

Excellence in Marine Sciences,  
Education, Engineering  
and Technology



Plymouth  
**Marine Sciences**  
Partnership

The Plymouth Marine Sciences Partnership (PMSP) represents the largest regional cluster of expertise in marine sciences, education, engineering and technology in the UK and one of the largest in Europe.

### **PARTNERSHIP**

PMSP Partners work closely together to provide opportunities for governments, agencies and industry through technology transfer, joint ventures, collaborative research, international partnerships and multi-disciplinary conservation efforts. Embedded within the science base is a unique capability for the dissemination of knowledge and public understanding of science. The Partnership contributes to the regional strategy of the South West of England Regional Development Agency.

### **UNIQUE**

PMSP builds on over 100 years of research activity based in Plymouth. One of the strengths of PMSP is the ability to call upon a diverse range of experts with complimentary skills to provide the necessary expertise to tackle some of our most challenging marine environmental questions.

### **VISION**

"The Plymouth Marine Sciences Partnership is committed to the delivery of world class, leading edge research and teaching; dedicated to the advancement of knowledge, technology and understanding of the seas."

### **PURPOSE**

The Partnership brings together leading marine science and technology organisations to optimize their knowledge and strengths for the benefit of the region, the UK and international communities. For a list of core Partners please refer to the back of this brochure. A full list of partnerships and hosted offices is available on our website, [www.pmsp.org.uk](http://www.pmsp.org.uk).



## **Objectives of PMSP**

- Observe how marine systems are changing and predict future changes
- Understand the seas and marine life and their interactions with society
- Develop technologies, policy advice and skills for sustainable use of our marine environment
- Educate and train marine scientists, technologists and policy makers
- Disseminate marine scientific knowledge for the public good

## **Core activities of PMSP**

**World class research** is carried out locally, nationally and internationally to monitor, understand and predict the role of the oceans in the Earth system.

**Business and innovation** activities are concerned with turning world-class marine science and technology into solutions for the UK and international markets, achieved through developing new technologies and processes with potential applications in a range of sectors.

**Informed policy decisions** rely on sound scientific evidence. The work of PMSP contributes scientific evidence to government departments and advisors to support decision-making processes at the local, regional, national and international level.

**Teaching and advanced training** for students, postgraduates and technicians offered by the partners has made Plymouth the UK's largest student and advanced training centre in marine science and technology.

**Outreach and education** initiatives enable school groups and the wider public to improve their understanding and awareness of the marine environment through a range of opportunities.

For an opportunity to explore our latest developments in marine science and technology and ways to get involved, please refer to our contact details on the back of this brochure.



# Exploiting Regional Excellence in the Global Market

## SUSTAINABLE ENERGY

Industry and users are increasingly subject to requirements and legislation which seek to minimise their impact on the environment. To meet these requirements PMSP provides sustainable solutions in advanced training, technology and environmental impact assessments for the renewable sector, such as marine renewables and offshore wind farms. It also explores opportunities for multiple uses of energy sites for aquaculture and marine conservation.



## EARTH OBSERVATION

Through expanding capabilities in Earth Observation (EO), the Partnership offers expertise in near real-time remote sensing of ocean and Earth surfaces and the atmosphere, developed from pioneering work with NOAA, NASA and ESA. CASIX, a NERC funded EO Centre of Excellence based in Plymouth, aims to exploit satellite data to quantify the atmosphere-ocean CO<sub>2</sub> fluxes that are implicated in the 'greenhouse effect' and climate change.

## ECOSYSTEM MODELLING

Ecosystem models address the complexity of ecosystem structure and function. PMSP modelling teams are making significant progress in developing models that help us understand and predict changes within ecosystems that arise from human activities or climatic changes.

## BIOGEOCHEMISTRY

A cornerstone of PMSP research involves improving our understanding of the Earth System and the role of the oceans in the planetary cycling of important elements, such as carbon and nitrogen, together with other nutrients, trace metals and micro-pollutants. This research is now being extended into investigating the critical role of the interaction between the sea surface and lower atmosphere in order to quantify biogas fluxes. The NERC funded Atlantic Meridional Transect Programme (AMT) enhances this biogeochemical research undertaken by PMSP.

## NOVEL TECHNOLOGY

Plymouth's scientists and technologists are engaged in developing a range of sensors, platforms and analytical techniques. These range from 'Hammerhead' - an EPSRC sponsored autonomous underwater vehicle -, new imaging systems that identify toxic algae for the aquaculture industry, through to methods for ship-board and *in situ* chemical analysis of trace metal speciation at picomolar levels.

## COASTS & BEACHES

The coastline is an unstable region in which waves undercut cliffs, sand constantly shifts and many shorelines are receding. Sea level rise and sediment retention exacerbate this retreat. A consequence of population pressure near coasts is wastewater discharges that pose a threat to public safety. Research in Plymouth focuses on processes involved in coastal morphology, predicting coastal change, monitoring and protection including environmentally sensitive design of coastal defences.



## MOLECULAR & CELL SCIENCES

The Partnership comprises one of the most highly developed marine molecular and cell biology research capabilities in Europe. Molecular techniques are revolutionising our understanding of marine ecosystems. Current projects within the partnership include: understanding the role of marine viruses; novel systems to identify unicellular and multicellular organisms; invertebrate developmental biology in neurosciences; exploiting the potential economic value of marine organisms, their natural products and their uses as tractable and ethical models for biomedical and biotechnology research.

## BIODIVERSITY

For more than 100 years Plymouth has been the UK's home for marine life sciences. This tradition continues with our core and applied research. Our science is being applied in practical ways, such as through the Marine Life Information Network for Britain and Ireland (MarLIN) set up in Plymouth, which aims to provide information on marine environmental management, protection and education.



## ECOLOGICAL STATUS & HEALTH

Multidisciplinary research within Plymouth's laboratories is providing new ways of assessing the health of ecosystems. New tools are being developed to measure and monitor coastal ecosystem functioning and health; examples include biomarkers of contaminant exposure and effect in a range of indicator species representing different functional groups, as well as ongoing status reports including annual CPR datasets.

## MONITORING

Plymouth's marine scientists are delivering some of the most comprehensive marine monitoring projects in the world. These range from the Continuous Plankton Recorder Survey to long-term and decadal time series monitoring stations in the English Channel, to the NERC Remote Sensing Data Analysis Service time series. Plymouth also hosts the project office of the Marine Environmental Change Network (MECN).

## ESTUARINE MANAGEMENT

Plymouth sits at the mouth of the Tamar estuary, which is one of the most researched and understood of all the world's estuaries. It has provided a test-bed for many hypotheses and, as a result, many new estuarine management tools have been developed. One area of current concern being addressed is understanding the balance between sediment dynamics, dredging and the sensitivity of habitats rich in biodiversity.

## POLICY & SOCIO-ECONOMICS

Plymouth has an internationally recognised capability in policy and socio-economic research and an outstanding reputation for supporting the development of new policies for sustainable use of our coasts and seas and their natural resources, including fish stocks. PMSP Partners lead major studies of coupled social and ecological systems funded by the European Union and the United Nations. Professionals trained in Plymouth are working globally in local and international marine management and we provide services to national and international agencies in this field.

## BIO-MEDICINE

Plymouth's scientists are among the leaders of research linking the marine environment and human health. Increasing capacity in biomedical research within PMSP includes identification of cause and effect as well as discovering novel compounds offering potential solutions to health problems. Plymouth is also home to one of the largest hyperbaric medical units in the UK carrying out diving, clinical and biomedical research in collaboration with universities, medical schools, industry and other hyperbaric facilities throughout Europe and worldwide, including the Plymouth based Peninsula College of Medicine and Dentistry.



## NATIONAL ASSETS

Plymouth's reputation as an international Centre of Excellence in marine science and technology is illustrated by the prestigious monitoring programmes, data-sets, culture collections, research facilities and project offices which are located within the city. For example, the IGBP GLOBEC International Project Office, the NERC AMT and the National Marine Biological Library, which is one of the world's finest marine reference libraries for marine life sciences.

## PARTNERS

The Marine Biological Association

[www.mba.ac.uk](http://www.mba.ac.uk)

The National Marine Aquarium

[www.national-aquarium.co.uk](http://www.national-aquarium.co.uk)

Plymouth Marine Laboratory

[www.pml.ac.uk](http://www.pml.ac.uk)

Sir Alister Hardy Foundation for Ocean Science

[www.sahfos.org](http://www.sahfos.org)

The University of Plymouth Marine Institute

[www.plymouth.ac.uk/marine](http://www.plymouth.ac.uk/marine)

Diving Diseases Research Centre

[www.ddrc.org](http://www.ddrc.org)

PMSP also works in partnership with other regional, national and international communities and several of these partnerships have project offices located within PMSP institutions. For a full list of partners and hosted offices please visit our website or contact us.

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