

**Regional Program STIC-AmSud
2016 Project Proposal (Research – Innovation) – 34 pages**

➤ sent the 20160515 .pdf to the STIC-AmSud Secretariat (stic@sticamsud.org)

A. General Information

A1	Project title
	Bioacoustical Research in Latin America Aquatic Mammals

A2	Acronym
	BRILAAM

A3	Research domain
	<p>BRILAAM is an original project aiming to promote advanced bioacoustic methodologies for aquatic mammal monitoring in South America (in Amazonia and in Oceans). It will be developed in three parts, mainly centered on the methodologies developed at University of Toulon in the AXE Information :</p> <ol style="list-style-type: none"> 1. Data analysis and signal processing: development of innovative wavelet signal processing techniques and statistical methods / algorithms that automatically segment and label the song units of whale song and dolphin clicks 2. Computational acoustics: development of sound propagation models for undersea canyons and riverine settings, adaptation of these models to bioacoustical signals. Inverse problems to locate the marine mammals. 3. Ecology and ethology: development of acoustic census methods for cetaceans using new instrumentation: JASON DAQ developed by CNRS team (http://glotin.univ-tln.fr/AXE) for long-term recording at low sampling rates and for short-term recording at very high sampling rates (1 MHz x 4 channels). Exploration of high-frequency acoustic emanations produced by cetaceans for possible communicative functions.

A4	Project goals
	<ol style="list-style-type: none"> 1. Create a new international collaboration with researchers in complementary domains as a way to help advance marine mammal bioacoustics in Latin America. <ol style="list-style-type: none"> A. Unite computer science, mathematics, physics, oceanography, biology, ecology, ethology and conservation to better understand cetacean populations in South America. B. Sponsor a Symposium on Sharing Acoustical Materials and Methods (SAMM) in 2017 C. Sponsor a Symposium on Sharing Acoustical Results (SAR) in 2018 2. Develop new methods in acoustics and in data processing including: <ol style="list-style-type: none"> A. Innovative wavelet signal processing techniques B. Statistical methods and algorithms that automatically segment and label the song units of whale song and dolphin clicks C. Classification with scaled acoustic analysis methods D. Sound propagation modeling using finite element methods and boundary elements methods 3. Mutual transfer of professional skills and technologies: <ol style="list-style-type: none"> A. A new instrumentation, JASON DAQ for long-term recording at low sampling rates and for short-term recording at very high sampling rates (1 MHz x 4 channels) will be used in 3 different environments in various geographic locations and modified for improvement as needed B. New signal processing techniques will be shared by all participants

	<p>C. Sharing methods of acoustical long-term recording, to arm a net of “acoustical observatories” in Chile and Peru</p> <p>D. New methods of obtaining ecological and ethological data about various cetacean species will be shared by all participants</p> <p>E. Possible new census methods based on bioacoustical measurements will be shared by all participants</p> <p>4. Promote future collaborations among scientific institutions:</p> <p>A. Create open source depository for audio recordings collected in this project</p> <p>B. Create citizen science open source platform with downloadable cetacean audio files and newly created signal processing software to will increase the amount of information obtained from these high-frequency recordings by scientists around the globe</p> <p>C. Facilitate students participation in data analysis and meeting participation, so as to build a lasting team of cetaceans bioacoustic researchers in South America</p> <p>D. Establish a permanent bioacoustics laboratory in the Peruvian Amazon and encourage scientists to take advantage of the technology and signal analysis methods provided by the CNRS LSIS in conjunction with the rich biodiversity of this region</p>
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A5	Abstract
	<p>Advanced investigations in bioacoustics involve interdisciplinary teams to include computer science, machine learning, feature learning, signal analysis, acoustics, physics, mathematics, biology, ecology and ethology. We propose forming a net of scientists in Chile, Peru and France (i.e. computer scientists, physicists, mathematicians, oceanographers, and ecologists) that will exchange technologies, data, theoretical models, field experiences, and other information in order to accelerate the development of bioacoustic in South America (Bioacoustics is hugely underdeveloped in Chile for example).</p> <p>We plan to install innovative, low-cost, multi-channel recording equipment from 2016 through 2018 capable of high sampling rates at real time (1 mHz: JASON DAQ – developed by Univ. of Toulon) in conjunction with other equipment already in place to acoustically monitor marine mammals over long periods of time. These acoustic surveys will occur in South American hot spots: Carlos III Island in the Magellan Strait, Corcovado Gulf near Chiloe Island, Chanaral Island in northern Chile, and the Peruvian Amazon. Innovative signal processing techniques that are currently being developed will be applied to the collected data, such as (non exhaustive) :</p> <ol style="list-style-type: none"> 1. Advanced Automatic decomposition of cetacean songs in units (blue whales, Amazon River dolphins, Orca, and Humpback whales as in [1]), 2. Finite element wave propagation models ([2]), 3. Wavelet or scattering representations ([3,4]), 4. Passive acoustic 3D tracking ([5]). <p>Furthermore, we intend to establish a permanent, international research station in the Peruvian Amazon, where this equipment and signal processing techniques can be used with not only freshwater cetaceans, but also amphibians & fish. A citizen science portal will be created on the Bioacoustics Research in Latin America website (http://sabiiod.univ-tln.fr/brila/) which will make the collected audio files and above-mentioned algorithms open sourced, facilitating global analyses</p>

Cited References from CNRS (references from other partners are listed in the CV):

- [1] 2015, M. Bartcus, F. Chamroukhi, H. Glotin « Hierarchical Dirichlet Process Hidden Markov Model for unsupervised bioacoustic analysis », Internat. Joint Conf. on Neural Networks (IJCNN).
- [2] 2016, J. Patris, H. Glotin, D. Komatish, E. van 't Wout, F. Malige, M. Asch « High Performance Computing for whale sound propagation by Finite Element Methods : SPECSEM and BEM++, applied in South America », in LAMLA the 1st South American bioacoustic congress, July 2016
- [3] 2015, M. Trone, H. Glotin, R. Balestrieri, D.E. Bonnett. "Enhanced feature extraction using the Morlet transform on 1 MHz recordings reveals the complex nature of Amazon River dolphin (Inia geoffrensis) clicks". Journ. Acoustical Society of America, 138, 2015, <http://dx.doi.org/10.1121/1.4933985>
- [4] 2015, R. Balestrieri, H. Glotin, "Scattering Decomposition for Massive Signal Classification: From theory to Fast Algorithm and Implementation with Validation on International Bioacoustic Benchmark", In: 2015, IEEE ICDM Workshops
- [5] Hervé GLOTIN - Pascale GIRAUDET - Frédéric BÉNARD, "Multiple sources real-time tracking using transitivity constraints", International patent 2007/06162 FR, Vol. EU, and 2014/15 : USA patent 8638641, Australian Patent 2008327744, NewZealand 606802, 2014

A6	Scientific coordinators at each institution			
	South America A		South America B	
	Institution	Universidad de Concepción (UdeC)	Institution	Conservación de la Naturaleza Amazonica del Perú, A.C. (CONAPAC)
	Project coordinator	Susannah Buchan	Project coordinator	Marie Trone
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	South America C		South America D	
	Institution	Pontificia Universidad Católica de Chile (PUC)	Institution	Instituto del Mar del Peru (IMARPE)
	Project coordinator	Elwin van 't Wout	Project coordinator	Vanessa Bachmann
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	Email	e.wout@ing.puc.cl	Email	vbachmann@imarpe.gob.pe
	France A		France B	
	Institution	Centre National de la Recherche Scientifique (CNRS)	Institution	
	Project coordinator	Hervé Glotin	Project coordinator	
	Address	Université de Toulon Laboratoire LSIS CS 60584-83041 - Toulon Cedex - France	Address	
	Tel/Fax	Phone: 00 33 (0) 4 94 14 28 24	Tel/Fax	
	Email	glotin@univ-tln.fr	Email	

A7	Other participating institutions	
	In South America Solinia: http://us.whales.org/blog/2013/07/wdc-welcomes-solinia-new-peruvian-ngo	In France Pelagos – Marine Mammals Sanctuary and the Port Cros National Parc, for testing material and methods before to send / use them in South America, like we did with Bombyx Sono Buoy http://glotin.univ-tln.fr/BOMBYX

A8	List of expected participants (name and affiliation)	
	Hervé Glotin: Centre National de la Recherche Scientifique (CNRS, UMR LSIS, Toulon) – Axe Information Valentin Gies : EA PROTEE, Univ. Toulon – Axe Information Valentin Barchsz : EA PROTEE, Univ. Toulon – Axe Information Philippe Arlotto : EA PROTEE, Univ. Toulon – Axe Information Julie Patris: Centre National de la Recherche Scientifique (CNRS, UMR LSIS, Toulon) Pascale Giraudet: Centre National de la Recherche (CNRS UMR LSIS, Toulon) - Axe Information Elwin van 't Wout: Pontificia Universidad Católica de Chile (PUC) Susannah Buchan: Universidad de Concepción (UdeC) Miguel Llapapasca: Universidad de Antofagasta Vanessa Bachmann: Instituto del Mar del Peru (IMARPE) David Bonnett: Conservación de la Naturaleza Amazonica del Perú, A.C. (CONAPAC) Marie Trone: Conservación de la Naturaleza Amazonica del Perú, A.C. (CONAPAC) Cedric Gileman: Solinia Marc Plumet: Solinia	

A9	International Project Coordinator (to be chosen among the Scientific Coordinators mentioned in A6)	
	Pr. Hervé Glotin: CNRS – UMR LSIS – Toulon univ. - Member of Institut Universitaire de France http://glotin.univ-tln.fr	

B. Project Details

B1. Project guidelines

1. Create a new international collaboration with young researchers in complementary domains as a way to help advance marine mammal bioacoustics in Latin America.

Unite computer science, mathematics, physics, oceanography, biology, ecology, ethology and conservation to better understand cetacean populations in South America.

Completed / in progress:

A. Marie Trone (CONAPAC) was a session organizer and co-chair for the special session, Animal Bioacoustic Research in Latin America, at the 170th Meeting of the Acoustical Society of America, Jacksonville, FL in November of 2015.

B. Marie Trone (CONAPAC) has initiated with H. Glotin the BRILA group (Bioacoustics Research in Latin America), with a mission to unite scientists and resources across disciplines engaged in bioacoustical research in Central and South American countries (<http://sabiiod.univ-tln.fr/brila/>).

C. Susannah Buchan (Universidad de Concepción) is a member of the organizing committee for the first meeting of Listening for Aquatic Mammals in Latin America (LAMLA) taking place in Brazil in June of 2016 (<http://www.lamla2016.com/>).

D. Julie Patris (CNRS) is presenting BRILAAM project at LAMLA in June of 2016, and is opening since begin 2016 effective collaboration with Elwin van 't Wout (Pontificia Universidad Católica de Chile (PUC)) and Susannah Buchan: Universidad de Concepción (UdeC). These collaborations needs STICAmSud to result into high level publications.

E. Marie Trone (CONAPAC) is organizing the pre-STICAmSud Mini Symposium in the Peruvian Amazon in July 2016 with the purpose of discussing this proposed project (BRILAAM), new bioacoustical materials, methods, their application in Chile and Peru, and field testing.

To be completed with help from this grant:

F. Sponsor a Symposium on Sharing Acoustical Materials and Methods (SAMM) in 2017.

G. Sponsor a Symposium on Sharing Acoustical Results (SAR) in 2018.

2. Develop new methods in acoustics and in data processing including:

A. Innovative wavelet signal processing techniques

B. Statistical methods and algorithms that automatically segment and label the song units of whale song and dolphin clicks

C. Classification with scaled acoustic analysis methods

D. Sound propagation modeling using finite element methods and boundary elements methods

3. Mutual transfer of professional skills and technologies:

A. The new bioacoustic instrumentation, the JASON DAQ, will be shared by participants in three different environments in various geographic locations and modified for improvement as needed. This instrumentation is capable of recording at low sampling rates for longer duration recordings or very high sampling rates (1 MHz x 4 channels) for shorter duration recordings.

B. New signal processing techniques (automatic decompositions; wavelet and scattering representations) will be shared by all participants.

C. Methods of acoustical long-term recording will be shared to create a network of “acoustical observatories” in Chile and Peru.

D. New methods of obtaining ecological and ethological data about various cetacean species will be shared by all participants. Possible information that may be obtained via bioacoustical measurements include population counts, identification of individual cetaceans, animal size, behavioral state, habitat usage, and communication.

4. Promote future collaborations among scientific institutions:

- A.** An open source depository for audio recordings collected in this project will be created.
- B.** A citizen science open source platform with downloadable cetacean audio files and newly created signal processing software will be created with the goal of increasing the amount of information obtained from these high-frequency recordings by scientists around the globe.
- C.** Student participation in data analysis and participation in meetings will be encouraged, so as to build a lasting team of cetacean bioacoustic researchers in South America.
- D.** A permanent bioacoustics research laboratory will be established in the Peruvian Amazon. Scientists will be encouraged to apply the technology and signal analysis methods developed in this project to learn more about the rich species diversity characterizing this region.
- E.** Joint scientific publications will result from the research collaborations set up in this project.

B2. Project description

Goals, motivation, methodology and contribution of each institution

1. Laboratoire des Sciences de l'Information et des Systèmes (LSIS), univ of Toulon (CNRS): Our goal is to share methods, technology and professional skills in studies of cetaceans. We have already developed a platform that is installed in the Mediterranean waters surrounding Port-Cros National Park that acoustically documents passing cetaceans (<http://glotin.univ-tln.fr/BOMBYX/>).

In BRILAAM, we aim to create and install several bioacoustic observatories, using our new instrumentation (JASON DAQ) designed at the university of Toulon for advanced tracking of cetaceans, for long-term recording at low sampling rates, or for short-term recording at high sampling rates and multiple channels (1 MHz SR x 4 channels allowing source separation and individual cetacean surveys).

Theoretical exchanges on acoustical modeling will allow for long term collaboration between researchers working in Chile and Peru. This collaboration will include LSIS and also the Laboratoire de Mécanique et d'Acoustique de Marseille (LMA UMR CNRS) which is interested in the Patris's PhD program. Pr M. Asch with the UMR Lab. of Fundamental and Applied Mathematics (UMR LAMFA) at the university of Amiens, will also provide critical expertise in the production of the new inverse model for bioacoustics applied in BRILAAM. One motivation of BRILAAM is to provide improved methods to the novel South American bioacoustic community, by demonstrating CNRS advances in this fast developing research area. BRILAAM shares similar motivations and methods that the SABIOD "Scaled Acoustic BIODiversity" project of the Mission Interdisciplinaire of the CNRS created and headed by H. Glotin (<http://sabiiod.org>).

2. Universidad de Concepción: Our motivation is to develop bioacoustics in Chile and support the field at a regional level. Specifically, the COPAS Sur-Austral program at the University of Concepcion, via Dr. Susannah Buchan's research, aims to couple bioacoustics with oceanographic approaches, to answer questions on large whale ecology and pelagic biological oceanography in Northern Chilean Patagonia. Susannah Buchan is currently the Principal Investigator on a blue whale acoustics research project in Northern Chilean Patagonia, where she has been working since 2007.

With this project, we aim to exchange technical knowledge on large cetacean acoustics in the southeast Pacific to support the development of novel acoustic analytical skills. We also aim to build analytical capacity in Chile. UdeC will contribute an annotated data set on large cetaceans for developing new data analysis techniques (i.e. unified treatment by the group, song classification, and propagation modeling). We will also exchange information on cetacean ecology and the interpretation of new bioacoustic analysis techniques. Moreover, we will play a major role in logistical and technical support for hydrophone installation, where prior funding has been provided.

3. Pontificia Universidad Católica de Chile (PUC): Our goal is to develop advanced mathematical techniques that effectively simulate the propagation of sound from marine mammals in both oceanic and riverine environments. We are motivated by our desire to use our expertise in research projects that have an impact on different fields of science and society. Indeed, the Institute of Mathematical and Computational Engineering acknowledges its mission to support interdisciplinary research by the development of the necessary computer algorithms. The affiliated researchers already have ample

experience in the development of acoustical models for a range of different applications. Specifically, the open-source library BEM++ has been jointly developed by the University College London and this university. This high-level implementation of the boundary element method will be used and improved to design state-of-the-art computational algorithms, with a special emphasis to the propagation of bioacoustical signals in aquatic environments.

4. Conservación de la Naturaleza Amazonica del Perú, A.C. (CONAPAC) and Instituto del Mar del Peru (IMARPE): One of our goals is to increase our knowledge of the two river dolphin species endemic to the Amazon watershed through a multi-year study utilizing high-frequency acoustical and signal processing techniques. Both of these cetacean species are listed as “data deficient” by the International Union for the Conservation of Nature (IUCN) and consequently lack the protection provided by endangered species status despite increasing anthropogenic threats (*Inia geoffrensis*: <http://www.iucnredlist.org/details/10831/0>; *Sotalia fluviatilis*: <http://www.iucnredlist.org/details/190871/0>). To accomplish this goal we will host the pre-STICAmSud Mini Symposium with representatives from France, Chile, Peru, the United States and Belgium sharing their expertise in the various disciplines to sampling and processing techniques relevant to the diverse cetacean species that inhabit these improve various aquatic habitats. This symposium will take place in the Peruvian Amazon in July of 2016. Results from this meeting will assist in the formulation of the 2017 Symposium on Sharing Acoustical Materials and Methods (SAMM). Our second goal includes applying this new technology opportunistically with fishing vessels in Peruvian waters. In addition, we are creating a citizen science website where we will share the recordings obtained using the new JASON DAQ technology, as well as the signal processing software, both created by the CNRS LSIS. We hope that this open source platform will increase the amount of information obtained from these high-frequency recordings by scientists around the globe. Finally, we aim to establish a permanent bioacoustics laboratory in the Peruvian Amazon to encourage the application of the technology and signal analysis methods developed during this project to learn more about the rich species diversity that characterizes this region.

Project scope

1. Chile, South America : From Magella to north of Chile visited by 50% of the cetacean species.
2. Peru, South America, Amazone river endemic dolphins.
3. France, Toulon Riviera coast, for the survey of endangered marine mammals.

Expected results

1. Provide bioacoustic instrumentation and signal processing algorithms to researchers in South America with the intention of accelerating collaboration between scientists and improving the quality and quantity of cetacean bioacoustic research results.
2. One postgraduate or post-doctoral student from Chile (PUC) to travel to France.
3. Sponsor a Symposium on Sharing Acoustical Materials and Methods (SAMM) in 2017 in Santiago, Chile
4. Sponsor a Symposium on Sharing Acoustical Results (SAR) in 2018 in Rosario, Argentina.
5. Publication of the results from this project :

Several methods in signal processing (scattering, scalograms, chirpgrams), in machine learning in deep learning / feature learning, in acoustic inversion will be validated and published along with long term recording on emblematic species of south america. New collaborations with Chili Santiago partners in BEM will conduct to new model in bioacoustics.

6. Citizen science website with downloadable cetacean audio files and signal processing algorithms created in the continuity of CNRS web site <http://sabiord.org> and brila subsection.
7. Creation of future research projects involving collaborations forged during this project.

B3. Schedule, with main execution stages

1. July 2016: Pre-STIC-AmSud Mini Symposium
2. January 2017: PhD student from France – Begin 2nd stage of PhD in Chile (Hervé Glotin provides one of the recording materials and Julie Patris installs the equipment in Chilean submarine canyons)
3. November 2017: Symposium on Sharing Acoustical Materials and Methods (SAMM) in 2017 in Santiago, Chile, to discuss materials and share methodologies; field test materials and methods at sea
4. February 2018: Postgraduate or post-doctoral student from Chile (PUC) to France to meet the French team and learn about signal processing and modelling developed in Marseille and Toulon
5. November 2018: Symposium on Sharing Acoustical Results (SAR) in Rosario, Argentina to share information regarding optimal use of materials and methods employed in this project
6. December 2018: Manuscript summarizing the results from this project submitted for publication review
7. December 2018: Citizen science website is established and operating with downloadable cetacean audio files and signal processing algorithms

B4. Contributions

Present contributions so as to highlight the role of each partner and the integration among partners.

1. Hervé Glotin (CNRS) will provide newly developed bioacoustic sampling equipment to researchers in Chile and Peru.
2. Hervé Glotin (CNRS) will provide newly developed bioacoustic signal processing algorithms to researchers in Chile and Peru.
3. Marie Trone (CONAPAC) will organize the pre-STICAmSud Mini Symposium that will take place in July of 2016 in the Peruvian Amazon.
4. Hervé Glotin (CNRS), Julie Patris (CNRS), Marie Trone (CONAPAC), Elwin van 't Wout (PUC), Susannah Buchan (Universidad de Concepción), Pascale Guiradet (CNRS), David Bonnett (CONAPAC), Cedric Gileman (Solinia) and Marc Plumet (Solinia) will participate in this pre-STICAmSud Mini Symposium in July of 2016.
5. Hervé Glotin (CNRS) will send PhD student, Julie Patris (CNRS), to Chile to install newly designed bioacoustic sampling equipment.
6. Elwin van 't Wout (PUC) will supervise a student at PUC who will develop a computational acoustic model. The student will also visit France to work with Hervé Glotin (CNRS).
7. Susannah Buchan (Universidad de Concepción) will implement the new instrumentation and signal processing algorithms provided by Hervé Glotin (CNRS).
8. Marie Trone (CONAPAC) and Vanessa Bachmann (IMARPE) will implement the new instrumentation and signal processing algorithms in the Peruvian Amazon and oceanic waters to bioacoustically sample the two species of river dolphins (*Inia geoffrensis* and *Sotalia fluviatilis*) and marine odontocetes.
9. Julie Patris (Université de Marseille) will model sound propagation in submarine canyons and fluctuating riverine habitats.
10. Hervé Glotin (CNRS), Julie Patris (CNRS), Marie Trone (CONAPAC), Vanessa Bachmann (IMARPE), Miguel Llapapasca (Universidad de Antofagasta), Elwin van 't Wout (PUC), Susannah Buchan (Universidad de Concepción), Pascale Guiradet (CNRS), David Bonnett (CONAPAC), Cedric Gileman (Solinia) and Marc Plumet (Solinia) will participate in the 2017 Symposium on Sharing Acoustical Materials and Methods (SAMM) either physically in Santiago or via Skype.
11. Hervé Glotin (CNRS), Julie Patris (CNRS), Marie Trone (CONAPAC), Vanessa Bachmann (IMARPE), Miguel Llapapasca (Universidad de Antofagasta), Elwin van 't Wout (PUC), Susannah Buchan (Universidad de Concepción), Pascale Guiradet (CNRS), David Bonnett (CONAPAC), Cedric Gileman (Solinia) and Marc Plumet (Solinia) will participate in the 2018 Symposium on Sharing Acoustical Results (SAR) either physically in Rosario or via Skype.

12. Hervé Glotin (CNRS), Julie Patris (CNRS), Marie Trone (CONAPAC), Vanessa Bachmann (IMARPE), Miguel Llapapasca (Universidad de Antofagasta), Elwin van 't Wout (PUC), and Susannah Buchan (Universidad de Concepción) will compose and submit a manuscript based upon the results of this project.

13. Marie Trone (CONAPAC), Vanessa Bachmann (IMARPE) and Miguel Llapapasca (Universidad de Antofagasta), will establish, promote and supervise the citizen science bioacoustics website.

B5. Regional Aspects

Indicate how the activities will stimulate effective scientific interactions between all the participants.

The proposed activities actively involve various research and conservation organizations (i.e. CNRS, University of Toulon, Universidad de Concepción, CUP, IMARPE, Universidad de Antofagasta, CONAPAC, and Solinia). This is the first time that the aforementioned organizations have collectively collaborated on a multi-disciplinary (i.e. machine learning, computer science, physics, mathematics, physiology, ecology and ethology) scientific investigation into cetacean bioacoustics for the purposes of both basic and applied sciences.

The pre-STICAmSud Mini Symposium in July 2016 will initially bring members from France, Chile, Peru, the United States, and Belgium together to discuss the integration of the new JASON DAQ instrumentation with these newly developed signal processing techniques. Methodologies involving sampling rate frequencies, hydrophone arrangements within arrays, and sound propagation modeling will be field tested and modified for enhanced data collection and analyses. Results from this pre-STICAmSud Mini Symposium will be prepared for publication and distributed to interested parties prior to the 2017 Symposium on Sharing Acoustical Materials and Methods (SAMM).

Following approximately one year of the implementation of the new equipment and algorithms in diverse aquatic habitats (i.e. deep ocean canyons and plains; dynamic shallow rivers), project participants will meet again to discuss the results at the 2018 Symposium on Sharing Acoustical Results (SAR). Throughout this project, audio files will be continuously uploaded to the citizen science website and will be globally available to all interested parties, along with the algorithms to process these acoustic signals.

B6. Institutions and CVs of coordinators

1. LSIS UMR CNRS 7296 in Toulon university

The LSIS was created in January 2002 by gathering the research teams from the DIAM (UPRESEA n°2210), the LIM (FRE n°2246) and the ENSAM of Aix-en-Provence. It is a research unit (UMR) common to the three institutions: University of Aix Marseille, the University of Toulon, and ENSAM with the CNRS (The National Institute of Computer sciences and its Interactions – INSII).

The development of our international relations has led to the creation of an international French-Argentine center of information and systems (CIFASIS) of sciences. This center is recognized by CONICET and the National University of Rosario.

LSIS actually unites approximately 200 scientists, professors, and PhD students in collaborative research projects. By its composition (The section 07 researchers of CNRS, the sections 27 and 61 research professors of CNU), the research activities of the laboratory cover topics in computer science control systems and image processing.

In order to ensure better skills and know-how visibility of LSIS in fundamental research as well as in applied research, in January 2008, we have restructured our research activities into three poles: Computer science, Systems and Image. Our objective is to have these projects as scientific leading tools and creating dynamics in the laboratory's activities. A research project should specifically target either of signal processing, inverse model, acoustics, machine learning, with application to bioacoustics. In LSIS Pr. Glotin leads the Scaled Acoustic Biodiversity (SABIOD) project for the Centre National de la Recherche Scientifique (CNRS) <http://sabiody.univ-tln.fr>,

involving 50 scientists collaborating on the topic, including Y. LeCun, who is the head of the research group for FaceBook, and S. Mallat, who is the head of the Data team at Ecole Normale Supérieure. Pr. Gloin has written dozens of scientific publications in the past decade on whale signal analysis (<http://sabiod.org/publications.html>), including a USA patent on whale 3D tracking by passive acoustics (<http://glotin.univ-tln.fr/oncet/>). His work has recently been cited in the New York times and BBC Earth

(http://www.nytimes.com/interactive/2016/04/16/opinion/sunday/conversation-with-whales.html?_r=0 and <http://www.bbc.com/earth/story/20160426-why-one-species-of-dolphin-has-turned-pink>).

2. Universidad de Concepción (UdeC) is one of the top universities in Chile, the most prestigious in Chile in oceanographic research, and well recognised in this field regionally and internationally. The University of Concepción is also the only university in Chile that currently owns and works with bottom mounted hydrophones, through the work of Dr. Susannah Buchan on blue whales in Northern Chilean Patagonia since 2007.

Bioacoustics is hugely underdeveloped in Chile, and part of the mission of the University of Concepcion is to develop this field in Chile, for monitoring and understanding cetaceans along its extensive coast line. Specifically, UdeC's COPAS Sur-Austral research program, where Dr. Buchan is based focuses on oceanographic research in Chilean Patagonia and has extensive expertise in this area. Dr. Buchan's research, in collaborations with other COPAS Sur-Austral oceanographers, is to couple bioacoustics and oceanography to answer questions on large whale ecology and pelagic biological oceanography in this remote part of the world ocean.

3. The Pontificia Universidad Católica de Chile (PUC) is one of the best recognized universities in Chile and consistently ranks among the top universities in Latin America. The campus is located in Santiago de Chile and has hosted many international scientific meetings. The research group in Mathematical and Computational Engineering is a new interdisciplinary initiative of the School of Engineering and Faculty of Mathematics. Its mission is to develop world-class mathematical models and computational algorithms with impact to a wide variety of applications. An important activity of the participating professor for this research project is the development of acoustical models with open-source libraries.

4. The Conservación de la Naturaleza Amazónica del Perú, A.C. (CONAPAC) became a non-profit Peruvian non-governmental organization (NGO) in 1990. The mission of CONAPAC is to promote the conservation of the rainforest through education of its stewards, the people who live along the Amazon and Napo Rivers. One way in which this mission is accomplished is by supporting researchers investigating the biodiversity of both the aquatic and terrestrial habitats. In return, the scientists share their knowledge and include local students in research experiences. As these young Peruvians witness international travelers coming to their communities in order to experience this extraordinary biome, an appreciation of the regional rainforest is fostered. In support of its mission, CONAPAC has recently committed to supporting Dr. Marie Trone in a multi-year dolphin research project and establishing an international bioacoustics laboratory, with the goals of promoting conservation while constructively contributing to the international scientific community.

5. The Instituto del Mar del Perú (IMARPE), is a governmental organization dedicated to the scientific investigation of the Peruvian ocean and its resources. IMARPE makes recommendations to the Peruvian government concerning the sustainable use of marine resources in order to conserve marine ecosystems, thus aiding the development of the country. The Top Predators Office continuously monitors seabird, marine mammal and sea turtle populations, diets and reproductive successes. These observations lead to assessments concerning the distribution and availability of prey and ecosystem health. This methodology provides an alternative method of environmental monitoring of resource supply. This office also

evaluates mass mortality events of top predators and their causation. Dr. Vanessa Bachmann is the Director of the Top Predators Office and will supervise the work of Miguel Llapapasca in this project, as he completes his Master degree with the Universidad de Antofagasta in Chile.

B7. Additional information / List all the complementary fundings expected or already obtained.

Obtained Funding:

1. CNRS:

- . New instrumentation, JASON DAQ for long-term recording at low sampling rates and for short-term recording at very high sampling rates (1 MHz x 4 channels) would be provided at reduced cost by univ Toulon collaboration into BRILAAM, for a total of 4 000 euros.
- . Travels will be helped by LSIS lab for a total of 4000 euros.
- . Financial support of the first stage of Julie Patris' PhD project that is investigating the bioacoustics of cetaceans inhabiting the deep oceanic waters bordering Chile using the SpecFem inversion model
- . Travel have been funded for two preliminary visits to the field and scientific contact in Isla Carlos III (Estrecho de Magallanes) and Isla Chañaral (Reserva Pinguinos de Humbolt)
- . Travels have been funded for the pre-STICAmSud Mini Symposium in July of 2016
- . Server High Performance Computing support for the citizen science website

2. CONAPAC:

- . International bioacoustics laboratory space and operation logistics (building for lab, electric and internet supply)
- . Room, board, and boat transportation between Iquitos and the laboratory and other sampling sites for 2017 and 2018 for Marie Trone.
- . Partial support of the pre-STICAmSud Mini Symposium in July of 2016

Expected Funding / Other Funding Applications to Be Submitted

1. Acoustical Society of America (ASA: <http://acousticalsociety.org/>)

- . Partial financial support of the 2017 Symposium on Sharing Acoustical Materials and Methods (SAMM)
- . Partial financial support of the 2018 Symposium on Sharing Acoustical Results (SAR)

2. International Marine Animal Trainers Association

- . Grant submission for funding to obtain small boat for full time use in Peru and boat captain salary

3. Busch Gardens and Sea World Conservation Fund:

- . Grant submission for funding to obtain small boat for full time use in Peru and boat captain salary

4. Pontificia Universidad Católica de Chile (PUC):

- . Complementary financial support to host international research meeting in Santiago, Chile

Experience of the coordinators in similar projects.

1. Hervé Glotin

- . Headed SABIOD (<http://sabiiod.org>) for MI CNRS from 2012 to now
- . Heading EADM in GRD CNRS MADICS

. General Chair of the workshop on Machine Learning for bioacoustics NIPS4F, ICML4B, ICML ULB, ICDM 4B

2. Marie Trone

- . Session Organizer & Co-Chair: Animal Bioacoustic Research in Latin America, 170th Meeting of the Acoustical Society of America, Jacksonville, FL; November 2-6, 2015.
- . Created and maintains Bioacoustics Research in Latin America (BRILA) website that resulted from the Animal Bioacoustic Research in Latin America session at the 170th Meeting of the Acoustical Society of America
- . Initiated the establishment of the International Bioacoustics Laboratory in the Peruvian Amazon
- . Submitted proposal to head an American National Standards Institute (ANSI) working group on high-frequency cetacean bioacoustics.

3. Susannah Buchan

- . Member of organizing committee for the first Listening for Aquatic Mammals in Latin America (LAMLA) meeting, held in June of 2016 in Brazil.

4. Vanessa Bachmann

- . Director of the Top Predators Office of IMARPE
- . Directed sea turtle monitoring in the Virrilá estuary
- . National and international policy advisor for marine mammals, birds and sea turtles
- . State consultant for Línea Base Ambiental (ELBA) in the Sitios Piloto (SP) Reserva Nacional de San Fernando-Punta San Juan de Marcona de la componente pingüinos de Humboldt (*Spheniscus humboldti*). Proyecto GEF-UNDP Hacia un Manejo Ecosistémico del Gran Ecosistema de la Corriente de Humboldt (GEMCH). Mar/Abril 2014

Present main activities and their relationship with the project's main goal.

1. The pre-STICAmSud Mini Symposium will have representatives from France, Chile, Peru, the United States and Belgium with expertise in the various disciplines meeting in July of 2016 in the Peruvian Amazon to share their expertise with respect to this project. Improved acoustic sampling and processing techniques that are relevant to the diverse aquatic habitats and cetacean species encountered in Peru and Chile should result. Not only are collaborations between France, Chile and Peru formed, but also Belgium and the United States.
2. PhD of Julie Patris – she is pursuing a PhD in acoustic modeling, using FEM and boundary methods developed both in France (Marseille) and in Chile (Santiago). A collaboration between France and Chile results from the sharing of technology and processing methods.
3. Development of an acoustical model with the open-source library BEM++ – Elwin van 't Wout (PUC Chile) is part of the main development team of the open-source library BEM++ that will be used in this project to model sound propagation of cetacean sounds in ocean environments. The development of this acoustical model that is based on the boundary-element method will be instrumental to achieve the project's goal to model the propagation of the bioacoustical signals of cetaceans.
4. The Symposium on Sharing Acoustical Materials and Methods (SAMM) in 2017 in Santiago, Chile will provide a forum for discussing ways to improve the technology and algorithms, as well as express their potential applications.
5. The Symposium on Sharing Acoustical Results (SAR) in 2018 in Rosario, Argentina, where is intalled the Argentina LSIS dpt, will provide a forum for sharing experiences within this research project. Successes will be highlighted and short-comings will be addressed with potential solutions for future

applications. Thus, the collaboration among these countries will continue as a result of this grant funding. A manuscript will result from this symposium.

6. The creation of the citizen science website will allow the uploaded audio files acquired via the new JASON DAQ instrumentation to be available to scientists around the world (e.g. South America, Europe, United States, etc.). This website will also encourage collaborative signal processing among nations with the signal processing software designed by the CNRS LSIS that will be accessible on this website. Thus, this work will be able to continue after 2018.

7. The establishment of an international bioacoustics laboratory in the Peruvian Amazon will encourage scientists to take advantage of the technology and signal analysis methods provided by the CNRS LSIS to acoustically investigate not only the two cetacean species that inhabit the Amazon River watershed, but also the diversity of bat, bird, primate, amphibian and insect species that inhabit this region.

Perspectives of continuing collaboration after project financing is over.

Collaborations between France, Chile, Peru, Belgium and the United States should continue after the funding from this grant ends for several reasons:

1. The JASON DAQ instrumentation is less expensive than equipment that is commercially available facilitating scientific investigations.

2. The algorithms for processing cetacean acoustic signals developed in this project will continue to be available as an open source resource on the internet.

3. The acoustic sound propagation modeling will continue to be available as an open source resource on the internet.

4. The acoustic signals recorded during this project from the two species of Amazon River dolphins, the smaller odontocetes in Peruvian coastal waters, and some of the larger cetaceans encountered in Chilean waters will be available in an open source depository on the internet.

5. An international bioacoustics laboratory will have been initiated, and pending continued funding past 2018, will allow extensions of the research conducted during this project.

B8. International referees

Suggest names of at least 3 international referees to evaluate the project. These researchers should not be connected to people in the project.

1- Kathleen Dudzinski

2- Paul Cristini – CNRS LMA

3- Eduardo Vivas

4 - Christophe Guinet – CNRS Chize

One Name of referee who should not review this project in your opinion =

1- Michel Andre LAB, Spain

2- end.

C. Project Budget

Project title: BRILAAM

Participating institutions:

CONICYT
CNRS
CONCYTET

The STIC-AmSud program **funds travel expenses** (air tickets and *per diem*) to researchers in research missions and workshops.

C1. First year (2017) = Planned missions – Year 1

Researcher	Status (student, junior, senior)	Institution	Origin	Destination	Planned date	Duration (max. 30 days)	Estimated cost of the trip (€)	Estimate of total <i>per diem</i> (€)	Trip and Mission funding institution ¹	Mission objectives
Julie Patris	Student / senior	Toulon univ, in mission in Chili for Phd program	Santiago	Toulon	January 2017	30 Days	1500	500	CNRS	Meeting to share objectives
Julie Patris	student	Toulon univ in mission to Chili	Santiago	Toulon	11. 2017	10 Days	1500	150	CONICYT	Workshop to share methods
Hervé Glotin	senior	Toulon univ	Toulon	Santiago	11. 2017	30 Days	1500	1000	CNRS	Workshop to share methods
Marie Trone	junior	CONAPAC	Iquitos	Santiago	11. 2017	30 Days	600	600	CONCYTEC	Workshop to share methods
Susannah Buchan	junior	Universidad de Concepción	Concepción	Santiago	November 2017	30 days	500	200	CONICYT	Workshop to share methods

¹

Each institution will pay for the trip and per diem of its own researchers.

Miguel Llapasca	student	Universidad de Antofagasta / IMARPE	Lima	Santiago	November 2017	30 days	600	600	CONCYTEC	Workshop to share methods
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CONSOLIDATED BUDGET: Year 1

**Funding requested to the STIC-AmSud Program
Estimated costs (€)**

	A. Travel costs (air tickets)	B- Maintenance costs (<i>per diem</i>)	TOTAL
CNRS France	3000	1 500	4500
CONICYT Chile	2000	350	2350
CONCYTEC Peru	1200	1 200	2400
<u>Total requested funding to STIC-AmSud</u>	<u>5 200</u>	<u>2 050</u>	<u>7 250</u>
<u>Other funding</u>	1000	1 000	2 000
TOTAL	6 200	3 050	9 250

Do you have additional funding sources for this project²?

LSIS / Univ Toulon provides Bonus Quality Research Funds, joint to specific Pelagos sanctuary grants, given to LSIS Toulon Dyni team for theoretical researches on bioacoustic methods. It will help in providing some material and travels, for a total of 2000 euros in year 1, same in year 2.

C2. Second year (2018)

Second year funding depends on approval of intermediate progress report.

Planned missions – Year 2

Researcher	Status (student, junior, senior)	Institution	Origin	Destination	Planned date	Duration (max. 30 days)	Estimated cost of the trip (€)	Estimate of total <i>per diem</i> (€)	Trip and Mission funding institution ³	Mission objectives
Elwin van 't Wout	junior	PUC	Santiago	Rosario	December 2018	7 days	700	200	CONICYT	Workshop to share results and write article
Marie Trone	junior	CONAPAC	Iquitos	Rosario	December 2018	7 days	800	200	CONCYTEC	Workshop to share results and write article
Susannah Buchan	junior	Universidad de Concepción	Concepción	Rosario	December 2018	7 days	700	200	CONICYT	Workshop to share results and write article
Julie Patris	Student / senior	Univ Toulon	Santiago	Rosario	December 2018	7 days	700	200	CNRS	Workshop to share results and write article
Hervé Glotin	senior	CNRS	Paris	Rosario	December 2018	15 days	1300	400	CNRS	Workshop to share results and write article
Miguel Llapasca	student	Universidad de Antofagasta / IMARPE	Lima	Rosario	December 2018	7 days	800	200	CONCYTEC	Workshop to share results and write article

3

Each institution will pay for the trip and per diem of its own researchers.

CONSOLIDATED BUDGET: Year 2

**Funding requested to the STIC-AmSud Program
Estimated costs (€)**

	A. Travel costs (air tickets)	B- Maintenance costs (<i>per diem</i>)	TOTAL
CNRS France	2000	600	2600
CONICYT Chile	1400	400	1800
CONCYTEC Peru	1600	400	2000
<i>Total requested funding to STIC-AmSud</i>	<i>4000</i>	<i>400</i>	<i>4400</i>
<i>Other funding</i>	<i>1000</i>	<i>1000</i>	<i>2000</i>
TOTAL	5000	1400	6400

Do you have additional funding sources for this project⁴

LSIS / Univ Toulon provides Bonus Quality Research Funds, joint to specific Pelagos sanctuary grants, given to LSIS Toulon Dyni team for theoretical researches on bioacoustic methods. It will help in providing some material and travels, for a total of 2000 euros in year 1, same in year 2.

4

C3. BUDGET TOTALS

	Year 1	Year 2	Total
Funding requested to CNRS (France)	4 500	2 600	7 100
Funding requested to CONICYT (Chile)	2 350	1 800	4 150
Funding requested to CONCYTEC (Peru)	2 400	2 000	4 400
<i>Total requested funding to STIC-AmSud</i>	7 250	4 400	11 650
<u>Other funding from LSIS / univ Toulon grants</u>	2 000	2 000	4 000
TOTAL	9 250	6 400	15 650

1/ Personal data

Name: Hervé Glotin

Birth date: February 14, 1970

Professional address (with telephone and e-mail):

Université de Toulon - CS 60584 – 83041 TOULON CEDEX 9 - France

Telephone: (+33) 04 94 14 28 24 **Email:** glotin@univ-tln.fr <http://glotin.univ-tln.fr>

Current job title and size of the research group:

- Full Professor of the Laboratory for Systems and Information Science (LSIS) with 150 members
- Head of Information Dynamics and Integration (Dyni) team (12 members)

2/ Highest obtained degree (with indication of place and date)

- PhD in Cognitive Sciences, thesis: “Audiovisual large vocabulary speech recognition”; Institut National Polytechnic, Grenoble, France; June 2001
- Doctorate for Research Direction, University of Toulon; December, 2007

3/ Professional activity in the last 5 years

- Professor for Master of Computer Science at the University of Toulon
- Professor for Master of Marine Biology at the University of Toulon
- Head of LSIS laboratory Dyni team since 2007
- Research on bioacoustic data clustering and analysis, mainly on
 - a. Sperm whale (*Physeter macrocephalus*) detection and 3D localization
 - b. Humpback whale (*Megaptera novaeangliae*) song analysis
 - c. Amazon River dolphin (*Inia geoffrensis*) click bioacoustics

4/ Other duties/ positions

- Director of University of Toulon Computer Science
- Head of the MI CNRS Scaled Acoustic Biodiversity Project <http://sabiiod.org> from 2012 to 2016
- Head of Environmental Acoustic Data Mining Group in GDR CNRS MADICS

5/ Awards, fellowships and external recognition

- Awarded membership of Institut Universitaire de France (IUF) 2011-2016 (*IUF promotes high quality research and strengthens interdisciplinary projects*)
- Leads the Scaled Acoustic Biodiversity (SABIOD) project for the Centre National de la Recherche Scientifique (CNRS) <http://sabiiod.univ-tln.fr>, involving 50 scientists collaborating on the topic, including Y. LeCun, who is the head of the research group for Face Book, and S. Mallat, who is the head of the Data team at Ecole Normale Supérieure.
- Dozens of scientific publications in the past decade on whale signal analysis (<http://sabiiod.org/publications.html>)
- USA patent on whale 3D tracking by passive acoustics (<http://glotin.univ-tln.fr/oncet/>).
- Work recently been cited in the New York Times and BBC Earth (http://www.nytimes.com/interactive/2016/04/16/opinion/sunday/conversation-with-whales.html?_r=0 and <http://www.bbc.com/earth/story/20160426-why-one-species-of-dolphin-has-turned-pink>)

6/ Ongoing funded research projects with dates, titles, sources of funding

Invited Pr. at Ocean Networks Canada, Victoria university, whole summer 2015, to design advanced passive submarine acoustic algorithms to survey cetacean and boat traffic. Grant Ocean Network Canada

* General PI of several internat workshop : Big Data ULearnBio ICML 2014 workshop CFP : 'Unsupervised Learning from Bioacoustic Big Data' june 2014-Beijing, ICML 2014 ULearnBio challenges; Neural Information Processing Scaled to Bioacoustics wkp - Nevada 2013 (with Y. LeCun, S. Mallat, T.Artieres, O. Tchernichovski, X. Halkias) - Bird and Whale NIPS4B challenges; The Bioacoustic classification challenge @ ICML2013; Machine Learning for Bioacoustics workshop (joint to ICML) Atlanta 2013 (with Y. LeCun NY univ., C. Clark & P. Dugan Cornell univ.) : Grants IUF, SABIOD and NIP or ICML

Current Projects:

- Co-PI of the National Security Dpt grant (SPID) for anti-drone passive acoustic system, 60 Keur.
- SYCIE : Multimodal Maritime Multi-Drone Mission Optimisation (+Prolexia, IFREMER, DCNS, FUI project) 2013-2017 [Co-Pi], 100 Keuro

- Scaled Acoustic Biodiversity Interdisciplinary Big Data CNRS (+Museum Histoire Naturelle de Paris, University P6, Orsay., Cornell Univ USA...) 2012-2017 [Pi] 120 Keuros
- Multimodal Submarine DataMining : BOMBYX : Joint Bioacoustics, Fauna video recording and courantology – 2011-19, 20 Keuros
- PHRASE: Augmented Reality and Autonomous Perception (+Inst. Science Mouvement, Prolexia, DGA RAPID project), 2012-2015 [Co Pi], 120 Keuros

7/ Selected Publications of project leader:

- Glotin, H. (2014) *Soundscape Semiotics - Localization & Categorization*, ISBN 978-953-51208 p., InTech, Open Book, 2014.
- Paris, Glotin, Doh, & Razik (2013) *Physeter* localization: sparse coding & fisher vectors; reprint ArXive.
- Doh, directed by Glotin, H. (2014) 'A new intra-spectral monohydrophone range estimator and bioacoustic sparse coding for scaled submarine biodiversity'. Doctoral dissertation, University of Toulon, December.
- Bartcus, Chamroukhi, & Glotin (2015) Hierarchical Dirichlet process hidden Markov model for unsupervised bioacoustic analysis - Application to whale song identification, in IJCNN 2015, http://sabiod.univ-tln.fr/workspace/IHMM_Whale_demo
- Halkias X., Paris S., & Glotin H. (2013) "Machine learning for whale acoustic classification, *Journal of the Acoustical Society of America*, 5(5), 3496-3505.
- Abeille, directed by Glotin, H. (2013) Automatic inter-pulse interval estimation application to scaled whale bio-population in Pelagos, Doctoral dissertation, University of Toulon, December.
- Glotin, LeCun, Mallat, Artières, Tchernichovski & Halkias (Eds), (2014) Proceedings of the 1st Information Processing for Bioacoustics NIPS4B, joint to NIPS, Lake Tahoe, Nevada, USA.
- Glotin, Clark, LeCun, Dugan, Halkias & Sueur (Eds), (2013) Proceedings of the 1st Workshop on Machine Learning for Bioacoustics, ICML4B, joint to the International Conference for Machine Learning, (ICML) Atlanta, Georgia, USA.
- Glotin, Giraudet & Benard (2014) Real-time robust method for determining the trajectory of one or more cetaceans by means of passive acoustics, using a laptop computer. FR, EU, USA Patent 8,638,641, New Zeland, Patent. <http://glotin.univ-tln.fr/oncet>
- Giraudet, P. & Glotin, H. (2006) Real-time 3d tracking of whales by echo-robust precise TDOA estimates with a widely-spaced hydrophone array, *Applied Acoustics*, 67 (11), 1106-1117.
- Glotin, H., Caudal, F. & Giraudet, P. (2008) Whales cocktail party: a real-time tracking of multiple whales, *International Journal Canadian Acoustics*, 36 (1), 7p.
- Caudal, F. & Glotin, H. (2008) Multiple real-time 3d tracking of simultaneous clicking whales using hydrophone array and linear sound speed profile, *Acoustics, Speech and Signal Processing, ICASSP, IEEE*
- Caudal, F. & Glotin, H. (2008) Stochastic Matched Filter outperforms Teager-Kaiser-Mallat for tracking a plurality of sperm whales, *New Trends for Environmental Monitoring Using Passive Systems*, 1-9.
- Bénard-Caudal, F., Giraudet, P. & Glotin, H. (2010) Whale 3D monitoring using astrophysic NEMO ONDE two meters wide platform with state optimal filtering by Rao-Blackwell Monte Carlo data association, *Applied Acoustics* 71 (11), 994-999.
- Patris, J., Glotin, H., Komatitsch, D., Wout, E.V.T., Malige, F. & Asch, M. (2016) High-performance computing for whale sound propagation in oceans based on accurate numerical techniques, in Listening for Aquatic Mammals in Latin America Conference (LAMLA)
- Razik, J., Hoeberechts, M. & Doh, Y. (2015) Sparse coding for efficient bioacoustic data mining: Preliminary application to analysis of whale songs, 2015 IEEE Internat.Conference on Data Mining Workshop (ICDMW), 780-787.
- Dugan, P., Zollweg, J., Popescu, M., Risch, D., Glotin, H. & LeCun, Y., 2014, High performance computer acoustic data accelerator: A new system for exploring marine mammal acoustics for big data Applications, arXiv preprint arXiv:1509.03591, in ICML2014

8/ Finished/defended in the last 5 years PhD students

oct 2009 - dec 2012: (+L. Ralaivola Pr. CNU 27) Phd codir P. Machart (Ministry grant): Coping with the Computational and Statistical Bipolar Nature of Machine Learning. Now post doc at IRISA Panama team
 oct 2010 - sept 2013: (+P. Giraudet CNU 69) PhD dir of R. Abeille (USTV grant): 'Multipulsed biosonar robust decomposition, application to whale authentication'
 nov 2011 - dec 2014: (+J. Razik, O. Adam Pr CNU 61) PhD codir of Y. Doh: 'Bioacoustique robuste embarquee' (Region PACA)
 dec 2012 - oct 2015: (+F. Chamroukhi) PhD dir of M. Bartcus (Ministry grant): 'Unsupervised Bayesian learning for large scale scene analysis'

9/ Ongoing Phd

oct 2015 - ...: (+M. Asch, Pr CNU 25) PhD dir. of Julie Patris (STICAmSud grant): 'High Perf. Comput. for 3D finite element bioacoustics (SPECFEM3D) <https://github.com/geodynamics/specfem3d>'

1/ Personal data

Name: Marie Trone

Birth date: August 26, 1967

Professional address (with telephone and e-mail):

Valencia College

1800 Denn John Lane; Kissimmee, Florida 34744; USA

Telephone: 407 582 4914

Email: mtrone@valenciacollege.edu

Current job title and size of the research group:

- Professor of Biology: Department of Math and Science - Valencia College
Supervised 1 research intern in Spring 2016 semester
- Adjunct Professor: Brain and Behavior Science - University of Southern Mississippi
Supervising 1 doctoral student

2/ Highest obtained degree (with indication of place and date)

- PhD in Experimental Psychology; University of Southern Mississippi, USA; May 2006
- MS in Biology; Andrews University, Michigan, USA; August 1999

3/ Professional activity in the last 5 years

- April 2016 – Informal approval for proposal to create International Master of Science in Bioacoustics Program as a collaboration between the Brain and Behavior Science Department of the University of Southern Mississippi and the Université de Toulon
- April 2016 – Created 700-level course: “Cetacean Bioacoustics”
- April 2016 – Created 100-level course: “Environmental Science in a Developing Country”; won grant to lead this new course to Peru in May of 2017
- April 2016 – Submitted proposal to the American National Standards Institute (ANSI) to lead a working group on cetacean high-frequency bioacoustics standards and measurements
- March 2016 – Certified to teach online courses for Valencia College
- March 2016 – Co-created Bioacoustics Research in Latin America group : <http://sabiiod.univ-tln.fr/brila/>
- February 2016 – Acquired 2 year room, board, & laboratory space support commitment from CONAPAC for international bioacoustics laboratory in the Peruvian Amazon
- December 2015 – Invited Speaker: Trone, M., Glotin, H., Blakefield, J., Balestrieri, R., Bonnett, D.E. Collaborating across disciplines: Applying machine learning techniques to analyze high-frequency dolphin clicks. Presented at the First Workshop of RIEMMCCA: Network of Aquatic Mammal Specialists of Central America and the Caribbean, joint to the 21st Biennial Conference on the Biology of Marine Mammals, San Francisco, California; December 12.
- December 2015 – Poster: Trone, M., Glotin, H., Blakefield, J., Balestrieri, R., Bonnett, D.E. (2015). Clicks count: Exploring the usage of high-frequency clicks as a means to estimate the quantity of Amazon River dolphins. Presented at the 21st Biennial Conference on the Biology of Marine Mammals, San Francisco, California; December 13-18.
- November 2015 – Session Organizer & Co-Chair: Animal Bioacoustic Research in Latin America, 170th Meeting of the Acoustical Society of America, Jacksonville, FL; November 5.
- November 2015 – Presentation: Trone, M., Glotin, H., Balestrieri, R., & Bonnett, D.E. (2015). Enhanced feature extraction using the Morlet transform on 1 MHz recordings reveals the complex nature of Amazon River dolphin (*Inia geoffrensis*) clicks. Presented at the 170th Meeting of the Acoustical Society of America, Jacksonville, FL; November 2-6, 2015.
- October 2014 – Presentation: Trone, M., Balestrieri, R., Glotin, H., & Bonnett, D.E. (2014). All clicks are not created equally: Variations in high-frequency acoustic signal parameters of the Amazon river dolphin (*Inia geoffrensis*). Presented at the 168th Meeting of the Acoustical Society of America, Indianapolis, Indiana; October 29, 2014.
- Peer-reviewer for the following journals: *Aquatic Mammals*; *Animal Behavior and Cognition*; *Animal Welfare*; *International Journal of Comparative Psychology*
- Professional Member of: Acoustical Society of America; Society for Marine Mammalogy; International Marine Animal Trainers Association

5/ Awards, fellowships and external recognition

Amazon River dolphin research featured in BBC Earth article:

<http://www.bbc.com/earth/story/20160426-why-one-species-of-dolphin-has-turned-pink>

6/ Publications last 5 years

- Trone, M., Glotin, H., Balestrieri, R., & Bonnett, D.E. (2015). Enhanced feature extraction using the Morlet transform on 1 MHz recordings reveals the complex nature of Amazon River dolphin (*Inia geoffrensis*) clicks. *Journal of the Acoustical Society of America*, 138, 1904. <http://dx.doi.org/10.1121/1.4933985>
- Trone, M., Glotin, H., Balestrieri, R., Bonnett, D.E., & Blakefield, J. (2015). Heterogeneity of Amazon River dolphin high-frequency clicks: Current Odontoceti bioacoustics terminology in need of standardization. *Proceedings of Meetings on Acoustics*, 22, 070003. <http://dx.doi.org/10.1121/2.0000028>
- Trone, M., Balestrieri, R., Glotin, H., & Bonnett, D.E. (2014). All clicks are not created equally: Variations in high-frequency acoustic signal parameters of the Amazon river dolphin (*Inia geoffrensis*). *Journal of the Acoustical Society of America*, 136, 2217. <http://dx.doi.org/10.1121/1.4900047>
- Trone, M., Balestrieri, R., & Glotin, H. (2013). Gabor scalogram extracts dolphin click formants. In: H. Glotin, Y. LeCun, T. Artières, S. Mallat, O. Tchernichovski, and X. Halkias (Eds.), *Proceedings of International Symposium: Neural Information Scaled for Bioacoustics*, sabiod.org/nips4b, joint to NIPS, Nevada, December 2013, 134-142. https://www.academia.edu/25058604/Gabor_Scalogram_Extracts_Dolphin_Click_Formants
- Paulos, R.D., Trone, M., & Kuczaj, S.A. II. (2010). Play in wild and captive cetaceans. *International Journal of Comparative Psychology*, 23(4), 701-722. http://comparativepsychology.org/ijcp-2010-4/10.Paulos_etal_Final.pdf
- Jaakkola, K., Guarino, E., Rodriguez, M., Erb, L., & Trone, M. (2010). What do dolphins (*Tursiops truncatus*) understand about hidden objects? *Animal Cognition*, 13(1), 103-120. doi 10.1007/s10071-009-0250-z

1/ Personal data

Name: Elwin van 't Wout

Birth date: May 15, 1986

Professional address (with telephone and e-mail):

Pontificia Universidad Católica de Chile

School of Engineering - Avenida Vicuña Mackenna 4860 - Macul, Santiago, Chile

Telephone: +56 2 2354 1104 - **Email:** e.wout@ing.puc.cl

Current job title and size of the research group:

Assistant Professor in High-Performance Computing

Member of the Institute for Mathematical and Computational Engineering

Currently supervising three students

2/ Highest obtained degree (with indication of place and date)

- Ph.D. in Applied Mathematics, Delft University of Technology; the Netherlands; November 2013

3/ Professional activity in the last 5 years

- Oct 2015 – current: Assistant Professor
School of Engineering, Pontificia Universidad Católica de Chile, Santiago, Chile
- May 2014 – Sep 2015: Postdoctoral Research Associate
Centre for Medical Image Computing, University College London, London, United Kingdom
- Jan 2014 – Apr 2014: Consultant
Almatis, Rotterdam, the Netherlands
- Oct 2009 – Nov 2013: Postgraduate Researcher
Flight Physics Department, Netherlands Aerospace Centre NLR, Amsterdam, the Netherlands

5/ Awards, fellowships and external recognition

- Honourable mention in the Student Paper Competition of the IEEE Antennas and Propagation Symposium, both 2011 and 2012
- Research recognized in the book “*European Success Stories in Industrial Mathematics*,” edited by Th.Lery et al., Springer (Berlin), 2011
- Graduated with highest distinction at Delft University of Technology for BSc and MSc degree

6/ Publications

- E. van 't Wout, D. R. van der Heul, H. van der Ven, and C. Vuik, “Stability Analysis of the Marching-on-in-Time Boundary Element Method for Electromagnetics,” *Journal of Computational and Applied Mathematics*, vol. 294, pp. 358–371, March 2016.
- E. van 't Wout, P. Gélat, T. Betcke, and S. Arridge, “A Fast Boundary Element Method for the Scattering Analysis of High-Intensity Focused Ultrasound,” *Journal of the Acoustical Society of America*, vol. 135, no. 5, pp. 2726–2737, Nov. 2015.
- E. van 't Wout, D. R. van der Heul, H. van der Ven, and C. Vuik, “The Influence of the Exact Evaluation of Radiation Fields in Finite Precision Arithmetic on the Stability of the Time Domain Integral Equation Method,” *IEEE Transactions on Antennas and Propagation*, vol. 61, no. 12, pp. 6064–6074, Dec. 2013.
- E. van 't Wout, D. R. van der Heul, H. van der Ven, and C. Vuik, “Design of Temporal Basis Functions for Time Domain Integral Equation Methods With Predefined Accuracy and Smoothness,” *IEEE Transactions on Antennas and Propagation*, vol. 61, no. 1, pp. 271–280, Jan. 2013.

1/ Personal data

Name: Susannah Buchan

Birth date: September 9, 1983

Professional address (with telephone and e-mail):

COPAS Sur-Austral, Edificio Departamento Oceanografía Piso 2

Universidad de Concepción - Barrio Universitario s/n, Concepción, Región del Bio Bio

Telephone: +56 9 6646 8466 **Email:** sbuchan@udec.cl

Current job title and size of the research group:

Associate Researcher, COPAS Sur-Austral program (total 26 researchers including post-doctoral fellows)

2/ Highest obtained degree (with indication of place and date):

PhD Oceanography; Universidad de Concepción; January 2015

3/ Professional activity in the last 5 years:

- Doctoral studies
- Postdoctoral research
- Associate researcher position

6/ Ongoing funded research projects with dates, titles, sources of funding:

CONICYT COPAS Sur-Austral FONDAP BASAL funding (PFB31)

7/ Projects approved in the least 5 years

CONICYT PhD scholarship // COPAS Sur-Austral Postdoctoral Award

8/ Publications

- Buchan S.J. and Quiñones R *accepted*. First insights into the oceanographic characteristics of a blue whale feeding ground in Northern Patagonia, Chile. *Marine Ecology Progress Series*, 2016.
- Buchan, S.J., Stafford K. M., Huccke-Gaete, R. 2015. Seasonal occurrence of southeast Pacific blue whale songs in southern Chile and the eastern tropical Pacific. *Marine Mammal Science*, 31(2): 440-458.
- Buchan, S.J., Huccke-Gaete, R., Rendell, L., Stafford, K.M. 2014. A new song recorded from blue whales in the Corcovado Gulf, Southern Chile, and an acoustic link to the Eastern Tropical Pacific. *Endangered Species Research* 23: 241-252.
- Buchan, S.J., Rendell, L. E., Huccke-Gaete, R., 2010. Preliminary recordings of blue whale (*Balaenoptera musculus*) vocalizations in the Gulf of Corcovado, northern Patagonia, Chile. *Marine Mammal Science*, 26(2): 451-459.

8.1 – Highlight the most important publications related to the project theme

- Buchan S.J. and Quiñones R *accepted*. First insights into the oceanographic characteristics of a blue whale feeding ground in Northern Patagonia, Chile. *Marine Ecology Progress Series*.
- Buchan, S.J., Stafford K. M., Huccke-Gaete, R. 2015. Seasonal occurrence of southeast Pacific blue whale songs in southern Chile and the eastern tropical Pacific. *Marine Mammal Science*, 31(2): 440-458.
- Buchan, S.J., Huccke-Gaete, R., Rendell, L., Stafford, K.M. 2014. A new song recorded from blue whales in the Corcovado Gulf, Southern Chile, and an acoustic link to the Eastern Tropical Pacific. *Endangered Species Research* 23: 241-252.

9.1 Ongoing:

Undergraduate thesis in Marine Biology (UdeC)

1/ Personal data

Name: Vanessa Bachmann Caller

Birth date: September 14, 1979

Professional address (with telephone and e-mail):

Esquina Gamarra y General Valle s/n Chucuito Callao; Peru

Telephone: 511 208 8650 anexo 815.

Email: vbachmann@imarpe.gob.pe

Current job title and size of the research group:

Director of the Top Predators Office, 6 other people work under my direction

2/ Highest obtained degree (with indication of place and date)

- Estudios de Maestría; Universidad Andrés Bello, Santiago de Chile; 2010.
- Diplomada en Manejo de Especies en Peligro de Extinción (DESMAN) de la Universidad de Kent y Durrell Wildlife Conservation Trust. Jersey-Inglaterra. 2009.
- Doctor of Veterinarian Medicine; Universidad Nacional Mayor de San Marcos. Lima, Perú; 2005.

3/ Professional activity in the last 5 years

INSTITUTO DEL MAR DEL PERU (IMARPE)

IMARPE is a governmental organization dedicated to the scientific investigation of the Peruvian ocean and its resources. It makes recommendations to the Peruvian government concerning the sustainable use of marine resources in order to conserve marine ecosystems, thus aiding the development of the country.

- *RESEARCH SCIENTIST OF THE TOP PREDATORS OFFICE-GENERAL MANAGER OF RESEARCH OF PELAGIC RES:* Dec. 2013 to present
- Director of the Top Predators Office. March 2106 – present
- Scientific research of possible causes of marine mammal, bird and sea turtle mortality. Dec. 2013 – present
- Support for census of South American sea lions (*Otaria flavescens*) during the breeding season. March – April 2014
- Health monitoring of sea turtles of the Virrilá Estuary. March 2016 – present
- Director of monitoring sea turtle populations the Virrilá Estuary. March 2016 – present
- Consultant in the Environmental Base Line Study (ELBA) in the Pilot Sites (SP) National Reserve of San Fernando-Punta San Juan de Marcona, Humboldt penguin (*Spheniscus humboldti*) component. GEF-UNDP project Towards an Ecosystem Management of the Great Humboldt Current Ecosystem (HCLME). March / April 2014
- Support for the collection of seabird samples for evaluation diet. March 2104/2106
- Representation of IMARPE in various working groups with governmental and non-governmental institutions. Responsible for monitoring sea turtles in the Virrilá Estuary.
- Review of conservation laws and issuance of scientific opinions of national and international importance on marine mammals, birds and sea turtles. Dec. 2013 - present

UNIVERSIDAD NAC. MAYOR S. MARCOS-FACULTY OF VETERINARIAN MEDICINE

An academic community formed by veterinarian doctors through the teaching, research, animal health outreach, animal food production, public health, food safety, biodiversity and ecosystem management to contribute to the development of society and the environment.

WILDLIFE MANAGEMENT INSTRUCTOR

Oct. 2014

Taught courses in the Sea Health Module, which included topics such as ecosystem services provided by the ocean; mammals, birds and sea turtles as bio-indicators of ecosystem health; discussions on case studies of major diseases that affect these species and the spread of toxic algae and pollutants of anthropogenic origin that undermine their health.

PATRONATO PARQUE DE LAS LEYENDAS FELIPE BENAVIDES BARREDA

Institution recognized for its management, research and conservation of the archaeological heritage and biodiversity of Peru, providing educational, cultural and recreational experiences for visitors and

the community, strengthening national identity.

HEAD OF THE ZOOLOGY DIVISION

July 2011 to Nov. 2013

- Management of Institutional Operational Plan that ensures the welfare of the animal collection, raise awareness for the conservation of native wildlife species, ensure exchange of species, personnel training, and training of young professionals in the management of wildlife.
- Development of the Collection Plan.
- Restructuring of the Animal Management Unit. Implementation daily report system of animal care by area. Success in the rehabilitation of mammals, primates, birds and marine mammals. Improvement of 16 animal enclosures. Implementation Research and Conservation Unit.
- Veterinary hospital equipment and laboratory diagnosis. Data entry by species and individual in the new Zoology information system. Determination of the content of the Señalética by species. Theoretical and practical training in the handling of wild, exotic and domestic species for more than 130 volunteers and 30 practitioners.
- Representation of PATPAL-FBB at the international level with seven research projects. Participation of the zoology staff in 11 educational workshops on animal training, preventative medicine, clinical pathology, wildlife rehabilitation, XIX, XX, and XXI Conferences of the Latin American Association of Zoos and Aquariums, Conservation Medicine. Host of First Meeting of Zoos Peruanos.
- Sampling and advice on research projects of seabirds.

5/ Awards, fellowships and external recognition

Durrell Wildlife Conservation Trust Scholar for earning the Endangered Species Management diploma. March 2009

6/ Ongoing funded research projects with dates, titles, sources of funding

Monitoring mortality events of marine mammal, bird and sea turtle mortality. Dec. 2013 – present on the Lambayeque coast and south Piura. Funded by IMARPE in collaboration with the Veterinarian Medicine Faculty of the Universidad Nacional Mayor de San Marcos.

7/ Projects approved in the least 5 years

Parasitological evaluation of the green sea turtle population (*Chelonia mydas agassizii*) in the Virrilá Estuary, Piura- Perú.

8/ Publications

Bachmann V., Calle S., Torres M., Gavidea C., Morales S., Acosta C. 2006. Dinámica de la Infección con *Mycoplasma hyopneumoniae* en porcinos provenientes de madres con y sin antecedentes de inmunización. Rev Inv Vet Perú 2006; 17 (1): 51-57

1/ Personal data

Name: Miguel Angel Llapasca Llocla

Birth date: January 4, 1986

Professional address (with telephone and e-mail):

Av. Universidad de Antofagasta S/N Campus Coloso; Antofagasta, Chile.

Telephone: +55 9 549 62682. **Email:** miguel.angel.llapasca@gmail.com

Current job title and size of the research group:

Master in Ecology of Aquatic Systems Candidate; University of Antofagasta, Chile.

2/ Highest obtained degree (with indication of place and date)

- Master in Ecology of Aquatic Systems Candidate, University of Antofagasta, Chile; 2015-2016.
- Bachelors in Biology; Universidad Nacional Agraria La Molina; Lima, Perú; 2014.

3/ Professional activity in the last 5 years

LABORATORY CENSOR, CLIMATE CHANGE ECOLOGY RESEARCH GROUP.

Antofagasta, Chile.

The group focuses on understanding the effects of climate change, particularly the El Niño-Southern Oscillation in biotic systems belonging to the outcropping of the Humboldt Current system.

FONDECYT PROJECT PARTNER 115042.

Sept. 2015 – present

Evaluating the effects of seasonal and monthly hypoxic oscillations on seabed biota: evaluating relationships between taxonomical and functional diversity and changes on trophic structure of macrobenthic assemblages. Mejillones, Antofagasta; Chile.

INSTITUTO DEL MAR DE PERÚ (IMARPE)

IMARPE is a governmental organization dedicated to the scientific investigation of the Peruvian ocean and its resources. It makes recommendations to the Peruvian government concerning the sustainable use of marine resources in order to conserve marine ecosystems, thus aiding the development of the country.

RESEARCH ASSISTANT

March 2013-Dic 2014

Responsible for conducting periodic evaluations on the feeding ecology and reproduction of seabird populations of the Peruvian coast and their relationship with the anchovy resource.

MARINE MAMMAL AND MARINE BIRD OBSERVER

Participation in research cruises.

- Hydroacoustic evaluation of pelagic resources cruise, phase 01-CR.1408-10. Marine mammal observer. Sept. Oct. 2014.
- Bio-oceanographic cruise, CR.1406. Marine mammal and bird observer. June 2014.
- Hydroacoustic evaluation of pelagic resources cruise, phase 01-CR.1402-04. Marine bird observer. Feb. 2014.
- Bio-oceanographic cruise, CR.1412. Marine mammal and bird observer. Dec. 2014.
- Hydroacoustic evaluation of pelagic resources cruise, CR.1308-09, Puerto Pizarro to Callao. Marine mammal observer, Aug.-Sept. 2013.

CONSULTANT

Nov. 2013 / March-Apr 2014

Environmental Base Line Study (ELBA) in the Pilot Sites (SP) Isla Lobos de Tierra, Islas Ballestas-Chincha and the National Reserve of San Fernando-Punta San Juan de Marcona, marine biodiversity component: Higher Predators.

- GEF-UNDP project Towards an Ecosystem Management of the Great Humboldt Current Ecosystem (HCLME).
- PIMS 4147

SURVEYOR

Collaborator in sea lion population evaluations during the breeding season.

- Field assistant in the national census of South American sea lions (*Otaria flavescens*). March - April 2014
- Field assistant in the national census of South American fur seals (*Arctocephalus australis*). Nov.-Dec. 2014

- Field assistant in the national census of South American sea lions (*Otaria flavescens*). March - April 2013
- Field assistant in the national census of South American fur seals (*Arctocephalus australis*). Nov.- Dec. 2013

GUNAS ENVIRONMENTAL SOLUTIONS S.A.C

Oct. 2013; Jan., May, July, Aug., Nov., Dec. 2014

Private company responsible for the aviary within the premises of Jorge Chavez International Airport (AIJCH).

CONSULTANT

Responsible for conducting the monitoring of avifauna present in the areas of takeoff and landing (AIJCH) that can interfere with the normal activity of the flights. Also in charge of planning and processing of data and the development of the respective monthly reports.

PACIFIC ADVENTURES - INTEGRATED MANAGEMENT OF THE MARINE ENVIRONMENT S.A.C.

July-Nov. 2010, 2011 and 2012

Private company that provides ecotourism services in marine wildlife, particularly marine mammals. It also conducts scientific research from data collected during the tours.

SCIENTIFIC RESEARCHER

Responsible for identifying cetacean species, principally humpback whales (*Megaptera novaeangliae*). Other data collected include ecological factors and marine mammal strandings. Environmental educational presentations given. Manage data system, process data and data analysis. Co-author of scientific publications.

5/ Awards, fellowships and external recognition

- Scholar 2015-2016 from the Master Program in Ecology of Aquatic Systems, University of Antofagasta. Chile. PROYECTO FIC-R: “Capacity building postgraduate training for innovation and competitiveness in Aquatic Sciences at the University of Antofagasta”.

6/ Ongoing funded research projects with dates, titles, sources of funding

- Master Thesis: SPATIAL AND TEMPORAL DISTRIBUTION MODELS OF THE COMMON DOLPHINS (*Delphinus* spp; *D. capensis* and *D. delphis*) AND DUSKY DOLPHIN (*Lagenorhynchus obscurus*) OFF THE NORTHERN HUMBOLDT CURRENT SYSTEM. 2016. Project in progress. Funding: Instituto del Mar del Perú (IMARPE) and Universidad de Antofagasta Master Program in Ecology of Aquatic Systems.

7/ Projects approved in the least 5 years

- Undergraduate thesis: “Patrón de distribución espacio-temporal de la ballena jorobada (*Megaptera novaeangliae* Boroski, 1781) en la costa norte del Perú” (2014).

8/ Publications

- Quiñones, J., García-Godos, I., **Llapapasca, M.**, Van Ordt, F y Paredes, E. 2015. The Black Sea Turtle (*Chelonia mydas agassizii*) at Lobos de Tierra Island, Northern Peru: high densities in small areas. South American Journal of Herpetology 10(3):178-186. doi: 10.2994/SAJH-D-14-00040.1
- Guidino C., **Llapapasca M.**, Silva S., Alcorta B. y Pacheco A. 2014. Patterns of spatial and temporal distribution of humpback whales at the southern limit of the Southeast Pacific breeding area. PLoS ONE 9(11): e112627. doi:10.1371/journal.pone.0112627.
- Pacheco, A.S., Silva, S., Alcorta, B., Balducci, N., Guidino, C., **Llapapasca, M.**, Sanchez-Salazar, F. 2013. Aerial behavior of humpback whales *Megaptera novaeangliae* at the southern limit of the southeast pacific breeding area. Revista de Biología Marina y Oceanografía 48(1): 185-191.

1/ Personal data

Name: Pascale Giraudet

Birth date: July 6, 1972

Professional address (with telephone and e-mail):

Université de Toulon - CS 60584 - 83041 TOULON CEDEX 9 - FRANCE

Telephone: (+33) 04 94 14 26 60 **Email:** giraudet@univ-tln.fr - <http://giraudet.univ-tln.fr>

Current job title and size of the research group:

Associate researcher in LSIS laboratory 150 members, in Dyni team (12 members)

2/ Highest obtained degree (with indication of place and date)

PhD in Cognitive Sciences; Thesis: "Neural representation of odor mixtures in the mammal olfactory bulb", Institut National Polytechnic Grenoble – France; 2000

3/ Professional activity in the last 5 years

- Professor for Master and Bachelor degrees in Marine Biology of University of Toulon
- Chair for marine mammal bioacoustics course
- Member of LSIS laboratory Dyni team
- Research on bioacoustic data recording and analysis
- Sperm whale detection and localization
- Humpback whale song analysis

4/ Other duties/ positions

- Head teacher of the 3rd year of Bachelor in Biology
- Co-director for University of Toulon Bachelor in Biology

5/ Awards, fellowships and external recognition

- Qualified for Assistant Professor position in Neurosciences (2003)
- INP Grenoble PhD Thesis Price (2000)

6/ Selected Publications over last 5 years

International journals

R. Abeille, Y. Doh, P. Giraudet, H. Glotin, J.M. Prévot, C. Rabouy (2014) Estimation robuste par acoustique passive de l'intervalle-Inter-Pulse des clics de *Physeter macrocephalus*: Méthode et application sur le Parc national de Port-Cros, *Journal of the Scientific Reports of Port-Cros National Park*, Vol. 28

F. Bénard, H. Glotin, P. Giraudet (2010) Whale 3D monitoring using astrophysic NEMO ONDE two meters wide platform with state optimal filtering by Rao-Blackwell Monte Carlo data association, *Journal of Applied Acoustics*, Vol. 71

Book Chapters

O. Dufour, T. Artières, H. Glotin, P. Giraudet (2013) Clusterized Mel filter cepstral coefficients and support vector machines for bird song identification, in soundscape semiotics, localization and categorization, In *Tech Open Book*, 2013

H. Glotin, P. Giraudet et al. (2013) Tracking multiple marine mammals by shortly or widely spaced hydrophones, In *Detection Classification Localization of Marine Mammals Using Passive Acoustics*, ISBN 978-2-7466-6118-9, p 71-92, 2013

F. Bénard, H. Glotin, P. Giraudet (2011) Highly defined whale group tracking by passive acoustic stochastic matched filter. In *Advances in Sound Localization, InTech*, ISBN 978-953-307-581-5, 20-02-2011.

International Conferences and Workshops

O. Dufour, H. Glotin, P. Giraudet, T. Artières, V. Delcourt, Y. Bas, D. Sannier, V. Liebault, S. Vigant, J. Buzon, (2014) Automatic classification of birds calls and songs from Provence, *Proc. of Ecology and Acoustics conf., MNHN Paris*

- A. Mishchenko, H. Glotin, P. Giraudet** (2014) Optimization of Levenberg-Marquardt 3D biosonar tracking, *Proc. of internat. workshop NIPS4B*, p164
- O. Dufour, H. Glotin, Y. Bas, T. Artières, P. Giraudet** (2014) Multi-instance multi-label acoustic classification of plurality of animals: birds, insects and amphibians. *Proc. of international workshop NIPS4B*, pp 165-168, Ed. 2014
- R. Abeille, P. Giraudet, H. Glotin** (2013) Acoustic observations for automatic size estimation of whales, *Annals of Telecommunications and Radio Science Bulletin*, October
- O. Dufour, T. Artières, H. Glotin, P. Giraudet** (2013) Automatic bird classification based on MFCC clusters, *Proc. of the 1st Int'l Wkp on Machine Learning for Bioacoustics (ICML 2013)*, pp 89-93, Atlanta, USA, 2013
- H. Glotin, P. Giraudet** (2013) From biosonar to whales' songs phylogeny - invited talk, *GIPSA GRENOBLE lab, int. Workshop Human Dialects and Animal Communication*, March. <http://dialectworkshop.u-grenoble3.fr/index.php?pg=1&lg=en>
- O. Dufour, R. Abeille, P. Giraudet, H. Glotin** (2012) Advances in passive acoustics for cetacean monitoring, *XXXV Coll. International Francophone de Mammalogie: Les mammifères dans les écosystèmes aquatiques*, DREAL and LPO Ed. October.
- Abeille, P. Giraudet, H. Glotin** (2011) A robust and fast bivariate inter-pulse intervals estimator in *Physeter catodon* clicks, *Fifth International Workshop on Detection, Classification, Localization: Density Estimation of Marine Mammals Using Passive Acoustics*, August.
- H. Glotin, J. Razik, P. Giraudet, S. Paris, F. Bénard** (2011) Sparse coding for fast minke whale tracking with Hawaiian bottom mounted hydrophones, *International Workshop on Detection, Classification, Localization: Density Estimation of Marine Mammals Using Passive Acoustics August, 2011, Portland, USA, supported by ONR Dpt of the Navy, Acoustical Society of America (ASA), August.*
- F. Bénard, H. Glotin, P. Giraudet** (2009) Sperm whale localization with the NEMO ONDE short-baseline platform. 4th International Workshop on Detection, Classification and Localization of Marine Mammals using Passive Acoustics, *Ed. Navy Research ONR*, p. 31, September.
- P. Giraudet, H. Glotin** (2007) Joint underwater sound celerity estimation and source localisation using 5 widely-spread hydrophones. *International Workshop on Detection and Classification of Marine Mammals Using Passive Acoustics*, Ed. Nav. Undersea Warfare, Federal RB Massachusetts, Boston, July
- H. Glotin, F. Caudal, P. Giraudet** (2007) Whale cocktail party analysis or tracking of simultaneous clicking whales using several hydrophones. *International Workshop on Detection and Classification of Marine Mammals Using Passive Acoustics*, Ed. Nav. Undersea Warfare, Federal RB Massachusetts, Boston, July
- F. Caudal, P. Giraudet, H. Glotin** (2007) Automatic click labelling using robust 4D tracking estimation of marine mammals: application to inter-click intervals and head foraging estimations. *International Workshop on Detection and Classification of Marine Mammals Using Passive Acoustics*, Ed. Nav. Undersea Warfare, Federal RB Massachusetts, Boston, July.
- P. Giraudet, H. Glotin** (2006) Echo-robust and real-time 3D tracking of marine-mammals using their transient calls recorded by hydrophones array *Int. IEEE Conf. on Acoustic Speech and Signal Processing (ICASSP)*, Toulouse, Vol. IV, pp 1161-1164, May.
- P. Giraudet, H. Glotin** (2005) Real time robust whales 3D tracking using hydrophones array in the Tongue of the Ocean. *2nd Int. workshop on detection and localization of Marine Mammals using Passive Acoustics*, Monaco Oceanographic Museum, ISBN 2-9525577-0-5, November.

Patents

- **H. Glotin, P. Giraudet, F. Bénard-Caudal** (2009) "Procédé de trajectographie en temps réel sur ordinateur portable de plusieurs cétacés par acoustique passive" Brevet déposé à l'Institut National de la Propriété Intellectuelle n° 07/06162 (September 2009) + extension Canada PCT n° 2009/01227
- **H. Glotin, P. Giraudet, F. Bénard-Caudal** (2007) "Multiple sources real-time tracking using transitivity constraints" Patent 2007/06162 FR, EU, USA patent 8638641, Australian Patent 2008327744, NewZealand 606802
- **H. Glotin, A. Mishchenko, P. Giraudet** (2015) Joint dopler and time-delay of qrrival for efficient passive acoustic tracking - application to bioacoustics **INPI, july 2015**

1/ Personal data

Name: Julie Patris

Birth date: June 6, 1975

Professional address (with telephone and e-mail):

Université de Toulon - CS 60584 - 83041 TOULON CEDEX 9 - FRANCE

Telephone: (+33) 04 94 21 54 42 - **Email:** julie.patris@lisis.org

Current job title and size of the research group:

- Professor of Physics in Marseille University
- Doctoral candidate for a second PhD, the co-dir Pr. H. Glotin (Univ. of Toulon, UMR LSIS) & Pr. Mark Asch, Univ. of Amiens, UMR Laboratory of Fundamental and Applied Mathematics (LAMFA) : "High performance computing for inversion of bioacoustic recordings to monitor cetaceans in South America"

2/ Highest obtained degree (with indication of place and date)

- PhD, Institut d'Astrophysique de Paris, directed by M. Dennefeld; 2002

3/ Professional activity in the last 5 years

- Professor of physics at Université Aix-Marseille since 2002

4/ Other duties/ positions

- 2013: Mission for whale acoustic observatory in New Caledonia
- 2009: Creation of Bachelor lessons on sensors and electronics
- 1999 - 2002 Teacher assistant at University Paris 6
- 1995 - 1999 Ecole Normale Supérieure de Cachan, Physics / Electronics

5/ Awards, fellowships and external recognition

1998 Aggregation of Physics (national rank = 5)

6/ Selected Publications since 2010

- Julie PATRIS, Pascale GIRAUDET, Franck MALIGE, Laurence BACHET et Hervé GLOTIN "A l'écoute des cétacés " revue Espèce, n°15 du 27 février 2015
- Hervé GLOTIN - Pascale GIRAUDET - Joseph RAZIK - Sébastien PARIS - Xanadu HALKIAS-Faïcel CHAMROUKHI - Jean-marc PREVOT - Julie PATRIS ... "Tracking multiple marine mammals by shortly or widely spaced hydrophones", in : Dirac NGO, Detection Classification localization of Marine Mammals using passive acoustics, Vol. ISBN, 978-2-7466-6118-9, pp. 71-92, jui 2013
- Hervé GLOTIN, Pascale GIRAUDET, Julie PATRIS..., Etude de faisabilité de la gestion par acoustique passive des baleines à bosse du Lagon Sud (FGAB) et proposition HERACLES (Humpback whale Real-time Acoustics in New-Caledonia for Localisation, density Estimation and Survey), nov 2013
- Nicolas ENFON, Randall BALEISTRIERO, Ales MISHCHENKO, Jean-Marc PREVOT, Joseph RAZIK, Sébastien PARIS, Julie PATRIS, Hervé GLOTIN, "Analyses bioacoustiques monophones du cachalot et d'un autre odontocète via l'observatoire neutrino toulonnais : comportements suivant la phase lunaire et le bruit en basse fréquence", Projet PELAGOS - DECAN 13-040
- J. Patris et al : Book : « Physics for Bachelor leve », Ed Pearson, 2015
- J Patris, H Glotin, D Komatitsch, EVT Wout, F Malige, M Asch, High-performance computing for whale sound propagation in oceans based on accurate numerical techniques, in Listening for aquatic mammals in Latin America Conference (LAMLA'2016)

Name: David E. Bonnett

Birth date: December 1, 1940

Professional address (with telephone and e-mail):

Conservación de la Naturaleza Amazonica del Perú, A.C. (CONAPAC)

P.O. Box 446

340 Avenida La Marina - Iquitos, Perú

Telephone: +51 65 25 2530 - **Email:** bonnettde@gmail.com

Current job title and size of the research group: Lieutenant Commander (LCDR) in U.S. Navy, retired

2/ Highest obtained degree (with indication of place and date)

- B. Bachelor of Science in Chemistry ; Miami University ; 1968
- C. Graduate level Training in Nuclear Engineering
- D. Graduate level Training in Submarine Engineering and Operations

3/ Professional activity in the last 5 years

- Recorded Amazon River dolphins (*Inia geoffrensis*) in the Peruvian Amazon in 2014, 2012 and 2011.
- Invited Speaker: Trone, M., Glotin, H., Blakefield, J., Balestrieri, R., **Bonnett, D.E.** (2015). Collaborating across disciplines: Applying machine learning techniques to analyze high-frequency dolphin clicks. Presented at the First Workshop of RIEMMCCA: Network of Aquatic Mammal Specialists of Central America and the Caribbean, joint to the 21st Biennial Conference on the Biology of Marine Mammals, San Francisco, California; December 12.
- Trone, M., Glotin, H., Blakefield, J., Balestrieri, R., **Bonnett, D.E.** (2015). Clicks count: Exploring the usage of high-frequency clicks as a means to estimate the quantity of Amazon River dolphins. Presented at the 21st Biennial Conference on the Biology of Marine Mammals, San Francisco, California; December 13-18.
-

4/ Other duties/ positions

- Participating in upcoming pre-STICAmSud Mini Symposim in the Peruvian Amazon in July 2016

5/ Awards, fellowships and external recognition

- Awarded the U.S. Naval Enlisted Scientific Education Program full scholarship.
- Recognized for special achievements in Underwater Acoustics and Nuuclear Submarine Operations.

6/ Ongoing funded research projects with dates, titles, sources of funding

Amazon River dolphin research has been self-funded

7/ Publications

- Trone, M., Glotin, H., Balestrieri, R., & **Bonnett, D.E.** (2015). Enhanced feature extraction using the Morlet transform on 1 MHz recordings reveals the complex nature of Amazon River dolphin (*Inia geoffrensis*) clicks. *Journal of the Acoustical Society of America*, 138, 1904. <http://dx.doi.org/10.1121/1.4933985>
- Trone, M., Glotin, H., Balestrieri, R., **Bonnett, D.E.**, & Blakefield, J. (2015). Heterogeneity of Amazon River dolphin high-frequency clicks: Current Odontoceti bioacoustics terminology in need of standardization. *Proceedings of Meetings on Acoustics*, 22, 070003. <http://dx.doi.org/10.1121/2.0000028>
- Trone, M., Balestrieri, R., Glotin, H., & **Bonnett, D.E.** (2014). All clicks are not created equally: Variations in high-frequency acoustic signal parameters of the Amazon river dolphin (*Inia geoffrensis*). *Journal of the Acoustical Society of America*, 136, 2217. <http://dx.doi.org/10.1121/1.4900047>

1/ Personal data

Name: Cédric Gilleman

Professional address (with telephone and e-mail):

Iquitos, Perú

<https://solinia.org/>

Email: cedric@solinia.org

Current job title and size of the research group:

Chief Executive Officer at Solinia

2/ Highest obtained degree

B. Master in Polytechnics

3/ Professional activity in the last 5 years

- Founded Solina in 2012, a Peruvian Non-Governmental Organization (NGO) for tucuxi (*Sotalia fluviatilis*) and Amazon River dolphin (*Inia geoffrensis*)
 1. Education and communication
 2. Scientific research and observations
 3. Conservation initiatives
 4. Legislation and policy
- Obtained grant from Whale and Dolphin Conservation (WDC) to support Solinia
- April 2014 - second Workshop to finalize the Regional Action Plan to determine the population parameters of the two river dolphin species inhabiting the Amazon watershed in the Iquitos region, to establish measures to protect these species and guarantee their survival. Conducted in collaboration with the Fundación Omacha in Colombia (<http://www.omacha.org/>)
- Attending pre-STICAmSud Mini Symposium in the Peruvian Amazon in July 2016

4/ Other duties/ positions

Act as the Chief Executive Officer of Solinia, <https://solinia.org/>

5/ Awards, fellowships and external recognition

- International recognition by the NGO, Whale and Dolphin Conservation (WDC): <http://us.whales.org/wdc-in-action/amazon-river-dolphins-and-sotalia-dolphins-peru>

6/ Projects approved in the least 5 years

- Whale and Dolphin Conservation