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# Constraint on oceanic hydrothermal 3He flux from inverse modeling

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Natural 3He originating from mantle degassing represents a widely used tracer for deep ocean circulation. The enriched 3He signal (700%) is injected in the ocean along the ridges axis by hydrothermal processes and is next transported in the ocean by the deep circulation. This tracer has been extensively measured during the GEOSECS and WOCE programs and now offers a satisfactory global oceanic cover. It has also been used to evaluate different Global Ocean models' circulation during the OCMIP2 project (Ocean Carbon Model Intercomparison Project). 3He being conservative, its hydrothermal flux can be used as a reference to constraint other geochemical tracers hydrothermal fluxes. However its interest is limited by the knowledge of its source function. In model simulations, the 3He source is set proportional to the ridge spreading rates, with a global rate of injection of 1000 mol/yr. We have attempted to better constrain this source function using inverse modeling. We have used the NEMO ocean general circulation model and run basis source function for different source regions. A compilation of 3He data (WOCE and GEOSECS) has been performed, and used to constraint the intensity of the source for each region. The inverse model is using a Bayesian approach that was previously developed for atmospheric carbon studies. We have then investigated the two hypotheses that are prescribed to build the source function: the global intensity, and the proportionality to the ridges spreading rates.