

Statement of Interest – Dennis A. Hansell
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Title: Impact of the East Pacific Rise's Hydrothermal Plume on Deep Dissolved Organic Carbon Distributions and Dynamics

DOC in the deep ocean holds 662 PgC, but we have little understanding as to the processes controlling its dynamics. Across the deep global ocean, the Pacific Ocean demonstrates the greatest variability in DOC concentrations, exemplified by an impressive mid water column minimum (at 1500-4000 m) and particularly low values in the central South Pacific (see figure). The low DOC values in the deep South Pacific are puzzling since those waters are a mixture of old Pacific Deep Water (originating from the North Pacific near 3000 m) and young, near surface/high latitude water in the South Pacific. Conservative mixing of these two source waters should result in DOC values that are elevated compared to the deep North Pacific, but the values are in fact lower. One mechanism to explain this apparent deficit in DOC in the mid water column of the South Pacific is that the system is diluted with hydrothermal plume water that is impoverished of DOC. This mechanism is probably not the only one at work, but tracing the plume waters into the region of low DOC will inform us as to its potential role.

We have very little understanding as to the role of hydrothermal plumes on DOC dynamics in the deep ocean at the basin scale. A few published works have informed us that some plumes are DOC impoverished while others are DOC enriched. But the effects described are highly localized to the plumes. Do major plumes have major impacts on carbon dynamics in the deep ocean? That is the question to be addressed in this proposed work.

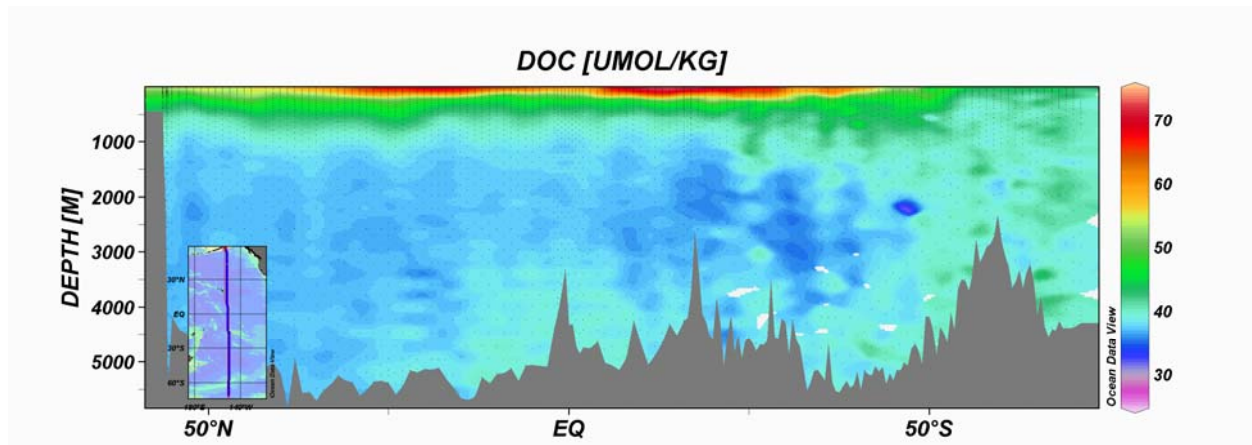


Figure. DOC along P16 in the central Pacific Ocean.