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Is satellite-derived export production consistent with the global distribution of nutrients?

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Production of organic matter by marine phytoplankton plays a key role in the regulation of the Earth's climate because it contributes to remove CO_2 from the atmosphere. However, most organic matter is recycled in the upper layer of the ocean without being effectively transported away from the air-sea boundary layer. Therefore, the gravitational sinking of organic particles into the interior of the ocean constitutes a key process, referred to as export production. Because of logistical difficulties, in situ data for export production are scarce. However, in the last two decades several studies have attempted to link remote-sensing data to export production, offering an unprecedented synoptic coverage for this process. Here we use a range of satellite-derived export production products as input for a coupled hydrodynamic-biogeochemical model. The model is run to steady-state and the resultant global distribution of nutrients is evaluated against observations taking into account the partition between regenerated and preformed nutrients. The emergence of particular biases in the resultant nutrient distribution is used to infer possible weaknesses of each satellite-derived export production product.