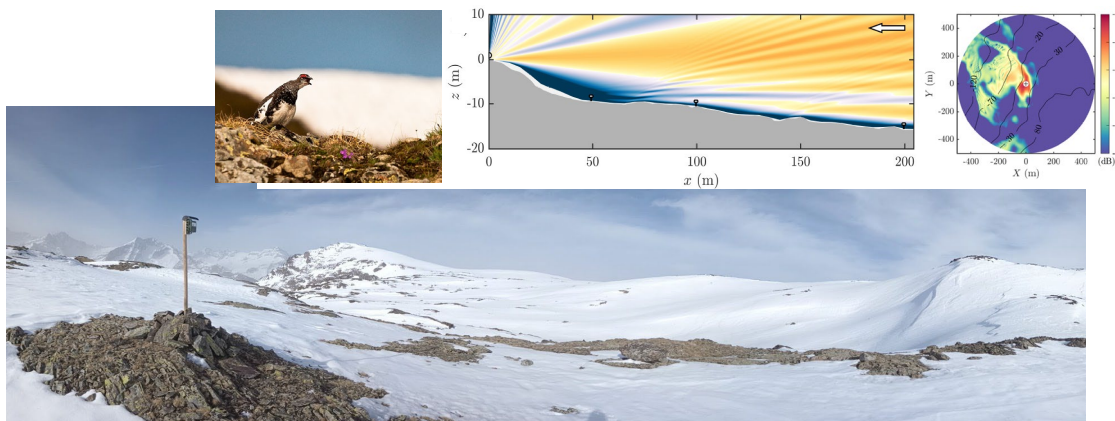


Post-Doctoral Position 10 months (December 2025 – December 2026)

Large-scale testing and finalization of a tool for determining the detection space of bird songs in alpine environments



Scientific Context

This postdoctoral position is part of a collaboration between the Fluid Mechanics and Acoustics Laboratory (LMFA, UMR CNRS 5509, École Centrale de Lyon) and the ENES Laboratory (UMR 8195, Université Jean Monnet, Saint-Étienne), focusing on the acoustic monitoring of the alpine ptarmigan, an iconic species of arctic-alpine environments. Previous work, conducted by Arthur Guibard during his PhD (2023), developed innovative numerical methods based on the parabolic equation to model sound propagation in heterogeneous environments. These methods incorporate topography, ground effects, and meteorological conditions, and have proven effective in simulating sound propagation in alpine terrain. They have also demonstrated their utility in modeling active acoustic spaces (signal detection zones) and, through the principle of reciprocity, optimizing acoustic tagging-based monitoring—a method still underutilized in bioacoustics due to its complexity.

This project is part of the POIA Arctic-Alpine Species Program, aiming to enhance the conservation of mountain species threatened by climate change, human activities, and habitat fragmentation.

Missions and Objectives

The selected candidate will be responsible for:

- Optimizing the computational code developed during Arthur Guibard's PhD to determine the active space and detection space of bird songs.
- Finalizing an operational version of the tool and testing it on field data collected between 2022 and 2025 as part of the POIA program, using a network of over 100 acoustic recorders deployed across the Alpine arc.
- Quantifying the detection space to estimate the number of individuals per unit area by cross-referencing simulations with vocal activity data extracted via the Lagonet software (developed by ENES).
- Validating the tool for the rock ptarmigan and assessing its transferability to other species, in collaboration with teams from LMFA and ENES.
- Contributing to the dissemination of this methodology for applications in conservation ecology and automated population monitoring through scientific publication.



This work will refine acoustic detectability estimates, a key challenge for large-scale population monitoring.

Work environment

Primary location: Acoustics Center, LMFA (UMR CNRS 5509), École Centrale de Lyon (Ecully, 69134).
Close collaboration with the ENES-CNPS Laboratory (UMR 8195), Université Jean Monnet (Saint-Étienne).

Supervision:

Frédéric Sèbe (ENES): frederic.sebe@univ-st-etienne.fr
Didier Dragna (LMFA): didier.dragna@ec-lyon.fr
Sébastien Ollivier (LMFA): sebastien.ollivier@univ-lyon1.fr

Required profile

PhD in acoustics, numerical modeling, or a related field (bioacoustics).

Required skills:

- Knowledge in numerical methods (wave propagation modeling, if possible parabolic equation).
- Experience in signal processing and acoustic data analysis (MATLAB, Python).
- Ability to work in a multidisciplinary team (acousticians, ecologists).
- Awareness of ecological issues related to animal population monitoring (an asset).
- Strong writing skills in English.
- Autonomy, rigor, and a taste for analysis and processing of data.

Languages: Fluent French and English (for writing articles and presentations).

Practical Conditions

Duration: 10 months December 2025 – December 2026).

Salary: According to CNRS

Benefits: Access to partner laboratory facilities, dynamic scientific environment.

Application Process

Interested candidates should submit:

- A detailed CV (max. 2 pages).
- A cover letter explaining their suitability for the project.
- Contact details for 2 references (including PhD supervisor).
- A sample publication or report demonstrating their skills.

Application deadline: September 30, 2025

Contact: Send documents in PDF format to frederic.sebe@univ-st-etienne.fr, didier.dragna@ec-lyon.fr, and sebastien.ollivier@univ-lyon1.fr (subject: "Application Post-Doc Acoustic Detection Space 2025").

Key references

- Ducrettet, M., Linossier J., Sueur J., Sèbe, F. & Hauptert, S. (2025 submitted). Bridging Passive Acoustic Monitoring and Essential.
- Guibard, A., Sèbe, F., Dragna, D., Ollivier, S. (2022) Influence of meteorological conditions and topography on the active space of mountain birds assessed by a wave-based sound propagation model. *J. Acoust. Soc. Am.* 151, 3703–3718.
- Guibard, A. (2023) Propagation acoustique en environnement hétérogène et réseaux de communication chez le lagopède alpin, PhD thesis, Ecole Centrale de Lyon, defended on 07/07/2023 https://acoustique.ec-lyon.fr/publi/guibard_thesis.pdf
- Hauptert, S., Sèbe, F. & Sueur, J. (2023) Physics-based model to predict the acoustic detection distance of terrestrial autonomous recorder units over the diel cycle and across seasons: insights from an Alpine and a Neotropical forest. *Methods in Ecology and Evolution*, 2023, 14, 614–630.
- Marin-Cudraz, T., Muffat-Joly, B., Novoa, C., Aubry, P., Desmet, J.-F., Mahamoud-Issa, M., Nicolè, F. Van Niekerk, M. H., Mathevon, N. & Sèbe, F. (2019). Acoustic monitoring of rock ptarmigan: A multi-year comparison with point-count protocol. *Ecological Indicators*. 101: 710-719.
- Sèbe, F., Marin-Cudraz, T., Guinet, J., Muffat-Joly, B., Aubry, P., Montadert, M., Desmet, J.-F., Mahamoud-Issa, M., Manson, J., Bunz, Y., Imberdis, L., Chiffard, J., Perrot, C., Mathevon, N. & Novoa, C. (2023) A l'écoute du chant des cimes : Utilisation de la bioacoustique pour le suivi des populations de lagopèdes alpins. (*Ouvrage sonorités alpines*, ed. Antipode).
- Programme POAI : <https://www.mercantour-parcnational.fr/fr/des-actions/connaitre-et-proteger/projet-poia-especes-arctico-alpines-2020-2022>

Why join us?

Participate in an innovative project at the interface of acoustics and ecology.

Contribute to the conservation of a threatened species in a context of global change.

Valorize results (publications, conferences, open-source tools).

Benefit from a strong scientific network and unique data (OFB network, POIA).

Questions? Feel free to contact the project leaders to discuss scientific or practical details.