# MAURÍCIO H. VANCINE

Ecologist and Doctoral Student in Ecology, Evolution and Biodiversity São Paulo State University (UNESP), Rio Claro, SP, Brazil mauricio.vancine@gmail.com, +55-19-993-340-549, mauriciovancine.github.io

### CAREER SUMMARY

I am an Ecologist (2014), Master in Zoology (2018) and PhD student at the Department of Biodiversity, all from Universidade Estadual Paulista, Rio Claro/SP, Brazil. I performed more than 660 hours of complementary education in Brazilian and international institutions focused on statistical and ecological modeling.

My expertise encompasses spatial ecology, landscape ecology, ecological modeling, species distribution modeling (SDM), ecological and spatial data analysis, the impacts of habitat loss and fragmentation on biodiversity, amphibian ecology, as well as proficiency in the R programming language.

Since 2017, I have authored over 20 articles published in distinguished Ecology journals. These publications primarily showcase the outcomes of my research on the effects of landscape structure and climate change on biodiversity in South America, with a focus on the Atlantic Forest Hotspot.

I am currently actively engaged in the development of tools to calculate landscape metrics for large spatial extents using the R language and GRASS GIS. In addition, I dedicated more than 500 hours to teaching and promoting the use of the R language through workshops, undergraduate and graduate courses and the publication of the book 'Análises Ecológicas em R'.

### RESEARCH INTERESTS

Habitat loss and fragmentation, landscape metrics, species distribution modeling (SDM), community ecology, amphibian ecology, conservation, teaching statistics and R language

### **EDUCATION**

## São Paulo State University (UNESP)

Mar 2020 - Mar 2024 (expected)

Ph.D., Graduate Program in Ecology, Evolution and Biodiversity

GPA: 4.00

Thesis: Landscape structure as a predictor of taxonomic and functional diversity of amphibians in the Atlantic Forest

Advisor: Prof. Dr. Milton Cezar Ribeiro

### São Paulo State University (UNESP)

Mar 2016 - Jul 2018

M.S., Graduate Program in Biological Science (Zoology)

GPA: 4.00

Thesis: Diversity, distribution and effect of climate change on Atlantic Forest amphibian communities link

Advisor: Prof. Dr. Célio Fernando Baptista Haddad

# São Paulo State University (UNESP)

Mar 2011 - Mar 2015

B.S. in Ecology

Thesis: Effect of fragmentation on the persistence of anuran amphibians (Amphibia: Anura) within the Atlantic Forest link

Advisor: Prof. Dr. Milton Cezar Ribeiro

#### COMPLEMENTARY EDUCATION

• Joint Species Distribution Modelling with HMSC (45 h) University of Jyväskylä (Online), Jyväskylä, Finlândia, link 2022

•	Data Science Journey (330 h) Ômega Data Science (Online), Curitiba, Paraná, <u>link</u>	2022
•	Hierarchical Modelling of Species Communities with the R-package Hmsc (25 h) University of Helsinki (Online), Helsinki, Finland, $\underline{\text{link}}$	2020
•	School on Community Ecology: from patterns to principles (60 h) São Paulo State University (UNESP), São Paulo, SP, Brazil, <u>link</u>	2020
•	Introduction to Hierarchical Modeling (45 h) Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil, <u>link</u>	2019
•	Geoprocessing with GRASS GIS (24 h) São Paulo State University (UNESP), Rio Claro, SP, Brazil	2016
•	V Southern-Summer School on Mathematical Biology (53 h) São Paulo State University (UNESP), São Paulo, SP, Brazil, <u>link</u>	2016
•	Biology and conservation of amphibians and reptiles (44 h) Instituto Boitatá, IBEC, Alfenas, MG, Brazil, <u>link</u>	2015
•	Ecological data analysis with R (40 h) São Paulo State University (UNESP), Rio Claro, SP, Brazil	2011

#### **PUBLICATIONS**

# Peer-reviewed (most relevant)

- 1. Beca G, Vancine MH, Carvalho CS, Pedrosa F, Alves RSC, Buscariol D, Peres CA, Ribeiro MC, Galetti M. 2017. High mammal species turnover in forest patches immersed in biofuel plantations. *Biological Conservation* 210:352–359. 10.1016/j.biocon.2017.02.033
- 2. Vancine MH, Duarte KS, Souza YS, Giovanelli JGR, Sobrinho PMM, López A, Bovo RP, Maffei F, Lion MB, Ribeiro-Júnior JW, Brassaloti R, Ortiz C, Sawakuchi HO, Forti LR, Cacciali P, Bertoluci J, Haddad CFB, Ribeiro MC. 2018. ATLANTIC AMPHIBIANS: a data set of amphibian communities from the Atlantic Forests of South America. Ecology 99(7):1692–1692. 10.1002/ecy.2392
- 3. Marjakangas E, Abrego N, Grøtan V, Lima RAF, Bello C, Bovendorp RS, Culot L, Hasui E, Muylaert RL, Lima F, Niebuhr B, Oliveira AA, Pereira L, Prado I, Stevens RD, Vancine MH, Ribeiro MC, Galetti M, Ovaskainen O. 2020. Fragmented tropical forests lose mutualistic plant-animal interactions. Diversity and Distributions 26(2):154-168. 10.1111/ddi.13010

# Peer-reviewed (August 28, 2023)

- 1. Beca G, Vancine MH, Carvalho CS, Pedrosa F, Alves RSC, Buscariol D, Peres CA, Ribeiro MC, Galetti M. 2017. High mammal species turnover in forest patches immersed in biofuel plantations. *Biological Conservation* 210:352–359. 10.1016/j.biocon.2017.02.033
- 2. de Castro Pena JC, Goulart F, Fernandes GW, Hoffmann D, Leite FS, dos Santos NB, Soares-Filho B, Sobral-Souza T, Vancine MH, Rodrigues M. 2017. Impacts of mining activities on the potential geographic distribution of eastern Brazil mountaintop endemic species. Perspectives in ecology and conservation 15(3):172-178. 10.1016/j.pecon.2017.07.005
- 3. Regolin AL, Cherem JJ, Graipel ME, Bogoni JA, Ribeiro JW, Vancine MH, Castilho PVD. 2017. Forest cover influences occurrence of mammalian carnivores within Brazilian Atlantic Forest. *Journal of Mammalogy* 98(6):1721-1731. 10.1093/jmammal/gyx103

- 4. Sobral-Souza T, Vancine MH, Ribeiro MC, Lima-Ribeiro MS. 2018. Efficiency of protected areas in Amazon and Atlantic Forest conservation: A spatio-temporal view. *Acta ecologica* 87:1-7. 10.1016/j.actao.2018.01.001
- 5. Muylaert RL, Vancine MH, Bernardo R, Oshima JEF, Sobral-Souza T, Tonetti VR, Ribeiro MC. 2018. Uma nota sobre os limites territoriais da Mata Atlântica. Oecologia Australis 22(3):302-311. 10.4257/oeco.2018.2203.09
- 6. Vancine MH, Duarte KS, Souza YS, Giovanelli JGR, Sobrinho PMM, López A, Bovo RP, Maffei F, Lion MB, Ribeiro-Júnior JW, Brassaloti R, Ortiz C, Sawakuchi HO, Forti LR, Cacciali P, Bertoluci J, Haddad CFB, Ribeiro MC. 2018. ATLANTIC AMPHIBIANS: a data set of amphibian communities from the Atlantic Forests of South America. *Ecology* 99(7):1692–1692. 10.1002/ecy.2392
- 7. Ferro e Silva AM, Sobral-Souza T, Vancine MH, Muylaert RL, Abreu AP, Pelloso SM, Carvalho MDB, Andrade L, Ribeiro MC, Toledo MJ. 2018. Spatial prediction of risk areas for vector transmission of Trypanosoma cruzi in the State of Paraná, southern Brazil. PLoS neglected tropical diseases 12(10):e0006907. 10.1371/journal.pntd.0006907
- 8. Bertassoni A, Costa RT, Gouvea JA, Bianchi RDC, Ribeiro JW, Vancine MH, Ribeiro MC. (2019). Land-use changes and the expansion of biofuel crops threaten the giant anteater in southeastern Brazil. *Journal of Mammalogy* 100(2):435-444. 10.1093/jmammal/gyz042
- 9. Moraes AM, Vancine MH, Moraes AM, Oliveira Cordeiro CL, Pinto MP, Lima AA, Sobral-Souza T. 2019. Predicting the potential hybridization zones between native and invasive marmosets within Neotropical biodiversity hotspots. Global Ecology and Conservation 20:e00706.06. 10.1016/j.gecco.2019.e00706
- 10. Santos JP, Sobral-Souza T, Brown Jr KS, Vancine MH, Ribeiro MC, Freitas AV. 2020. Effects of landscape modification on species richness patterns of fruit-feeding butterflies in Brazilian Atlantic Forest. Diversity and Distributions 26(2):196-208. 10.1111/ddi.13007
- 11. Marjakangas E, Abrego N, Grøtan V, Lima RAF, Bello C, Bovendorp RS, Culot L, Hasui E, Muylaert RL, Lima F, Niebuhr B, Oliveira AA, Pereira L, Prado I, Stevens RD, Vancine MH, Ribeiro MC, Galetti M, Ovaskainen O. 2020. Fragmented tropical forests lose mutualistic plant-animal interactions. *Diversity and Distributions* 26(2):154-168. 10.1111/ddi.13010
- 12. Bello C, Cintra ALP, Barreto E, Vancine MH, Sobral-Souza T, Graham CH, Galetti M. 2021. Environmental niche and functional role similarity between invasive and native palms in the Atlantic Forest. *Biological invasions* 23(3):741-754. 10.1007/s10530-020-02400-8
- 13. Gusmão RA, Hernandes FA, Vancine MH, Naka LN, Doña J, Gonçalves-Souza T. 2021. Host diversity outperforms climate as a global driver of symbiont diversity in the bird-feather mite system. Diversity and Distributions 27(3):416-426. https://doi.org/10.1111/ddi.13201
- 14. Da Silveira NS, Vancine MH, Jahn AE, Pizo MA, Sobral-Souza T. 2021. Future climate change will impact the size and location of breeding and wintering areas of migratory thrushes in South America. *The Condor* 123(2):duab006. 10.1093/ornithapp/duab006
- 15. Jover A, Cabrera A, Ramos A, Vancine MH, Suárez AM, Machell J, Pérez-Lloréns JL. 2021. Distribution of macroalgae epiphytes and host species from the Cuban marine shelf inferred from ecological modelling. *Aquatic Botany* 172:103395. 10.1016/j.aquabot.2021.103395
- 16. Bercê W, Bello C, Mendes CP, Vancine MH, Galetti M, Ballari SA. 2021. Invasive wild boar's distribution overlap with threatened native ungulate in Patagonia. *Journal of Mammalogy* 102(5):1298-1308. 10.1093/jmammal/gyab099
- 17. Oshima JEF, Jorge MLS, Sobral-Souza T, Börger L, Keuroghlian A, Peres CA, Vancine MH,

- Colleni B, Ribeiro MC. 2021. Setting priority conservation management regions to reverse rapid range decline of a key neotropical forest ungulate. Global Ecology and Conservation 31:e01796. 10.1016/j.gecco.2021.e01796
- 18. Monteiro ECS, Pizo MA, Vancine MH, Ribeiro MC. 2022. Forest cover and connectivity have pervasive effects on the maintenance of evolutionary distinct interactions in seed dispersal networks. *Oikos* 2022(2):oik.08240. 10.1111/oik.08240
- 19. Ribeiro-Souza P, Graipel ME, Astúa D, Vancine MH, Pires JSR. 2022. Effects of climate change on distribution and areas that protect two neotropical marsupials associated with aquatic environments. *Ecological Informatics* 101570. 10.1016/j.ecoinf.2022.101570
- 20. Costa MF, Francisconi AF, Vancine MH, Zucchi MI. 2022. Climate change impacts on the Copernicia alba and Copernicia prunifera (Arecaceae) distribution in South America. Brazilian Journal of Botany 45:807-818. 10.1007/s40415-022-00801-8
- 21. Muylaert RL, Kingston T, Luo J, Vancine MH, Galli N, Carlson CJ, John RS, Rulli MC, Hayman DT. 2022. Present and future distribution of bat hosts of sarbecoviruses: implications for conservation and public health. *Proceedings of the Royal Society B* 289(1975):20220397. 10.1098/rspb.2022.0397
- 22. Borges GA, Mancilla G, Siqueira AB, Vancine MH, Ribeiro MC, Maia JCS. 2022. The fate of vegetation remnants in the southern Amazon's largest threatened hotspot: part (I) a 33-year analysis of LULCC in the Tapajos River basin, Brazil. Research, Society and Development 11(10):e448111032553. 10.33448/rsd-v11i10.32553
- 23. Galetti M, Carmignotto AP, Percequillo AR, Santos MCO, Ferraz KMPMB, Lima F, Vancine MH, Muylaert RL, Bonfim FCG, Magioli M, Abra FD, Chiarello AG, Duarte JMB, Morato R, de Mello Beisiegel B, Olmos F, Galetti Jr. PM, Ribeiro MC. 2022. Mammals in São Paulo State: diversity, distribution, ecology, and conservation. *Biota Neotropica* 22(spe). 10.1590/1676-0611-bn-2022-1363
- 24. Santos PM, Ferraz KMPMB, Ribeiro MC, Niebuhr BB, Vancine MH, Chiarello AC, Paglia AP. 2022. Natural forest regeneration on anthropized landscapes could overcome climate change effects on the endangered maned sloth (*Bradypus torquatus*, Illiger 1811). *Journal of Mammology* gyac084. 10.1093/jmammal/gyac084
- 25. Dutra VAB, Vancine MH, Lima AAM, Toledo PM. 2023. Dinâmica da paisagem e fragmentação de ecossistemas em três bacias hidrográficas na Amazônia Oriental entre 1985 e 2019. Revista Brasileira de Geografia Física 16(02):936-949. 10.26848/rbgf.v16.2.p936-949
- 26. Amaral IS, Pereira JB, Vancine MH, Morales AE, Althoff SL, Gregorin R, Pereira MJR, Valiali VH, Oliveira LR. Where do they live? Predictive geographic distribution of Tadarida brasiliensis brasiliensis (Chiroptera, Molossidae) in South America. Neotropical Biology and Cconservation. in press.

## **Books**

1. Da Silva FR, Gonçalves-Souza T, Paterno GB, Provete DB, **Vancine MH**. 2022. **Análises Ecológicas no R**. Nupeea: Recife, PE, Canal 6: São Paulo. 640 p. ISBN 978-85-7917-564-0. <u>link</u>

For all publications, citations, and journal referee ORCID, Web of Science, Scopus, Google Scholar

# MANUSCRIPTS IN REVIEW

1. Teixeira JVS, Bonfim FCG, **Vancine MH**, Ribeiro MC, Oliveira LC. Effect of landscape attributes at multiple scales on the occurrence of the threatened golden-headed lion tamarin, Leontopithecus chrysomelas Kuhl, 1820 (Primates, Callitrichidae). *American Journal of Primatology*.

- 2. Tonetti V, Bocalini F, Schunck F, **Vancine MH**, Butti M, Ribeiro MC, Pizo M, Balmford A. The Protected Areas network may be inefficient to cover biodiversity in a fragmented tropical hotspot under different climate scenarios. *Perspective in Ecology and Conservation*.
- 3. Anunciação PA, Ernst R, Martello F, **Vancine MH**, Ribeiro MC, Carvalho LMT. Climate-driven loss of taxonomic and functional richness in Atlantic Forest anurans. *Perspective in Ecology and Conservation*.

#### **FUNDING**

• Doctoral Graduate Scholarship, São Paulo Research Foundation (FAPESP) 2022-2024

Grant:  $\frac{2022/01899-6}{\text{BRL } 91,002.24}$ 

• Master Graduate Scholarship, São Paulo Research Foundation (FAPESP) 2017-2018

Grant:  $\underline{2017/09676-8}$ Value:  $\underline{BRL} \ 16,248.\overline{5}4$ 

• Undergraduate Research Scholarship, São Paulo Research Foundation (FAPESP) 2013-2015

Grant:  $\frac{2013/02883-7}{\text{Value: }\overline{\text{BRL }10,539.87}}$ 

#### AWARDS AND HONORS

• High Academic Performance Award, São Paulo State University (UNESP)

2015

## RESEARCH EXPERIENCE

• Doctoral research

2020-currently

Title: Landscape structure as a predictor of taxonomic and functional diversity of amphibians in the Atlantic Forest

Aim: analyzing the structure of landscapes throughout the Atlantic Forest; analyze how landscape structure affects the taxonomic and functional diversity of amphibian communities; and analyze this same question of species-specific mode, in addition to analyzing co-occurrences using JSDMs.

• Master research 2016-2018

Title: Effect of Landscape Modifications and Climate Changes on the Persistence of Amphibians in the Atlantic Forest

Aim: to present an assessment of the surveys of the amphibian communities for the Atlantic Forest; to investigate how habitat loss and fragmentation affect the persistence of amphibians; and to investigate how climate change affect the future persistence of the genus *Brachycephalus*.

• Undergraduate research

2013-2015

Title: Effect of fragmentation on the persistence of anuran amphibians (Amphibia: Anura) within the Atlantic Forest

Aim: evaluate the relative contribution of landscape indices (percentage of forest cover, connectivity, relief and urban proximity) to the persistence of species using species distribution modeling.

# TEACHING EXPERIENCE

# Graduation courses (300 h)

• Introduction to the use of geospatial data in R (60 h) 2021 Invited teacher, Ecology, Biodiversity and Evolution Graduate Program, São Paulo State University (UNESP)

Invited teacher, Ecology, Biodiversity and Evolution Graduate Program, São Paulo State University (UNESP)
• Introduction to Geoprocessing for Ethnobiology and Conservation (45 h) 2019 Invited teacher, Ethnobiology and Nature Conservation Graduate Program, Rural Federal University of Pernambuco (UFRPE)
• Ecological Niche Modeling: theory and practice (60 h)  Teaching assistant, Ecology and Biodiversity Graduate Program, São Paulo State University (UN-ESP)
• Ecological Niche Modeling: theory and practice (45h) Teaching assistant, Ecology Graduate Program, The University of Campinas (UNICAMP)
• Ecological Niche Modeling in R (30 h)  Teaching assistant, Ecology and Biodiversity Graduate Program, Graduate Program, São Paulo State University (UNESP)
Undergraduate courses (102 h)
• Statistical Models in Ecology (30 h)  Teacher, Ecology Undergraduate, São Paulo State University (UNESP)
• Statistical Models in Ecology (12 h) 2018 Teaching assistant, Ecology Undergraduate, São Paulo State University (UNESP)
• Quantitative Ecology (60 h) 2015 Teaching assistant, Ecology Undergraduate, São Paulo State University (UNESP)
Workshops and Short courses (104 h)
• Introduction to the R language for data manipulation and visualization (09 h) 2022 Short course instructor, XXXIII Ecology Studies Week, São Paulo State University (UNESP)
• Introduction to the R language for data manipulation and visualization (08 h) 2021 Short course instructor, XXXI Ecology Studies Week, São Paulo State University (UNESP)
• Geoprocessing with QGIS (03 h) Short course instructor, 32 <sup>a</sup> Biology Studies Week, São Paulo State University (UNESP)
• Introduction to species distribution modeling using the R language (06 h) 2021 Workshop instructor, Mastozóologos Organizados em uma Conferência Online (MOCÓ), Sociedade Brasileira de Mastozoologia
• Introduction to R Language (08 h) Short course instructor , XXX Ecology Studies Week, São Paulo State University (UNESP)
• Introduction to R Language (08 h) Short course instructor, 30 <sup>a</sup> Biology Studies Week, São Paulo State University (UNESP)
• Introduction to Species Distribution Modeling using R Language: theory and practice (07 h)  Short course instructor, 9° Brazilian Congress of Herpetology, The University of Campinas (UNI-CAMP)
• Field work with amphibians (08 h) Short course instructor, 29 <sup>a</sup> Biology Studies Week, São Paulo State University (UNESP)

2020

2016

• Introduction to the use of geospatial data in R (60 h)

Short course instructor, XXVII Ecology Studies Week, São Paulo State University (UNESP)

 $\bullet$  Field herpetology (15 h)

• Introduction to software R (16 h)

2016

Short course instructor, XXVII Ecology Studies Week, São Paulo State University (UNESP)

• Introduction to software R (08 h)

2015

Short course instructor, XXVI Ecology Studies Week, São Paulo State University (UNESP)

• Organization of data in electronic sheets - Calc (08 h)

2014

Short course instructor, XXV Ecology Studies Week, São Paulo State University (UNESP)

### ADMINISTRATIVE EXPERIENCE

• Student representative

2020-2021

Graduate Program in Ecology, Evolution and Biodiversity, São Paulo State University (UNESP)

### PROFESSIONAL AFFILIATIONS AND MEMBERSHIPS

- Associação Brasileira de Ecólogos (ABE)
- Associação Brasileira de Ciência Ecológica e Conservação (ABECO)

## STUDENT SUPERVISION

• Lucas de Souza Almeida

2022

Conhecimento atual, distribuição potencial e conservação de Cecílias (Amphibia: Gymnophiona) Coadvidor, Master thesis, Ecology, Biodiversity and Evolution Graduate Program, São Paulo State University (UNESP)

• Bruno Eduardo Ribeiro Silva

2022

Comparação da distribuição de espécies inferidos por Modelos de Nicho Ecológicos e mapa de especialistas da IUCN para antíbios anuros da América do Sul Undergraduate thesis, Ecology, São Paulo State University (UNESP)

• Helena Thereza Carvalho de Oliveira

2021

Distribuição do padrão reprodutivo em comunidades de anuros na Mata Atlântica Undergraduate thesis, Biological Sscience, São Paulo State University (UNESP)

## **SERVICES**

• Journal referee: Zoologia, PLOS One, Biological Invasions, Hydrobiologia, Scientific Data, Diversity and Distributions, Papéis Avulsos de Zoologia

#### **SKILLS**

## Programming languages

• R (advanced), tidyverse (advanced), markdown (advanced), quarto (intermediate), shiny (basic), LaTeX (basic), git (basic), Python (basic), JavaScript (basic), shell/bash (basic)

## R packages

• LSMetrics: multiscale calculation and spatialization of landscape metrics using GRASS GIS Authors: Bernardo Niebuhr, Maurício Humberto Vancine, Renata de Lara Muylaert, John Wesley Ribeiro, Milton Cezar Ribeiro

Site: mauriciovancine.github.io/lsmetrics

• ecodados: ecological data base for teaching statistics

Authors: Gustavo Paterno, Diogo B. Provete, Fernando Rodrigues da Silva, Thiago Gonçalves-Souza, Maurício Humberto Vancine

Site: paternogbc.github.io/ecodados

• amphiBR: dataset from the official publication of the List of Amphibians in Brazil published by the Brazilian Society of Herpetology

Authors: Paulo Barros de Abreu Junior, **Maurício Humberto Vancine**, Diogo B. Provete Site: paulobarros.github.io/amphiBR

## Statistical knowledge

- Descriptive statistics: tabular data manipulation (advanced), spatial data manipulation (advanced), tabular data visualization (advanced), spatial data visualization (advanced)
- Inferential statistics: frequentist (advanced), likelihood (intermediate), bayesian (basic)

## **Softwares**

• QGIS (advanced), GRASS GIS (advanced), GNU/Linux (intermediate)

## Languages

- English (intermediate)
- Spanish (basic)
- Portuguese (native speaker)

## **MEDIA**

#### News

- Pesquisadores mapeiam áreas com potencial para futuros surtos de doenças semelhantes à Covid-19. Jornal da UNESP. link
- Alto Tietê somou mais de 30 hectares desmatados em quatro anos. G1. link 2022

#### YouTube

• Análises Ecológicas no R (Lançamento). link

- 2022
- Modelos em Ecologia: extrapolando nosso conhecimento sobre a distribuição das espécies. DEA UFV. link

  2021
- We R Live 01: Como começar no R. GeoCast Brasil. link 2022
- Métricas de paisagem no R. GeoCast Brasil. <u>link</u>

#### Podcasts and interviews

- Você tem medo de errar? DesAbraçando Árvores. <u>link</u>
- GeoCast Brasil. O Fascinante Mundo do Sensoriamento Remoto. link 2020

#### REFERENCES

- Prof. Dr. Milton Cezar Ribeiro, São Paulo State University (UNESP), Brazil milton.c.ribeiro@unesp.br, +55-19-3526-9680
- Prof. Dr. Célio F. B. Haddad, São Paulo State University (UNESP), Brazil haddad1000@gmail.com, +55-19-3526-4302
- Dr. Thiago Gonçalves-Souza, University of Michigan, USA tgoncalv@umich.edu, +1-734-596-0508
- Dr. Renata Lara Muylaert, Massey University, New Zealand R.deLaraMuylaert@massey.ac.nz, +64-06-356-9099 ext. 85217