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**TITLE: AtlantECO [WP2] - dataset –** Gridded UVP5 derived carbon flux

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**1.- INTRODUCTION**

This table contains carbon flux data derived from the particle size distribution measured with the 5th version of the Underwater Vision Profiler (UVP5).

**2.- METHODOLOGY USED**

Data were collected from a public database (PANGAEA) which already assembled and cleaned the entire dataset. We then processed those data using R (version 4.1.2).

Previous research has shown that the distribution of particle size follows a power law over the micrometre to the millimetre size range. This Junge-type distribution translates into the following mathematical equation, whose parameters can be retrieved from UVP images:

 (1)

where *d* is the particle diameter, and exponent *k* is defined as the slope of the number spectrum. This slope is commonly used as a descriptor of the shape of the aggregate size distribution.

The carbon-based particle size approach relies on the assumption that the total carbon flux of particles (*F*) corresponds to the flux spectrum integrated over all particle sizes:

 (2)

where *n*(*d*) is the particle size spectrum, that is, equation (1), and *m*(*d*) is the mass (here carbon content) of a spherical particle described as:

 (3)

where ,  is the average density of the particle, and *w*(*d*) is the settling rate calculated using Stokes Law:

 (4)

where ,  is the gravitational acceleration, the fluid density, and  the kinematic viscosity.

In addition, mass and settling rates of particles, *m*(*d*) and *w*(*d*), respectively, are often described as power law functions of their diameter obtained by fitting observed data, . The particles carbon flux can then be estimated using an approximation of equation (2) over a finite number (*x*) of small logarithmic intervals for diameter *d* spanning from 250 µm to 1.5 mm (particles <250 µm and >1.5 mm are not considered, consistent with the method presented in Guidi et al., 2008 such as

 (5)

where *A* = 12.5 ± 3.40 and *B* = 3.81 ± 0.70 have been estimated using a global data set that compared particle fluxes in sediment traps and particle size distributions from the UVP images.

**3.- DATASET DESCRIPTION**

**Data type:** Carbon fluxes (mg m-2 day-1)

**Latitude/Longitude format:** WGS84 (-180°/+180°)

**Geographic area covered by the dataset:** Global Ocean

**Depth range covered by the dataset:** 0 to 5500 m (102 depth levels)

**Time period covered by the dataset:** Monthly climatology

**Dataset format:** NetCDF

**Date of dataset creation:**  2023-03-01

**Raw dataset repository:** ETHZ server

**4.- MAIN VARIABLE DESCRIPTION**

mean\_POC: mean particulate organic carbon flux

min\_POC: min particulate organic carbon flux

max\_POC: max particulate organic carbon flux

median: median particulate organic carbon flux

sd\_POC: standard deviation of particulate organic carbon flux

n\_obs: number of observations in 1°x1° degree cell

**6.- CONTRIBUTORS**

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