

PhD in marine biogeochemistry: Closing nitrogen budgets in mediterranean sponges through novel *in situ* gas-flux measurements

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PROJECT CONTEXT

N De-GAS is a broader marine-biogeochemistry project that investigates how benthic holobionts contribute to nitrogen cycling in the northwestern Mediterranean and how these processes relate to seasonal water-column stratification and pycnocline dynamics. It seeks to establish how biological nitrogen transformations influence coastal ecosystem functioning under environmental change.

THE PhD PROJECT

The doctoral project will develop and apply a novel *in situ* approach to measure dissolved-gas fluxes through marine sponges. Using paired measurements of water entering and leaving the sponge, the researcher will quantify species-level fluxes of N_2 , N_2O , NO and CH_4 in abundant Mediterranean sponge species. These data will close nitrogen budgets by incorporating gaseous nitrogen products alongside measured nutrient, organic-matter and oxygen fluxes.

Measuring dissolved gases *in situ* is technically demanding because samples can degas during collection and small concentration differences must be resolved reliably. The project will use clean, controlled PeriSIP sampling to avoid vacuum-induced degassing, followed by advanced dissolved-gas analysis. The work is especially timely because N_2O and CH_4 are greenhouse gases: identifying their production or consumption by abundant sponges is essential to determine whether sponge-driven transformations mitigate nitrogen loading or contribute to climate-relevant emissions.

Laboratory experiments with ^{15}N -labelled ammonium and nitrate will complement the field gas-flux measurements. They will distinguish denitrification from dissimilatory nitrate reduction to ammonium (DNRA), identify coupled nitrogen transformations, and provide mechanistic interpretation of *in situ* gas signals. Together, the field and laboratory components will deliver robust species-resolved nitrogen budgets and training in advanced sampling, dissolved-gas analysis and stable-isotope techniques.



WE SEEK

Applicants should hold, or be close to completing, a Master's degree that enables admission to a PhD program in Marine Sciences, Biology, Ecology, Oceanography, Environmental Sciences, Chemistry, Biogeochemistry or a closely related field. Strong English communication skills, an interest in marine biogeochemistry and microbial symbioses, and readiness for collaborative field and laboratory work are essential. Experience with stable isotopes, nutrient or gas analysis, SCUBA diving, statistics or R/Python will be valued but is not essential.



The selected candidate will be based at the "Institut de Ciències del Mar" (ICM-CSIC) in Barcelona and will work in close collaboration with staff at the "Centre d'Estudis Avançats de Blanes" (CEAB-CSIC).

EXPRESSION OF INTEREST

Please send a CV, academic transcript, brief motivation statement and two referees to mribes@icm.csic.es (copy: coma@ceab.csic.es).