Buoy Solves Swell Challenge

Plymouth Marine Laboratory (PML, UK) has developed a near-surface ocean profiling buoy which scientists can use to gain accurate measurements from the top few metres of the ocean. By suspending instruments below a floating buoy which rises and falls with the swell, measurements can be taken at a constant depth. PMLâ€™s near surface ocean profiler acts as an instrumentation platform that can be lowered into the sea and left to drift, away from the influence of the â€˜mother shipâ€™.

Instrument sampling depth is remotely controlled by a winch and tubing back to the mother ship, enabling sample seawater to be pumped aboard for analysis. A tether is then used to retrieve the buoy for loading before moving to the next sampling location.

The buoy has already been tested in the dynamic seas of the western English Channel but it will make its real research debut on a cruise into the Celtic Sea.

Gas transfer across the air-sea interface is a major link in the great global chemical cycles that drive life and other processes on our planet. Knowing which gases are being absorbed or emitted by the ocean, how the quantities change seasonally and most importantly, how much gas is moving across the sea surface, is crucial to our understanding of how these cycles work and how climate may be affected in the face of global change.

While measurements in the atmosphere and below the surface are relatively easy to obtain, the shallow band just above and below the sea surface can prove extremely difficult to sample. Yet, it is within the few metres either side of the air-sea interface that the most telling measurements for air/sea gas transfer can be obtained. Assessing dissolved gas concentration gradients close to the sea surface requires good depth precision. The traditional jib-mounted method of lowering instruments into the sea cannot provide this except in the rare event of a very calm sea state. Even in a light swell, the instrument pack can rise and fall through a depth of metres in the water column. Such movement can result in a series of measurements that are inaccurate at best and misleading at worst.

PhD student Richard Sims will be operating the buoy on the cruise, which begins this week and will last for 4 weeks.

Image: Deployment of the buoy. Visible is the winch for the instruments.