



2023 Master internship at UCA



TITLE : WATER TREATMENT FOR MINIMIZING MARINE POLLUTION THROUGH BALLAST WATER

LAB & PEOPLE

- Name of the hosting lab: MARINE TECHNOLOGY
- General activities of the lab: Water treatment, water quality, Disinfection, Environmental Risk
- Website: <https://inmar.uca.es/> - <https://tep181.uca.es> - www.tecnohabs.es
- Number of staff / PhD: 7 researchers / 1 PhD student
- Supervisor name and contact: Javier Moreno Andrés – javier.moreno@uca.es

TOPIC OF THE INTERNSHIP

- Scientific context of the internship (max 20 lines)

Shipping is one of the major vectors of aquatic pollutants, transferring them through ballast waters. Currently, ballast waters have been considered as one of the main causes of introduction of aquatic invasive species, considering it within the four global threats for the oceans. At a global scale, shipping is estimated to transfer three to five billion tons of ballast water annually, which contains not only biological pollutants, but also other chemical pollutants present in harbor areas that are susceptible to be transferred.

With the aim of avoiding the transfer of aquatic pollutants via maritime traffic, we propose to study different treatment technologies and strategies that could be able to decontaminate these transferring waters, mainly based on UV-based technologies.

Keywords: Ballast water, Harmful Algal Blooms, UV inactivation, maritime transport

Bibliography:

[1] O.-K. Hess-Erga, J. Moreno-Andrés, Ø. Enger, O. Vadstein, Microorganisms in ballast water: Disinfection, community dynamics, and implications for management, *Sci. Total Environ.* 657 (2019) 704–716. <https://doi.org/10.1016/j.scitotenv.2018.12.004>.

[2] J. Moreno-Andrés, L. Romero-Martínez, S. Seoane, A. Acevedo-Merino, I. Moreno-Garrido, E. Nebot, Evaluation of algacide effectiveness of five different oxidants applied on harmful phytoplankton, *J. Hazard. Mater.* 452 (2023) 131279. <https://doi.org/10.1016/J.JHAZMAT.2023.131279>.

[3] J. Moreno-Andrés, M. Tierno-Galán, L. Romero-Martínez, A. Acevedo-Merino, E. Nebot, Inactivation of the waterborne marine pathogen *Vibrio alginolyticus* by photo-chemical processes driven by UV-A, UV-B, or UV-C LED combined with H₂O₂ or HSO₅⁻, *Water Res.* (2023) 119686. <https://doi.org/10.1016/J.WATRES.2023.119686>.

- Tasks and duties entrusted to the student:

Optimization of different technologies for the inactivation of potentially harmful phytoplankton or bacteria, including:

- Start-up and operation of UV reactors.
- Validation of photochemical treatments in different water matrices.
- Study of possible reactivation phenomena after treatment.

- Skills to be acquired or developed: Laboratory skills, microbial analysis, phytoplankton analysis techniques, kinetic and growth modelling. Handling of different equipment for water treatment and water quality.

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: End of Bachelor, Master Student
- Field(s) of study: Environmental Sciences, Marine Sciences, Microbiology, Ecotoxicology, Water quality.
- Scientific skills: Laboratory skills
- Language skills required: Good English or Spanish (not mandatory).

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 3-6 months

Desired Starting date of the mission: Flexible, to be agreed with the selected student.

Indicative weekly schedule: 25h / week

Remuneration: *Erasmus grant*. Funded by Erasmus+ internship grants

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

*If you're interested please send your CV and letter of motivation to the scientist in charge,
javier.moreno@uca.es*