

The Influence of Hydrocarbon Seeps on the Deep Sea in the Anthropocene

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Hydrocarbon seeps, including those associated with subsurface oil and gas deposits as well as those related to subduction zones and other active margin processes, are increasingly recognized for their abundance and influence on the ecology of continental margins worldwide. Seeps may provide physical substrata and habitat heterogeneity, and provide chemical substrates for deep-sea primary productivity, which may also exclude many of the background deep-sea fauna. The biological role of seeps can be as a relatively high biomass source of prey for mobile fauna, and even as nursery grounds for a variety of deep-sea species. Coincident with the recognition of the role of hydrocarbon seeps in the deep-sea ecosystem is the increased rate of industrialization of the deep sea, and the penetration of global ocean change to these depths. Fishing, oil and gas exploration and exploitation, waste disposal, and developing industries such as offshore wind and wave energy all have the potential (some already realized) to result in disturbance of the physical, chemical, and biological processes that occur on relatively long time scales at seeps. These only exacerbate the impact of the more pervasive and long-term effects of increased temperature, deoxygenation, and ocean acidification. Management of human activities in the deep sea can help to improve the resilience of these communities to ongoing and future ocean change.