

Postdoctoral position on deep learning and inverse problems for ocean acoustics
GIPSA-Lab, Grenoble, France ([link to get full information](#))

Position: 18-month position at GIPSA-Lab (<http://www.gipsa-lab.grenoble-inp.fr/en/>), Grenoble, France

Supervisors:

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Context and objectives: Machine learning (ML), and more recently deep learning, are the most recent revolutions in computer science. However, the impact of ML on underwater acoustics stays limited. This is largely due to two factors inherent to the acoustic inversion problem: large datasets with reliable annotations are usually not available, and the signal degradation due to propagation and noise is more severe than for other classical ML applications.

In this project, the postdoctoral investigator will embed ML methods into the traditional underwater acoustics inverse problem (source localization and environmental inversion). Of particular interest will be to replace the non-linear forward model (i.e. acoustic propagation code) with an approximated version obtained using a neural network. Such methods, proposed by the geoscience community [1], are known to accelerate the resolution of the inverse problems [2], but have never been explored in ocean acoustics. Independent research is expected, and other ideas by the postdoctoral investigator will be encouraged.

Any progress made by the postdoctoral investigator will be directly integrated into current work within our group on related topics [3,4], which provide a basis for broad-impact contributions and long-term international collaboration.

Requirements: Applicants must have a PhD in a field relevant to the project. Applications from candidates with a Ph.D in machine learning / data science and a strong interest in acoustics or ocean science, as well as applications from candidates with a Ph.D in acoustics and a proven background in machine learning are welcome. Before hiring, the applicant file must be validated by the French Department of Defense. Preference will be given to applicants from the European Union.

Application: An online application form must be filled: <https://bit.ly/3FvefVL>. The applicant must a CV and a cover letter, and provide the contacts of at least two references. Other material (e.g. research statement, relevant publications, etc.) can also be included. Review of applications will begin immediately and continue until the position is filled.

Specifications: the position is fully funded for 18 months, but could be renewed upon scientific outcome and performance. The monthly salary will range from 2,600 € to 3,800 € based on experience.

References:

- [1] Krasnopolsky, V. M., & Schiller, H. (2003). Some neural network applications in environmental sciences. Part I: forward and inverse problems in geophysical remote measurements. *Neural Networks*, 16(3-4), 321-334.
- [2] Hansen, T. M., & Cordua, K. S. (2017). Efficient Monte Carlo sampling of inverse problems using a neural network-based forward—Applied to GPR crosshole traveltime inversion. *Geophysical Journal International*, 211(3), 1524-1533.
- [3] Bonnel, J., Dosso, S. E., Knobles, D. P., & Wilson, P. S. (2021). Transdimensional Inversion on the New England Mud Patch Using High-Order Modes. *IEEE Journal of Oceanic Engineering*.
- [4] Baron V., Bouley S., Muschinowski M., Mars J., Nicolas. B, (2019), Drone localization and identification using an acoustic array and supervised learning (2019), *Artificial Intelligence and Machine learning in defense application Conf.*