A Novel Approach to Fluorescence Quantum Yield Determination in the Southern Ocean

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The fluorescence quantum yield (FQY) of marine phytoplankton refers to the ratio of photons emitted as fluorescence to those absorbed by the individual cells and serves as a first order estimate of photosynthetic efficiency. Chlorophyll concentration, pigment packaging and various photoprotective mechanisms influence FQY. The Southern Ocean is a complex high-nutrient low-chlorophyll region characterised by strong seasonal cycle dynamics. This important regulator of global carbon export is often under sampled due to weather-restricted access and the high cost of research cruises. Crucial *in situ* studies will lead to improved understanding of the factors that influence FQY variability and will ultimately allow for enhanced remote sensing capabilities of this important region, furthering investigations into species composition, light environment and nutrient availability from space. There is currently no suitable stand-alone, submersible instrument available for FQY measurements. A JFE Advantech Multi-Exciter Fluorometer (MFL), originally designed to discriminate phytoplankton species in a population, was selected as a viable option to derive FQY. The instrument underwent an in-depth optical characterisation and was subsequently calibrated in absolute units of light. Initial results indicate that the repurposing of the MFL may serve as an accessible, cost-effective tool to study variability in FQY *in situ*. An improved understanding of Southern Ocean phytoplankton dynamics will in turn aid in the development of robust, regionally-specific FQY algorithms.