VIANEY LEOS BARAJAS

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EDUCATION

Ph.D., Statistics July 2019
Iowa State University
Ames, IA, USA

B.S., Mathematics with minor in Applied Statistics June 2011
California State University, Bakersfield
Bakersfield, CA, USA

RESEARCH INTERESTS

Time Series, State-Space Models, Hidden Markov Models, Bayesian Statistics, General Mixture Models, Computational Statistics, MCMC Methods, Animal Movement, Statistical Ecology, Splines

RESEARCH PUBLICATIONS

Peer-Reviewed Journals

1. Adam, T., Grieves, C., **Leos-Barajas, V.**, Meese, E., Lowe, C., Langrock, R. and Blackwell, P. (2019) *Joint modeling of multi-scale animal movement data using hierarchical hidden Markov models. Methods in Ecology and Evolution (In Press)*

2. Papastamatiou, Y.P., Watanabe, Y.Y, Demšar, U., **Leos-Barajas, V.**, Bradley, D., Langrock, R., Weng, K., Lowe, C.G., Friedlander, A.M.and Caselle, J.E. (2018) *Activity seascapes highlight central place foraging strategies in marine predators that never stop swimming.* Movement Ecology 6:9

3. Papastamatiou, Y.P., Iosilevskii, G., **Leos-Barajas, V.**, Brooks, E.J, Howey, L.A., Chapman, D.D., Watanabe, Y.Y. (2018) *Optimal swimming strategies and behavioral plasticity of oceanic whitetip sharks.* Scientific reports, **8**, 551.

4. Langrock, R., Adam, T., **Leos-Barajas, V.**, Mews, S., Miller, D.L., Papastamatiou, Y.P. (2018) *Spline-based nonparametric inference in general state-switching models.* Statistica Neerlandica, **72**,179-200

5. **Leos-Barajas, V.**, Gangloff, E., Adam, T., Langrock, R., van Beest, F., Nabe-Nielsen, J. & Morales, J.M. (2017) *Multi-scale modeling of animal movement and general behavior data using hidden Markov models with hierarchical structures.* Journal of Agricultural, Biological, and Environmental Statistics, **22**, 232–248.

6. Gangloff, E., Chow, M., **Leos-Barajas, V.**, Hynes, S., Hobbs, B., Sparkman, A.M. (2017) *Integrating behaviour into the pace-of-life continuum: Divergent levels of activity and information gathering in fast-and slow-living snakes.* Behavioural processes, **142**, 156–163.

7. **Leos-Barajas, V.**, Photopoulou, T., Langrock, R., Patterson, T.A., Watanabe, Y.Y., Murgatroyd, M. and Papastamatiou, Y.P. (2017) *Analysis of animal accelerometer data using hidden Markov models.* Methods in Ecology and Evolution, **8**, 161–173.

8. Towner, A.V., **Leos-Barajas, V.**, Langrock, R., Smale, M.J., Kaschke, T., Jewell, O.J.D. and Papastamatiou, Y.P. (2016) *Sex-specific and individual preferences for hunting strategies in white sharks.* Functional Ecology, **30**, 1397–1407.

Conference Proceedings

1. Adam, T., **Leos-Barajas, V.**, Langrock, R. and van Beest, F. (2017) *Using hierarchical hidden Markov models for joint inference at multiple temporal scales.* Proceedings of the 32nd IWSM Vol. 2.

2. Hofmann, H., Cook, D., Kaplan, A., Hare, E., **Leos-Barajas, V.**, Sievert, C. and Tyner, S. (2015) *On the move at DinoFun world.* Visual Analytics Science and Technology (VAST), 2015 IEEE Conference on, 159-160.

3. Hofmann, H., Cook, D., Kaplan, A., Hare, E., **Leos-Barajas, V.**, Sievert, C. and Tyner, S. (2015) *Visualizing communication patterns at DinoFun World.* Visual Analytics Science and Technology (VAST), 2015 IEEE Conference on, 161-162.

Reports

1. **Leos-Barajas, V.**, Wang, Z., Kaiser, M.S. and Zhengyuan, Z. (2017) *Improving Estimates of Real-Time Traffic Speeds During Weather Events for Winter Maintenance Performance Measurement.* InTrans Project 13-485.

Pre-prints

1. **Leos-Barajas, V.** and Michelot, T. (2018) *An Introduction to Analyzing Animal Movement Data with Hidden Markov Models using Stan for Bayesian Inference.* arXiv:1806.10639 *(Stan Case Study in Preparation)*

CURRENT WORK

Submitted

- Ötting, M., Deutscher, C., Langrock, R. and **Leos-Barajas, V.** (2018) The hot hand in professional darts. Submitted to: *Journal of Royal Statistical Society: Series A*
- *State-space modelling reveals habitat perception of a small terrestrial mammal in a fragmented landscape.* Gardiner, R.Z., Hamer, R., **Leos-Barajas, V.**, Peñaherrera-Palma, C., Jones, M. and Johnson, C. Submitted to: *Ecology and Evolution*
- *Approximate Bayesian inference for a "steps and turns" continuous-time random walk observed at regular time intervals*
  Ruiz-Suarez, S., **Leos-Barajas, V.**, Alvarez-Castro, I. and Morales, J.M.
  Submitted to: *Methods in Ecology and Evolution*

In Preparation

- **Methodology**
  - *Hidden Markov Models with Multi-Scale State Processes.*
    Leos-Barajas, V, Kaiser, M.S., Holland, K. and Papastamatiou, Y.P. (*Dissertation Chapter*)
  - *Modeling the Interaction Between Movement and Physiology of Merino Sheep.*
    Leos-Barajas, V., Kaiser, M.S., di Virgilio, A. and Morales, J.M.. (*Dissertation Chapter*)
  - *A data-driven approach to Bayesian model monitoring.*
    Leos-Barajas, V. and Kaiser, M.S.
  - *Introduction to state-space models for ecologists.*
    Auger-Méthé, M., Thomas, L., Newman, K., Campbell, D., Cole, D., King, A., Petris, G., **Leos-Barajas, V.**, Flemming, J., Nielsen, A. and Michaud, N.
- **Applications**
  - *Neonate garter snakes (Thamnophis elegans) exhibit consistent among-individual variation in multiple behavioural measures and habituation at multiple time scales*
    Gangloff, E., **Leos-Barajas, V**, Demuth, G., Zhang, H., Kelly, C.D. and Bronikowski, A.M.
  - *Modeling silky shark movements around Cocos and Galápagos Islands.*
    Hearn, A., Adam, T., **Leos-Barajas, V.**, Windstein, M., Michelot, T. and Morales, J.M.
  - *Movements of hammerhead sharks across acoustic arrays in the Galápagos Islands.*
    Hearn, A., **Leos-Barajas, V.** and Morales, J.M.

RESEARCH EXPERIENCE

Research Assistant October 2018– Current
Predictive modeling for the Office of the Vice President for Research
Iowa State University, Office of the VPR

Researcher March 2018–October 2018
Develop novel statistical methods for making biological inference on niche choices from behavioural time series data.
Bielefeld University, Statistics & Data Analysis Group, Dept. of Business Administration and Economics.

Research Assistant September–December 2017
Hidden Markov models for speaker identification problems.
Center for Statistics and Applications in Forensic Evidence.

Research Assistant August 2014–July 2016
Improving Estimates of Real-Time Traffic Speeds During Weather Events for Winter Maintenance Performance Measurement.
Iowa State University, Dept. of Statistics.

TEACHING EXPERIENCE

Instructor 2016 – 2017
Introduction to Business Statistics
Iowa State University, Dept. of Statistics.

Lab Instructor 2013 – 2014, 2017
Statistical Methods for Research Workers, *Regression for Social and Behavioral Research*, *Introduction to Business Statistics II*
Iowa State University, Dept. of Statistics.

Grader 2011 – 2014
Engineering Statistics, *Applied Categorical Data Analysis*, *Statistical Methods for Research Workers*, *Regression for Social and Behavioral Research*
Iowa State University, Dept. of Statistics.

WORKSHOPS

Instructor

Stan (+R) (assistant) June 10-12, 2019
An introduction to using Stan for Bayesian data analysis
Calvin College – Grand Rapids, MI

Hidden Markov Models Workshop (co-instructor with Roland Langrock) September 4-7, 2018
Versatile Tools for Analysing Animal Movement and Other Time Series Data
Bielefeld, Germany

MigraMar Annual Meeting December 2017
Half-day workshop on R packages moveHMM and momentuHMM.
Panama City, Panamá

MigraMar Annual Meeting November 2016
One-day workshop on hidden Markov models and their application in animal movement modeling.
La Paz, México

Attendee

New Perspectives on State-Space Models September 2017
Casa Matemática, Oaxaca, México.

PRESENTATIONS

Oral Presenations

- *Multi-scale modeling of animal movement data* August 2018
  Joint Statistical Meeting – Invited Talk
  Vancouver, Canada
- *Modeling the feedback between movement and condition in Merino sheep* July 2018
  International Statistical Ecology Conference – Invited Talk
  St Andrews, Scotland
- *An overview of the R package moveHMM* November 2017
  Department of Ecology at Iowa State University
  Ames, IA, USA
- *Analyzing animal accelerometer data using hidden Markov models* July 2016
  International Statistical Ecology Conference
  Seattle, Washington, USA
- *A data-driven Bayesian model monitoring approach for monitoring lake function* May 2016
  Universidad Nacional del Comahue
  San Carlos de Bariloche, Argentina
- *Visualizing the movement of white sharks around South Africa* March 2015
  Graphics Group at Iowa State University Ames, IA, USA
- *Estimating red snapper harvest by charter boats in the Gulf of Mexico* July & September 2014
  International Statistical Ecology Conference & Graybill Conference on Statistical Ecology
  Montpellier, FR / Ft. Collins, Colorado, USA

Poster Presentations

- *Semi-parametric hidden Markov models using Stan for Bayesian inference.* June 2018
  International Society for Bayesian Analysis World Meeting
  Edinburgh, Scotland
- *Hidden Markov Models with Multi-Scale State Processes* April 2019
  44^{th} University of Arkansas Spring Lecture Series

RESEARCH VISITS

Hosted

Cristina Tlapale Hernández August – October 2018
from Centro de Investigaciones Biológicas del Noroeste, México
Visiting Bielefeld University

Hosts

James Ketchum December 10-13, 2018
Pelagios Kakunjá
La Paz, Baja California Sur, México

Alex Hearn — April 30 - May 5, 2018
Galapagos Academic Institute for the Arts and Sciences (GAIAS)
San Cristobal, Galápagos, Ecuador

Juan M. Morales — April – June 2016
National Scientific and Technical Research Council (CONICET)
Bariloche, Argentina

Roland Langrock — August 2014
Centre for Ecological and Environmental Modeling (CREEM)
St Andrews, Scotland

ADVISING

Sofía Ruiz Suarez, *PhD Student* (co-advising with Juan M. Morales) — March 2018 – Present
Department of Statistics
National University of Rosario, Argentina

SOCIETIES

Member of:

- American Statistical Association (ASA)
- International Society for Bayesian Analysis (ISBA)
- American Elasmobranch Society (AES)
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

LANGUAGES

Programming: R, Rcpp, C++, Stan, JAGS, JMP, SAS

Reading, Speaking and Writing: English and Spanish