

# Théo Michelot

The Observatory, Buchanan Gardens ◊ St Andrews KY16 9LZ, UK

tm75@st-andrews.ac.uk

## EDUCATION

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- PhD in Statistics** 2016-2019  
University of Sheffield, UK  
*Thesis: Stochastic models of animal movement and habitat selection*
- MSc in Mathematical and Software Engineering** 2010-2015  
INSA de Rouen, France

## RESEARCH EXPERIENCE

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- Postdoctoral research fellow** Since February 2019  
University of St Andrews, UK  
Development of continuous-time stochastic processes for the analysis of animal telemetry data
- Research placement** July-December 2015  
University of St Andrews, UK  
Development of an R package for the analysis of animal movement data with hidden Markov models
- Research placement** June-September 2013  
University of St Andrews, UK  
Analysis of ecological and financial data with hidden Markov models

## PUBLICATIONS

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17. **Michelot, T.**, Glennie, R., Harris, C., Thomas, L. (2021). Varying-coefficient stochastic differential equations with applications in ecology. *Journal of Agricultural, Biological and Environmental Statistics*. DOI: 10.1007/s13253-021-00450-6.
16. Connors, M., **Michelot, T.**, Heywood, E., Orben, R.A., Phillips, R., Vyssotski, A., Shaffer, S.A., Thorne, L. (2021). Hidden Markov models reveal major animal movement modes from multi-sensor tags: a case study of four albatross species. *Movement Ecology*, 9 (7), DOI: 10.1186/s40462-021-00243-z.
15. Runde, B.J., **Michelot, T.**, Bacheler, N.M., Shertzer, K.W. and Buckel, J.A. (2020). Assigning fates in telemetry studies using hidden Markov models: an application to deepwater groupers released with descender devices. *North American Journal of Fisheries Management*, 40, pp. 1417–1434.
14. **Michelot, T.**, Blackwell, P.G., Chamailé-Jammes, S., Matthiopoulos, J. (2020). Inference in MCMC step selection models. *Biometrics*, 76, pp. 438-447.
13. Farhadinia, M.S., **Michelot, T.**, Johnson, P.J., Hunter, L.T.B., MacDonald, D.W. (2020). Understanding decision making in a food-caching predator using hidden Markov models. *Movement Ecology*, 8 (9), DOI: 10.1186/s40462-020-0195-z.
12. Spangenberg, M., Serrouya, R., Dickie, M., DeMars, C., **Michelot, T.**, Boutin, S., Wittmann, M.J. (2019). Slowing down wolves to protect boreal caribou populations: a spatial simulation model of linear feature restoration. *Ecosphere*, 10 (10), DOI: 10.1002/ecs2.2904.
11. **Michelot, T.**, Gloaguen, P., Blackwell, P.G., Étienne, M.P. (2019). The Langevin diffusion as a continuous-time model of animal movement and habitat selection. *Methods in Ecology and Evolution*, 10 (11), pp. 1894-1907.

10. Bacheler, N. M., **Michelot, T.**, Cheshire, R. T., Shertzer, K. W. (2019). Fine-scale movement patterns and behavioral states of gray triggerfish *Balistes capriscus* determined from acoustic telemetry and hidden Markov models. *Fisheries Research*, 215, pp. 76-89.
9. **Michelot, T.**, Blackwell, P.G. (2019). State-switching continuous-time correlated random walks. *Methods in Ecology and Evolution*, 10 (5), pp. 637–649.
8. **Michelot, T.**, Blackwell, P.G., Matthiopoulos, J. (2019). Linking resource selection and step selection models for habitat preferences in animals. *Ecology*, 100 (1), DOI: 10.1002/ecy.2452.
7. Grecian, W.J., Lane, J., **Michelot, T.**, Wade, H., Hamer, K.C. (2018). Understanding the ontogeny of foraging behaviour: insights from combining marine predator bio-logging with satellite-derived oceanography in hidden Markov models. *Journal of the Royal Society Interface*, 15 (143), DOI: 10.1098/rsif.2018.0084.
6. McClintock, B., **Michelot, T.** (2018). momentuHMM: R package for generalized hidden Markov models of animal movement. *Methods in Ecology and Evolution*, 9 (6), pp. 1518-1530.
5. **Michelot, T.**, Langrock, R., Bestley, S., Jonsen, I.D., Photopoulou, T., Patterson, T.A. (2017). Estimation and simulation of foraging trips in land-based marine predators. *Ecology*. 98 (7), pp. 1932–1944.
4. Langrock, R., Kneib, T., Glennie, R., **Michelot, T.** (2017). Markov-switching generalized additive models. *Statistics and Computing*. 27 (1), pp. 259–270.
3. **Michelot, T.**, Langrock, R., Patterson, T.A. (2016). moveHMM: An R package for analysing animal movement data using hidden Markov models. *Methods in Ecology and Evolution*, 7 (11), pp. 1308–1315.
2. **Michelot, T.**, Langrock, R., Kneib, T., King, R. (2016). Maximum penalized likelihood estimation in semiparametric capture-recapture models. *Biometrical Journal*, 58, pp. 223–239.
1. Langrock, R., **Michelot, T.**, Sohn, A., Kneib, T. (2015). Semiparametric stochastic volatility modelling using penalized splines. *Computational Statistics*, 30, pp. 517–537.

## IN PREPARATION

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Klappstein, N.J., Potts, J.R., **Michelot, T.**, Pilfold, N.W., Börger, L., Lewis, M.A., Derocher, A.E. Energy selection functions: modelling the energetic drivers of animal movement and habitat use. *Author preprint*, DOI: 10.22541/au.160640483.30543006.

Glennie, R., Adam, T., Leos Barajas, V., **Michelot, T.**, Photopoulou, T., McClintock, B. Hidden Markov models: pitfalls and opportunities in ecology.

Glennie, R., **Michelot, T.** hmmTMB: an R package for flexible hidden Markov models with random effects.

## BOOK CHAPTERS

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Antinori P., **Michelot T.**, Lescuyer P., Müller M., Acosta-Martin A.E. (2019) Detection of unknown chemical adduct modifications on proteins: from wet to dry laboratory In: Evans C., Wright P., Noirel J. (eds), *Mass Spectrometry of Proteins Methods in Molecular Biology*, vol 1977. Humana Press, New York, NY.

## TEACHING

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### Guest lecturer

- MT4113 Computing in Statistics, University of St Andrews *Fall 2019*
- Ecological Modelling, University of Lisbon *Fall 2019*

### Teaching training

Academic Staff Development Programme, University of St Andrews

- Assessment and feedback (half-day workshop)
- Effective lecturing (half-day workshop)

*Fall 2019*

### Lecturer and demonstrator for two workshops

*Hidden Markov models for animal movement and other ecological data*

- Two-day workshop in St Andrews, UK. *August 2017*
- Three-day workshop in Mossel Bay, South Africa. *March 2016*

### Tutorial demonstrator

University of Sheffield

- MAS113 Introduction to Probability and Statistics (first year)
- MAS275 Probability Modelling (second year)
- MAS223 Statistical Inference and Modelling (second year)
- MAS6002 Statistical Laboratory (MSc)

*2016-2018*

## STUDENT SUPERVISION

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### MSc research placements

Carlina Feldmann (U. of St Andrews, with Theoni Photopoulou) *October-November 2019*  
Topic: *Spatially-explicit models of animal movement for acoustic detection data*

Hugo Hervé (U. of St Andrews, with Len Thomas and Richard Glennie) *June-August 2019*  
Topic: *Simulation study of multiple imputation techniques for the application of hidden Markov models to irregular and noisy telemetry data*

### Honours projects

Mairi McHale (U. of St Andrews, with David Borchers) *2019-2020*  
Topic: *Analysis of snow leopard movement data using hidden Markov models*

### Student examination

Bantu Halam (U. of Cape Town, Department of Statistical Sciences) *September 2019*  
External examiner for MSc thesis: *Mining a large shopping database to predict where, when, and what consumers will buy next*

## PRESENTATIONS

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*Time-varying diffusion processes in movement ecology*

Talk at the virtual International Statistical Ecology Conference, online. June 2020.

*Linking scales of animal movement using statistical samplers*

Invited seminar at the University of Alberta, Edmonton, Canada. March 2020.

*Behavioural response studies of beaked whales using accelerometer data and diffusion models*

Talk at the British Ecological Society conference, Belfast, UK. December 2019.

*Spline-based diffusion models and application to accelerometer data*

Invited seminar at the University of Glasgow, UK. November 2019.

Seminar at the University of St Andrews, UK. November 2019.

*Hidden Markov models of animal movement and behaviour*

Invited seminar at the University of Lisbon, Portugal. November 2019.

Invited talk at the congress of Soc. Portuguesa de Estatística, Amarante, Portugal. November 2019.

*Modelling animal movement and habitat selection across scales*

Invited talk at the annual meeting of the BES movement ecology group, Sheffield, UK. July 2019.

*The Langevin diffusion as a model of animal movement and habitat selection*

Talk at the meeting of the National Centre for Statistical Ecology, Edinburgh, UK. June 2019.

*Modelling animal movement and habitat selection across scales*

Invited seminar at the School of Biosciences of the University of Cardiff, UK. March 2019.

*Analysing telemetry data with hidden Markov models*

Invited seminar at the Duke University Marine Lab, Beaufort, USA. March 2019.

*Do animals move like statistical samplers?*

Talk at the Research Students' Conference in Statistics and Probability, Sheffield, UK. July 2018.

*Markov chain Monte Carlo as a model of animal movement and space use*

Talk at the International Statistical Ecology Conference, St Andrews, UK. July 2018.

*moveHMM and momentuHMM – Analysing animal movement in R*

Tutorial at the moving2gather meeting, Montpellier, France. December 2017.

*Can animals do MCMC? Linking resource selection and step selection models*

Poster at the Bio-logging symposium, Konstanz, Germany. September 2017.

*From movement to space use*

Flash talk at the BES movement ecology group meeting, London, UK. July 2017.

*momentuHMM: an R package for the analysis of general telemetry data using hidden Markov models*

Talk at the EURING meeting, Barcelona, Spain. July 2017.

*Can animals do MCMC? Integrating resource selection and step selection*

Talk at the meeting of the National Centre for Statistical Ecology, Canterbury, UK. June 2017.

*Analysing animal movement data with moveHMM – Conservation action plan for the wild haggis*

Talk at the International Statistical Ecology Conference, Seattle, USA. June 2016.

### **Best student talk award**

*Multistate Ornstein-Uhlenbeck processes for modelling animal movement*

Talk at the Research Students' Conference in Probability and Statistics, Dublin, Ireland. June 2016.

*moveHMM: an R package for modelling animal movement with hidden Markov models*

Seminar at the Australian Antarctic Division, Hobart, Australia. June 2016.

Seminar at the Sea Mammal Research Unit, St Andrews, UK. November 2015.

*A statistical introduction to animal movement modelling*

Talk at the German Statistical Week, Hamburg, Germany. September 2015.

## COMMUNITY INVOLVEMENT

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### Associate Editor

*Since 2021*

*Journal of Statistical Theory and Practice*

### Reviewer

*Advances in Statistical Analysis* (2020), *Animals* (2019), *Ecography* (2018), *Ecological Applications* (2017), *Ecological Monographs* (2019), *Ecology and Evolution* (2016, 2017), *Ecology Letters* (2019), *Emu - Austral Ornithology* (2018), *Journal of Agricultural, Biological, and Ecological Statistics* (2017, 2018), *Journal of Animal Ecology* (2019), *Journal of Mammalogy* (2018), *Journal of Zoology* (2019), *Methods in Ecology and Evolution* (2016, 2017×3, 2018), *Movement Ecology* (2016×3, 2019, 2020×3), *Nature Ecology & Evolution* (2020), *Plos One* (2018), *Scientific Reports* (2018, 2019), *Sensors* (2021).

### Early career researcher representative

*Since 2019*

Executive committee of the National Centre for Statistical Ecology, UK

## OTHER SKILLS

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### Programming

R (including Rcpp, Stan, TMB), C++

### Tools

git, Latex, R development tools (devtools, unit testing, profiling, documentation)

### Languages

French, English