**Hydrocarbon transport in marine sediments and the influence of chemical dispersant application**

**Luis J. Perez Calderon**, Alejando Gallego, James A. Anderson, Ursula Witte

*Institute of Biological and Environmental Sciences, School of Biological Sciences, University of Aberdeen, AB24 3UL; lj.perezcalderon@abdn.ac.uk*

## Aims

- Experimentally compare hydrocarbon entrainment via three distinct transport mechanisms:
  1. Post-depositional transport: following oil-mineral aggregate deposition in silt usually via diffusion.
  2. Advection: dissolved and dispersed oil is carried advectively into permeable sediments such as sand.
  3. Percolative transport: oil is carried to permeable intertidal sands and leaches through the sand.
- Assess the entrainment capability of individual hydrocarbons within a hydrocarbon mixture.
- Establish the influence of commercial dispersant application on hydrocarbon entrainment into sediments.

## Background

- Hydrocarbon exploration in increasingly challenging environments increases the risk of oil spills.
- The fate of spilled hydrocarbons in marine sediments remains poorly understood.
- The application of dispersant is controversial and its consequences for hydrocarbon fate and subsequent effects on the marine environment are not well known.
- Post-depositional oil-sediment interactions remain poorly integrated into oil spill response models.

## Conclusions and Applications

- Hydrocarbons were shown to readily entrain sediments through oil-sediment aggregate deposition, percolation and advection, processes that are often not taken into consideration in oil spill models.
- Dispersant application affected oil transport depending on the transport mechanism and sediment type. Entrainment of hydrocarbons via advection and percolation in sands was enhanced by dispersant application but the effect was unclear following oil-sediment aggregate deposition in silts.
- Water-soluble hydrocarbons were less affected by dispersant application than less water-soluble ones, indicating dispersants may selectively mobilise specific hydrocarbons.
- The findings of this research may aid in the decision-making process of dispersant application and in future development of oil spill models to consider oil transport mechanisms within sediments.