

## **Drake gateway opening recorded by global $^{87}\text{Sr}/^{86}\text{Sr}$ signals of foraminifers**

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For decades, marine carbonates skeletons (MCS) are used to infer past ocean's strontium isotope record, i.e.  $^{87}\text{Sr}/^{86}\text{Sr}$ , which is considered to be homogeneous on a global scale. However, recent studies showed that the  $^{87}\text{Sr}/^{86}\text{Sr}$  of MCS record the impact of continental Sr fluxes. Then, can we anticipate that  $^{87}\text{Sr}/^{86}\text{Sr}$  of foraminifers are potential tracers of geodynamic event influencing water mass circulation at the global scale?

We investigated the Sr signal of oceans at the Eocene-Oligocene period, which is marked by both climatic changes and geodynamic events, notably two major oceanic gateways opening, i.e. Tasman and Drake. We measured 68  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios on foraminifers from three ODP and IODP expeditions Leg 113, 320 and 342, located in Southern, Pacific, and Atlantic oceans, respectively. Our study shows that both benthic and planktonic foraminifers of the Pacific Ocean display lower  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios than those from the Southern and Atlantic oceans. This argues for a non-homogeneous  $^{87}\text{Sr}/^{86}\text{Sr}$  signal from an ocean to another, attesting for weakly connected oceans. Meanwhile, we also notice a common inflexion towards less radiogenic  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios for Southern and Atlantic oceans' *circa* 33 Ma, getting closer to the Pacific signal. Contemporaneous to the Drake gateway opening at 33 Ma, the similar  $^{87}\text{Sr}/^{86}\text{Sr}$  signatures for each ocean may reflect the signature of the Antarctic Circumpolar Current onset and the associated enhanced ocean mixing.

Thus, the oceans' Sr isotope record has to be considered for a given ocean and can represent a new powerful tool to investigate paleo-oceanic circulations.