PROJECT TITLE: Machine Learning for Ocean Monitoring for Climate Change Analysis (ML4OC-CC)

Supervisors:
Dr David Moffat, Plymouth Marine Laboratory, Earth Observation Science Area
Dr Thomas Jackson, Plymouth Marine Laboratory, Earth Observation Science Area

Project Enquiries: dmof@pml.ac.uk
Project keywords: Machine Learning, Earth Observation, Bias Correction, Time Series, Deep Learning

Figure 1: Band 560nm from different sensors before and after bias correction.

Figure 2: Example of current inter-sensor bias map between MODIS and MERIS data measured at 443nm for julian day 210.

Proposed start date:
Monday 11th July

Project description
Global Earth observation for marine science relies on using dedicated sensors aboard multiple satellites which generate massive quantities data every day. However, each satellite has an operational lifespan of between 5 and 15 years and the instrument specifications and capabilities have improved over the years. Climate change studies require multidecadal records to separate anomalous ecosystem responses in systems that have natural cycles at daily, seasonal, and decadal scales. This necessitates a merged satellite data record that is consistently processed and characterised for over 25 years, without the introduction of artifacts when new sensors enter the record. The aim of this project is to investigate how Machine Learning (ML) can be used to improve our ability to combine different satellite data together into a harmonised record. This would involve building a ML model to convert from one satellite sensor to another, using a pre-existing collection of Terabytes of satellite ocean colour data. The machine learning approach
could be compared to current methods to examine its potential added value and any improvements to the resulting harmonised record will allow us to better delineate climate signals from natural cycles.

**Work schedule:**

6 Weeks: desk work at PML  
1 Week: AI and fieldwork summer school (PORTWIMS)  
1 week: Report, presentation or poster work

**Travel and subsistence costs:**

The placement will cover the cost of attendance at the PORTWIMS summer school

**Candidate requirements**

Programming skills, preferably in python are highly desirable. Experience with or an understanding of Machine Learning and/or Remote Sensing would be advantageous.

**Background reading and references**

