

## Effects of oil spill dispersants on marine oil snow formation, fate and impact

### Supervisory Team

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### Scientific background

Oil spills are one of the most challenging threats to the marine environment that can have long-term impacts on fisheries, the economy and society. Dispersants are commonly applied as a remediation strategy to disperse oil into the water column and produce small oil droplets that are more readily degraded by indigenous oil-degrading bacteria. Whilst dispersants are one of the many tools to prevent coastal contamination, there are concerns they may contribute to the formation of marine oil snow (MOS). MOS has been speculated to be a transport vector for oil into the deep sea. This PhD will investigate whether dispersants inhibit or enhance the formation of MOS over a range of relevant conditions.

### Research methodology

The student will use state-of-the-art microbiological, chemical, and molecular techniques to quantify the effects of dispersants on MOS formation over a range of differing oil and environmental conditions. Using lab experiments and in-situ analyses the student will use Next Generation Sequencing to identify oil-degrading microbes associated with MOS.

### Training

Training will include marine fieldwork, including participating in a multidisciplinary controlled oil-spill experiment at sea with the CASE partner OSRL. Training will be given in experimental design, molecular microbiology (e.g. Next Generation Sequencing, bioinformatics) and environmental chemistry. The student will be part of the vibrant [Ecology and Environmental Microbiology Group](#) at the University of Essex, as well as benefiting from expertise at OSRL ([www.oilspillresponse.com](http://www.oilspillresponse.com)) and further engagement with OSRL's Industry partners, such as IPIECA, Shell and ExxonMobil. Additionally, as part of the ARIES cohort, the student will have access to a range of training courses, such as "advanced genomics".

### Person specification

This is an exciting opportunity for a highly motivated student with a background in Microbiology, Marine or Ecological Sciences, who is keen to learn new skills to address a global environmental issue and engage with the oil industry's scientific expertise. The successful applicant will undertake studies as part of a multi-disciplinary team ([Boyd McKew](#), [Terry McGenity](#) and [Rob Holland](#)). The PhD will be based at the University of Essex, with three months spent at OSRL, Southampton.

### References

**BA McKew**, F Coulon, AM Osborn, KN Timmis, **TJ McGenity** (2007) Determining the identity and roles of oil-metabolizing marine bacteria from the Thames estuary, UK. *Environmental Microbiology* 9, 165-176

**BA McKew**, F Coulon, MM Yakimov, R Denaro, M Genovese, CJ Smith, AM Osborn, KN Timmis, **TJ McGenity** (2007) Efficacy of intervention strategies for bioremediation of crude oil in marine systems and effects on indigenous hydrocarbonoclastic bacteria. *Environmental Microbiology* 9, 1562-1571.

**TJ McGenity**, BD Folwell, **BA McKew**, GO Sanni (2012) Marine crude-oil biodegradation: a central role for interspecies interactions. *Aquatic Biosystems* 8, 1.

U Passow, J Sweet, A Quigg (2017) How the dispersant Corexit impacts the formation of sinking marine oil snow. *Marine Pollution Bulletin* 125:139-145.

Kleindienst et al (2015) Chemical dispersants can suppress the activity of natural oil-degrading microorganisms. *Proceedings of the National Academy of Sciences USA* 112:14900-14905

### Key Information

- This project has been shortlisted for funding by the ARIES NERC Doctoral Training Partnership ([www.aries-dtp.ac.uk](http://www.aries-dtp.ac.uk)).

- Successful candidates who meet UKRI's eligibility criteria will be awarded a NERC studentship - in 2018/19 the stipend is £14,777.
- Undertaking a PhD with ARIES will involve attendance at training events.
- ARIES is committed to equality & diversity, and inclusion of students of any and all backgrounds. All ARIES Universities have Athena Swan Bronze status as a minimum.
- Applicants from quantitative disciplines who may have limited environmental science experience may be considered for an additional 3-month stipend to take appropriate advanced-level courses.
- Usually only UK and EU nationals who have been resident in the UK for 3 years are eligible for a stipend. The closing date for applications is 23:59 on 8<sup>th</sup> January 2019. Shortlisted applicants will be interviewed on 26<sup>th</sup>/27<sup>th</sup> February 2019

### **How to Apply**

Please apply by sending a CV (including contact details of two academic referees) and a cover letter explaining your motivation and suitability for the PhD to Emma Revall [ariesapp@essex.ac.uk](mailto:ariesapp@essex.ac.uk) by 8<sup>th</sup> Jan 2019. If you have any questions please feel free to contact any member of the supervisory team.



# *Oil Spill Response*

