### Project title: OP19_47 Ocean wave field and climate monitoring with a GNSS Wave Glider

### One Planet Research Theme:
Climate & Climate Change ☒ | Earth System Processes ☒ | Anthropocene ☐ | Environmental Informatics ☐

### Lead Supervisor: Dr Nigel Penna, School of Engineering, Newcastle Univeristy

### Key Research Gaps and Questions:
1. Determine the quality with which the ocean wave field may be measured and monitored using a GNSS Wave Glider, including validation with wave buoys
2. Validate and further develop wave field models, including using meteorological data collected onboard the GNSS Wave Glider.

### Project Description:
Ocean wave field monitoring is needed for climatology, as it controls the input of wind stress into the oceanic mixed layer and thereby serves as a control for the global ocean climate. Whilst the ocean wave field can be predicted (modelled) if wind measurements are available from ships or autonomous sea vehicles, direct measurements of the wave heights themselves are scarce. This project will address this using a roving, unmanned, self-propelled and self-powered ocean surface vehicle (the Wave Glider), in combination with high precision measurements from Global Navigation Satellite Systems (GNSS), to measure and monitor the wave field, and to compare with model predictions. The precise point positioning GNSS method, which may be used anywhere globally, will be used to determine cm-precision wave heights. These will be validated with wave buoy measurements, both in the North Sea off the Northumberland coast, and off the west coast of Scotland, where large swells frequently arise. Comparisons will also be made with state-of-the-art wave models (e.g. WAM) to aid their further development. The project will involve collaboration with the National Oceanography Centre, Liverpool. The student will be trained in geodesy (GNSS positioning), oceanography and wave modelling, develop field skills, and programming, scripting and high-performance computing skills under the Linux operating system.

### Prerequisites:
Good Master’s or Bachelor’s degree in a mathematical-based subject (e.g. maths, physics, oceanography, geophysics, engineering, surveying), preferably including experience in computer programming and/or scripting

For more information, please contact Nigel Penna (nigel.penna@ncl.ac.uk).