

The *Pride of Bilbao*.

Sophisticated research ships such as NERC's new RRS *James Cook* are vital for marine research. But ferries and cargo ships also gather large amounts of scientific data. **Becky Allen** explores an often-overlooked contribution these less glamorous vessels make to science.

When they begin their summer holidays, few passengers realise that the ferries they have just rolled off may have been doing a spot of science during the crossing. Known as 'ships of opportunity', ferries are helping monitor whale and dolphin populations in the Bay of Biscay; gathering data on water temperature, salinity and fluorescence in the Irish Sea; and even collecting plankton samples en route from Aberdeen to Lerwick.

The idea is not new. Between 1680 and 1850 alone, 22 million days of meteorological data were recorded in Royal

Navy logbooks and, says Dennis Wheeler who researches long-term climate datasets at the University of Sunderland, 'Some of our early understanding of global air circulation comes from old ships' logs.' But many believe that modern technology – coupled with the current shipping boom – mean that with sufficient funding, ships of opportunity could herald a sea change in our understanding of the marine environment.

According to Nick Hardman-Mountford, Acting Director of the Centre for observation of Air-Sea Interactions and Fluxes (CASIX) at Plymouth Marine Laboratory, 'The biggest barrier is a lack of awareness in the shipping industry that instruments exist which are capable of operating autonomously at sea, and that scientists are keen to use commercial ships to take these measurements.'

Since 2004, his team has been working on a new device that can be installed in ships to autonomously measure the difference in partial pressure of CO₂ between the ocean and the atmosphere. Tested successfully on the RRS *James Cook* and the British Antarctic Survey's RRS *James Clark Ross*, the system could significantly boost our knowledge of the oceans' crucial

role in climate change.

'We need to use increasingly complex forecast models to understand the complex interactions of these processes. The models need lots of measurements to check they are giving the right answers. Increasing the number of CO₂ measurements made by ships of opportunity would lead to very substantial increases in the number of measurements we have. This in turn would dramatically improve our ability to monitor and forecast future climate and to take account of ocean feedbacks,' Nick explains.

Day in, day out

What makes ferries such powerful scientific platforms is that, unlike state-of-the-art research ships, they operate set routes almost every day of the year.

According to Chris Balfour, an instrumentation engineer at the Proudman Oceanographic Laboratory (POL), 'The all-year-round sailing pattern makes them a cost-effective platform to make

We have a nineteenth-century knowledge of jellyfish.



The FerryBox project displays results on board the ferry *Pride of Bilbao*.



Launching the Continuous Plankton Recorder (CPR) from the back of the *Pride of Bilbao*.



Trained volunteers use ferries to conduct surveys of whales and dolphins.

Mark Baynes / Alamy

oceanographic measurements of water properties, irrespective of weather, without the need to organise scientific research cruises to gather this information. This sailing regularity provides an almost continuous set of measurements. Information such as this would be very difficult and expensive to gather by more traditional approaches to oceanography such as research cruises.'

Together with the National Oceanography Centre, Southampton (NOCS), and other European partners, POL has been part of the influential FerryBox project. Begun in 2002, the project showed that ferries could be successfully used to gather this kind of data and has since gone on to develop a

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standard set of instruments for measuring temperature, salinity, turbidity, fluorescence and nutrients in surface waters.

Around 15 European countries now use FerryBoxes. In the UK, a NOCS FerryBox operates on P&O Ferries' *Pride of Bilbao* between Portsmouth and Bilbao, and a POL FerryBox gathers data on Norfolkline's Birkenhead to Dublin route. And, says Roger Proctor of POL, 'Through FerryBox, Europe has become the leading group in the world for this kind of project.'

The UK's Continuous Plankton Recorder (CPR) is another world-leader and

a venerable example of the value of long datasets collected by ships of opportunity. Since the CPR was set up in 1931, 278 ships have towed plankton recorders across 5.5 million miles of the North Atlantic and the North Sea – equivalent to a dozen return journeys from Earth to the Moon – collecting over 200,000 samples en route.

Over the past five decades, the CPR has provided important evidence of climate change, seeing cold-water plankton decline and warm-water species move into more temperate areas as sea temperatures rise.

Plankton breakthrough

In 2007, a recorder on a merchant ship in the Labrador Sea off the east coast of Canada picked up a type of plankton normally found only in the Pacific. The route this Pacific diatom probably took was through the Northwest Passage in the Arctic Ocean. A dramatic drop in sea-ice cover has led to the opening up of the passage. This may well be the first time this species has lived in the North Atlantic in over 800,000 years.

According to Clare Buckland, Media and Education Officer at the Sir Alister Hardy Foundation for Ocean Science (SAHFOS), which operates the CPR, 'Our data are a good source of long-term information to assess environmental changes, and help us find out which are man-made and which are natural.'

Ships of opportunity are extremely cost-effective – and can be brought online relatively quickly. Many ferry companies offer free travel to marine mammal monitoring projects such as ORCA, whose trained volunteers conduct monthly relative

abundance surveys of whales and dolphins on three ferry routes in the North Sea and Bay of Biscay.

Kelly MacLeod, ORCA's chair and a research fellow at the Sea Mammal Research Unit says, 'Chartering ships is really expensive – ferries are convenient and cheap. The ferries are going that way anyway, so all we need to do is convince them to allow us on board.'

And access to ships of opportunity allowed Jon Houghton of Swansea University to begin work just four days after receiving a NERC urgency grant. Jon wanted to uncover the cause of last year's attack by mauve stinger jellyfish that cost a Northern Irish salmon farm more than £1 million.

According to Jon, 'We have a nineteenth-century knowledge of jellyfish. We don't even know their seasonality, relative abundance or distribution. Ferries are really useful for gathering this basic knowledge.'

While the PR opportunities of jellyfish may be limited, ferry companies are keen to support whale and dolphin projects. P&O Ferries told *Planet Earth*, 'Win-win is a bit of a cliché, but if this relationship isn't exactly that, I don't know what is.' ♦

MORE INFORMATION

CASIX, www.pml.ac.uk/casix
 FerryBox, www.ferrybox.org
 SAHFOS, www.sahfos.org
 ORCA www.orcaweb.org.uk

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