



Development and use of a biosensor for measuring dissolved iron in seawater

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Our understanding of the role that trace metals play in oceanographic processes is limited by poor data coverage in time and space scales. In recent years, sensor arrays on autonomous platforms (e.g. buoys, moorings, gliders, profilers) have begun providing oceanographers with high resolution time series data. Although sensing capabilities are expanding, there have been no trace metal sensors deployed because traditional methods are not amenable to autonomous deployment. Here we present a straightforward method to measure dissolved iron in seawater. The device uses a biomolecule to provide selectivity against other trace metals in seawater. The biosensor measures iron in filtered samples (pH 1.7-8.0) without interference from the seawater matrix, and has a detection limit of 48 pM for 1 L sample. Iron profiles measured by this method in the subarctic Pacific were consistent in both the distributions and concentrations measured in parallel by chemiluminescent analysis. These promising results are a first step toward measuring iron on autonomous platforms.