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Education

2018 – Present **Joint PhD candidate in Physics,** University of Antananarivo and University of Montpellier
Remote sensing and spatial modeling: application to malaria surveillance and control in Madagascar

2014 **MSc in Geosphere, Sp. Remote sensing and Natural Risk**
Faculty of Sciences and Technologies, University of La Réunion, France

2012 **MSc in Applied Geophysics**
Faculty of Sciences and Technologies, University of Antananarivo, Madagascar

2007 **BSc in Sciences of the Earth**
Faculty of Sciences and Technologies, University of Antananarivo, Madagascar

Appointments

2014 – Present **Research Engineer in Geomatics**, Health and Geomatics Group, Epidemiology and Clinical Research Unit, Institut Pasteur in Madagascar

2014 – Present **Teaching Assistant**, Faculty of Sciences and Technologies, University of Antananarivo, Madagascar

Teaching fields: *Remote sensing, GIS, Linear programming*

2007 – 2011 **Geomatics Technician**, Madagascar Oil S.A.

Training and internship

2018 **Training in Spatial Modeling with "Ocelet" language**, Cirad, La Réunion

2017 **Training in Multicriteria Analysis**, Cirad – IPM, Madagascar

2016 **Training on Bioinformatics**, IPM, Madagascar

2015 **Training in scientific communication: Article writing and publishing**, AuthorAID, Madagascar

2014 **Internship in Remote Sensing and GIS applied in Health risk**, Epidemiology and Clinical Research Unit, Institut Pasteur in Madagascar

2012 **Internship in Remote Sensing, GIS and Applied Geophysics in Mining exploration**, SGDM, Madagascar

2007 **Internship in corundum mining**, World Gems Company, Madagascar

Workshops

- Sharing the humid forest mapping method by Satellite Image Classification. Finnish Association for Nature Conservation, Antananarivo, Madagascar, 2016.
- Theoretical Approach of Radar Remote Sensing and its Applications. SEAS-OI, La Réunion, France, 2013.

Oral presentations at congresses

- **Rakotoarison HA**, Rasamimalala M, Rakotondramanga JM, Ramiranirina B, Franchanrd T, Kapesa L, Razafindrakoto J, Baril L, Piola P, Rakotomanana F. Using Multi-Criteria Evaluation to identify priority areas for Indoor Residual Spraying in the central highland, Madagascar. 66th Annual Meeting of ASTMH, Baltimore, USA, 2017. **Speaker**
- **Rakotoarison HA**, Piola P, Rakotomanana F. La Télédétection et le Système d'Information Géographique, un outil d'aide à la décision dans la lutte contre le paludisme à Madagascar. 13th Scientific Days of Remote Sensing Network, Dakar, Senegal, 2015. **Speaker**
- **Rakotoarison HA**, Piola P, Rakotomanana F. Identification des zones prioritaires pour la campagne d'aspersion intradomiciliaire dans la lutte contre le paludisme à Madagascar. 1st Research Congress in Indian Ocean Public Health, La Réunion, France, 2014. **Speaker**
- **Rakotoarison HA**, Piola P, Rakotomanana F. Identification des zones prioritaires pour la campagne d'aspersion intradomiciliaire dans la lutte contre le paludisme à Madagascar. 1st Scientific Congress of Medical School, Antananarivo, Madagascar, 2014. **Speaker**
- **Rakotoarison HA**, Rakoto H, Rasolomanana E, Contribution of satellite image processing to litho-structural mapping in Madagascar. Junior Researcher Days, Durban, South Africa, 2013. **Speaker**

Publications (in final preparation)

- **Rakotoarison HA**, Rasamimalala M, Rakotondramanga JM, Ramiranirina B, Franchanrd T, Kapesa L, Razafindrakoto J, Baril L, Piola P, Rakotomanana F. Landscape change detection and assessment to model mosquito suitable habitat using remotely sensed data, Madagascar
- **Rakotoarison HA**, Rasamimalala M, Rakotondramanga JM, Ramiranirina B, Franchanrd T, Kapesa L, Razafindrakoto J, Baril L, Piola P, Rakotomanana F. Mapping malaria risk gradient based on Multicriteria Evaluation for selective Indoor Residual Spraying in the highlands, Madagascar

Interests and additional skill

- IT/Technology: ArcGIS, QGIS, Idrisi, ENVI, R, Ocelet
- Languages: English (Intermediate), French (fluent)
- Sports: Volley-ball, Swimming

Abstract describing the research project

The spatio-temporal spread of vector-borne diseases (transmitted by hematophagous insects such as mosquitoes that are vectors of diseases such as malaria) is strongly influenced by environmental factors (landscape, location and abundance of hosts and vectors, etc.) and climate (temperature, humidity, etc.). The resulting landscape structure and location of vectors and hosts population, strongly associated with hosts exposure to infection by a pathogen vector, vary in time and space. Global changes, climatic and related to environment anthropization, modify the landscape structure and the population dynamic of vectors. They consequently affect the emergence and diffusion of vector-borne diseases. However, it is difficult to quantify or qualify this impact.

An integrative approach is necessary to jointly consider population dynamic of vectors and epidemic dynamic, both varying in time and space. A modeling approach is relevant to represent this complex biological system, allowing to couple spatial and temporal components, and thus to take into account their interactions. Remote sensing, especially high or very high spatial resolution imagery, has the potential to characterize environmental conditions that may be favorable to vectors or hosts of an epidemiological system, but are still underused in predictive models of epidemic dynamics.

The objective of this research is to develop a model which will allow simulate, through multi-sensor remote sensing approach, spatio-temporal spread of pathogen vectored. Anopheles mosquitoes, vectors of malaria in Madagascar, will be taken as a vectors example. The model will allow studying the impact of anthropogenic modifications of environment (e.g. urbanization, land-use changes), climate change (e.g. temperature increase) on population dynamics of vectors and hosts infection. The model will be used to evaluate different global changes scenarios, as well as potential strategies of outbreaks control, aiming to either the vectors or hosts.

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September 25th, 2018

Object: Application for the E²M² workshop

Dear E²M² organizers,

I am a Research Engineer at Institut Pasteur de Madagascar. My work is essentially focused on understanding the impact of environment on distribution and dynamic of infectious diseases. In particular, I work on mapping diseases epidemic risk using remote sensing data. Currently, I am starting a joint PhD in Physics (2018 – 2019) at both University of Antananarivo and University of Montpellier. My thesis project is entitled "Remote sensing and spatial modeling: application to malaria surveillance and control in Madagascar". It will consist on Anopheles population dynamics using environmental and climatic variables, extracted from satellite images, and then developing a model of transmission risk.

I would like to attend the workshop "E²M²: Ecological and Epidemiological Modeling in Madagascar" as the theme of the workshop fits perfectly with my thesis project. Referring to the last session "E²M² 2018", the different modules proposed are very interesting and are essential, for me, in carrying out my work. This workshop will help me progress in my thesis. Indeed, participating in this event will allow me, as proposed, to fine-tune my model-based research questions, develop clear model frameworks and corresponding equations, and fit my models to real-world data.

This workshop is an opportunity for me to deepen my knowledge of modeling and discover new models. It will also be an occasion to exchange capacities and to develop a wider network with young researchers.

Looking forward to hearing from you soon.

Kind regards,