Assessment of Terrestrial Organic Matter Inputs in the New Britain Trench: a Biomarker Based Study

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The hadal trenches with water depth ranging from 6000 to 11000 meters are the deepest biogeochemical province in the ocean. Recent findings show high sedimentation rates, high abundance of biomass, intense microbial activity and chemosynthetic communities in the hadal trenches, suggesting that the hadal trenches play a more important role in ocean biogeochemical cycles than previously recognized. Due to proximity to landmass in many trenches and steep slope of trenches' edges, terrestrial materials may be rapidly transported into the trenches and serve as an energy and nutrient source in trenches ecosystems. Bulk parameters ($\delta^{13}C$ and C/N) have been used to distinguish terrestrial and marine organic matter, but are suffered from low sensitivity. In contrst, molecular biomarkers have specific biological sources and are sensitive source indicators. Here, we examined biomarkers in sediments from the New Britain Trench (NBT), a trench in tropical Pacific. The sediments were recovered from the trenches and adjacent abyssal seas using a full-ocean-depth lander and a box corer. The predominance of C_{24}-C_{34} alkanols/C_{16}+C_{18} alkanols and C_{27}-C_{31} n-alkanes/C_{15}-C_{20} n-alkanes as well as relatively high abundance of taraxerol, a specific biomarker for vascular trees, suggest significant contribution of terrestrial organic matter. A series of des-A-triterpenes and sterenes, early degradation compounds of triterpenoids and sterols, and C_{16} and C_{18} glycerol fatty acids, labile organic compounds, were detected, reflecting a pretty good preservation of organic matter in the NBT surrounding area. Diols/keto-ols ranging from C_{28} to $C_{32,}$ long chain alkenones ($C_{37:2}$ and $C_{37:3}$) and C_{27} cholsterols were detected, reflecting a contribution of marine eustigmatophytes, cocolithphores and zooplankton, respectively. We are currently conducting a comparison study of biomarkers between the Mariana Trench (MT) and NBT to better understand relationship between terrestrial organic matter inputs and biogeochemical processes. These two trenches have distinct geographical characters in that the NBT is under a strong influence of New Britain Islands whereas the MT is far from any major landmass.