

## Internship Opportunity

### Mapping the global offshore energy transition and ocean sprawl through satellite data.

**Job Title:** SAGES-MASTS Policy Internship

**Organization:** Marine Scotland Science, Scottish Centre of Excellence in Satellite Applications

**Duration:** up to 6 months

**Start date:** October / November 2020 (flexible)

**Remuneration:** up to £8k (dependent on duration)

**Travel costs:** receipted travel and necessary overnight stays covered

### Summary

SAGES & MASTS (including the SUPER DTP) are offering a unique opportunity for a short-term Internship with the Offshore Energy Environmental Advice Group at Marine Scotland Science (MSS) and the Scottish Centre of Excellence in Satellite Applications. The intern will develop and refine methods to identify offshore oil and gas platforms and wind turbines using satellite data and use the outputs to quantify the contribution of offshore energy to 'ocean sprawl' across different global production basins. MASTS are delighted to join the existing SAGES Scottish Government Policy Internship programme in partnership with Marine Scotland Science.

### Background

Anthropogenic structures are deployed in marine environments worldwide to support industrial activities, with construction rates currently growing at up to 30% per year. The introduction and subsequent removal of structures may have profound effects on marine ecosystem processes including the consumption and production of plankton and the spatial distribution of fish, mammals, and birds. As countries transition to low carbon economies, the rate of offshore structure installation and removal will rapidly accelerate through offshore renewable energy development and oil and gas decommissioning.

The industry approach to offshore energy (renewables and oil and gas) installation/removal, and the potential interactions between structures and the marine ecosystem, are common between many global production basins. However, stark contrasts exist between jurisdictions in offshore energy policies, regulation and collection of relevant asset/environmental data. The global marine science community, offshore energy industry and governments/regulators are actively seeking greater international alignment on installation/removal practices and policies. In addition, there is increasing interest in the management of marine resources as 'global commons'. This requires accurate, up-to-date information on the nature and location of offshore energy infrastructure that can be compared across global basins. Whilst this information is collated in national database for some jurisdictions, there are many locations where such data are lacking. Satellite imagery offers a potential mechanism to compile a global database of offshore structures.

Detecting the location of offshore installations from visible imagery, especially in the North Sea, can be challenging due to cloud cover. A solution to this is to consider the use of SAR. However, the use of SAR images alone can be challenging, especially with oil and gas platforms, due to a lack of spatial

resolution, resulting false positives due to, for example, shipping. This short-project will therefore investigate the use of satellite-data fusion techniques to identify offshore installations.

This output of this project will provide a set of algorithms that can be used to generate a global offshore infrastructure map and time series that can be used to quantify the contribution of offshore energy infrastructure to ocean sprawl and understand how the global use of marine space is changing.

Ultimately, this tool can be used to inform marine management decisions and shape future national and international policy on marine spatial planning and offshore energy developments.

**Aims and Objectives**

The role of the intern will be to develop methods to extract data (including, location, type, and size) on offshore energy infrastructure from open access datasets such as Sentinel and Landsat images. This will initially be focused in the North Sea where algorithms can be refined and results can be ground-truthed with existing spatial data on offshore energy assets. Following method development, the technique will be applied to other production basins where similar open access data is available.

The primary objective are as follows:

1. Perform a comprehensive literature review of the current state-of-the-art of offshore installations using satellite data to identify the main challenges, as well as capturing the currently available open-access datasets, pay-for data, and data that could become available in the near- to mid-term that might be of value.
2. Develop and test algorithms to automatically identify, and extract detail on offshore oil and gas platforms and wind turbines using visible, NIR, and SAR data. Ground truth with spatial databases in the UK.
3. Undertake a sensitivity analysis of the use of different satellite imagery for infrastructure
4. Apply algorithms to produce an offshore energy infrastructure database and map (potentially as a web-based GIS platform) for a selection of global production basins and quantify the contribution of offshore energy to ‘ocean sprawl’

**Indicative timeframe**

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Objective 1						
Objective 2						
Objective 3						
Objective 4						
Final report						

**Person specifications**

**Please note – the applicant must be a member of SAGES & MASTS or SUPER**

We are looking for an Early Career Researcher or SAGES / MASTS or SUPER graduate student:

- Either working towards, or has recently completed a PhD
- Knowledge and/or experience of working with both visible/NIR and SAR data
- Knowledge and/or experience of data fusion techniques
- Knowledge and/or experience of GIS software, to produce an interactive map of offshore assets, would be desirable.
- Strong research data collection and synthesis skills.
- Strong communications skills (written and verbal) as post holder will be working with various organisations.
- Independent worker who can plan their own workload and is confident in their ability to deliver a well written report.

**How to apply**

To apply, please provide a one-page cover letter detailing why you are the right person for this Policy Internship as well as a CV (2 pages maximum) to Rosanna Harvey-Crawford, Innovation Manager, SAGES. Please include one reference that you are happy for us to contact, should you be successful.

[r.e.harvey-crawford@ed.ac.uk](mailto:r.e.harvey-crawford@ed.ac.uk)

Questions can be directed to [sally.rouse@gov.scot](mailto:sally.rouse@gov.scot)

Deadline for applications is 25<sup>th</sup> of September 2020, 17.00hrs

By applying you are confirming that you are available for an interview, via videoconference, on Friday 9th October 2020