics, CREST.
12/2016 - 08/2017 **Engineer**, *Inria (Lille, France)*.
09/2015 - 08/2016 **Postdoctoral Fellows**, *University of McMaster (Ontario, Canada)*.
09/2014 - 08/2015 **Postdoctoral Fellows**, *Inserm (Villejuif, France)*.
10/2011 - 09/2014 **Ph.D. in Statistics**, *Inria (Lille, France)*.

Teaching Duties

09/2017 - now **ENSAI**, *Department of Statistics*, $\simeq$ 100h/year, Data analysis, Parallel computing, Probability.
09/2016 - 08/2017 **University of Lille 1**, *Master ISN, Department of Mathematics*, 30h, Data analysis.
09/2015 - 08/2016 **University of McMaster**, *Department of Statistics*, 64h, Analysis, Introduction to Statistics.
09/2012 - 08/2014 **École Polytech'Lille**, *3rd year*, 64h/year, Data analysis, Probability, Statistics.
09/2012 - 08/2014 **École ISA of Lille**, *2nd year*, 64h, Analysis of Variance, Regression.

Student supervisions

- PhD students:
  - Antoine Bouvet (2022-.) Analyzing inertial swimming data for automatically monitoring athlete's activity during training. Jointly supervised with Salima El Kolei (CREST-Ensai) and Nicolas Bideau (M2S).
  - Camille Méneur (2021-.) Statistical modelling for detection and classification of heart defects in racehorses. Jointly supervised with Gilles Stupfler (Univ. of Angers).
  - Axel Potier (2020-.) Improving the forcasting by product grouping. Jointly supervised with C. Biernacki (Univ. of Lille) and V. Vandewalle (Univ. of Nice).
- MSc students:
  - Antoine Bouvet (2021) with S. El Kolei: Analysis of accelerometer data for monitoring swimmer training.
  - Florian Guillaume (2021) with M. Du Roy de Chaumary: Analysis of accelerometer data to investigate the links between physical activities and chronical diseases.
  - Lucile Sop Madjo (2020) with M. Sedki and P. Dargent: Investigating the link between physical activities and obsesity in EDEN cohorte.
  - Kafando Moussa (2020) with S. El Kolei: On spatial scan statistics.
  - Anais Fernandez (2020) with F. Navarro: Implementing a Python library for selecting the variables in model-based clustering.
  - Boubacar Traore (2020): model-based clustering with nonignorable missingness.
  - Coulot Remy (2018) with A. Saumard: non-model based clustering
  - Julien Gheysens (2017): inhomogenous Poisson process.

Editorial activities

Since 2021, I am Associate Editor of Computational Statistics & Data Analysis. I am Editor of the 5th Special Issue on ADVANCES IN MIXTURE MODELS of Computational Statistics & Data Analysis.

I have been reviewer for 16 journals of statistics: Advance in Data Analysis and Classification, Advances in Statistical Analysis, Canadian Journal of Statistics, Computational Statistics & Data Analysis, Econometrics and Statistics, Electronic Journal of Statistics, Journal of Applied Statistics, Journal of Classification, Journal of Statistical Computation and Simulation, Journal of Statistical Theory and Applications, Journal of Statistical Software, Neural Processing Letters, The Annals of Applied Statistics, Scientific Reports , Statistics and Computing, Statistics and Probability Letters.

Grants

I have received a grant of 10K€ from Rennes metropole (AIS-Rennes) for the project: *variable selection with semi-parametric mixture models*.

I am a member of the scientific commitee of evaluation of the French Agence of Research for the topic “mathematics, numerical science, bioloy and health" (ANR-AAPG-2022 CES 45).

Conference organization

- Member of the Scientific Program Committee of Journées de Statistiques de Rennes (JSTAR) 2023.
- Session "Clustering of noisy data" at CMstatistics 2022 (organizer + chair).
- Session "Scan statistics" at EcoSta 2022 (organizer + chair).
- Member of the Scientific Program Committee of EcoSta 2022.
- Member of the Scientific Program Committee of Journées de Statistiques de Rennes (JSTAR) 2022.
- Session "Semi-parametric methods in clustering applications" at the 6th Canadian Conference in Applied Statistics 2021 (organizer + chair).
- Session "Contributions in time series" at EcoSta 2021 (chair).
- Session "Modèles de mélange" at the 52ème journées de la Société Francaise de Statistiques (chair).
- Session "Contributions in computational statistics" at CMstatistics 2020 (chair).

Submitted to peer-reviewed journals

El Kolei, S., M. Du Roy de Chaumaray, and M. Marbac (2022). “Estimation of the Order of Non-Parametric Hidden Markov Models using the Singular Values of an Integral Operator.” URL: https://arxiv.org/abs/2210.03559.

Biernacki, C. et al. (2021). *Model-based Clustering with Missing Not At Random Data*. URL: https://arxiv.org/abs/2112.10425.

Du Roy de Chaumaray, M. and M. Marbac (2021a). “Full Model Estimation for Non-Parametric Multivariate Finite Mixture Models”. URL: https://arxiv.org/abs/2112.05684.

Book chapters

Marbac, M. (2022a). *Introduction à une étude statistique avec données manquantes, sous la direction de F. Bertrand, G. Saporta, C. Thomas-Agnan*.

Marbac, M. (2022b). *Méthodes basées sur la vraisemblance pour données manquantes ayant un mécanisme ignorable, sous la direction de F. Bertrand, G. Saporta, C. Thomas-Agnan*.

Marbac, M. (2022c). *Méthodes de pondération pour données manquantes, sous la direction de F. Bertrand, G. Saporta, C. Thomas-Agnan*.

Peer-reviewed journals (Statistics)

Cheam, A.M.S. et al. (2023). “Translation-invariant functional clustering on COVID-19 deaths adjusted on population risk factors”. *Journal of the Royal Statistical Society: Series C* (accepted). URL: https://arxiv.org/abs/2012.10629.

Du Roy de Chaumaray, M. and M. Marbac (2023). “Clustering Data with nonignorable Missingness using Semi-Parametric Mixture Models.” *Advances in Data Analysis and Classification* (accepted). URL: https://arxiv.org/abs/2009.07662.

Marbac, M. et al. (2022). “Simultaneous semi-parametric estimation of clustering and regression.” *Journal of Computational and Graphical Statistics* forthcoming, pp. 1–9. URL: https://doi.org/10.1080/10618600.2021.2000872.

Biernacki, C., M. Marbac, and V. Vandewalle (2021). “Gaussian Based Visualization of Gaussian and Non-Gaussian Based Clustering”. *Journal of Classification* 38, pp. 129–157. URL: https://link.springer.com/article/10.1007/s00357-020-09369-y.

Du Roy de Chaumaray, M., M. Marbac, and V. Patilea (2021). “Wilks’ theorem for semiparametric regressions with weakly dependent data”. *The Annals of Statistics* 49(6), pp. 3228 –3254. URL: https://doi.org/10.1214/21-AOS2081.

Frévent, C. et al. (2021). “Detecting spatial clusters on functional data: a parametric scan statistic approach”. *Spatial Statistics* 46, p. 100550. ISSN: 2211-6753. URL: https://www.sciencedirect.com/science/article/pii/S2211675321000609.

Du Roy de Chaumaray, M., M. Marbac, and F. Navarro (2020). "Mixture of hidden Markov models for accelerometer data". *The Annals of Applied Statistics* 14(4), pp. 1834–1855. URL: https://projecteuclid.org/euclid.aoas/1608346901.

Marbac, M., M. Sedki, and E. Patin (2020). "Variable selection for mixed data clustering: Application in human population genomics". *Journal of Classification*, pp. 1–19. URL: https://link.springer.com/article/10.1007%2Fs00357-018-9301-y.

Marbac, M. and V. Vandewalle (2019). "A tractable multi-partitions clustering". *Computational Statistics & Data Analysis* 132, pp. 167–179. URL: https://www.sciencedirect.com/science/article/abs/pii/S0167947318301592.

Marbac, M. and M. Sedki (2018). "VarSelLCM: an R/C++ package for variable selection in model-based clustering of mixed-data with missing values". *Bioinformatics* 35(7), pp. 1255–1257. URL: https://academic.oup.com/bioinformatics/article/35/7/1255/5091183?login=true.

Cheam, A.S.M., M. Marbac, and P.D. McNicholas (2017). "Model-based clustering for spatiotemporal data on air quality monitoring". *Environmetrics* 28(3), e2437. URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/env.2437.

Marbac, M., C. Biernacki, and V. Vandewalle (2017). "Model-based clustering of Gaussian copulas for mixed data". *Communications in Statistics-Theory and Methods* 46(23), pp. 11635–11656. URL: https://www.tandfonline.com/doi/abs/10.1080/03610926.2016.1277753.

Marbac, M. and M. Sedki (2017a). "A family of block-wise one-factor distributions for modeling high-dimensional binary data". *Computational Statistics & Data Analysis* 114, pp. 130–145. URL: https://www.sciencedirect.com/science/article/abs/pii/S0167947317300932.

Marbac, M. and M. Sedki (2017b). "Variable selection for model-based clustering using the integrated complete-data likelihood". *Statistics and Computing* 27(4), pp. 1049–1063. URL: https://link.springer.com/article/10.1007/s11222-016-9670-1.

Marbac, M., C. Biernacki, and V. Vandewalle (2016). "Latent class model with conditional dependency per modes to cluster categorical data". *Advances in Data Analysis and Classification* 10(2), pp. 183–207. URL: https://link.springer.com/article/10.1007/s11634-016-0250-1.

Marbac, M. and P.D. McNicholas (2016). "Dimension Reduction in Clustering". *Wiley StatsRef: Statistics Reference Online*, pp. 1–7. URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118445112.stat07846.

Marbac, M., P. Tubert-Bitter, and M. Sedki (2016). "Bayesian model selection in logistic regression for the detection of adverse drug reactions". *Biometrical Journal* 58(6), pp. 1376–1389. URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/bimj.201500098.

Marbac, M., C. Biernacki, and V. Vandewalle (2015). "Model-based clustering for conditionally correlated categorical data". *Journal of Classification* 32(2), pp. 145–175. URL: https://link.springer.com/article/10.1007/s00357-015-9180-4.

Peer-reviewed journals (Epidemiology)

Dumas, O. et al. (2021). "Household cleaning and poor asthma control among elderly women". *The Journal of Allergy and Clinical Immunology: In Practice*. URL: https://www.sciencedirect.com/science/article/abs/pii/S2213219821002026?via%3Dihub.

Saldanha Gomes, C. et al. (2020). "Clusters of diet, physical activity, television exposure and sleep habits and their association with adiposity in preschool children: the EDEN mother-child cohort." *International Journal of Behavioral Nutrition and Physical Activity* 17(1). URL: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-00927-6#citeas.

Marbac, M. et al. (2018). "Patterns of cleaning product exposures using a novel clustering approach for data with correlated variables". *The Annals of Epidemiology* 28(8), pp. 563–569. URL: https://www.sciencedirect.com/science/article/abs/pii/S104727971630504X.

R packages

Du Roy de Chaumaray, M. and M. Marbac (2021b). *MNARclust: Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models*. R package version 1.0.0. URL: https://CRAN.R-project.org/package=MNARclust.

Marbac, M. et al. (2021). *ClusPred: Simultaneous Semi-Parametric Estimation of Clustering and Regression*. R package version 1.0.0. URL: https://CRAN.R-project.org/package=ClusPred.

Cheam, A.M.S., M. Marbac, and P.D. McNicholas (2020). *SpaTimeClus: Model-Based Clustering of Spatio-Temporal Data*. R package version 1.0.1. URL: https://CRAN.R-project.org/package=SpaTimeClus.

Marbac, M and M. Sedki (2020). *VarSelLCM: Variable Selection for Model-Based Clustering of Mixed-Type Data Set with Missing Values*. R package version 2.1.3.1. URL: `https://cran.r-project.org/web/packages/VarSelLCM/index.html`.

Biernacki, C., M. Marbac, and V. Vandewalle (2019). *ClusVis: Gaussian-Based Visualization of Gaussian and Non-Gaussian Model-Based Clustering*. R package version 1.2.0. URL: `https://CRAN.R-project.org/package=ClusVis`.

Du Roy de Chaumaray, M., M. Marbac, and F. Navarro (2019). *MHMM: Mixture of hidden Markov models for accelerometer data*. R package version 1.0. URL: `https://cran.rstudio.com/web/packages/MHMM/index.html`.

Marbac, M and M. Sedki (2016a). *MHTrajectoryR: Bayesian Model Selection in Logistic Regression for the Detection of Adverse Drug Reactions*. R package version 1.0.1. URL: `https://CRAN.R-project.org/package=MHTrajectoryR`.

Marbac, M and M. Sedki (2016b). *MvBinary: Modelling Multivariate Binary Data with Blocks of Specific One-Factor Distribution*. R package version 1.1. URL: `https://CRAN.R-project.org/package=MvBinary`.

Oral presentations

- **International conferences**
  - CMstatistics, London, *Simultaneous semi-parametric estimation of clustering and regression* (2021). Invited.
  - Conference of the Classification and Data Analysis Group (CLADAG) of the Italian Statistical Society, Florence, *Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models* (2021). Invited.
  - Symposium on Data Science and Statistics (SDSS), virtual, *Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models* (2021). Peer-reviewed.
  - EcoSta, Hong-Kong (virtual), *Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models* (2021). Peer-reviewed.
  - Channel Network Conference, Paris (virtual), *Scan statistics for multiple spatial clusters to investigate geographical disparities of air pollution data* (2021). Peer-reviewed.
  - CMstatistics, London (virtual), *Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models* (2020). Invited.
  - Bernoulli-IMS One World Symposium 2020, virtual, *Wilks' theorem for semiparametric regressions with weakly dependent data* (2020). Peer-reviewed.
  - ICML ARTEMIS workshop, virtual, *Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models* (2020). Peer-reviewed.
  - Cronos, Limassol, *Variable selection for model-based clustering of mixed data* (2019). Invited.
  - CMstatistics, London, *Variable selection for model-based clustering of mixed data* (2017). Invited.
  - CMstatistics, London, *Model-based clustering of Gaussian copulas for mixed data* (2015). Invited.
  - MissData, Rennes, *Exact Criterion for Variable Selection in Clustering of Data with Missing Values* (2015). Peer-reviewed.
  - CompStat, Geneva, *Model-based clustering of Gaussian copulas for mixed data* (2014). Invited.
  - StatLearn, Bordeaux, *Clustericat: an R package to cluster categorical data* (2013). Peer-reviewed.
  - StatLearn, Lille, *Model-based clustering for conditionally correlated categorical data* (2012). Peer-reviewed. Best poster award.
- **National conferences**:
  - 52ème journées de la Société Francaise de Statistiques (SFdS), Nice, *Clustering Data with Non-Ignorable Missingness using Semi-Parametric Mixture Models* (2021). Peer-reviewed.
  - 51ème journées de la Société Francaise de Statistiques (SFdS), Nancy, *M-estimation inference for partially linear single-index models: an empirical likelihood approach* (2019). Peer-reviewed.
  - 7ème rencontres R, Rennes, *VarSelLCM: an R/C++ package for variable selection in model-based clustering of mixed-data with missing values* (2018).
  - 50ème journées de la Société Francaise de Statistiques (SFdS), Paris-Saclay, *Empirical likelihood for general conditional estimating equations* (2018). Peer-reviewed.
  - 49ème journées de la Société Francaise de Statistiques (SFdS), Avignon, *Sélection de variables pour le clustering de données catégorielles* (2017). Peer-reviewed.
  - 47ème journées de la Société Francaise de Statistiques (SFdS), Lille, *Variable selection for model-based clustering using the integrated complete-data likelihood* (2015). Peer-reviewed.
  - 46ème journées de la Société Francaise de Statistiques (SFdS), Rennes, *Classification de données mixtes par un mélange de copules Gaussiennes* (2014). Peer-reviewed.

- GDR MASCOT NUM, Institut Henri Poincaré Paris, *Model-based clustering of Gaussian copulas for mixed data*, invited speaker, (2014). Invited.
- 1ère journée YSP (Young Statisticians and Probabilists), Institut Henri Poincaré Paris, *Classification de données mixtes par un mélange de copules Gaussiennes* (2014). Invited.
- 5ème rencontres des jeunes Statisticien-ne-s, Aussois, *Modèle de mélange de copules Gaussiennes pour la classification de données hétérogènes* (2013).
- 45ème journées de la Société Francaise de Statistiques, Toulouse, *Modèle de classification de données qualitatives par modes de dépendance conditionellement corrélés* (2013). Peer-reviewed.
- 44ème journées de la Société Francaise de Statistiques, Bruxelles, *Modèle de mélange pour classifier des données qualitatives conditionnellement corrélées*, (2012). Peer-reviewed.

- **Seminars:**

- Séminaire de Statistiques, Rennes, *Choix de modèle pour modèles de mélange et chaînes de Markov cachées dans un cadre non-paramétrique*, (2022). Invited.
- Séminaire des Vendredis Quantis, Grenoble, *Les méthodes de correction de la non-réponse par imputation*, (2022). Invited.
- Séminaire de Statistiques, Grenoble, *Mixture of Hidden Markov Models for the Analysis of Accelerometer data*, (2019). Invited.
- Séminaire de Statistiques, CNAM, *Variable selection for mixed data clustering: a model-based approach*, (2019). Invited.
- BrownBag Ensai, Rennes, *Empirical likelihood for general conditional estimating equations*, (2018). Invited.
- Meetup Machine Learning, Rennes, *Contributions en classification non supervisée*, (2018). Invited.
- Séminaire de Statistiques, AgroParisTech, *Empirical likelihood for general conditional estimating equations*, (2018). Invited.
- Séminaire de Statistiques, Université d'Aix-Marseille, *Variable selection for mixed data clustering: a model-based approach*, (2017). Invited.
- Séminaire de Statistiques, Insa de Rennes, *Variable selection for mixed data clustering: a model-based approach*, (2017). Invited.
- Séminaire de Statistiques, Lyon 2, *Variable selection for mixed data clustering: a model-based approach*, (2017). Invited.
- Séminaire Modal, Lille, *Variable selection for mixed data clustering: a model-based approach*, (2017). Invited.
- Séminaire de Statistiques du laboratoire ERIC, Lyon 2, *Model-Based Clustering of Gaussian Copulas for Mixed data*, (2016). Invited.
- Statistics Seminar, McMaster, *Model-Based Clustering of Gaussian Copulas for Mixed data*, (2015). Invited.
- Séminaire de Statistiques, Angers, *Sélection de variables en classification non-supervisée sans estimation de paramètres*, (2015). Invited.
- Séminaire de Statistiques, Rennes 2, *Classification de données mixtes par un modèle de mélange de copules Gaussiennes*, (2015). Invited.
- Séminaire de Statistiques du CESP, Villejuif, *Sélection de variables par critère exact pour la classification non supervisée*, (2014). Invited.
- Séminaire Modal, Lille, *Modèle de mélange par intervalles pour la classification de données hétérogènes*, (2013).
- Séminaire Modal, Lille, *Modèle de mélange par blocs de dépendance intermédiaire pour la classification de données qualitatives*, (2012).