



Planktic foraminiferal sedimentation and the marine calcite budget

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Résumé en anglais

The vertical flux and sedimentation rate of planktic foraminiferal tests are quantified and a global planktic foraminiferal CaCO₃ budget is presented. Test and calcite flux rates are calculated according to the distribution of species obtained from multinet and sediment trap samples. Modern planktic foraminiferal population dynamics are discussed as a prerequisite for the quantification of the calcite budget, highlighting the importance of ecological, autecological (e.g., reproduction), and biogeochemical conditions that determine the presence or absence of species. To complete the open-marine, particulate CaCO₃ inventory, the contribution of coccolithophores, pteropods, and calcareous dinophytes is discussed. Based on the studied regions, the global planktic foraminiferal calcite flux rate at 100 m depth amounts to 1.3-3.2 Gt yr⁻¹, equivalent to 23-56% of the total open marine CaCO₃ flux. The preservation of tests varies on a regional and temporal scale, and is affected by local hydrography and dissolution. During most of the year (off-peak periods), many tests dissolve above 700-m water depth while settling through the water column, with on average only 1-3% of the initially exported CaCO₃ reaching the deep-seafloor. Pulsed flux events, mass dumps of fast settling particles, yield a major contribution of tests to the formation of deep-sea sediments. On average, ~25% of the initially produced planktic foraminiferal test CaCO₃ settles on the seafloor. The total planktic foraminiferal contribution of CaCO₃ to global surface sediments amounts to 0.36-0.88 Gt yr⁻¹, ~32-80% of the total deep-marine calcite budget.

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