Supplementary Materials

RESIDENCE TIME OF DUST PARTICLES IN THE WATER COLUMN

In order to define the duration of the incubation of dust in seawater for the laboratory experiments, the residence time of dust particles in the upper mixed layer was defined by measuring the sinking speed of dust particles in a laboratory trial. This was done using video recordings of dust particles sinking in filtered seawater inside a glass aquarium (70 × 70 × 250 mm). Field-collected windborne dust was poured onto the water surface and let sink. The camera was positioned horizontally at 150 mm from the top of the aquarium, so the filming window captured particles that reached terminal velocity. Video recording (60 fps) was done with a DSLR camera (Canon EOS T5i) using a large magnification (with extension bellows) to obtain a field of vision of 4.5 × 2.5 mm (297 px mm^{-1}) whose central point was focused on the center of the aquarium (i.e., ~ 25 mm from any wall, to avoid boundary effects on sinking speed). A background illumination was applied to better visualize smallest particles by light scattering using a LED ring. Sinking speed was quantified from video sequences with the TrackMate plugin (Tinevez et al., 2017) in the Fiji/ImageJ software (Schindelin et al., 2012). With this method it is possible to track trajectories of multiple particles within the filming window. A total of ~10,600 trajectories were recorded, with an average sinking speed of 25 ± 0.67 m d^{-1}.

Note that the filming was done in absence of any turbulence, so 25 m d^{-1} is the maximum sinking speed in a hypothetical "calm" water column in which the particles sink in a "free-fall" fashion with linear trajectories. The presence of any small turbulence would make the trajectories more convoluted which would result in a shorter net downward displacement and thus slower sinking speed (i.e., dust residence time of dust particles even longer). Depending of the sizes, some particles may even stay indefinitely in the mixed layer. If a more realistic scenario is considered, for example, a 20 m upper mixed layer subjected to strong winds in Patagonia, these dust particles may stay for many days/several weeks within the euphotic zone (i.e., often more than 60 m, unpublished data). Thus, if the particles sink 60 m in 2.4 days, a conservative value of twice that time was chosen (5 days) in order to account for wind-generated turbulence. Therefore an incubation time of 5 days was chosen as a representative period of the residence time of dust particles in the water column subjected to permanent medium-strong wind forcing as the one observed in the study area.