Turnover time of fluorescent dissolved organic matter in the dark global ocean - DTU Orbit (17/02/2019)

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Marine dissolved organic matter (DOM) is one of the largest reservoirs of reduced carbon on Earth. In the dark ocean (>200 m), most of this carbon is refractory DOM. This refractory DOM, largely produced during microbial mineralization of organic matter, includes humic-like substances generated in situ and detectable by fluorescence spectroscopy. Here we show two ubiquitous humic-like fluorophores with turnover times of 435±41 and 610±55 years, which persist significantly longer than the ~350 years that the dark global ocean takes to renew. In parallel, decay of a tyrosine-like fluorophore with a turnover time of 379±103 years is also detected. We propose the use of DOM fluorescence to study the cycling of resistant DOM that is preserved at centennial timescales and could represent a mechanism of carbon sequestration (humic-like fraction) and the decaying DOM injected into the dark global ocean, where it decreases at centennial timescales (tyrosine-like fraction).

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