Tim CD Lucas

PERSONAL INFORMATION

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PRESENT APPOINTMENT

2020–present **Imperial College**

Early Career Research Fellow

During this fellowship I aim to develop statistical regression methods that properly accounts for human movement and use these methods to estimate the effects of air pollution on disease. Due to the coronavirus pandemic I have also spent a considerable fraction of my time working on models of contact tracing.

PREVIOUS APPOINTMENTS

Jan–June 2020 **University of Oxford**

Senior Post Doc.

Models of neglected tropical diseases, contributing to software and promoting good research software practices such as version control and unit testing.

2016–2020 **University of Oxford, Malaria Atlas Project**

Post Doc.

I worked as a postdoctoral research scientist in geospatial epidemiology with the Malaria Atlas Project at the University of Oxford. I have made large contributions to the *first high resolution, global, space-time* estimates of both *Plasmodium falciparum* and *P. vivax* leading to two high-profile publications. To this end I have developed new statistical methods that combine *machine learning* and *geostatistics*. I have also supervised research assistants on smaller projects, leading to one publication.

2018–2019 **Shared parental leave**

Parental leave

Six months shared parental leave.

Jan–July 2016 **University College London**

Research Programmer

I enabled the Madingley Model to run on a high performance cluster and ported code to R for morphological analyses amongst other tasks.

EDUCATION

2012–2016 **University College London, CoMPLEX**

PhD

The role of population structure and size in determining bat pathogen richness
I used *network epidemiological models* and phylogenetic regression to study the epidemiology of bat-borne diseases with applications to zoonotic surveillance. I conceived the projects and managed my own budget. [pdf]
Supervisors: Prof. Kate Jones & Dr Hilde Herbots

2011–2012 **University College London, CoMPLEX**

MRes

Modelling Biological Complexity · Merit
Projects included adapting '*ideal gas*' models to acoustic data, analysing moment closures for a *pair-approximation* model of plant ecology and applying a novel *machine learning* method to a library of bat calls.

2006–2010 University of Sheffield, Animal & Plant Sciences

MBioSci *Zoology* · First
For my final project I used *wavelet* analysis to study multi-annual *cycles in malaria* incidence in Thailand.

OTHER PROFESSIONAL ACTIVITES

Peer Review *Journals Reviewed for:*

Journal of Theoretical Biology, BMC Infectious Diseases, PLoS Pathogens, Malaria Journal, Methods in Ecology and Evolution, Global Ecology and Biogeography, Ecology and Evolution, Remote Sensing in Ecology and Conservation, ROpenSci, National Academy Science Letters, Journal of Advances in Medicine and Medical Research.

PEER-REVIEWED PUBLICATIONS

2020

Lucas TCD (2020) *A translucent box: interpretable machine learning in ecology*. Ecological Monographs. [pdf]

Lucas TCD, Nandi AK, *et al.* (2020) *Improving disaggregation models of malaria incidence by ensembling non-linear models of prevalence*. Spatial and Spatiotemporal Epidemiology. [pdf]

Lucas TCD*, Davis E*, *et al.* (2020) *Engagement and adherence trade-offs for SARS-CoV-2 contact tracing*. In Press. Philosophical Transactions of the Royal Society B. [pdf]

Lucas TCD, Pollington T, Davis E and Hollingsworth D. (2020) *Responsible modelling: Unit testing for infectious disease epidemiology*. Epidemics. [pdf]

Nguyen M, Howes RE, **Lucas TCD**, *et al.* (2020) *Mapping malaria seasonality in Madagascar using health facility data*. BMC medicine, 18(1), 1-11 [pdf]

Rathmes G, Rumisha SF, **Lucas TCD**, *et al.* (2020) *Global estimation of anti-malarial drug effectiveness for the treatment of uncomplicated* Plasmodium falciparum *malaria 1991–2019*. Malaria Journal. [pdf]

Crellen T, Pi L, *et al.* (2020) *Dynamics of SARS-CoV-2 with Waning Immunity in the UK Population*. In Press. Philosophical Transactions of the Royal Society B. [pdf]

Toor J, Adams ER, *et al.* (2020) *Predicted impact of COVID-19 on neglected tropical disease programs and the opportunity for innovation*. Clinical Infectious Diseases. [pdf]

Graham M, Ayabina D, **Lucas TCD**, *et al.* (2020) *SCHISTOX: An individual based model for the epidemiology and control of schistosomiasis*. Infectious Disease Modelling. In Press.

2019

Weiss DJ, **Lucas TCD**, Nguyen M, *et al.* (2019) *The global landscape of* Plasmodium falciparum *prevalence, incidence, and mortality 2000–2017*. The Lancet 394, 10195, 322–331. doi: 10.1016/S0140-6736(19)31097-9 [pdf]

Battle KE, **Lucas TCD**, Nguyen M, *et al.* (2019) *Mapping the global endemicity and clinical burden of* Plasmodium vivax *2000–2017*. The Lancet 394, 10195, 332–343. doi: 10.1016/S0140-6736(19)31096-7 [pdf]

Zhu SJ, *et al.* (2019) *The origins and relatedness structure of mixed infections vary with local prevalence of* P. falciparum *malaria*. eLife 8 e40845. doi: 10.7554/eLife.40845 [pdf]

2018

Weiss DJ, Nelson A, Gibson HS *et al.* (2018) *A global map of travel time to cities to*

assess inequalities in accessibility in 2015. Nature 553 (7688), 333 [pdf]

Pfeffer D, **Lucas TCD**, May D *et al.* (2018) *malariaAtlas: an R interface to global malariometric data hosted by the Malaria Atlas Project.* Malaria Journal 17:352 doi: 10.1186/s12936-018-2500-5 [pdf]

2017 Redding D, **Lucas TCD**, Blackburn T & Jones KE. (2017) *Evaluating Bayesian spatial methods for modelling species distributions models with clumped and restricted data.* PLoS One [pdf]

Golding N, August TA, **Lucas TCD**, Gavaghan DJ, van Loon EE & McInerny G. (2017) *The zoon R package for reproducible and shareable species distribution modelling*. Methods in Ecology and Evolution. doi: 10.1111/2041-210X.12858 [pdf]

2015 **Lucas TCD***, Moorcroft EA*, Freeman R, Rowcliffe MJ & Jones KE. (2015) *A generalised random encounter model for estimating animal density with remote sensor data.* Methods in Ecology and Evolution. doi: 10.1111/2041-210X.12346 [pdf]

2013 Walters CL, Collen A, **Lucas TCD**, Mroz K, Sayer CA and Jones KE. (2013) Challenges of Using Bioacoustics to Globally Monitor Bats. in *Bat Evolution, Ecology, and Conservation.* Springer New York. 479-499.

GBD For Global Burden of Disease capstone papers please see end of document.

* Co-first authors.

PEER-REVIEWED CONFERENCE PROCEEDINGS

2018 Law HC, Sejdinovic D, *et al.* (2018) *Variational learning on aggregate outputs with Gaussian processes.* Advances in Neural Information Processing Systems [pdf]

GRANTS AWARDED

2020 · MRC Centre Early Career Research Fellowships. Three years wages and expenses. £300,000

2020 · Co-investigator on multi-centre grant. *An analytical framework for Test, Trace and Isolate in the UK: optimising and targeting deployment alongside other measures* UKRI-DHSC COVID-19 Rapid Response Rolling Call. Grant COV0659. £412,720

TEACHING AND SUPERVISION

2020 · Organised and delivered four hour workshop (twice due to demand). "Machine Learning in the Health Sciences". Two hours practical workshop and two hours of case studies from members of the department.

2020 · Internal workshops on unit testing, cluster computing and mixed-effects models.

2019 · Co-wrote and ran an afternoon workshop. "Advanced Statistical Modelling with TMB".

2019 · Thesis committee for PhD student Dan Pfeffer.

2018 · Supervised two research assistants on side projects resulting in one publication (pdf).

2017 · Wrote and gave a two day workshop 'Geospatial statistics with R and INLA' at UiTM, Malaysia.

2015 · Demonstrator for reproducible species distribution modelling workshop run by Quantitative Ecology special interest group at BES.

2013–2014 · Online tutor for SysMIC, a course for teaching quantitative skills to biologists. Answering questions online and marking assessments.

INVITED TALKS

2020 *Model stacking to incorporate auxiliary data for malaria mapping.*
Talk at workshop on: Machine Learning in Behaviour, Ecology and Evolution, University of Neuchâtel, Switzerland

2017 *Predicting malaria risk from diverse and multilevel data.*
Plenary at SDCS2017, Springer

COMPUTATIONAL SKILLS AND SOFTEWARE

Statistical methods Geospatial statistics, machine learning, Bayesian inference, TMB, Stan.

Languages R (expert level), Python, Matlab, Mathematica, SQL.

Other Experience in R package development, Git/Github, unit testing, continuous integration, shell/ssh and high performance computing.

Software Nandi A, **Lucas TCD**, Arambepola A, Python A. *disaggregation: Disaggregation Modelling*. https://github.com/aknandi/disaggregation

Pfeffer D, **Lucas TCD**, May D, Keddie S, Rozier J, Gibson H. *malariaAtlas: An R Interface to Open-Access Malaria Data, Hosted by the 'Malaria Atlas Project'*. www.github.com/malaria-atlas-project/malariaAtlas

Lucas TCD, Python A, Redding D. *INLAutils: Utility Functions for 'INLA'*. www.github.com/timcdlucas/INLAutils

Lucas TCD, Goswami A. *paleomorph: Geometric Morphometric Tools for Paleobiology*. www.github.com/timcdlucas/paleomorph

August T, **Lucas TCD**, Golding N, van Loon E, McInerny G. *Zoon: Reproducible, Accessible & Shareable Species Distribution Modelling*. www.github.com/zoonproject/zoon

Lucas TCD. *palettetown: Use Pokemon Inspired Colour Palettes* www.github.com/timcdlucas/palettetown

REFEREES

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GLOBAL BURDEN OF DISEASE PUBLICATIONS

2020 GBD 2019 Diseases and Injuries Collaborators (2020) *Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019.* The Lancet, 396 [pdf]

GBD 2017 Disease and Injury Incidence and Prevalence Collaborators (2018) *Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019* The Lancet, 392 [pdf]

2018 GBD 2017 Risk Factor Collaborators (2018) *Global, regional, and national*

comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet, 392 [pdf]

GBD 2017 Disease and Injury Incidence and Prevalence Collaborators (2018) *Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017.* The Lancet, 392 [pdf]

GBD 2017 DALYs and HALE Collaborators (2018) *Global, regional, and national disability-adjusted life-years (DALYs) for 359 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017.* The Lancet, 392 [pdf]

GBD 2017 Mortality Collaborators (2018) *Global, regional, and national age-sex-specific mortality and life expectancy, 1950–2017: a systematic analysis for the Global Burden of Disease Study 2017.* The Lancet, 392 [pdf]

GBD 2016 Healthcare Access and Quality Collaborators (2017) *Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016.* The Lancet, 391 (10136) [pdf]

2017

GBD 2016 Disease and Injury Incidence and Prevalence Collaborators (2017) *Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016.* The Lancet, 390 [pdf]

GBD 2016 Causes of Death Collaborators (2017) *Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016.* The Lancet, 390 [pdf]

GBD 2016 DALYs and HALE Collaborators (2017) *Global, regional, and national disability-adjusted life-years (DALYs) for 333 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016.* The Lancet, 390[pdf]

GBD 2016 SDG Collaborators (2017) *Measuring progress and projecting attainment on the basis of past trends of the health-related Sustainable Development Goals in 188 countries: an analysis from the Global Burden of Disease Study 2016.* The Lancet, 390 [pdf]

16th February, 2021